

The Art of Care

A Report on the 2019 Vizient Connections Education Summit

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The Art of Care: A Report on the 2019 Vizient Connections Education Summit

The Art of Care Brings Power to Health Care Vision

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The 2019 Vizient Connections Education Summit brought together close to 1800 members from across the country to experience a tapestry of best practices, knowledge sharing, and networking. Representatives from academic medical centers, large systems, community hospitals, children’s hospitals, non-acute and ambulatory care providers, and suppliers gathered at the Wynn Las Vegas Resort on September 16-19, 2019, to network, learn, and share.

“The Art of Care” served as the event’s distinctive theme and framed novel ways to enhance patient experiences and champion the providers who care for them. This year’s educational focus was reflected in the event’s new name, Vizient Connections Education Summit, and translated into an expanded 2-day agenda full of interactive learning sessions. Peer-led Power Huddles and posters zeroed in on members’ most crucial and requested topics, such as ambulatory care growth, patient engagement, performance improvement, opioid stewardship, and harnessing smart technology, to name a few.

2019 Summit Snapshot

Total attendees: 2735
 Member attendees: 1791
 Power Huddles: 111
 Poster presentations: 60
 Member overall meeting score (Continuing Education): 9.43/10.00

Collaboration, Teamwork, and Social Connectedness Drives Outcomes

The power of collaboration, especially in times of great challenge, was a key message delivered during the summit’s opening session when Byron Jobe, president and CEO of Vizient, described a personal experience in Glacier Park, Montana. At the age of 19, Jobe joined a group of young explorers for a 20-mile hike that turned into a weather-related crisis. They survived their journey through teamwork, relying on each other—and a 50-foot rope—to return to safety. As our members face their own challenges, collaboration within their organizations and among their peers and community partners becomes critical for success.

This emphasis on teamwork was reiterated by CNN Chief Medical Correspondent Sanjay Gupta, MD, who spoke eloquently about reporting from war zones, natural disasters, and the 9/11 attack on the United States. He recounted firsthand stories of how people rise up to help each other in the face of death, including his own heroism performing neurosurgery on the battlefield.

Through his TV project, *Chasing Life*, Dr Gupta and his crew visit people around the globe to understand how different cultures manage health and stress. His findings point to the vital role that social cohesion and support play in the health of people and their communities. Dr Gupta suggests that harnessing these findings may be part of a solution for the United States, where even with significant health care expenditures life expectancy has

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dipped in part because of “deaths of despair” related to increased suicide, opioid addiction, and liver cirrhosis.

Overall, this year’s education summit theme, “The Art of Care,” captured both the qualitative and quantitative nature of successful, patient-centered, and meaningful improvements in health care.

Imparting Learning and Celebrating Success

From C-suite executives to service line managers, members could choose from 111 Power Huddles—30-minute content-rich sessions during which teams described successes and challenges in achieving quality, operational, and overall organizational goals. This year’s summit incorporated more community hospital provided presentations than ever before, reflecting the power and diversity of Vizient’s membership. Knowledge sharing spanned the continuum from the innovative—using technology successfully to address poor handwashing techniques among patient care providers, to the strategic and complex—making virtual visits a successful option for patients and their families.

Many sessions were led by physicians and featured project methods and results that can be applied within other organizations. Some Power Huddles focused on patient and staff engagement, such as the Neuromedicine Patient and Family Advisory Council at UF Health (Gainesville, Florida). This group reduced readmissions by 45% to 55% among neurosurgery patients who received a low-cost handbook to help manage patient and family expectations and improve the care experience. Another session featured a patient who had suffered a catastrophic injury that left him paralyzed. He and his wife now serve as patient safety advocates for MedStar Health in Columbia, Maryland. They explained how the organization’s patient-centered response went beyond “deny and defend” and aided him and his family toward recovery.

Presenters helped the audience explore different viewpoints to resolve challenges. Enhancing communication and coordination between primary care physicians and specialists was driven by the Coordinating Optimal Referral Experiences (CORE) model used at the University of Colorado, School of Medicine, Aurora, Colorado, resulting in improved access to care, fewer unnecessary visits and tests, and lower out-of-pocket costs. Sixty posters were displayed and shared with attendees as road maps to improved performance. Care redesign, antimicrobial stewardship, reduced drug write-offs, and productive partnerships with skilled nursing facilities were examples of topics covered by poster teams. New perspectives heard at the summit included innovative applications of technology, such as the use of virtual nurses in medical-surgical and telemetry units at

Ochsner Health System, New Orleans, Louisiana, and using a gamification environment as an experiential education program for pediatric patients to increase their sense of adventure and reduce the need for sedation during radiation therapies at Nebraska Medicine, Omaha, Nebraska.

The Summit mobile app housed all presentations and posters and provided easy access to content and meeting logistics. Posters also were available to attendees via electronic kiosks, a new approach to providing members with access to this valuable content. Also new this year were select oral poster presentations that engaged attendees and encouraged questions and idea sharing. Summit presenters were excited to share, and attendees showed an eagerness to learn about these unique and successful projects.

Beyond the educational content of the Summit meeting, more than two thirds of member attendees also participated in network or user meetings scheduled before and after the summit as platforms for discipline-specific learning and collaboration. The Vizient Learning Lounge provided an opportunity for members to meet with Vizient content experts to discuss their needs. Solutions and data applications also were featured as opportunities for learning about how Vizient can support members conquer their most difficult challenges. Deep dive, one-on-one performance scorecard consultations were offered to help members better understand their organizations’ performance in their inpatient and ambulatory quality and accountability.

Accomplishments were recognized and applauded at the Member Supply Chain Awards Luncheon Celebration on September 18 and the Member Clinical Awards Dinner Celebration on September 19 (see the list of award winners on pages 16S-17S). In an homage to the theme, The Art of Care, performance artist Michael Israel welcomed guests to the celebration event with his unique speed painting, creating iconic images upside down and then revealing the final product to the delight of the audience. His play on perspective reinforced the summit’s theme and challenged dinner guests to artfully envision health care.

Contributing to the Greater Good

Vizient honored Community Partners of Dallas as the winner of its annual Norman Borlaug Humanitarian Award, saluting the organization’s work helping abused children. The award was introduced at the summit by Colleen Risk, chief people officer at Vizient, presented by Borlaug’s granddaughter, Jennifer Rhoda Marsh, and enthusiastically accepted by Community Partners’ CEO Paige Daniels.

Community Partners of Dallas was founded to support the work of Child Protective Services in Dallas County. Each year the organization serves more than 20 000 abused and neglected children and its programs have been replicated in cities across Texas.

The Vizient humanitarian award is named for the late Norman Borlaug, PhD, an agronomist who dedicated his life's work to finding ways to end famine and feed the world's hungry. He was known as "the man who saved a billion lives" for his revolutionary approach to plant breeding that exponentially increased yields while resisting drought and disease.

Members and staff contributed to the local community, displaying avid community support at the summit's Volunteer Village, where more than 10 000 diapers were packed to support HELP of Southern Nevada Diaper Bank, a member of the National Diaper Bank Network. Vizient partnered with Huggies again this year to support local diaper needs for family well-being. For each person who volunteered, Huggies donated an additional day's supply of diapers to the diaper bank. Members also packed more than 1500 pediatric hygiene kits.

Bringing the Patient Experience to Life

During the closing general session, actress and playwright Anna Deavere Smith brought health care stories to life in her dramatic renditions of a young female doctor stranded at her hospital during Hurricane Katrina and the humor-inflected cancer journey of the late Ann Richards, governor of Texas. Her emotional readings were based on interviews she conducted to reveal personal tales as well as societal challenges in health care, and her performance was an expression of the urgency members feel to reimagine their journeys and make the right, sustainable decisions for the communities they serve. Toby Cosgrove, MD, executive advisor to the Cleveland Clinic, followed Ms Smith's performance and encouraged attendees to fully embrace change and innovation in order to bring better health care to all people.

The Art of Care: What's Your Why?

Throughout the summit, attendees were asked to be photographed with their own handwritten words describing, "What's Your Why?" The question was reflective and introspective, and brought smiles to the faces of those who participated and shared their "Why." The result was a collection of personal and heartfelt reasons—ranging from "making a difference" and "compassion" to "quality" and "empowerment"—highlighting

a wonderful and diverse picture of passion, engagement, and expertise.

A video collage was created and presented at the conclusion of the meeting, highlighting the personal stories of Vizient's members', suppliers', and staff's personal Art of Care!

Patient Experience Steers Quality Improvement Successes

Julie Cerese, PhD, MSN, RN

Group Senior Vice President, Technical Solution Sales and Delivery and Performance Management, Vizient

Each year the summit brings together members, organizations, and market segments to discuss best practices, innovations, and next steps to advance their performance improvement journey. While discussions were wide-ranging, the vital importance of the patient experience emerged again and again as a central and consistent driver of high-value care.

Reinterpreting Value From the Patient Perspective

During the Clinical Executives Network meeting held prior to the summit, Shannon Phillips, MD, chief experience officer at Intermountain Healthcare, Salt Lake City, Utah, refocused the definition of value, rating the *patient* experience as important as clinical outcomes and cost. Usually value is discussed in terms of the hospital's and/or payer's requirements, but Phillips challenged her audience to "think outside the bed" and seek innovative care delivery models that meet patients where they are, including community and virtual care settings.

Phillips described how Intermountain uses self-disruption to orient clinical and operational resources along a spectrum from community-based care (focused on health and wellness) to specialty care (focused on illness and injury). The organization redesigned its primary care model to drive patients in risk-based plans into practices leveraging team-based care medical homes with mental health integration and chronic disease care management.

This change delivered 60% fewer readmissions, 35% fewer emergency department admissions, and decreased cost per member per month by 20%, thus improving the experience for both patients and care teams. Phillips encouraged members to look beyond their bottom lines as they concentrate on the health of their communities and affordability for those they serve.

Measure Strategic Decisions by These 5 Principles

Market forces are challenging providers to innovate along every dimension of the system of care. To position themselves for future success, health care organizations should measure strategic decisions against enduring principles:

1. Embrace transparency.
2. Focus intensely on high reliability—well-designed processes, finding waste, and reducing costs.
3. Think outside the bed—focus on innovative delivery methods that meet the patient where, when, and how they need/want us, including virtual and community-based settings.
4. Strengthen community-based primary care, which focuses on health, and specialty care, where patients can receive safe, cost-effective care for serious illnesses and injuries.
5. Remain focused on the benefit to the community and to the patient, not just the bottom line.

—Shannon Phillips, MD

Presentations during the Power Huddles demonstrated the summit's theme, "The Art of Care," by analyzing problems and developing solutions in creative and nontraditional ways. Many strategies blended both art and science to achieve results, as demonstrated by a Power Huddle presented by the Indiana University (IU) Health (Indianapolis) and IU School of Medicine team, which focused on preadmission wellness and patient immunonutrition needs. At IU Health University Hospital, 75% of surgical admissions have 3 or more risk factors for complications.

Changing the mind-set from risk stratification to prehabilitation, a preoperative wellness program was developed to address patient needs, including surgical immunonutrition. Results included improved patient and surgeon satisfaction as well as decreased length of stay, fewer harm events, decreased surgical-site infections, and decreased costs per case.

These teams were successful largely because they used the patient experience as the cornerstone of their interventions. Other patient-centric, value-driven strategies can be found in the "Patient Experience" sidebar.

Patient Experience, Front and Center

Based on the summit's 111 Power Huddles, the Vizient team identified 5 simple practices members can implement now to make a major impact on patient-centered care.

Help during harm events: The team from MedStar Health presented the CANDOR (Communication and Optimal Resolution) approach, a principled and comprehensive response to unexpected harm events, to nurture immediate patient and caregiver healing and move away from a "deny and defend" culture. Jack Gentry, a patient left paralyzed after a surgical adverse event, explained how empathetic communication and the hospital's willingness to offer financial support helped him and his family in their healing.

Ask the surprise question: Two presentations demonstrated the impact of the mandatory surprise question: Would you be surprised if this patient died within the next 6 months? The Mayo Clinic, La Crosse, Wisconsin, team explained how providers use this question in their risk stratification process, a strategy that has helped reduce readmissions significantly following care transitions while giving patients more supportive care. At NYU Langone Health, using the surprise question for screening helped the organization improve advance care planning for patients, including hardwiring a trigger within the electronic medical record for supportive care for end-of-life patients.

Provide a "line of sight" into safety: A team from Denver Health, Denver, Colorado, presented its "Target Zero" process for reducing patient harm events, highlighting how it refocused on the patient by transparently sharing daily data and building marketing-style campaigns to keep messages simple. The result was a 49% decrease in harm events across 7 categories.

Encourage physicians to share quality data for greatest impact: Duke University Health System, Durham, North Carolina, presented on building meaningful quality dashboards focused not only on what information should be contained in a dashboard or physician scorecard, but who should deliver it for the most impact—physicians. Duke's work on creating dashboards that are viewed as a "source of truth" has helped the neurology and neurosurgery divisions improve their quality rankings in annual *U.S. News & World Report* rankings.

Involve community partners with super-utilizers: A team from INTEGRIS Southwest Medical Center, Oklahoma City, Oklahoma, discussed its successful super-utilizer program, which uses a community care coordination team (nurse practitioner, registered nurse, and 2 social workers/counselors) to work with patients who frequent the emergency department. The organization also works with community partners, such as homeless shelters, food banks, and police and health departments, to ensure patient needs are met. The program has reduced super-utilizer costs by 46%.

Anticipating Care Needs: Designing Programs and Serving One Patient at a Time

In concert with the patient's experience with their health and the health care system, we also need to better understand how social determinants of health affect individuals and our communities, how people seek and access care, and how we uniquely meet those needs. Programs that assess and address the specific needs in a community are vital to downstream clinical outcomes.

For example, programs such as blood pressure screening and medication treatment programs that are delivered locally through community churches have proven successful in improving blood pressure management, with the intention of reducing significant negative effects of uncontrolled hypertension.

In addition to programs, it is equally important to design mechanisms to assess the unique needs of each person/patient and fulfill her/his individual needs for effective healing. We can certainly use data to inform program development and identify patients who are at risk or in need of specific services, but it is easy to underestimate the importance of listening, hearing, and identifying what the patient wants and what he/she values.

The challenge is identifying individual patient needs and creating direct connectors between those needs and the programs and services that most effectively and efficiently serve patients.

Patient Experience as the North Star

The Vizient Quality and Accountability study and associated ranking began in 2005 and has continued to shed light on how to define success and the enduring characteristics of high-performing organizations. As the Quality and Accountability ranking completes its 15th year of operation, a new Vizient study is underway to understand how high-performing members sustain their achievement year after year.

One preliminary finding suggests that these organizations make decisions driven by patient needs. All clinical processes, structural plans, and even major capital investments are evaluated based on patient needs and changed, modified or eliminated if the appropriate patient-centric requirements are not met.

Within these high-performing organizations, staff members are empowered to help patients. They are clear on what they need to do to fulfill requests, including end-of-life wishes. In many cases, staff members are free from time-intensive executive oversight that may delay arriving at the right decisions. In addition to serving patients in the clinical environment, teams also must function in support of the organization's goals. The power of patient experience is bidirectional, from the C-suite to the care delivery setting and vice versa.

Summit attendees gathered to honor successful peers at the Member Clinical Awards Dinner Celebration. Some organizations received an award for the first time; others were finding ways to carry over wins from academic medical centers to other parts of their growing systems. Some were winning in both the inpatient and ambulatory care categories.

Above all is the honor and respect that is bestowed by peers on the award winners. The Stanford CEO and chief information officer shook their colleagues' hands before the team went on stage to accept the Quality Leadership Award; University of Utah Health and Intermountain Healthcare may compete locally, yet they acknowledge that the work of both organizations improves the health of the people of Utah. The winning academic medical center, Rush Medical Center, Chicago, Illinois, received a standing ovation. This acknowledgment comes from colleagues who share their passion for high performance and know the hill is high.

The future of health care delivery on a national basis hinges on value defined by the patient experience, including outcomes, satisfaction, and cost. As members pursue their patient-centered goals, they acknowledge the risk of chasing data precision and allowing the variables they are measuring to overshadow the right actions. Sometimes solid "directional" information is eye-opening and encourages teams to learn, explore, and improve on behalf of their patients and communities.

As members take the stage year after year, those who were not awardees are not discouraged. On the contrary, the success of their peers and the needs of their patients push them forward to future successes, better outcomes, and greater impacts.

Looking Beyond Data Dashboards to Achieve Improvements

David Levine, MD, FACEP

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Steve Meurer, PhD, MBA, MHS

Executive Principal, Data Science and Member Insights, Vizient

As members strive to integrate care delivery at the system and population levels, the voices of academic medical centers, large/complex medical centers, community hospitals, and others were heard and respected at the Vizient Connections Education Summit. Regardless of size and influence, organizations came ready to learn from each other during the well-received Power Huddles, posters, and other events. Summit attendees enjoyed diverse opportunities to share data solutions for sustainable improvement. By working together, members are discovering fresh ways to use data insights.

Data Prowess, Simplified

Some improvement teams are indeed finding that they achieve more valuable results with decentralized, simplified pathways. One community hospital team (Mayo Clinic Health System, La Crosse, Wisconsin) attracted a standing-room-only audience with its presentation on readmission reduction strategies, demonstrating how all-cause, all-payer readmissions were reduced from 12.6% to 8% in 1 year by conducting multiple interventions at a time. Rather than create a long-term cause-and-effect study, this group chose to trial multiple interventions simultaneously (15 interventions total) to achieve rapid success. The initiative was led by staff nurses who knew processes, understood how to drive change, and had the respect of the medical staff.

Mayo’s flexible approach contrasts sharply with the siloed quality improvement structures often found in health care organizations. Layers of statisticians, Lean management consultants, and expensive data warehouses can impede progress and muddy results. Sometimes the vital passion for improvement gets lost in such large and unwieldy infrastructures.

The Mayo team’s nimble success story demonstrates more local, decentralized control. In this case, the quality department supported the work of localized teams of nurses rather than doing all the work themselves, ultimately delivering a better return on investment. Smaller teams empowered to test changes are poised to produce results faster by looking beyond the dashboards and then sharing their stories of success across the continuum. Their projects challenge leaders to understand that a red dot on a dashboard is insufficient information; these

teams ask questions, mine data for key drivers, clarify problems, and produce solutions for enhanced quality and safety.

A long-held practice of attributing case data to individual physicians is giving way to a broader perspective of evaluating a group of cases within a service line. This expanded focus avoids punitive overtones and encourages physicians to fully engage with improvement teams to enhance the patient experience.

Fine-tuning Cohorts, Enhancing Knowledge

This year’s Bernard A. Birnbaum, MD, Quality Leadership Awards featured 4 cohorts (1 more than last year) to reflect the diverse membership of Vizient organizations. Four homogenous data groups were created: comprehensive academic medical centers; large, specialized complex care medical centers; complex teaching medical centers; and community hospitals. These groupings provide comparisons and rankings of similar facilities within each 100+-member cohort. The newly refined cohorts help perform critical and useful reviews of intragroup data and deliver insights to support member success.

Vizient members benefit from this comparative data as a major guidepost for performance improvement. Vizient has an immense member pool, including more than 50% of the nation’s acute care health systems and 95% of US academic medical centers. Vizient works with its large membership to produce data that are timely, transparent, meaningful, and actionable (see Figure 1). Using cohort data helps Vizient members look critically at their gaps and reach out to peers for vetted ideas.

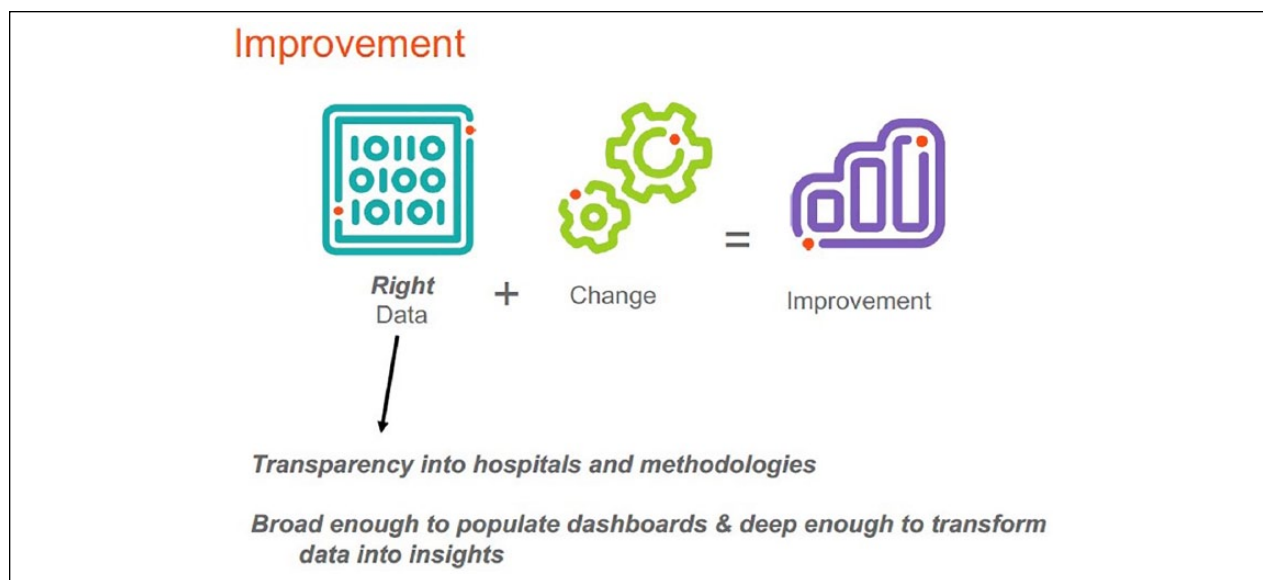


Figure 1. Improvement process fueled by right data.
Source: Vizient.

New data directions are member-driven. Based on member requests, a pediatrics scorecard and inpatient/outpatient oncology scorecard were introduced in 2019 to provide a deeper understanding of these service lines.

Targeted, comparative data help leaders—including physicians—become more value driven. Historically, medical training did not include specific training in quality data; today's physicians are more hands-on, often using data to inform and improve their practices.

Expanding Boundaries on Ambulatory Care Analytics

Ambulatory data use today is where inpatient data use was 10 years ago. Today's health care organizations are adept at measuring surveillance factors such as visits, lab tests, and prescribed medications. Quality metrics such as access, readmissions, and timely appointments are now used routinely to assess efficiency, but leaders want to move beyond efficiency factors to study metrics connected to outcomes, patient care, and quality of life. In the future, patient-reported outcomes need to be captured.

The vast majority of care occurs within the 4 walls of a system, including its ambulatory care sites. Members' use of data to track patient journeys within these walls has become increasingly sophisticated, yet they are also interested in the patient's journey across the continuum, encompassing post-acute care, long-term care, and physician office services. They want to connect the dots of the entire journey and not simply understand when a patient enters or leaves the system. For these across-the-continuum insights, the data capabilities of Vizient stand out.

This level of tracking is challenging because many skilled nursing facilities (SNFs) and hospice centers are still paper based with limited data reporting capabilities. Some systems are responding by buying, building, managing, or partnering with post-acute care entities to gain greater control over bed utilization and length of stay. Instead of wasting valuable inpatient resources while waiting for SNF beds to open up, these organizations are playing active roles in post-acute care to manage outcomes and value.

Additionally, top-performing systems are asking challenging questions about if and when a patient actually needs to be in the hospital. Instead of a heart failure patient coming to the emergency department, the team may deliver care in an observation unit or heart failure clinic. The goal is to effectively manage the patient in the community when appropriate, not necessarily in the hospital. For example, the University of Vermont Medical Center purchased 6 hotels that went out of business and converted them to transitional housing for

patients who did not require inpatient stays—a win-win for both patients and providers.

Ultimately, viewing patient needs in a noninstitutional way can yield new opportunities to anticipate appropriate services.

Becoming Data Informed, Not Data Driven

Health care professionals may be drowning in a sea of data from an abundance of daily and even hourly dashboards. Some organizations are tracking up to 275 metrics, when what they really need is a better understanding of key drivers.

Teams can become so focused on the numbers that they react to blips, not real problems. In the winter, readmissions often increase because of flu—a population-wide phenomenon that is difficult to manage. It is imperative to consider the normal flow of data and react appropriately. Teams can make wrong decisions if they are blinded by data.

Reflecting on the summit's theme (The Art of Care), data are scientific and concrete but using the data is an art. Although the numbers say something, wise interpretation is equally important. A newly hired nurse may be concerned that an elderly patient has a systolic blood pressure of 90, but an experienced clinician may know that this individual lives normally at 85.

Improvement teams must move beyond the data and encourage curiosity, drill down into root causes, turn their findings into compelling stories, and share insights to motivate their organizations toward progress and lasting change. Backed by accountable leaders and supported with data science, these hard-working teams can transform into true improvement accelerators.

Rethinking the Economics of Health Care Quality and Pricing

Tom Robertson

Executive Director, Vizient Research Institute

A research study built upon findings from a national survey, telephone interviews, and focus groups yielded some surprising results on health care quality perceptions and price transparency.

Consumer behavior does not conform to traditional economic wisdom, according to *When Markets Fail: The Unmet Expectations of Price Transparency*, conducted by the Vizient Research Institute in 2018. Study data and implications presented at the summit provide evidence to suggest that higher deductibles coupled with price transparency will not have the effects hoped for by payers and policy makers.

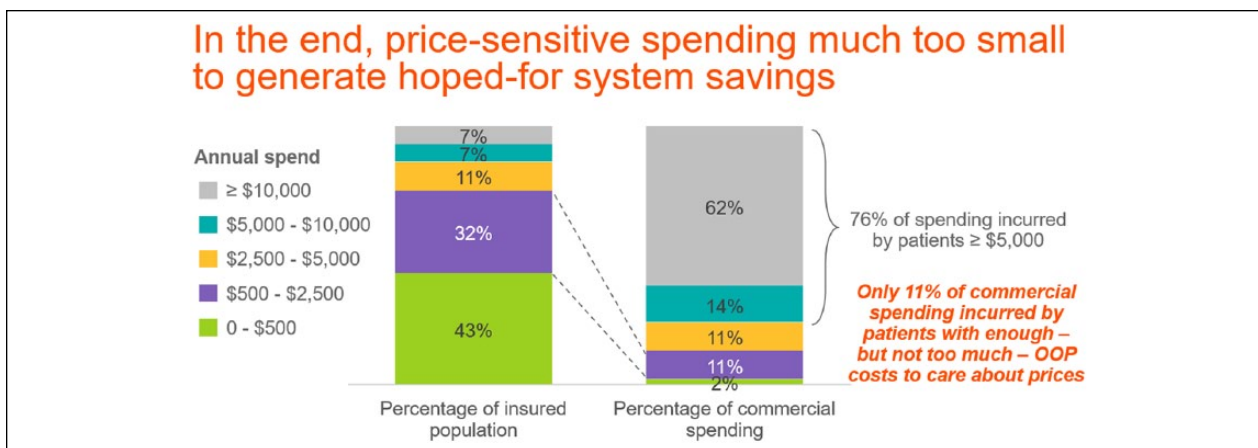


Figure 1. Distribution of commercially insured beneficiaries and spending.

Abbreviation: OOP, out of pocket.

Source: Agency for Healthcare Research and Quality Medical Expenditure Panel Survey, 2014.

The national survey portion of the Vizion Research Institute study explored how consumers discern health care quality and in what circumstances they will pay more for what they believe is higher quality. The findings indicate that when the personal stakes are low (eg, sore throat), 77% believe there is little or no quality difference among providers. When the personal stakes are higher (eg, cancer), the numbers invert to 72% believing there is a difference in quality. Yet consumers often do not consult clinical data or even insurance ratings when assessing quality; most rely on word-of-mouth referrals from friends and family members or patient reviews.

For many household purchases, quality increases incrementally and consumers can assess whether the next increment of quality is worth the next increase in price. Television screen sizes increase along with price. Computer speeds and memory capacity increase along with price. Consumers decide where their optimal combination of price and quality intersect.

By contrast, health care quality—in the mind of the consumer—is not a linear function. A provider is either good enough or not. Ordinary consumers cannot discern small increments of quality in health care. Their assessments rely on experiential, not clinical, factors and their evaluation of providers tends to be binary. A doctor or hospital is good enough or they are not—more like an on/off light switch than a dimmer. Consumer views of health care quality are binary.

Health care is not a typical economic good where more is better. Consumers avoid health care services for as long as they can; once they encounter the health system, costs add up very quickly. Patients with any serious condition hit their deductible almost immediately and reach their out-of-pocket limit relatively early in any protracted episode of care. A Vizion study of commercially

insured non-emergency CT/MRI (computed tomography/magnetic resonance imaging) scans showed that 83.6% of scans were performed on patients who had met their deductibles by the time of service; 40.4% of these patients also had met their out-of-pocket maximums prior to service, thus negating incentives for price shopping.

Health care spending among the commercially insured population is uneven, with nearly half (43%) of the insured spending \$500 or less per year while 76% of spending is incurred by only 14% of the people. Those patients average more than \$5000 per person for the year (Figure 1). Only 11% of the spending by a commercially insured population is by patients who spend enough—but not too much—to care about prices. With such a small percentage of the commercial population's spending occurring in a range of price sensitivity, it is difficult to imagine price transparency ever having its desired effect.

The likelihood that price transparency will fail to deliver the savings hoped for by payers may be a short-term reprieve for providers, but it portends a long-term dilemma for the country. With nothing on the horizon showing promise to reduce the rate of health care spending increase, there is reason for concern. If market forces do not work, external measures may be unavoidable down the road.

Innovative Ways to Wring Value From Scale

Steve Jenkins

Senior Advisor, Sg2

A quarter century of consolidation has dramatically changed health care delivery. Given the industry's mixed

track record on wringing value from scale, purchasers and policy makers have become increasingly distrustful that bigger is better. In the face of this, one summit presentation challenged members to leverage scale across multiple dimensions to deliver enhanced value to the communities they serve.

The Drivers of Consolidation

National health systems have not been the main drivers of industry consolidation. Hospital and professional services expenditures at the top 10 systems grew minimally over the last 20 years. Similarly, for-profit systems have not been primary consolidation drivers, actually showing a decrease in beds.

However, nonprofit local and regional systems have indeed coalesced and emerged as consolidation drivers.

Mixed Record on Proving Scale Value

Today, Vizient/Sg2 members are larger and more complex. Bigger may indeed be an important part of surviving. And yet it is not by itself sufficient to remain relevant. Real economies of scale remain elusive. Systems exhibit wide performance and price variation. To date, in fact, system consolidation appears to have little effect on clinical quality, cost efficiency, or reliability.

The presentation cautioned participants against buying into the idea of a magic number in revenue or assets that equates to scale. Instead, today's leaders must take a broader view, looking beyond traditional financial and operational sources. Equally important to ensure local market relevance is unlocking scale via economies of skill, clinical care delivery, and covered lives. The right combination of size and scope will enable organizations to achieve scale across the continuum, within and across its system of care.

Extracting value from scale begins with a precise goal, one well aligned with organizational ambition. The first stage of the journey involves the most common scale decisions: merging administrative functions such as human resources and payroll, centralizing information technology, and consolidating accounts receivable and collections to improve the revenue cycle. Many systems have already accomplished this stage and are moving on to prove the value of the powerful levers of clinical scale. Clinical scale decisions involve rationalizing service distribution (eg, integrating duplicative open-heart programs into a systemwide center of excellence), integrating medical practices from a mixture of independent physician groups and solo practitioners, and decanting lower acuity services, such as a screening colonoscopy, to less expensive ambulatory care sites.

Shining Examples of Value Generation

Based on conversations with Vizient members, some singular examples emerged of innovative ways to wring value from scale.

Center of excellence: Froedtert & The Medical College of Wisconsin rationalized service delivery for total joint replacement by adopting a center of excellence approach and concentrating cases on a single campus. The team reduced length of stay and readmissions while also decreasing direct costs by \$1.1 million. Interestingly, they also achieved a 12% growth in cases in spite of reducing the sites of care.

Smarter capacity management: Leaders at Johns Hopkins Hospital in Maryland partnered with GE to build a state-of-the-art command center for a more efficient use of existing beds and capacity. Center staff operated independently from nursing and used predictive analytics to forecast surges and resolve capacity backups. The center decreased emergency department wait time before admission by 30%, reduced delays in leaving the operating room by 20%, and decreased wait time for outside hospital transfers by 20% as a quality measure.

Home care: Mount Sinai Hospital in New York extended its reach without adding beds by creating an At Home Program to treat sick but stable patients who could receive care at home. More than 800 patients were seen in the program, resulting in readmissions cut in half, a 20% increase in patient satisfaction, and a 20%-30% reduction in cost.

Ambulatory solutions: The team at Advocate Aurora Health in Wisconsin faced diverse health care needs across its 4 hospitals but did not want to invest in upgrading aging facilities in some places. Instead, they built flexible ambulatory solutions, decanting ambulatory surgeries from busy tertiary facilities while expanding access to lower-cost, consumer-centric care in others. One market (Pleasant Prairie) is experiencing high employer-driven growth, but system leaders chose not to build a new hospital and use an ambulatory template to serve the needs of employees-turned-patients.

Reimagined consumer experience: When faced with full schedules, long operating room wait lists, some specialty leakage, and a high no-show rate, leaders at the Cleveland Clinic developed an entirely new consumer interface for their busy clinics. They pulled scheduling out of the clinics and adopted a multichannel click-in, walk-in, and call-in system to better serve clinic patients. The patient-friendly system delivered an increase in visit volume, a call abandonment rate near zero, an 8% increase in same-day primary care visits, and virtual visits nearly doubled.

Nonmerger decision: Blessing Health System in Illinois remained independent by choosing not to merge with another system and building scale in novel ways. The

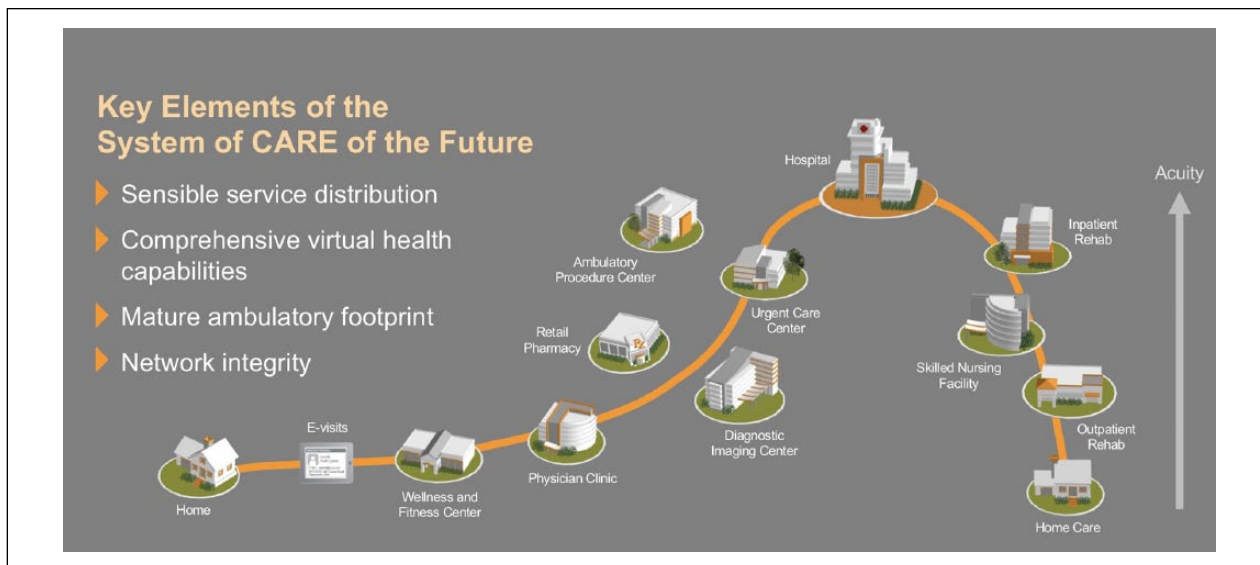


Figure 1. Defining future, fully integrated system of CARE.
Source: Steve Jenkins, Sg2.

organization joined the BJC Healthcare collaborative (in nearby St Louis, Missouri) and invested in multichannel access to ambulatory services. The team also strengthened Blessing’s market relevance through direct-to-employer contracts and focused on execution to remain profitable.

Defining the Future System of Care

Without more progress toward enhanced scale, regulators and market disruptors will develop their own solutions, siphoning off crucial volumes and long-term consumer loyalty.

A well-oiled system of CARE (Clinical Alignment and Resource Effectiveness), though, positions provider systems to use the right combination of size and scope to prove value. That includes sensible system distribution, comprehensive virtual health capabilities, a mature ambulatory footprint, and network integrity where patients are motivated to remain within the system for most if not all care (Figure 1). A system is more than a portfolio of services or assets; a multichannel and fully integrated system opens up opportunities to deliver value to patients, payers, physicians, and staff.

As the pool of commercially insured patients shrinks—contracting even more if Medicare is expanded to patients aged ≥55—health care executives must explore new ways to remain competitive at government rates. Modernizing operations and avoiding diseconomies of scale will be essential. Collaboration among systems also will ensure the industry can deliver on the full promise of scale. Together, members are making greater progress by paying keen attention to market dynamics, sharing their

learnings, and borrowing winning practices from other industries.

About Sg2

Sg2, a Vizient company, is an expert-led, future-focused health care strategy advisory firm. Sg2 helps organizations transform how they deliver high-quality, cost-effective care by better understanding their market, then partnering with them to formulate and implement strategies to drive market performance and smart growth. Headquartered in Skokie, Illinois, with offices in Denver, Colorado, and Los Angeles, California, Sg2 serves health care providers across the spectrum, including integrated delivery networks, academic medical centers, independent community hospitals, and life sciences companies.

Better Together

Julie Cerese, PhD, MSN, RN

Group Senior Vice President, Technical Solution Sales and Delivery and Performance Management, Vizient

Aaron Gerber, MD, MBA

President, Sg2, Vizient Network Services and Advisory Solutions

The 2019 Vizient Connections Education Summit was a highly anticipated forum for learning and networking among Vizient members. This distinctive national event does not stand alone; it is one facet of the myriad ways that Vizient members connect—through the many unique

networking opportunities available to them—to learn and share, and, most important, to improve their performance.

A supportive enthusiasm and camaraderie exists among members, a phenomenon that one rarely sees in large organizations. Time after time, members come together in person or virtually to share stories and successes to help each other and improve together. They have learned that true progress comes from deep collaboration and they continue to seek new ways to solve current challenges and address future changes in a hypercompetitive market.

The Vizient Member Experience

The whole is greater than the sum of the parts.
— Aaron Gerber MD, MBA

Accelerating the Diffusion of Ideas

Health care progress and innovation move in cycles. When there is a high degree of uncertainty based on legislation and national policy, it is extremely difficult for leaders to move forward with confidence. Yet the times demand that health systems, consolidating at a rapid rate, advance quickly to prove their value to patients, employers, payers, and regulators. As organizations become larger, their leadership teams must seek out all viable opportunities to improve outcomes, reduce costs, and run efficiently. These opportunities already exist but need to be advanced. Health care leaders do not face an innovation problem, but they may be encountering a diffusion problem. When an opportunity for improved services is identified, how does this knowledge make its way not only through a system but also beyond market boundaries to permeate other systems? To be sure, there are barriers to wide circulation ranging from internal opinions (“It was not invented here.”) to concerns about how the benefits of leading practices can be translated into stakeholder value. When a good idea makes sense, who will shepherd it through execution and share it for the greatest impact?

Leaders must be mindful of the importance of diffusion, ensuring that winning concepts are communicated and even enhanced by their Vizient colleagues. This rapid sharing of game-changing knowledge is highly prized by members, known as the “secret sauce” of their successes. While this diffusion of ideas is challenging, the ability to accelerate this and drive results is being enabled by a robust peer-driven community that connects forward-thinking leaders and facilitates performance improvement in meaningful ways.

Taking Networking to the Next Level

Members are asking for more. They want to transform current networking and informal conversations into powerful

connections for change. Vizient responded, taking member networking to the next level by delivering 2 more intense types of shared connections:

- *Leader Connections*: Trusted, intelligence-driven connections to solve problems and anticipate disruption.
- *Performance Connections*: Data-driven insights, leading practices and collaboration to accelerate performance.

The Leader Connection. Members bring together pivotal teams of decision makers to formulate and advance solutions on cost, quality, and market performance. In the past, these solution areas were often siloed and not well coordinated. Now members are aiming for more integrated and decisive teamwork, using data, health care intelligence, content expertise, and expert facilitation techniques from Vizient and Sg2 to make better, faster strategic decisions.

The Performance Connection. Members have ready access to a portfolio of performance improvement data, collaboratives, and benchmarking studies where they engage with peers to examine processes for improved care, smoother operations, cost savings, and market sustainability. Teams use collaborative projects to achieve top-tier performance in quality, safety, cost-effectiveness, and strategy.

They are not only implementing leading practices but are collaborating to define and drive *next practices* to perform even better. Next practices can help systems operate on a more value-driven basis, especially in areas such as clinical improvement, new care delivery models, and partnerships.

Vizient goes beyond the simple networking experience to provide a more robust *member* experience: enabling members to do more themselves, enabling members to get better together faster, and providing expert facilitation and resources to assist members with problem solving through one-on-one consulting.

The vital ingredients in these connections are a commitment to improvement, a willingness to share knowledge (including failures), and a solid foundation of comparative data and market intelligence.

Advancing Decisions Within the System

Not all decisions require the same process or external support. Members often use different levers to effect the change they desire. Many decisions are homegrown and can be executed solely using internal resources. Other decisions are better achieved by collaborating with peers, where concepts and pilot results can be rapidly shared for



More than just a ranking system — awards grounded in evidence

Vizient® is proud to recognize the winners of the 2019 Vizient Excellence Awards for Clinical and Supply Chain Performance, identifying the top-performing hospitals in the country. Many groups announce “rankings” of health care organizations, but the Vizient Excellence Awards are grounded in evidence.

2019 award winners

Bernard A. Birnbaum, MD, Quality Leadership Award

This award is given annually to comprehensive academic medical centers (AMCs); large, specialized complex care medical centers; complex care medical centers; and community hospital members that demonstrate superior performance, as measured by the Vizient Quality and Accountability Ranking Program, which has been calculated annually since 2005.

Comprehensive academic medical centers

- Rush University Medical Center
- NYU Langone Health
- Mayo Clinic – Rochester
- University of Utah Health
- Hospital of the University of Pennsylvania
- UC San Diego Health
- Memorial Hermann – Texas Medical Center
- Stanford Medicine
- The University of Texas Medical Branch at Galveston
- Oregon Health & Science University
- Houston Methodist Hospital

Large, specialized complex care medical centers

- Mayo Clinic – Florida
- Houston Methodist Sugar Land Hospital
- Cleveland Clinic – Fairview Hospital
- Penn Presbyterian Medical Center
- Memorial Hermann The Woodlands Medical Center

vizient®

Complex care medical centers

- Penn Medicine Chester County Hospital
- Froedtert & the Medical College of Wisconsin Community Memorial Hospital
- Houston Methodist The Woodlands Hospital
- Excela Health Latrobe Hospital
- Houston Methodist Willowbrook Hospital
- Memorial Hermann Katy Hospital
- Beaumont Hospital, Grosse Pointe

Community hospitals

- Cleveland Clinic Lutheran Hospital
- Mayo Clinic Health System in Red Wing
- American Fork Hospital
- Logan Regional Hospital
- OhioHealth Dublin Methodist Hospital
- Cedar City Hospital
- Progress West Hospital

Ambulatory Care Quality and Accountability Award

This award measures the quality of outpatient care in five domains: access to care, capacity and throughput, quality and efficiency, continuum of care and equity.

- NYU Langone Health
- University of Utah Health
- Stanford Medicine
- University of Colorado Medicine – UHealth University of Colorado Hospital
- University of Washington Medical Center

Supply Chain Operational Excellence Award

This award recognizes top-performing members that have achieved strong operational controls and efficiency in supply chain operations.

Comprehensive academic medical center

MedStar Health, Inc.

Large, specialized complex care medical center

Freeman Health System

Complex care medical center

Hunterdon Healthcare System

Community hospital

Freeman Health System

Environmentally Preferred Sourcing Excellence Award

This award recognizes members that positively contribute to human and environmental health through responsible purchasing decisions.

Comprehensive academic medical center

Hospital of the University of Pennsylvania

Large, specialized complex care medical center

Cooper University Health Care

Complex care medical center

UC Health – Cincinnati

Community hospital

Hawaii Pacific Health

Supplier Diversity Excellence Award

This award recognizes members that best champion inclusion in their supply chain and accelerate economic growth in their local community through the engagement, empowerment and utilization of minority-, women- and veteran-owned business enterprises.

Comprehensive academic medical center

University of Maryland Medical System

Large, specialized complex care medical center

Broward Health

Complex care medical center

Arrowhead Regional Medical Center – San Bernardino

Community hospital

Novant Health

Serving the nation's leading health care systems

Vizient serves the nation's best health care systems — AMCs, integrated delivery networks, independent community hospitals, safety net organizations, pediatric facilities and non-acute providers. They all work diligently every day to provide the highest quality care to their patients and communities.

We are humbled and inspired by these award winners.



To learn more about us, visit vizientinc.com.

mutual benefit. Finally, some complex decisions require a fully guided process facilitated by a Vizient and Sg2 team, where data insights and content expertise can be applied to the members' greatest challenges.

In this regard, Penn Medicine is a great example. Patricia Sullivan, PhD, chief quality officer at Penn Medicine, has used all 3 levers within her system to impact quality and safety. At Penn Medicine, they assess their priorities and undertake improvement efforts independently using their own subject matter experts, they take advantage of Vizient network connections and collaboratives to learn from colleagues, and on rare occasions they utilize external subject matter experts to solve problems. The goal is to arrive at a deeper understanding of problems and put into motion key decisions to drive change and meet strategic goals.

Embracing the Future

Members are always anticipating the next patient need or market shift. Sometimes leaders overestimate the pace of change but underestimate the scope of change. Rarely do decisions remain confined to a specific service or care team; the impact of change often reverberates throughout the entire system and the region it serves.

One area that looms large with quality and efficiency potential is a reimagining of the health workforce itself. Labor alone can account for more than half of a health care organization's operating costs. These costs are significantly affected by nursing and physician shortages and fluctuations in patient volumes and acuity. In its 2019-2029 Impact of Change National Demand Forecast, Sg2 experts predict a 9% increase in chronic disease admissions over the next 10 years related to an increase in Medicare enrollees and a 15% growth across the entire outpatient continuum.

Faced with increased demand and care complexity, it is time for leaders to rethink workforce needs and introduce new models of care. These adaptations include an expanded use of advance practice practitioners to supplement physician services and redesigned processes to improve quality and efficiency. Redesigns of this magnitude require the ability and resources to innovate and test models in the midst of already busy operations. In order to be successful, leaders must grant permission to safely experiment as well as designate innovation units to pilot new ideas.

As health care evolves, so too does its perception as a marketable service. As consumers bear an ever-increasing share of the cost burden, they will make more health care decisions with product attributes in mind: cost, quality, and market performance. A member's authentic value proposition will become increasingly important to keep patients loyal to its services.

System boundaries blur as patients demand greater access to home-based and digital services. Reaching patient-centric, market-ready decisions requires a more wholistic view of what's needed, connecting and integrating the viewpoints of clinical, financial, operational, and strategic C-suite officers. Aided by Vizient, these leaders develop new solutions in tandem with their colleagues within a trusted community committed to performance improvement across the continuum.

Today's dynamic marketplace is too complex and fast-changing to compete in isolation. Better, more rigorous, and sustainable decisions are produced through members working together. Vizient member connections provide members with the data, tools, and networks necessary to achieve sustainable improvements in cost, quality, and market performance. The ultimate goal—providing exceptional patient care.

Power Huddles

Connecting With Populations Served: Enhancing Workforce Diversity

**Nancy Mosca, PhD, RN-BC, PNP-BC,
PHCNS-BC, and Megan Dorrington, MSN,
MBA, RN-BC, CPN**

Akron Childrens Hospital

Background. Each census report reflects increasing ethnic and racial diversity in the US population, illuminating the need for the health care workforce to better reflect the population it serves. The US Department of Health and Human Services Health Resource Services Administration, among other influential national health care, public health, and professional organizations, has identified increasing the number of minority health professionals as a key strategy to eliminating health disparities.¹⁻³ Health care institutions nationwide are responding with program development to enhance both the diversity of their health care ranks and the cultural competence of their workforce. Recruiting and retaining a highly competent, diverse, and engaged workforce is one operational imperative of this Midwest pediatric acute care hospital's strategic plan. This presentation described how the chief nursing officer aligned with the enterprise's strategic plan and, working through a shared governance structure, developed and implemented a strategic plan for nursing to address the lack of diversity in its workforce. This work received national recognition in April 2019 as the recipient of the American Organization of Nurse Executives' PRISM Award, which recognizes organizations or individuals who are advancing diversity efforts within the nursing profession, a health care organization, or a community. This summit will be the hospital's first opportunity to share 5 years' worth of outcomes

data with a national audience. *Intervention Detail.* As a result of a nursing workforce needs assessment guided by the enterprise's strategic plan, a restructuring of nurse tech support position resources was undertaken to target future employees who would contribute to the diversity of the nursing workforce. Assuring Success with a Commitment to Enhance Nursing Diversity (ASCEND) is a summer internship program designed to strategically recruit racially, ethnically, and gender-diverse nurses. This is an innovative opportunity to recruit and retain a multicultural workforce through academic partnerships with baccalaureate nursing programs. The program exposes senior students of underrepresented groups to a welcoming and inclusive pediatric nursing culture. Interns spend 10 weeks at the hospital cultivating relationships, with the goals of employment as nurse techs during their senior year and hiring on as registered nurses (RNs) at graduation. The program pairs each intern with a clinical nurse mentor, providing clinical experience along with weekly professional development activities. Professional development topics included professionalism, priority setting, communication skills, compassion fatigue, nurse-sensitive indicators, culture competence, resume development, and interview skills. ASCEND program interns reported feeling more confident of achieving success in their future nursing career. Human resource metrics are tracked for changes in nursing workforce diversity characteristics of race, ethnicity, and gender. RN recruitment and retention of program alumni are also monitored. *Outcomes and Impact.* In 4 years, 84 interns have completed the ASCEND program. Of eligible graduates, 65% were hired as RNs. Of those, 24% are male, 21% are African American, 8% are Hispanic, 5% are of mixed heritage, 3% are Asian, and 3% are Middle Eastern. The overall retention rate of all RNs hired since the ASCEND program inception (cohort #1 in 2015) is 86%, as of December 31, 2018. Small changes in workforce diversity have been noted, as ASCEND interns comprise just 8% of new graduate nurse hires within the organization. The program is contributing to workforce diversity while also influencing current nursing staff's cultural awareness and competency. In spring 2018, the program was awarded a \$1 million, 5-year philanthropic grant from a local financial institution to continue and expand its work. For the first time, scholarship dollars were available to further support interns for their final year of college. Recruitment of this cohort was just beginning at the time of abstract submission. However, this presentation will include 2018 cohort RN recruitment results, as well as 2019 cohort outcome measures, including recruitment of nurse tech employees. The ASCEND program for cohort #5, summer 2019, was anticipated to include an increased number of interns because of financial support. As our health care workforce changes to better reflect

families served, our ability to make social, health, and business outcome improvements is enhanced. Opportunity for program improvement lies in fine-tuning applicant eligibility criteria.

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Capturing Life After Death: A Collaborative Approach to Inpatient Mortality

Glenda Grandy, MS, RN, CCDS, and José Rivera, IIE, MBA

Beaumont Hospital, Royal Oak

Background. Our quality and safety team formed a Clinical Validation Committee (CVC) to review inpatient mortalities. CVC members include coding specialists, clinical documentation improvement (CDI) specialists, physician advisers, and hospital leadership. *Intervention Detail.* The CVC team utilized Resource Manager, a Vizient Clinical Data Base tool, to monitor our results. *Outcomes and Impact.* The committee enabled us to improve our mortality observed-to-expected ratio from 0.75 to 0.64. Data also were monitored using statistical process control, which demonstrated positive special cause. As a result, collaboration continues among quality, coding, and CDI.

Reducing Heart Failure Readmissions Through an Accountable, Patient-Focused Process

Ellen Kraft, RN, BSN, and José Rivera, IIE, MBA

Beaumont Hospital, Royal Oak

Background. In 2017, Beaumont Hospital, Royal Oak's, heart failure readmission rate exceeded national and state averages, even with a dedicated nurse navigator team scheduling follow-up appointments within 5 days and reconciling medications prior to discharge. Upon further analysis, patients seen by the nurse navigator team had worse readmission rates than patients with the same expected length of stay who received no interventions. Nurse navigators did not utilize the hospital's quality reporting matrix

and were unaware of their patient readmission rates. These outcomes called the quality, medicine, and heart and vascular departments to action. *Intervention Detail.* These departments organized a multidisciplinary task force consisting of frontline leaders from 14 departments, including bedside nursing, dietary, and information technology. The task force met for 12 weeks to identify gaps in the current process and design a care pathway that engaged patients and families. Leveraging Resource Manager, a Vizient Clinical Data Base tool, the task force identified 3 critical issues: lack of early and correct inpatient identification, not engaging patients or families through nurse navigator interventions, and inconsistent education materials across disciplines and units. Additionally, no accountability existed for coordinating hospital resources and disciplines. With these critical issues identified, we created a care pathway from admission to 48 hours post discharge. Patients are now identified in the emergency room through partnering advanced practice provider services, and a majority are found through evolved EPIC workbench reports. All identified patients undergo daily education, standing weights, and intake and output nursing orders placed by the nurse navigator team. Nurse navigators visit all patients at the bedside upon admission, educate the patient and family on their diagnosis, and, through motivational interviewing, coordinate additional consults to support transitions of care. Consults may include cardiology, physical and occupational therapy, dietary, care management, social work, and palliative care. At discharge, nurse navigators reconcile medications and visit the patient and family again at the bedside to confirm patient follow-up appointments. Last, patients receive a follow-up phone call from the nurse navigator team within 48 hours of discharge. All process outcomes are tracked for each patient through an online Microsoft SharePoint database. Each month process outcomes are compared to clinical outcomes using Resource Manager and are then reported back to the task force. *Outcomes and Impact.* The care pathway enabled communication across disciplines, focused change for patients, and created an accountable process not only for our care team but also for patients and families. With solutions implemented in March 2018, the first set of 6-month outcomes revealed the all-payer readmission rate decreased by 22.2% year-to-date, and nurse navigators increased the number of discharged heart failure patients receiving interventions from 43% to 58%. By December 2018, the heart failure all-payer readmission rate achieved a statistically significant reduction.

The Quality Matrix: Organize/Act on the Flood of Data

Sam Flanders, MD, and Jose Rivera, IIE, MBA
Beaumont Hospital, Royal Oak

Background. In 2009, Beaumont Health developed and implemented its Quality Matrix as a “one-stop shop” for all quality and safety measures. Measures on the Quality Matrix must be important, measurable, and able to be benchmarked. The Quality Matrix serves as the master quality and safety work plan for each hospital. Each measure has an accountable executive, physician, and point person. The Quality Matrix has a true vertical alignment governance structure, from frontline staff to the board of directors. All measures are translated into actionable “big dot” visuals, enabling tracking of progress at the system, hospital, service line, and unit levels. Using the Quality Matrix to focus on underperforming metrics, Beaumont Hospital, Royal Oak, achieved a 5-star ranking in the Vizient Quality & Accountability Scorecard (AMC) for 7 out of 9 years, beginning in 2009. For 2018, Beaumont Hospital, Royal Oak, tracked 702 measures in its Quality Matrix, which helps the executive team determine which measures need an action plan. The main categories in the Matrix include the following:

- Centers for Medicare & Medicaid Services (CMS)/service line readmissions
- Core measures
- Collaborative quality initiatives
- Culture of safety
- CMS/service line mortality
- Infection control
- National Database of Nursing Quality Indicators (NDNQI)
- Patient safety indicators
- Length of stay
- Hospital-wide mortality
- Bar code medication administration

The Quality Matrix is used across Beaumont Health to proactively resolve issues before they escalate. *Intervention Detail.* Currently, organizations must track data from multiple sources and scorecards, potentially dulling their effectiveness. Given the challenge of creating a single strategy to collect, analyze, report, and act upon, Beaumont Health created the Quality Matrix. Currently the acute care Quality Matrix contains 3022 measures for the 8-hospital system, with additional metrics for its post-acute and medical group enterprises. With the help of the Vizient Clinical Data Base, Beaumont Health evaluates performance compared to our academic peers. We created benchmarks using a Status 1 through Status 4 approach (“red” to “blue”). Each metric is benchmarked and “graded” Status 1 (red), Status 2 (yellow), Status 3 (green), or Status 4 (blue). The system recognized the need for a single, cohesive, “no regret” strategy to collect, analyze, report, and act on quality data. This provides a “big dot” tracking mechanism for committees

and the board, but granularity for the front lines. The Quality Matrix is updated monthly and reconfigured annually as measures are added and removed. With each update, any metric falling to “Status 1” (red) is automatically pushed to an accountable individual with an action plan request. The Quality Matrix helps the Royal Oak executive team determine which measures need an action plan. Vizient is a significant data source used to populate the Quality Matrix. We strive to achieve Status 4 for each metric, which represents performance in the top 10th percentile within Vizient service lines. Status 1, Status 2, and Status 3, respectively, represent greater than the 50th percentile, the 50th to the 25th percentile, and the 25th to the 10th percentile. *Outcomes and Impact.* Using the Quality Matrix has provided central coordination with local accountability to Beaumont Health’s quality and safety metrics. We measure success by tracking the percentage of underperforming (Status 1) measures over time and combine this with the Beaumont Quality Progress Index, which tracks the average status of each measure. From 2016 through 2018, we improved our overall percentage of Status 1 metrics by 28%, 18%, and 13%, with increases in the Quality Progress Index of 9.4%, 6%, and 3.4%. For example, Beaumont Hospital, Royal Oak, utilizes the Vizient Quality & Accountability Scorecard and tools to drive the need for change across the organization. Leadership, providers, and frontline staff are engaged and committed to improving quality and eliminating instances of patient harm. Special attention is directed to Status 1 (“red”) metrics, with root cause analysis and action plan creation. In calendar year 2018, Beaumont Hospital, Royal Oak, had an overall 21% decline in Status 1 (“red”) metrics, with an overall increase of 7.7% in the Quality Progress Index, ending the year at 3.06 (out of a possible 4). The greatest improvements were in the categories of infection control, culture of safety, and NDNQI (National Database of Nursing Quality Indicator), while we maintained strong performance in hospital-wide mortality, length of stay, and core measures. Beaumont Health has significantly accelerated and simplified our metric-driven quality program using the Quality Matrix, including consistent benchmarking and having a single repository for multiple, disparate metrics.

Urgent Need for Antibiotic Stewardship in Urgent Care Centers

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Background. Antibiotic stewardship has historically focused on inpatient facilities; however, 80% of all antibiotic use occurs in ambulatory settings, and approximately 40% of antibiotic prescriptions are generated

within urgent care centers (UCCs) and retail clinics. Despite the large number of antibiotics prescribed in UCCs, few health systems have described implementing antibiotic stewardship in such settings. This is critically important because approximately 45% of all antibiotics prescribed in UCCs are inappropriate and unnecessary. In our health system, an opportunity to improve antibiotic prescribing practices was identified when our UCCs joined the regional Medicare Quality Improvement Organization’s outpatient antibiotic stewardship program in January 2017, as well as when we participated in a statewide outpatient antibiotic stewardship initiative in spring 2017. The goal of the antibiotic stewardship initiative in our health system’s UCCs was to reduce total antibiotic utilization and, in particular, to reduce total azithromycin utilization, identified as a commonly overprescribed antibiotic. Our strategy for the UCC antibiotic stewardship initiative was multifactorial and multidisciplinary in nature. In order to be successful, participants had to focus on delivering patient and provider education within UCCs, standardizing therapeutic management of common infections, and providing direct feedback to providers on antibiotic prescribing rates. Key to our success was having the consistent support and engagement of the UCC lead physician, as well as the engagement of front-line UCC providers. This initiative aligns with our institution’s aims of strategic partnerships and optimal health. A novel antibiotic stewardship initiative, this project and similar interventions and strategies need to be implemented in health systems nationwide to improve antibiotic prescribing practices in all UCCs and to help combat the global threat of increasing antimicrobial resistance. *Intervention Detail.* A literature review revealed that antibiotics are commonly prescribed in UCCs and are inappropriately prescribed in approximately 45% of all cases.¹⁻³ Our health system sought to improve antibiotic prescribing across our UCCs by decreasing total antibiotic utilization. We put several interventions into place to achieve this goal, starting with increasing patient education and awareness of antibiotic stewardship by placing posters and commitment letters in all patient exam rooms and making patient education pamphlets easily accessible and easy to order for each UCC. UCC provider education also was important, and the health system’s antimicrobial stewardship team delivered an on-site lecture to UCC providers focused on how best to manage common infections, avoid prescribing antibiotics for viral infections, and effectively communicate these messages to patients. The lead UCC physician then performed chart audits from April 2017 through May 2018, and feedback on individual provider’s antibiotic prescribing was provided either in person or via email to identify opportunities for improvement. Antibiotic utilization data then became available within the UCCs. Beginning in May 2018, UCC

providers began receiving monthly emails with their antibiotic prescribing rates, allowing for peer-to-peer comparisons. The quantitative measures assessed during this initiative included the following: antibiotic utilization data represented as total prescriptions per 100 patient visits per month; azithromycin utilization data represented as azithromycin prescriptions per 100 patient visits per month; azithromycin prescriptions per 100 visits for the diagnoses of upper respiratory infection, bronchitis, and sinusitis in order to provide evidence that antibiotic prescribing was declining, regardless of the diagnosis selected by the provider; antibiotic prescriptions per 100 patient visits in pediatric and adult populations; and antibiotics prescribed for the diagnosis of sinusitis. *Outcomes and Impact.* The UCC antibiotic stewardship initiative resulted in a 50.3% decrease in total antibiotic prescriptions per 100 patient visits when results were compared between the pre-antibiotic stewardship period (November through December 2016) and the post-antibiotic stewardship period (July through August 2018). This corresponds to a rate ratio of 0.49 (95% confidence interval = 0.48-0.52). Additionally, a dramatic decrease in azithromycin utilization was evidenced by an 88.5% decrease in azithromycin prescriptions per 100 patient visits when results were compared between the pre-antibiotic stewardship period (November through December 2016) and the post-antibiotic stewardship period (July through August 2018). This corresponds to a rate ratio of 0.12 (95% confidence interval = 0.10-0.13). The decrease in azithromycin prescriptions per 100 patient visits was consistent across the diagnoses of upper respiratory infection, bronchitis, and sinusitis. Additionally, for acute sinusitis, UCC providers were informed that amoxicillin/clavulanate is the drug of choice for bacterial disease. Consequently, amoxicillin/clavulanate prescriptions for sinusitis increased to 47% in August 2018 from 32% in November 2016. Additionally, azithromycin and levofloxacin were not recommended for treating bacterial sinusitis. As a result, prescriptions for azithromycin and levofloxacin decreased to zero in August 2018, from 24% and 3%, respectively. And finally, the decrease in antibiotic prescriptions per 100 patient visits was consistent in both pediatric (patients 0 to 17 years of age) and adult (patients \geq 18 years of age) populations, as evidenced by a decrease of 68.2% and 51.6% in total antibiotic prescriptions per 100 patient visits, respectively. This antibiotic stewardship initiative across our health system's UCCs provides evidence that a multifaceted educational approach—including in-person lectures, distribution of patient education material, chart audits, and direct feedback to providers—is a successful strategy to decrease antibiotic prescribing and improve antibiotic stewardship practices.

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The Essentials: Eating, Sleeping, Consoling— New Neonatal Abstinence Syndrome Management

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Background. Prescription opioid use in the United States increased more than 3-fold over the past 2 decades, and opioid use affects between 14% and 22% of pregnancies. Infants who are exposed to opioids or other substances in utero can display a variety of neurologic, respiratory, and gastrointestinal symptoms that together comprise Neonatal Abstinence Syndrome (NAS). By the end of 2017, the Denver Health neonatal intensive care unit (NICU) had cared for 34 infants with a diagnosis of NAS, 65% of whom required pharmacologic treatment. With a median length of stay (LOS) of 25 days for these infants, this 25-bed NICU found itself caring for at least 2 substance-exposed newborns on any given day. *Intervention Detail.* Through 2017, substance-exposed newborns were scored on their withdrawal symptoms using the Finnegan Neonatal Abstinence Score, which evaluates infants on 24 different symptoms. This method of scoring is complex and varied greatly from one nurse to another. In 2018, the Denver Health NICU initiated the Eat, Sleep, Console (ESC) assessment tool. This tool evaluates infants on only 3 criteria: the infant's ability to eat enough to sustain growth and development, sleep for at least 1 hour at a time, and be consoled by a caregiver within 10 minutes. Registered nurses caring for substance-exposed newborns in the NICU underwent rigorous training on the new ESC tool, as well as a variety of nonpharmacologic interventions to ease symptoms. This functional assessment tool focused on the most important withdrawal symptoms and was helpful in increasing interrater reliability. It also emphasized caregiver involvement, with a focus on keeping mothers and babies together. *Outcomes and Impact.* After implementing the ESC tool, the Denver Health

NICU experienced a sharp decline in the number of substance-exposed newborns requiring pharmacologic treatment, from 65% in 2017 to below 13% in 2018, as well as a decreased median LOS to 12 days for those substance-exposed newborns requiring treatment. In a follow-up questionnaire, the majority of NICU registered nurses rated the ESC tool as “effective enough” or “very effective.” Additionally, it allowed many infants who previously would have been treated with medications in the NICU to remain with their mothers.

Target Zero: Prepare for and Celebrate Events That Never Happen

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Background. “Is your hospital safer this year than it was last year?” We asked ourselves this critical question in 2013 and realized we did not know the answer. Through a strategic planning process involving executive and clinical leadership, we created a bundled metric of total hospital harm that would serve as an objective measure of harm and the basis for a campaign to eliminate it. The aspirational goal to eliminate preventable harm in the hospital is embedded in the name of our metric: Target Zero. The Denver Health and Hospital Authority Patient and Family Advisory Council provides feedback on proactive safety interventions and communication modes. It was important to our leadership that we include events that are preventable, reliably measured and defined, and adjudicated by clinical staff members. We ensured that there was alignment between the components of our Target Zero metric, Centers for Medicare & Medicaid Services (CMS) incentive programs, and Vizient programs. Our board of directors approved Target Zero as an enterprise strategic focus and management incentive plan metric. Each year our leadership reviews the individual measures and determines if overall metric changes are needed. Our presentation details the launch, evolution, and maintenance of a multidisciplinary effort to reduce common harm events in acute care hospitals, which has resulted in 3 consecutive years of significant reductions. The Target Zero initiative has become part of the fabric of hospital improvement work through daily safety huddles, innovative data displays, gamified education modules,

and unit-based celebrations of success. The results have translated into improvements in external safety measures, such as the Leapfrog Hospital Safety Score, the CMS Hospital Star Rating, and the CMS Hospital Value-based Purchasing Program. The project exemplifies that “Preventing Harm” applies to all hospitals, and guides Vizient members in creating their own path for harm reduction. *Intervention Detail.* Target Zero includes 7 categories: falls with moderate or major injury, high-harm medication safety events, hospital-acquired venous thromboembolisms, publicly reported surgical site infections (SSIs), hospital-acquired *Clostridium difficile* infections, catheter-associated urinary tract infections (CAUTIs), and central line-associated bloodstream infections. We chose these events because evidence-based interventions exist that result in significantly better outcomes and lower risk of harm. Every Target Zero component is collected and/or benchmarked by Vizient. The hospital-acquired infection measures are adjudicated by infection control and reported to the Centers for Disease Control and Prevention’s National Healthcare Safety Network (NHSN) program. Vizient utilizes these NHSN measures in the Ambulatory Quality and Accountability study; Hospital Improvement Innovation Networks; and Resource Manager, a Vizient Clinical Data Base tool. Falls are voluntarily reported and adjudicated by our nursing department using National Database of Nursing Quality Indicators criteria. The fall measure is reported monthly. Medication safety events are reported and adjudicated by our pharmacy department. To improve hospital safety, we needed both measurement and transparency of harm. We deliberately moved from rates (eg, events per 1000 patient days) to a raw count of adverse events to underscore the negative experience of our affected patients. Using individual counts also allows us to build data displays at the unit level, reflecting “days since last event,” a powerful tool for frontline celebration of success. Data are summarized by event type and department of origin. Reports have drill-down capability to access patient- or department-level data for review. Knowing that not all events that we track are truly preventable, we target an annual 10% to 20% reduction in harm events compared to the prior year. Individual units establish internal goals to maximize days between events. Process measures that guide our efforts include the number of hits on the data tool site and the number of employees participating in online education modules. *Outcomes and Impact.* During the first 4 years of the project, we achieved an average 15% annual reduction in events. We revised our internal campaign in 2017 with easily accessible reports, appealing educational options, and routine enterprise-wide data review. A Target Zero website on our intranet allows all staff to see our overall progress and department leaders to see the number of events and days

between events on each unit. Unit managers display their results on visual management boards. Target Zero results are reviewed weekly during the daily patient safety briefing to shine light on successes and opportunities. Each measure has an institutional 2-month focus with computer screen savers, unit-based huddle sheets, and targeted educational modules. These modules incorporate gamification to teach about each adverse event and specific interventions to prevent harm. The quality team rounds on units, asking frontline staff targeted questions related to the specific module while using the information gathered for recognition and rewards. This also helps pinpoint additional educational opportunities. Global and targeted interventions have been key to decreasing harmful events. Electronic hand hygiene monitoring and surveillance capabilities of our new electronic health record helped across all event types. CAUTIs decreased by 73% through interventions, including a buddy system for Foley catheter insertions, a reduction of Foley insertions in the emergency department, and a bundled urinary catheter order set. SSIs decreased 50% through collaborative projects. Falls with injury decreased 65% through Denver Health initiatives such as the “Big Three”: (1) install bed alarm on all patients until fall risk assessed; (2) keep patients in close proximity if moderate or high fall risk; and (3) assist to bathroom, stay, assist back. Ultraviolet light utilization to eradicate *C difficile* helped decrease infections by 15%. These interventions resulted in an overall 40% decrease in fall events between 2015 and 2018!

Right Care, Right Setting, Right Time: A Framework for Neuroscience Capacity Management

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Background. With a growing average daily census, alarming bed utilization rates, and increased elective surgical volumes, the Duke University Health System neuroscience service line needed to develop a reliable and systematic process to direct the flow of admissions to the correct care teams throughout the entire organization. The service line was frequently unable to accommodate outside hospital transfer requests because of bed constraints. Simultaneously, lower-acuity cases were being accepted to the flagship Duke University Hospital, often without systematic thought or consideration that those cases did not need the resources of a large academic medical center. As a result, an important collaboration formed between Duke University Hospital,

its 2 sister community hospitals (Duke Regional Hospital and Duke Raleigh Hospital), the transfer center, and the neuroscience service line to create an algorithm-driven, multihospital triage and care system. This multidisciplinary group of physicians, administrators, and analysts worked together to develop admission algorithms to facilitate the flow of neuroscience patients to the most appropriate care teams within the health system. This work is unique because our team has figured out how to connect stakeholders from disparate silos across a health system, enabling them to work together and drastically improve service line efficiency. We have learned how to effectively co-create a solution, with physicians, nurses, and administrators, to a problem that previously seemed unsolvable. One of the most innovative algorithms we created transfers low-acuity neuroscience patients from the Duke University Hospital emergency department (ED) directly to nearby community hospital inpatient beds. This type of work will become increasingly important as hospitals and health systems continue to merge in their attempts to lower costs and achieve higher operational efficiencies. *Intervention Detail.* Multiple sources of quantitative data helped focus our team’s efforts. Over the past 5 years, the neuro intensive care unit’s bed utilization rate has steadily increased from 65% to 96%—a 47% increase in average daily census. Likewise, the neuroscience step-down floor experienced a 28% increase in average census. The neuroscience general floor experienced a 15% increase in average census as well. A component of this increased activity comes from a growing amount of outside hospital transfer requests. Currently, there are an average of 190 neuroscience transfer requests per month—75% more than just 3 years ago. The data made it clear that new and innovative ways of thinking were necessary to accommodate patient care needs for both transfer center and ED admissions. After thoroughly exploring the data, the team found that Duke University Hospital was accepting roughly 13 patients per month through the transfer center that could have received appropriate, high-quality care at Duke Regional Hospital. This cohort was made up of patients with less medically complex conditions, including certain subtypes of ischemic stroke, uncomplicated seizures, and other general neurology conditions. The team also found that there was a small group of patients arriving to the University Hospital ED who could have been receiving care more quickly and efficiently at Duke Regional. Data also revealed 2 additional groups of neurosurgical populations who would vastly benefit from a more systematic triage system. Overall, 4 algorithms were generated to more efficiently direct the flow of neuroscience admissions to help patients get the right care in the right setting at the right time. *Outcomes and Impact.* Today, the algorithms are fully in use. Patients are being effectively identified, triaged, and routed to appropriate care teams throughout the organization on a daily basis. One of the most important

algorithms routes lower-acuity neuroscience transfer center patients to Duke Regional Hospital. The algorithm has successfully routed 289 patients so far, with the average starting to climb to more than 20 patients per month. This has given immediate and much-needed relief to University Hospital care team members, who have been struggling with a rising average daily census, and it has saved the hospital more than 5 years of cumulative inpatient bed days. The second algorithm, which rapidly transfers mechanical thrombectomy ischemic stroke candidates, is transferring 5 to 10 patients per month. The third algorithm, which acts as a “fast track” for emergency neurosurgical patients with conditions such as aneurysmal subarachnoid hemorrhages and brain tumors, is routing patients to care teams weekly. The fourth algorithm, which recently went live, will transfer anywhere from 5 to 10 noninterventional stroke patients from University Hospital ED to Duke Regional Hospital per month. The transfer center and ED staff members who apply these algorithms have been trained with visual diagrams, active rounding, data reviews, and monthly updates. The physicians, administrators, and analysts who developed the algorithms continue to refine logic and review outcomes data through regular weekly meetings. Overall, this initiative has given Duke Health’s neuroscience service line the ability to shape patient admission patterns that previously were thought to be fixed and unchangeable, allowing them to maximize resources and provide care in a more efficient manner.

Make It Meaningful: Creating a Quality Dashboard Platform for Measurable Improvements

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Background. Four years ago, Duke Health neurosurgery had no insight into quality metrics. Team members were being held accountable for data they knew nothing about. There was no source of truth for quality, and most of the work was prioritized from anecdotal accounts. After receiving generic, ad hoc reports from health system leaders, the team was left without a way to dig deeper into the data to fully understand which areas needed improvement. Readmission rates were a priority one month, only to be superseded by clinic patient satisfaction scores the next month. It took weeks for data to become available at the provider, department, and patient levels. The team was taking shots in the dark with every quality improvement (QI) initiative. This project is uniquely innovative because the Duke Department of Neurosurgery team figured out how to connect disparate data sources into one

coherent platform that enables it to improve quality in much faster cycles than before—with real, measurable results to demonstrate improvements. The team is now able to engage providers more effectively with monthly snapshots of quality scores that can easily be drilled down to the patient level so that improvement opportunities can be spotted within minutes. *Intervention Detail.* One of the first steps to this process was identifying the quality measures that mattered most to both neurosurgeons and the health system. The team comprehensively reviewed measures currently being tracked and chose 17 quality metrics that mattered most. The list includes the Vizient mortality index, the Vizient length of stay index, readmission rates, inpatient and outpatient patient satisfaction scores, patient email response times, closed encounter times, clinic lead times, and several other metrics. This comprehensive list helped focus the team. Next, a master dashboard was built containing visual data for each metric, with context around targets, long-term trends, denominators, and data time frames. The dashboard can be aggregated to the overall department, division, or provider level. Each provider in the department receives a snapshot of this dashboard with her/his quality scores every month. The dashboard is uniquely innovative because each metric has an associated “top performer”—the provider who is performing the best on each metric. This top performer information spurs friendly competition between providers and gives lower performers a pathway to success by connecting them to someone with whom they can discuss improvement opportunities. The master dashboard is supplemented with 3 other dashboards that allow the team to quickly drill into opportunity areas for specific metrics. The supplemental dashboards contain extra information about patient satisfaction, mortalities, and outpatient clinic data. *Outcomes and Impact.* Today, the entire quality platform is fully automated and in use. The dashboards are published to an internal website maintained by the Duke Health analytics department. The platform can be accessed by users who are logged into a secured computer with appropriate permissions. Neurosurgeons are engaged with their quality outcomes and they actively discuss opportunities for improvement. The vice chair of quality plays an instrumental role by identifying opportunities and communicating them across the department. Overall, this has been a massively successful culture change for the department of neurosurgery. There have been many measurable results over the past few years as well. The neurosurgery mortality index dropped from 1.02 to 0.65 over a 3-year period, which is a 36% improvement. Five-day note closure rates improved from 87% to 97%. New appointment lead time decreased from 21 days to 10 days. Three-day patient email response rates improved from 86% to 95%. Clinician and Group Consumer Assessment of Healthcare

Providers and Systems global rating patient satisfaction scores improved from 83% to 93%. These results show the vast amount of success that the neurosurgery team has achieved by purposefully organizing and sharing their quality data with frontline providers. The platform is now being replicated across other clinical departments at Duke Health, including the departments of surgery, medicine, and OB/GYN.

Perioperative Pain Optimization: Preoperative Treatment for Patients on High-Dose Opioids

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Background. Pain management has a significant influence on postoperative outcomes. Across 3 different hospitals in our health system, patients taking significant opioids prior to admission had higher readmission rates and emergency department (ED) visits compared to patients on low-dose or no preoperative opioids. At Duke Health, we established the Duke Perioperative Pain Care Clinic, the first of its kind in the nation. The clinic aids in the functional recovery of surgical patients through personalized care plans to manage pain. The purpose of the clinic is the preoperative optimization of pain and medication management. Traditional preadmission testing clinics or surgical offices are poorly equipped to provide perioperative care for chronic pain patients. Customary chronic pain clinics frequently encounter access issues in accommodating perioperative time lines to optimize patients. The Duke Perioperative Pain Care Clinic provides comprehensive care from the decision to have surgery, through the inpatient stay, and up to 90 days postoperatively. *Intervention Detail.* The primary data set included all inpatient surgical admissions in opioid-tolerant patients—a total of 8024 patients from March 2017 through July 2018. Patient data from the Duke Perioperative Pain Care Clinic (perioperative cohort) was collected by manual review. These patients were then identified and eliminated from the primary data set, creating a control cohort of 7848 patients and a perioperative cohort of 176 patients. *Outcomes and Impact.* In the perioperative cohort, the preoperative opioid dose was reduced by 18% from the first perioperative clinic appointment to hospital admission, and the opioid dose from the first perioperative appointment to 90 days post procedure discharge was reduced by 44%. Thirty-day readmissions were 13.8% for the control cohort, compared with 11.11% for the perioperative cohort. Thirty-day ED visits were 15.8% for the control cohort compared with 12.5% for the perioperative cohort. Patients who were optimized and then provided consistent follow-up

post discharge showed a trend toward better outcomes in terms of opioid dose requirement, 30-day ED visits, and 30-day readmissions. Not only did perioperative patients decrease their preoperative opioid dose, but they also displayed a significant reduction in opioid dose requirements 90 days after their procedure. While the study's small sample size precludes definitive conclusions for this population, further studies with larger study cohorts may provide more definite direction.

Integrated Memory Care Clinic: Dementia-Sensitive Primary Care

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Background. Most of the 5.7 million persons living with dementia (PLWD) in the United States receive medical care in general primary care settings. That care is typically fragmented and insensitive to the specific needs of PLWD and their care partners. Dementia, combined with multiple comorbid conditions, often results in more frequent use of acute care services. These encounters are often characterized by negative experiences for both PLWD and their caregivers, and result in adverse health outcomes for PLWD. Emory University's Integrated Memory Care Clinic (IMCC) is a comprehensive dementia care program grounded in the principles of the patient-centered medical home, clinical geriatrics, and palliative care. IMCC is directed by advanced practice registered nurses (APRNs) and seeks to improve the health care experience of people living with Alzheimer's disease and related disorders. It incorporates geriatric nursing, social work, and APRNs from neurology, gerontology, and palliative care. Unlike other dementia care programs in which APRNs play primarily adjunctive or case management roles, IMCC APRNs are the first-line clinicians, providing comprehensive and coordinated primary care for dementia and other chronic conditions, as well as episodic care for minor acute illnesses, in collaboration with a cognitive neurologist and a geriatrician. Taking a palliatively oriented and dementia-informed approach, IMCC aims to reduce the dementia burden by partnering with patients and caregiver dyads in care design and delivery. IMCC represents a novel care model for dementia patients and their caregivers and may be a more sustainable model for this growing vulnerable population. *Intervention Detail.* IMCC's mission is to incorporate patients and families into the care team to provide excellent health care while reducing health care costs, thereby improving care coordination and patient quality of life. Treatment is

planned and delivered according to each patient's dementia type and stage; symptom type, frequency, and severity; and patient and caregiver wishes. IMCC assumes a dementia-informed, person-centered, and palliative approach to deliver the least intrusive care and optimize quality of life. Caregivers are regarded as collaborators and are involved in the coproduction of patient care. In all appointments, providers prioritize patient and caregiver goals and preferences and discuss goals of care and advance care planning. An individualized plan is initiated through a systemic assessment of needs and developed with a balanced set of goals, medication regimens, and treatment strategies for the care of dementia and other chronic conditions. The plan also specifies care team member roles (IMCC staff, primary informal caregiver, and other caregivers). The IMCC social worker recommends resources that take into consideration the family's location, the patient's veteran status, their finances, and the patient's dementia stage. The IMCC social worker then identifies community resources for the family, including caregiver education, support groups, adult day programs, home-delivered meals, respite, and patient placement. Care partners can participate in a number of evidence-based interventions and classes that help reduce the frequency of dementia-related behavioral and psychological symptoms (BPSD); decrease the caregiver's burden, depressive symptoms, and anxiety; increase the caregiver's confidence and competence; and improve the caregiver's ability to manage challenges and her/his tolerance of the PLWD's memory impairment. At IMCC, the first-line approach to behavioral and psychological symptoms of dementia management is nonpharmacologic, using collaborative planning and consultation with the caregiver and education about BPSD management. Pharmacologic management is used sparingly as an adjunct. *Outcomes and Impact.* In a preliminary examination of IMCC's feasibility and efficacy, we observed significantly decreased rates of ambulatory care-sensitive hospitalizations and a relatively low rate (25%) of emergency department visits compared to published rates for PLWD (37% to 54%). Furthermore, the study found decreased severity of delusions ($P = .032$, 95% confidence interval [CI] $-0.19, -0.0091$), decreased severity of depression ($P < .001$, 95% CI $-0.18, -0.062$), and decreased total symptom severity ($P = .005$, 95% CI $-0.19, -0.0035$). Caregivers thus far have been highly satisfied with access to care and their understanding of the care plan. Caregivers indicated a very high degree of satisfaction with the clinical experience; 97% of post-visit evaluations yielded "extremely satisfied" ratings. Caregiver comments also reflected an overwhelmingly positive impression of IMCC: "This process thus far has been a blessing. We have been looking for a caring and knowledgeable one-stop shop," said one caregiver. "I

especially appreciate Emory's integrated approach and general health care. I think it's just fabulous and the way medicine should be," said another caregiver.

Creating Consistency and Value by Internalizing Utilization Review Programs

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Froedtert & the Medical College of Wisconsin

Background. Evolving third-party payer regulations have driven implementation of hospital physician adviser/utilization review (PA/UR) programs to guide observation and inpatient status determinations. These teams of utilization review case managers and physician advisers serve as expert liaisons to care providers who can no longer be expected to keep up with third-party payer nuances. Many hospitals utilize external consultants to do a portion of this work because of the volume of patient admissions that must be reviewed. At Froedtert & the Medical College of Wisconsin, a 500-bed teaching hospital, admission status reviews for observation or inpatient status are divided between an internal team and an external consultant. In this model of 2 different processes, confusion and inconsistencies result. Therefore, expansion of the internal PA/UR team was considered with the goal of maintaining and improving consistency and value. By keeping utilization review in house, relationships formed between the internal PA/UR team and our care providers were anticipated to enhance the active, ongoing communication needed for initial status determinations and subsequent peer-to-peer (P2P) appeals. Decreasing reliance on an external consultant also brings significant cost savings. Hospitals strive to be compliant with regulations while maximizing financial reimbursement, and having an internal PA/UR program can help accomplish these goals. *Intervention Detail.* Data were obtained from internal reports maintained by our internal utilization review case managers and denials management team, in addition to a database maintained by an external consultant. It was hypothesized that determinations made by our internal PA/UR team during daytime hours prompted more efficient responses from our providers than determinations made by an external consultant during daytime and off hours. Efficiency of status determinations was determined by the ability of a utilization review case manager or an external consultant case manager to reach a provider. Internal case managers were able to reach providers 91.6% of the time, compared with our external consultant who reached providers 57.1% of the time. To address this, the first step in internalization was to train

staff physicians on our hospital's utilization review committee as ancillary physician advisers to make status determinations in off hours. These staff physicians represent our Physician Adviser Moonlighting Program, and they have ongoing relationships with our hospital's providers, enabling them to further enhance conversations regarding admission status. After this initiative's success, it was hypothesized that internal physician engagement, denials management, and involvement in hospital contract negotiation would allow for improved appeals outcomes. Specifically, success at performing P2P appeals (where providers have the opportunity to discuss cases with payer medical directors) to overturn denials of inpatient status was compared between internal attending providers and our external consultant. There is no national P2P appeal overturn rate benchmark available. Initially, the success overturn rate was 69% (94/135) if the appeal discussion was done by an internal attending provider, but only 36% (83/228) if done by an external consultant. A P2P coordinator position was created to guide and educate providers during that process, resulting in our current overturn rate of 84%. *Outcomes and Impact.* By creating an internally based PA/UR program, providers respond more readily to discussions regarding status determination. In a large academic medical center, this allows for patients who need to be converted from outpatient to inpatient status to do so promptly. The PA/UR team, including the staff physicians trained as ancillary physician adviser moonlighters, have formed relationships with our providers to create this efficiency. Furthermore, our attending providers actively taking care of their patients are in a better position to discuss a denial during a P2P appeal with a third-party payer than an external consultant. The higher internal appeal success results in a significant reduction in additional denials management work required to do a written appeal if the P2P appeal was unsuccessful, as well as an increase in hospital financial reimbursement by securing a diagnosis-related group inpatient payment. This has prompted leadership to agree to the creation of additional internal positions to reduce reliance on an external consultant. These internal positions not only are more cost-effective, but will improve the consistency and potentially enhance the quality of the work performed. Our projected annual savings is \$550 000. PA/UR programs vary widely in their approach to admission status determinations and P2P appeals processes. Based on our findings, we encourage other institutions to consider the benefits of the relationship formed between their hospital's providers and an internal PA/UR team.

Huddle Up and Out: Driving Cultural Transformation Through Active, Multidisciplinary Team Engagement in Discharge Huddles

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Harborview Medical Center

Background. Harborview Medical Center (HMC), a 413-bed county hospital in Seattle, Washington, and the only Level 1 trauma/burn referral center for 5 states, has increasingly faced high census and longer hospital length of stay (LOS). LOS trended up year-over-year from 5.95 days in fiscal year 2012 to 7.65 days in fiscal year 2018. As a safety net hospital, changes in reimbursement, particularly in the Medicaid population, have further challenged efficient patient throughput and discharge. HMC is one of 2 major teaching sites for the University of Washington Schools of Medicine, Nursing, Social Work, and Pharmacy, with residents providing much of the frontline care. HMC leadership designated safe, effective, efficient, early discharges as a care transformation priority to achieve efficient throughput and budgeted LOS. HMC partnered with Vizient consultants to transform our discharge process. HMC hosted a production, preparation, process (3P) event with the Vizient team to design innovative processes in areas critical to improving LOS. The team included representatives from care management, including continuity of care nurses (CCNs), social workers (with their master's degrees in social work [MSWs]), physicians, advanced practice practitioners, charge nurses, bedside acute care nurses, pharmacists, therapists, utilization management specialists, information technology representatives, and chief residents from multiple specialties. They targeted multidisciplinary discharge huddles as an early area of focus. *Intervention Detail.* Discharge huddles were redesigned to be multidisciplinary, standardized, CCN-led, brief, and patient-centered. They focused on eliminating delays in care and proactive discharge planning. New huddles were initially rolled out on the medicine service, the largest inpatient service with 5 teaching teams and 3 hospitalist teams. The medicine service traditionally had a CCN embedded within the team; other team members were not actively included in discharge planning discussions. We piloted the discharge huddles with 2 of 5 medicine service teams facilitated by 2 CCNs identified as high performers and early adopters. The medicine service discharge huddle team included MSWs, pharmacists, representatives from therapies, unit charge nurses, attending physicians, and senior residents. Huddles were led by CCNs, who

followed a standardized script. The script included the patient name, diagnosis, hospital day relative to geometric mean LOS, barriers to discharge, and assignment of action items for follow-up after the 15-minute huddle. CCNs were tasked with creating a sense of urgency within the team to expedite the timely progression of patient care and a safe and effective discharge. HMC leadership and Vizient teams attended discharge huddles daily and held weekly debrief sessions to dialogue and discuss opportunities for improvement. Feedback, particularly from multidisciplinary team members, was critical as huddles had to be incorporated into busy workflows. These ongoing active and transparent feedback mechanisms supported information gathering used to continuously improve the discharge huddles before broad dissemination. Data about huddle timing and quality were provided transparently to teams and also were used to refine the process. Once the discharge huddles were standardized and running efficiently, the reengineered huddles were rolled out across all clinical teams. Data highlighting successes, discharge barrier themes, and improvement opportunities are displayed in the team rooms for targeted interdisciplinary brainstorming of barrier mitigation. Despite initial successes on the medicine service, overall hospital LOS increased. Through multiple plan-do-study-act (PDSA) cycles, we increased peer coaching for CCNs to decrease variation across the huddles, drove more active action planning, further engaged frontline nurses and residents, integrated a capacity management physician team, and introduced leadership standard work. *Outcomes and Impact.* We track discharge timing and LOS for HMC acute care overall and by clinical service. Data are captured on an institutional quality dashboard that is accessible to all frontline staff, providers, and leadership. Aggregate LOS data are presented at a monthly HMC Executive Steering Committee meeting that supports continuous process improvements and celebrates successes. In the first 3 months after huddle implementation on the medicine service, admit LOS trended toward budgeted goal (from 7.25 days at baseline to 6.78 days at month 3), percentage of discharge by noon trended toward improvement (from 14.1% at baseline to 16.1% at month 3), and average discharge time was moved slightly earlier in the day (from 15:01 at baseline to 14:14 at month 3). Despite initial improvements with the medicine service pilot, overall LOS increased (from 8.8 days in month 1 to 9.4 days in month 4). After close assessment and implementation of consecutive PDSA cycles of improvement, we saw a sustained decrease in the overall average LOS (from 9.4 days in month 4, an average of 8.6 days in months 5 through 8, to an average of 8 days in months 9 through 11). We continue to track these data elements on a regular basis and target frontline engagement strategies as we identify gaps in our initiatives. Results show that active

frontline engagement of the entire multidisciplinary care team, executive team support, collaboration, shared accountability, data-driven continuous improvements, standardized best practices, and ongoing evaluation using PDSA cycles are key elements to achieving safe and efficient patient discharge.

Innovative Nurse-Driven Solutions to Complex Patient Issues: Methodist Proficiency Assessment and Competency Certification

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Houston Methodist Hospital

Background. Serious adverse events (SAEs) occur in a significant proportion of hospitalized patients. Studies show SAEs are often iatrogenic and preventable in many cases, as they are commonly preceded by documented evidence of physiological instability (eg, hypotension, tachycardia, tachypnea), at times up to 24 hours before the event. Patient risk and outcomes are dependent on the number and severity of vital sign derangement. Unfortunately, in patients with abnormal vital signs, almost 50% of nurses are unaware and therefore unable to intervene. Delayed recognition of deterioration is a significant factor in patients who experience an SAE while hospitalized. In fact, when delayed recognition is extended to 4 to 8 hours, patient risk of mortality more than doubles. These failure to rescue (FTR) events are notably complex and have multifactorial causes. However, research clearly demonstrates that hospitalized patients in the acute care setting are dying as a direct result of the multidisciplinary care team's lack of patient monitoring and surveillance. Rapid response teams (RRTs) and electronic early warning systems have been developed and tested to address the FTR crisis. Although these strategies have had some success on the FTR continuum, they fail to address the core issue of early recognition and intervention in patients with clinical deterioration. Nurses who spend the most time with patients are best suited to recognize subtle changes in their condition. However, nurses are spending less time with their patients. Therefore, it is easy to identify lack of nurse surveillance as a primary cause of unrecognized clinical deterioration and FTR events. By establishing expectations and standardizing basic nursing care, we have demonstrated that nursing is the key to solving the FTR crisis. *Intervention Detail.* Based on significant evidence that a comprehensive physical assessment prevents FTR and SAEs, we conducted a

large-scale nursing quality improvement project called the Methodist Proficiency Assessment and Competency (MPAC) Certification. The goals of MPAC Certification are to establish basic nursing care expectations and standardize nursing practice throughout the hospital by (1) prioritizing the nurse's initial comprehensive physical assessment; (2) advancing nursing practice through improvements in the nurse's critical thinking, clinical skills, and communication; and (3) creating a culture of patient safety by improving early nurse recognition of patient deterioration. The salient aspects of the project include the following:

- Nurses and managers must achieve and maintain mandatory MPAC Certification to practice as a nurse or remain in management.
- Required components of the comprehensive physical assessment are now standardized.
- Participants are required to bring their own stethoscope and penlight to training (no borrowing).
- MPAC Certification training consists of 4 hours of didactic instruction, including viewing a Houston Methodist Hospital standardized physical assessment video; a registered nurse (RN) skills demonstration of a normal physical assessment on a standardized patient; and scenario-based, simulated change in patient condition in which nurses are required to quickly identify patient deterioration, provide appropriate nursing interventions, and communicate the patient's status to the provider or RRT.
- Nurses and managers must successfully complete each component of the training and skills validation to obtain MPAC Certification.
- Yearly MPAC Certification renewal is required. MPAC Certification has been added to new nurse orientation. All incumbent staff are expected to demonstrate the standardized normal physical assessment, as well as successfully identify and communicate with the provider a change in patient condition with simulated clinical deterioration during the annual skills validation fair.

Outcomes and Impact. Using direct observation, we collected baseline data ($n = 180$) on randomly selected RNs conducting a physical assessment on their patients. Data showed 27% of nurses completed a comprehensive (head-to-toe) physical assessment. Between January 2018 and December 2018, more than 100, four-hour MPAC Certification training classes were held with more than 1900 (96% of nursing staff) employees successfully completing their MPAC Certification. Post-MPAC audits ($n = 450$) showed a 45% improvement in nurses conducting a comprehensive assessment. To ensure sustainability,

monthly audits continued for at least 12 months. In an effort to begin to evaluate the impact of MPAC Certification on patient safety, we reviewed the records of all patients who had an RRT activation call during November 2017 (pre-MPAC Certification; $n = 94$) and November 2018 (post-MPAC Certification; $n = 101$). Starting with the 24 hours prior to the RRT activation call time and stopping 30 minutes prior to the RRT activation call time, we reviewed patient vital signs to identify any abnormal data that met our RRT activation call criteria and recorded the time. A time difference (delay time) was then calculated from the RRT activation call time to the first documented abnormal vital sign. The average delay from the first subtle sign of change in patient condition (abnormal vital sign) to activation of the RRT was 16.37 hours for the pre-MPAC Certification group and 8.89 hours for the post-MPAC Certification group. This reduction in delay time (7.41 hours; $P = .000$) from pre- and post-MPAC Certification is a strong indication that nurses who prioritize their time and conduct a comprehensive physical assessment at the beginning of their shift can improve patient safety through early recognition of change in patient condition. If sustained, these findings represent a new and exciting evidence-based solution to the FTR crisis, and it is evident that nursing is the key to success.

Protecting the Workforce Through an Aggression Prevention Team

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Indiana University Health

Background. In 2015, Indiana University Health (IUH) Academic Health Center, Indianapolis, noticed a 50% increase in violence with 191 security calls and 71 employee assaults. Culture of Patient Safety scores were low—3.39 out of 5. J. M. Anderson corroborated these findings in June 2019 (unpublished data). At IUH Hospital in Bloomington, a community hospital in the same health care system, security received an average of 38 calls per month for violence and reported assaults with injuries of 6 per month. D. L. Fabert corroborated these findings in June 2019 (unpublished data). In an effort to improve workplace safety, an interprofessional team of clinical and nonclinical staff was formed to analyze the activation of resources when a health care worker was being threatened. The Aggression Prevention Team/Behavior Alert (APT/BA) was developed to proactively respond to threats of violence. The APT/BA was developed in response to violence issues in the hospital settings. APT/BA is an all-encompassing process that addresses these concerns. When staff are fearful, they are

not able to think critically or care for their patients properly. With the APT/BA process, staff know that a team is available to assist with difficult situations and they feel supported. *Intervention Detail.* The IUH team performed a literature review in July 2018 that found: (1) The Joint Commission (TJC) Sentinel Event Alert from April of 2018: Physical and Verbal Violence Against Health Care Workers.¹ Alerts are issued when TJC wishes to raise awareness about specific risks within the health care setting, and (2) the American Nurses Association petitioned the Occupational Safety and Health Administration to require violence prevention programs. In 2016, health care and social service workers suffered 69% of all workplace violence injuries and were nearly 5 times more likely to experience violence on the job than the average US worker. They are more likely to get injured at work than police officers. Nurses suffer in particular.² As a benchmark, health care professionals are assaulted at a rate 6 times greater than all other occupations.³ The American Hospital Association estimated in 2016 that \$429 million was spent in medical care, staffing, indemnity, and other costs as a result of violence against hospital employees. J. M. Anderson analyzed IUH data regarding assaults and was able to corroborate these findings in June 2019 (unpublished data). Additionally, the use of violent restraints showed an upward trend. D. L. Fabert also was able to corroborate these findings in June 2019 (unpublished data). An interprofessional team evaluated current response data and performed a gap analysis. Patient grievances were compared against Maslow's Hierarchy of Needs for commonalities.⁴ A lecture presented by Veterans Affairs⁵ described a sequential series of events in violence escalation,⁶ which was mirrored to our tiered approach. The interprofessional team analyzed the current response when staff was being threatened—a systematic approach, the APT/BA proactively responded to threats utilizing a tiered response of prevention, response, and recovery. Key stakeholders discussed gaps and solutions to keep staff safe using this tiered response. Prevention: staff trainings on de-escalation techniques were conducted, nurses were provided education, and drills were conducted for a potential active shooter attack. Response: staff were able to activate APT/BA when threatening patient behaviors or escalating patient aggression occurred. Recovery: to assist team members in recovery, employee assistance support and crisis debriefing occur after an event. *Outcomes and Impact.* The APT/BA team responds immediately and performs de-escalation techniques and secures staff safety. Care contracts are developed for patients with repeated threatening behaviors. All health care staff are trained on APT/BA to reduce workforce harm events. The APT/BA response results in improved staff awareness and increased de-escalation training

capability. There was an 18% decrease in assaults at the IUH academic health center in 2017. This occurred while assaults against nurses increased nationally by more than 40%. In 2017, APT responses increased by more than 30%. Since implementation of APT/BA, safety engagement scores rose by 33%. J. M. Anderson, corroborated these findings in June 2019 (unpublished data). Similar results were realized in the IUH Bloomington community hospital setting with a 43% decrease in restraint use and a 52% decrease in assaults with injury in the first year of response implementation. D. L. Fabert corroborated these findings in June 2019 (unpublished data). These results show that the APT/BA outcomes are sustainable over time and also repeatable in different settings with successful outcomes. Although the health care industry has seen a 50% assault increase,⁷ our APT/BA response resulted in improved staff awareness and decreased assaults. In both the academic and community hospital settings, 76% of assaults occurred against nurses and 64% were nonintentional related to altered mental status. J. M. Anderson corroborated these findings in June 2019 (unpublished data). D. L. Fabert corroborated these findings in June 2019 (unpublished data). Data on nonintentional assaults led to a realization that many outbursts are affected by patient diagnosis. It may be necessary to add a behavioral component to patient care plans. Data regarding violent patients' complaints and their relationship to Maslow's Hierarchy expose the need for early identification and proactive intervention to meet those needs. The above requires the multidisciplinary approach the APT/BA response provides.

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Preadmission Wellness and Immunonutrition: A Critical Opportunity for Harm Reduction

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Background. In 2012, Indiana University (IU) Health recognized the need for a substantial and dramatic shift in how perioperative care was provided to surgical patients. At inception, there were struggles to identify tangible changes at the bedside that would reduce harm, increase quality, and deliver improved care without adding substantial cost, personnel, or complexity. In preliminary research at this institution, 75% of the patient population had major risk factors for inpatient complications, including comorbid conditions that were not being addressed until after surgical admission. Additionally, preadmission testing found that more than 50% of patients were malnourished, including cases of undiagnosed scurvy. The malnutrition elements alone represented a 49% risk of complications and mortality,¹ a finding that is not isolated to Indiana. The fact that our standard work/processes did not proactively address these issues provided the foundation for our vision for a new patient-centered perioperative care process. Thus, the Pre-Operative Wellness and Enhanced Rapid Recovery (POWER) program, integrating prehabilitation and optimization, nutrition screening, and immunonutrition, was created. **Intervention Detail.** The POWER program was developed at the adult academic health center, with IU Health, University Hospital, as the center hub. Using the demographics of our patient population we redesigned our preoperative program to emphasize surgical prehabilitation. We encouraged our surgical staff to adopt and incorporate prehabilitation and evidence-based processes to improve outcomes and reduce harm events. Staff members system-wide learned to understand that the vast majority of our patients would benefit from a short delay to optimize their medical condition prior to surgery. Educating patients, surgeons, and staff on the benefits of this process change was a key element of our success. Within our clinics and preoperative testing processes, we progressively developed multidisciplinary engagement to identify each patient's undermanaged comorbid conditions. We also engaged care management staff to better identify weaknesses in the patient's home and community environment that could impede their presurgical preparation, as well as their post-discharge care plan. Engaging the care management team early has shown to improve outcomes and reduce length of stay (LOS). We also recognized, through evidence-based literature, the value in presurgical nutrition

screening and the use of immunonutrition. We did several internal trials to validate the literature. Consistent with the evidence, immunonutrition provided us with substantial improvements in our outcomes and harm reduction. The POWER program is now being implemented system-wide at no direct cost to the patient. **Outcomes and Impact.** A database was developed to help track the outcomes of patients enrolled in the POWER program compared to those who were not. As a result, documented trends have shown that overall, patients enrolled in POWER outperform those not enrolled. The POWER program, with immunonutrition, has led to significant decreases in surgical LOS. Within our institution, the surgical LOS index dropped from 5.14 in 2012 to 1.12 in 2018. The initial immunonutrition trial (October 2013 through April 2014), with 60 hepatobiliary patients, showed a reduction in LOS from 18.33 days to 6.47 days, with a reduction in subsequent readmission from 19% to 9.8%. For University Hospital, this translated into a diagnosis-related group (DRG) LOS reduction of 8.33 days per major case. With expansion of the program across the IU Health Adult Academic Health Center, we have seen surgical site infections reduced by 57%, as well as reductions in central line-associated bloodstream infection, *Clostridium difficile* infection, catheter-associated urinary tract infection, and ventilator-associated events.² There have been documented reductions in the hospital direct cost per unit care in more than 140 high-risk DRGs. For the patient population of University Hospital, this saved an average of \$3702.95 per patient, and for Methodist Hospital, an average of \$5543.41 per patient. This equates to a savings of \$1.2 million per quarter for University Hospital alone. The POWER program also has helped us address hospital-acquired complications, as evidenced by reduction in Patient Safety Indicator (PSI 90) scores. These findings were the basis for the decision to accept the POWER program as the future standard of perioperative care within our institution, as well as to identify how this patient care process can be extrapolated into nonsurgical areas of care. With plentiful results that have positively influenced care of surgical patients, it is our aim to share this experience and how we anticipate moving forward with a more aggressive, fully comprehensive program to drive population health and outcomes.

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Drug Cost Too High? Engage Prescribers!

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Background. Like many hospitals and health systems, Indiana University Health (IU Health) is challenged with managing costs. To accompany the long-established system Pharmacy & Therapeutics Committee, clinical councils were implemented to address variable drug use practices across the system. In order to achieve significant cost savings, a method to standardize prescribing practices for selected agents was established. Agents for evaluation were identified by reviewing overall system drug costs and the breadth of use across hospitals, as well as comparing costs to both internal and external benchmarks. *Intervention Detail.* Once an agent was identified for a cost-savings initiative, drug use practice data were gathered. Many drugs have multiple indications, so understanding which clinical practices were the primary users was key to directing it to the appropriate clinical council. Use of Vizient Clinical Data Base tools facilitated this analysis. These data, along with prescribing data from our electronic medical record, helped identify which clinical councils the initiative was directed to, as well as stakeholders who could become the initiative champion. Regional members on the clinical council served as liaisons as the initiative moved through the clinical council toward implementation. Finally, tracking the results of the initiative and sharing that data with prescribers on the clinical councils was important to keep the groups engaged. This process has resulted in cost savings, standardized care, and reduced practice variation. *Outcomes and Impact.* The pharmacy department measures success by maintaining our pharmacy drug cost/discharge compared to the previous year's baseline. IU Health System's 2018 pharmacy drug cost/discharge remained flat compared to 2017. Identified cost savings initiatives for 2018 resulted in a \$7 million drug expenditure savings.

Reducing Opiate Prescribing in the Emergency Department: It Doesn't Have to Be a Pain

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Background. In September 2017, Indiana University Health (IUH) Frankfort Hospital paired with QSource as part of a special innovation project to reduce opioid prescribing in Clinton County, Indiana. Clinton County had an opioid overdose rate that was double the state average. A multifaceted approach was implemented and monitored

over 18 months to reduce emergency department (ED) opioid prescribing by 91.6%. Implementation of a chronic pain committee, provider prescription reporting transparency, mandatory INSPECT reporting (Indiana's prescription drug monitoring program), and patient education were key to the project's success. IUH Frankfort Hospital is a critical access hospital in Clinton County, Indiana. IU Health acquired the hospital into the system in June 2017. Clinton County has an above-average nonfatal opiate overdose rate. This project was important to reduce opioid abuse in the community and to respond locally to the opioid epidemic. The goal for our facility was to significantly reduce opioid prescribing from the ED. Performance management was maintained by nursing and physician leadership, providing staff accountability, with report functions completed by pharmacy. This work is unique to our system as it provided real-time feedback and transparency to providers for prescribing habits. It also provided staff members with the tools they need for patient communication and education in uncomfortable situations. *Intervention Detail.* This project was multifaceted and multidisciplinary. Our facility implemented a chronic pain policy and a committee that outlined procedures for non-acute pain "frequent flyers." Patients with chronic conditions (eg, migraine, back pain, abdominal pain) who came into the ED for pain medications were educated on appropriate ED usage and referred to appropriate specialists or primary care providers. Opioid prescriptions were no longer prescribed for non-acute conditions. All prescriptions were required to be generated from the hospital electronic medical record. INSPECT reporting was a requirement before prescribing any controlled substance. Pharmacy began tracking prescriptions generated through the ED. A monthly report was generated to show prescriptions written by provider, quantity prescribed, duration of prescription, and rate of prescribing for each provider. Local policy guidelines limit prescriptions for controlled substances to a 3-day supply for acute pain. The initial goal for prescribing rates was set at 8% or less. Monthly data for each provider were posted in the ED to show peer-to-peer comparison of controlled substance prescribing rates, along with gaps where providers were prescribing outside of policy guidelines. Nursing and physician leadership discussed report outliers with the prescriber as part of the improvement plan. QSource routinely provided physician education materials and validated that the data were statistically significant. The inpatient pharmacy provided monitoring services for this project. Specific monitoring of opiate prescriptions included multiple parameters, such as provider opiate prescribing rate compared to peers, prescriptions that exceeded a 3-day supply with chart review for indications and provider, total milligram morphine equivalents for prescriptions, and total quantity of tablets/capsules prescribed per provider. All of this information

was displayed in the ED for peer-to-peer comparison. *Outcomes and Impact.* The comparison of data from June of 2017 to January of 2019 is astounding. At our June 2017 baseline there were 203 prescriptions written for controlled substances that month from the ED. This correlated to a prescribing rate (controlled substance prescription/total patient encounters) of 21.2% for ED patients. The goal for the system is to have a prescribing rate near 8%. Implementation of the project with monthly follow-up and review has decreased and maintained our December 2018 prescribing rate at 2.25%, with only 17 prescriptions for controlled substances written that month. The quantity of each prescription also was limited appropriately to a maximum 3-day supply. QSource data from the most recent 18-month period shows a 91.6% reduction in controlled substance prescribing since initiation of this program. On a side note, there was concern that patient experience and satisfaction would decrease secondary to implementation of this program. This was not the case. Providers and nursing have clear communication with patients regarding their plan for pain. Staff feel empowered by the support for this project and patient experience scores have not decreased. They have actually increased, but that cannot be attributed directly to this project.

Insights to Action: A Visualization Approach for Influencing Opioid Prescribing

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INTEGRIS Health

Background. In May 2018, the Oklahoma Senate passed legislation that made physicians culpable for the outcomes of their patients using narcotics. The law did not state dosing limits for physicians, but it did add significant documentation requirements, patient consenting, and duration limits. Physicians were scared because they felt uneducated, uninformed, and threatened with a punitive response for their well-intentioned actions. INTEGRIS Health set out on a dyad journey for stewardship to prepare our providers for the law change while informing them about their prescribing practices. Reaching 3000 providers simultaneously was not a problem that medical education or pharmacy was prepared to tackle alone. Through the development of real-time engagement analytics and a simple, scalable influencing process, our medical directors became our frontline influencers. Physicians became stakeholders in developing prescribing expectations, interpreting results, and championing change. While health system collaboratives and conferences focused on education, marketing materials,

Centers for Disease Control and Prevention guidelines, order sets, and multimodal pain therapies, INTEGRIS Health was against the clock with the legislative changes and needed to develop a scalable solution to release tension with providers and invite them to easily become engaged stakeholders. Our belief is that once providers understand their current state, they will then be empowered to cultivate innovation and change. Performance management encompasses 4 achievable steps:

1. Build a dyad governance structure with physicians and shared services departments to develop resources and oversee prescribing guidelines for the institution.
2. Develop a morphine milligram equivalent (MME) analytics platform that encompasses the whole spectrum of care available via mobile devices.
3. Engage medical directors and staff to set procedural limits based on evidence.
4. Influence behavior with public visualizations and adoption of compliance metrics.

This approach is important to share as it efficiently achieved large-scale change through influence, as well as support within a climate of litigation and fear. *Intervention Detail.* The interventions can be split into two buckets: an analytics platform and prescribing influencers. Our analytics platform pulls a daily feed from our EMR (electronic medical record) and compares all opioid prescriptions against a third-party MME conversion table that includes intravenous, oral, rectal, and patch conversions, mapped against the National Drug Code to generate the MME equivalent. In order to calculate the average daily MME for any prescribed opioid not administered in the hospital, multiply the total quantity prescribed and divide by the duration. The administered dose is calculated as the total MME received. These data are then visualized to mobile and desktop using business intelligence tools. Solutions identified for conference attendees to consider are separating physician assistants from authorizing physicians, parsing common text patterns from nondiscrete signatures, how to manage patches (such as fentanyl), and defining the line between opioid naïve and chronic. Data then provided insight into several interesting areas, including zip code mapping for ambulatory to target populations who were receiving higher average daily MMEs, inpatient versus discharge prescribing, and specialty and department peer-to-peer comparisons. These initial metrics served to point the governance team in the right direction. To influence prescribing, goal setting was the next intervention. Nonclinicians are paired with medical directors in high-opportunity areas to utilize literature to create low, medium, and high prescribing MME thresholds customized to certain procedures. These

thresholds are then used to develop compliance metrics for leaders and providers through business intelligence visualizations. Metrics include a list of names of providers who achieved perfect prescribing over the past 7 days, number of missed opportunities, and a trend line showing adherence percentage over the past 14 days. This creates a competitive environment for continual compliance and improvement. The daily updated metrics dashboard for each unit is displayed on a TV screen in physician lounges. *Outcomes and Impact.* This project continued to scale procedural limit goal setting and new physician group dashboards throughout calendar year 2019 and potentially beyond. The project showcased visuals and measurements to support other institutions in thinking about their metrics differently. The results of developing our analytics platform that measures all care settings brought about drastic changes in MME ordering throughout calendar year 2018. Average daily MME for the system in January 2018 was 51 MME. Average daily MME for the system in January 2019 was 41 MME, which equates to 19.6M fewer MME prescribed over a 12-month period. The percentage of patients who received an opioid prescription in the ambulatory setting in January 2018 was 5.5%, for an average of 37.0 MME. In January 2019 the rate was 4.1%, with an average of 38.3 MME. Similar trends were observed in the inpatient and acute discharge settings. The inpatient reduction of MME administered in the hospital setting was most surprising, as it dropped from 17% and 19.7 MME in January 2018 to 13.4% and 17.3 MME in January 2019. Our first procedural goal interventions went live in December 2018. Within 14 days of goal setting the first department saw its compliance rise from 14% to 29% without any structured coaching or process interventions.

Frequent Flyers: Stellar Strategies for Emergency Department Super-Utilizers

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Background. When patients consistently use the emergency department (ED) as a primary source of care, it places unwanted stress and imposes unnecessary costs on an already crowded and financially overwhelmed health care system. ED super-utilizers encompass a small portion of patients who account for a high percentage of health care costs. Super-utilizers typically have complex chronic medical conditions and frequently utilize the ED because of a perceived lack of health care resources. In addition to health care disparities, super-utilizers have numerous social barriers that prevent successful outpatient disease management. As a result, they end up seeking costly care

in the ED for chronic medical management. Our institution found that fewer than 5% of patients accounted for more than 50% of hospital resources and health care costs. We recognized this problem and subsequently developed the 5/50 program to coordinate outpatient care. Our Community Care Coordination Team (CCCT) addressed underlying social barriers and provided patients with the necessary resources to prevent disease progression requiring acute care services. Our CCCT implemented improved access to community resources, which led to improved care for super-utilizers at the lowest per capita cost to the health care system. Our program reduced reliance on the ED for nonemergent health care and saved our hospital more than \$2.5 million in avoidable ED visits and hospital readmissions from June 1, 2015, through December 31, 2018. This collaborative approach avoids the use of costly acute care resources and maintains satisfaction for both patients and the health system. *Intervention Detail.* The uninsured rate among nonelderly adults in the United States was 14% in 2017, or an estimated 27 million people. Lack of primary care and health insurance are associated with longer hospitalizations, greater resource consumption, and poorer health status. Patients who qualify for government subsidized insurance plans often have additional barriers that create health disparities (eg, lack of transportation to appointments, lack of income to afford medications). Previous research has found that enrolling super-utilizers in community health programs can be a successful strategy to improve health outcomes and reduce the use of resource-intensive services, resulting in better patient education and improved outpatient management for chronic medical conditions. These were key goals for our CCCT and our institution's 5/50 program. Potential candidates for the program were identified by reviewing lists of patients with ≥ 3 ED visits over 90 days, direct ED physician referral, as well as use of an EMR (electronic medical record) alert tool for patients who had hospital admissions in the previous 30 days. CCCT consisted of 2 registered nurses, 2 social workers, a nurse practitioner, and 2 bilingual community health workers who followed-up with patients up to 6 months post discharge at their homes to assess and assist with social and health care needs. Additionally, the CCCT developed relationships with key community partners, including paramedics, the health department, the regional food bank, local transportation services, nursing homes, free/low-cost clinics, mental health services, and the police department homeless outreach team. Interventions from our CCCT included extensive outreach and frequent face-to-face communication with patients in their homes, resulting in timelier outpatient follow-up. CCCT continuously reassessed patient needs, established individual care plans, and provided education for self-management of chronic conditions. The team prepared patients for primary care visits and provided

resources for housing, substance abuse treatment, medication management, transportation, and other community resources. *Outcomes and Impact.* Initiation of the 5/50 program has shown highly successful outcomes, successfully decreasing ED visits and reducing hospital readmissions at our institution. Over a 3½-year period, 5/50 program participants had 1510 ED visits prior to enrollment and 882 visits post enrollment, a 58% reduction. The program had 986 inpatient/observation admissions pre enrollment, which decreased by 58% to 573 after enrollment. Program participants had an average of 6.3 ED visits prior to enrollment and 2.7 visits post enrollment, a mean difference of -3.6 visits (95% confidence interval [CI] -4.9 to -2.4, $P < .0001$). Program participants had an average of 1.6 inpatient admissions pre enrollment, which decreased to 0.6 inpatient admissions post enrollment, a mean difference of -1.1 admissions (95% CI -1.4 to -0.7, $P < .0001$). A cost-benefit estimation showed that prior to program enrollment it cost our institution \$5 418 628.30 to manage these patients. The total cost of the program over a 3-year period was \$1 294 500, and the post-enrollment cost was reduced to \$1 615 228.90, yielding an overall cost avoidance of \$2 508 899.40 (a 46% reduction). Our outcomes show that community programs such as the 5/50 program can significantly reduce health resource utilization and provide critical information needed to fix the significant national burden that ED super-utilizers impose upon health systems.

Creating a Telehealth Training and Education Program

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Background. The American Medical Association has recommended that telehealth training be incorporated into both undergraduate and graduate medical education programs. According to the American Telemedicine Association, there are more than 200 active telemedicine networks, with more than half of all US hospitals using some form of telemedicine. Thomas Jefferson University is leading the nation's adoption of telehealth with expansion in 4 key domains: outpatient care, transitions in care, inpatient care, and academic research. Because of this program, we have recognized the emerging need for trained professionals who can effectively deliver telehealth services, both as providers and as skilled staff. However, there is no formal education within medical education or allied health schools. Thomas Jefferson University has created education for (1) telehealth facilitators; (2) allied health professionals; (3) undergraduate, graduate, and postgraduate medical education; and (4) physician faculty. This session provided an overview of

our programs, detailed the scope of the educational need, described the challenges of operating and implementing the program, and went over lessons learned from our experience for those either already involved with or those getting into telehealth. *Intervention Detail.* Jefferson Health has committed itself to “health care without an address,” recognizing that hospitals of the future will not resemble our current landscape. By using telehealth, digital technologies, and connectivity, health care will become more home-based. Recognizing that both providers and patients need to be nudged toward and exposed to this new type of thinking, Jefferson Health created an expansive telehealth program, an innovation and design lab, and has committed to examining social determinants of health to ensure that access to quality health care remains equal. Through this process, it became evident that the current structures of educating administrative staff, medical students, residents, fellows, and current attending physicians were inadequate to support these changes. Because of this, we collected data on what current providers were doing during a telehealth visit, and investigated current laws and operations of those running a telehealth program. Using this information, a few different educational and training programs were created in a step-by-step sequence beginning with telehealth facilitators—one of the only credentials available for telehealth facilitation, providing education on the applications, benefits, and challenges of telehealth delivery. We expanded to medical and resident education, both visiting and in-house. Visiting undergraduate and graduate medical students participated in patient follow-up calls, tele-triage visits, literature reviews, and a final project. We have a robust training program for current physicians based on running both on-demand and tele-triage programs. All programs are now focused on educating participants about the clinical and nonclinical skills essential to the telehealth patient-provider encounter. Because we are using telehealth in all these capacities, we also have started including quality reviews and antibiotic stewardship of on-demand patients. *Outcomes and Impact.* To date, Jefferson Health's telehealth program has educated and trained more than 200 physicians, students, fellows, and other allied health providers. The Telehealth Facilitator Program has trained 151 students and 90 external participants—a mix of physicians, nurses, technicians, administrators, and other allied health professionals. In 2016, we offered the first telehealth elective for medical students and residents, allowing those from both our medical school and outside institutions to gain exposure to acute care telemedicine. Emergency medicine resident training included Jefferson Health emergency medicine residents taking part in follow-up calls. In 2016 and 2017, when the bulk of calls were done, 197 visits were completed. As the program changed, residents began to do tele-triage shifts, which continues to be part

of the resident-required curriculum. We created the first fellowship program that trains attending physicians to be leaders and directors of telemedicine programs. Our first fellow wrote and published an article on telehealth quality and antibiotic stewardship based on research conducted during the fellowship. We trained our faculty in on-demand and tele-triage from 2016 to 2019. As of this abstract, we have expanded to offer continuing medical education courses in telehealth physical exams, as well as consulting services for outside institutions. Having a wide range of learners has allowed us to understand needs at different levels and improve our education to expand telehealth quality. Our experience can serve as a model for other institutions to develop their own telemedicine training programs, clarifying what is necessary for participants to understand about telehealth so they are prepared for the hospital of the future.

Kaiser Permanente Implant Registries: Driving Value-Based Care

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Kaiser Permanente National Implant Registries

Background. With the ongoing shift from volume- to value-based health care, registries play a key role in driving and documenting improved quality and patient safety. Value-based purchasing is an important element of value-based health care. In the value equation (value = quality/cost), physicians typically emphasize quality and physician autonomy while hospitals focus on standardized care and budget considerations. A collaborative approach between physicians and hospitals, with defined and aligned objectives, leads to improved patient outcomes at a reduced cost. Kaiser Permanente (KP) is a large, integrated health care delivery organization with more than 22 000 physicians caring for more than 12.2 million members across 8 regions. KP's integrated health care system, administrative databases, and comprehensive electronic health record provide a unique opportunity for implant registries to enhance patient safety, quality, cost-effectiveness, and research. The Kaiser Permanente Implant Registries (KPIR) include orthopedic, abdominal endovascular aneurysm repair (EVAR), and cardiac registries (implantable cardioverter defibrillator, pacemaker, cardiac resynchronization therapy, and heart valve) that monitor implantable devices within our health care system. The registries were specifically developed to (1) identify procedure incidence and implantable device utilization; (2) evaluate patient and device outcomes; (3) identify patients at risk of poor clinical outcomes; (4) identify and monitor devices in a recall

or advisory situation; (5) evaluate comparative effectiveness of devices; and (6) serve as a foundation for quality improvement (QI) and research studies. KP's National Product Council (NPC) is a physician stakeholder-led purchasing organization that emphasizes physician leadership and clinical expertise, with the hospitals and health plan providing key analytical, financial, and administrative support. This organization and support, along with the KPIR outcomes data, empowers KP physicians to make patient-centric, value-based purchasing decisions. *Intervention Detail.* KPIR tracks implants used in 490 000 procedures with >2 million implants for >12 million members. Value-based contracting is supported by

1. Monitoring outcomes and complications to identify the most effective surgical techniques and devices.
2. Identifying early signs of device failure, sometimes in advance of US Food and Drug Administration action (eg, EVAR stent recall).
3. Using patient risk calculators at the point of care for clinical decision making.
4. Providing confidential feedback to physicians on their patients' outcomes.
5. Providing risk-adjusted hospital outcomes and benchmarking for QI.
6. Monitoring patients with recalled implants.
7. Tracking implant usage and performance for contract decisions.
8. Evaluating new technology (eg, total knee gender-specific instrumentation, cardiac plasma blades).

The NPC is responsible for selecting and establishing contracts for products and services used in patient care. Governing principles for these decisions include

1. Quality is the highest priority.
2. Physicians are responsible for purchasing decisions on all devices, implants, and related services.
3. A specialty line "core group" manages subspecialty teams for specific implant and supply contracting.
4. Kaiser Foundation Health Plan provides financial, business, legal, and contracting support, both internally and through its arrangement with a large group purchasing organization.
5. Product selection and purchasing decisions are evidence based and data driven, including KPIR data.
6. Contract decisions and cost awareness are communicated to physicians through multiple pathways, including product announcements, educational seminars, a mobile app for product scanning, and local product councils.

7. Compliance metrics are established by physician champions and monitored at national, regional, facility, department, and individual levels.

Outcomes and Impact. In 2018, 78 orthopedic surgeons and 31 hospital leaders participated on the Orthopedic Core Group and its teams. These teams managed 77 contracts covering more than \$270 million in annual spend. Compliance with hip and knee contracts in 2018 was 98%. The cost savings in 2018 was \$8 786 621. Direct operational expenses for these teams was \$221 319. The return on investment was therefore a \$39 savings for every \$1 of direct cost. In 2017, 572 KP orthopedic surgeons participated in the Kaiser Permanente Orthopedic Registries, with 12 593 hips, 22 155 knees, 2441 shoulders, and 6054 hip fracture cases registered. During the same time period, 6218 cardiovascular implantable electronic devices (CIED) and 430 primary EVAR procedures were captured. The collaboration between the KP Registries and the NPC demonstrate value through

- Successful patient recall management (230 patients in 2017).
- Data analysis and feedback to physicians on techniques/implants of potentially low value and/or higher failure rates (anterior cruciate ligament reconstruction allografts, hip resurfacing vs traditional replacement, ceramic femoral heads, EVAR stents, CIEDs, pacemakers with poor battery longevity).
- Reduction of emergency room visits for postoperative total joint patients by 50% through root cause analysis and development of remediation programs.
- Identification of best practices and redesigned clinical pathways (same-day joint replacement surgery, CIED remote monitoring).
- Evaluation of new technology (patient-specific instrumentation for hip/shoulder replacement, pulsed radiofrequency energy for cardiac dissection, leadless pacemakers).
- Correlation of patient-modifiable risk factors with outcomes (eg, body mass index, medical comorbidities, bone density, smoking) to refine perioperative care pathways.

Adoption of best practices identified by the registries and the NPC resulted in decreased revision rates of less than 5% at 10 years for knee and hip arthroplasty procedures, 6% at 7 years for anterior cruciate ligament reconstruction, and less than 2% for shoulder arthroplasty at 2 years.

A Specialty Unit for Babies Experiencing Drug Withdrawal

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Kentucky Children's Hospital

Background. The issue addressed was the care of newborns experiencing drug withdrawal, known as neonatal abstinence syndrome (NAS). *Intervention Detail.* The intervention consisted of establishing a unit separate from the NICU (neonatal intensive care unit) to care for babies with NAS and their families. *Outcomes and Impact.* A net profit of \$3.19 million was realized with the drug withdrawal unit. Length of stay for NAS babies decreased from 11.25 days in the NICU to 5.8 days in the drug withdrawal unit. Direct cost per case was \$6917.31 versus \$17 329.31 in the NICU. Nurses and parents voiced increased satisfaction.

Connections: An Innovative Approach to Perinatal Substance Abuse

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Lehigh Valley Health Network

Background. Nearly 5 years ago, Lehigh Valley Health Network (LVHN) sadly had 2 tragic sentinel cases that involved maternal substance use disorder (SUD). We also noted a substantial increase in the number of admissions to our neonatal intensive care unit (NICU) for neonatal abstinence syndrome (NAS). Concurrently, several professional organizations, such as the Centers for Disease Control and Prevention, the American Congress of Obstetricians and Gynecologists, the American Society of Addiction Medication, and the Substance Abuse and Mental Health Services Administration, all were reporting on the exponential rise of maternal substance abuse, primarily related to the opioid epidemic and associated adverse maternal and neonatal outcomes. Regionally, in December 2018, the Pennsylvania Health Care Cost Containment Council (PHC4) released a report indicating that between 2016 and 2017, substance use was present in 1 out of every 25 maternal hospital stays, as compared to 1 out of every 69 in 2000 and 2001. PHC4 also reported in March 2018 that the rate of NAS had increased more than 1000% in the same time frame. At this time, we identified an unmet need in the Lehigh Valley and surrounding areas for our pregnant population suffering with SUD, given the limited access to medication-assisted treatment providers. Our health system

envisioned the Connections program as a comprehensive, multidisciplinary model with the mission to identify and support women with SUD, enabling them to have an optimal pregnancy outcome, resulting in a healthy infant living in a positive family environment. Many of these women have psychosocial, economic, and other challenges affecting their ability to access care. By having the ability to offer a patient-centered, multidisciplinary program that collocates numerous aspects of care, we can improve patients' compliance with their care and, even more so, their perinatal outcomes. Although this unique program is young, LVHN shares its learning to provide a reproducible model that will help combat the opioid epidemic within your community. *Intervention Detail.* The spectrum of maternal and newborn care is outlined in a clinical care pathway that was developed through our obstetrics, pediatrics, and psychiatry departments. It begins with an initial prenatal assessment and ends months into the postpartum period. We utilize universal screening to identify women with or at risk for substance abuse. The questions are asked initially via a patient-entered portal, and answers are affirmed by an obstetric nurse and a physician. For patients who screen positive, screening, brief intervention, and referral to treatment strategies are then used to assess those women who would benefit from additional services. For treatment, we partnered with our county drug and alcohol administration and a community drug and alcohol treatment program. We have reduced barriers to access for residential and outpatient treatment programs. Our patients are followed by a certified recovery specialist who can motivate and encourage through shared experience. We employ a care manager to connect all the pieces of the patient's care. Given the small number of medication-assisted treatment providers willing to treat pregnant women in our community, 2 of our obstetricians completed training and are able to perform inductions and maintenance for buprenorphine. The Connections program is offered at several sites, bringing the resources to the patients. At each session, the patient has access to the obstetrician, care manager, counselor for behavioral health, and their certified recovery specialist. Once the infant is born, they are assessed for NAS and managed using a consistent protocol. Additional resources, including social services and child advocacy programs, can be utilized when necessary to provide for the newborn's safety. In the postpartum phase, we maintain close contact with the family, again with the care manager reaching out to the patient and connecting her to the services she and her baby need. *Outcomes and Impact.* The Connections program intends to eliminate variation in treatment plans throughout pregnancy, labor, delivery, and postpartum, improving quality of care for this specific population. To maximize the information available to the team and to evaluate the success of the program, in-depth analytical tools were created to aggregate and trend the information

available. Using REDCap (Research Electronic Data Capture) software, a database was created to track patients and their relevant history relating to the Connections program. This platform provides a highly customizable interface for case management documentation. This information is combined with pregnancy episode data, delivery data, and newborn data extracted through Epic. The final data set is uploaded into Tableau software, which provides a user-friendly interface where data can be viewed in real time. The Connections program now can easily track multiple volume metrics such as total encounters, gestational age at program induction, and meconium drug screening. Metric compliance can be trended for mother and newborn readmissions for both emergency department and inpatient visits, prenatal and postpartum follow-up compliance, order set compliance, Lehigh County Office of Children and Youth Services involvement, NICU consults, and early childhood intervention referrals. In addition, those metrics can be compared against the total pregnancy population, as well as the pregnancy population not involved with the Connections program. With the implementation of our pathway, compliance for perinatal substance use screening throughout the network has increased to more than 60%. To date, the program has brought services to more than 100 women. More than 30% of the women involved in the Connections program since July 2018 have been treated by our obstetricians with buprenorphine therapy. We also have placed 15 women in residential treatment in less than 1 year. With the growing concerns and trends surrounding SUD, we are expecting program volumes to grow over time.

Reducing Readmissions: A Mayo Clinic Health System Success Story

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Mayo Clinic

Background. The 30-day readmission rate is a publicly reported quality measure that serves as an indicator for safe, effective, and affordable care for patients. At Mayo Clinic Health System in La Crosse, Wisconsin, multiple efforts targeting reducing avoidable readmissions have been underway for years. Despite this work, an in-depth assessment of readmissions data in 2017 showed that 78% of all readmissions over a 6-month time frame were repeat readmissions. Of these patients, more than 50% passed away within a 6-month time frame following their last readmission. As a result of this insight, leadership set an aggressive goal to move the rate from 12.6% to 8% within 12 months.

A multidisciplinary team co-led by organizational leaders with diverse backgrounds—an ambulatory care nurse administrator and a behavioral health operations administrator—was created to develop new interventions. This innovative leadership combination was uniquely positioned to approach improvement efforts from the vantage point of care across the continuum rather than just focusing on care provided in the hospital setting. Core team members included frontline staff and leaders from both the inpatient and outpatient settings, including nurses, social workers, case managers, pharmacists, family medicine physicians, hospitalists, care coordinators, palliative care representatives, and quality improvement (QI) staff. The team sought to address the issues identified by first understanding gaps in current processes aimed at reducing readmissions. To do this, team members performed case reviews, captured the voice of the customer through patient interviews, and reviewed historical data to understand the details behind the readmissions. Visual management tools were created to track the performance of existing processes, which enabled leadership to differentiate if processes were working versus processes not being followed. This helped the team refine current processes as well as design and pilot new interventions for implementation. *Intervention Detail.* The A3 problem-solving methodology was used as a framework to reduce readmissions. Research and data collection were completed to better understand gaps in current state processes. Baseline electronic health record data were gathered over a 6-month time frame in 2017. Of total readmissions, 70.4% were assessed to be a high risk for readmission, 16.1% at medium risk, and 13.5% at low risk, based on LACE index scores. Most readmissions were associated with chronic obstructive pulmonary disease (COPD), sepsis, and heart failure diagnoses. Medical chart reviews and patient interviews were completed to dig deeper into the underlying causes for readmissions. QI tools, including root cause analysis and the 5 Whys technique, were utilized to analyze the findings. Using the results of these analyses, our team ensured that appropriate interventions were built around each patient population. For example, for heart failure and COPD patients, a process was implemented to ensure post-discharge follow-up in a specialty clinic within a 14-day time frame. For complex patients (eg, sepsis, miscellaneous diagnoses), a transitional care visit was scheduled specifically with the patient's primary care provider post hospitalization. For end-of-life patients, palliative care interventions were implemented in both the inpatient and outpatient settings to complete advanced care plans. To improve handoffs between inpatient and outpatient practices, a transition huddle was introduced where inpatient registered nurses (RNs) hand off care to outpatient RN care coordinators. To enhance the discharge teaching experience, medical equipment needed by the patient post discharge was now delivered in time for the discharge

coordinator's patient education visit. The team continues to monitor performance metrics and has designed additional interventions to be tested in 2019. *Outcomes and Impact.* The collaborative efforts of the multidisciplinary team had a statistically significant impact ($P = .002$) in reducing the all-cause, all-payer 30-day readmission rate from 12.6% in December 2017 to 8% in December 2018. This reduction in readmissions also contributed to a 15% decrease in total variable costs for readmissions from 2017 to 2018. These results demonstrate that improvements across the continuum of care can significantly impact both performance and financial metrics. Key lessons learned from the project team's experience include the value of ensuring that processes can be measured and that outcome measures are monitored and acted on to continuously improve performance. The team also learned that not every tactic or intervention developed will prove successful or impact the overall outcome as anticipated. This underscores the importance of utilizing an iterative process of planning, testing, and evaluating introduced changes. Also, the team noted that certain impact measures, while qualitative in nature, are no less valuable. This includes interdisciplinary teamwork in caring for patients across the continuum of care and having interdisciplinary teams from both the inpatient and outpatient settings collaborate to develop and implement interventions. From the patient's perspective, survey results from mid-2018 showed improvements of up to 40% in metrics related to communication with the care team, understanding discharge instructions, and symptom management from previous scores measured in early 2018.¹ Sennhauser et al successfully demonstrated the use of a multidisciplinary team approach to reduce 30-day, all-cause readmissions for heart failure patients. This project's results support those findings as multidisciplinary project leadership and infrastructure achieved transformational improvement in the 30-day, all-cause readmission rate by engaging and empowering staff and leaders across the organization to provide patient-centered care.

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Beyond Deny and Defend: Empathic Communication in Resolution After Harm

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MedStar Health

Background. Preventing harm caused by unsafe health care is a global, national, and local priority. Despite widespread recognition of patient safety as a public health

issue since at least 1999, preventable patient harm still occurs in alarming numbers. Research from 2016 suggests that more than 250 000 US hospital deaths annually are attributed to medical error, making it the third leading cause of preventable death.¹ A perennial challenge to progress in patient safety is the culturally embedded “deny and defend” paradigm. It typically manifests as a “wall of silence” after unexpected outcomes happen, usually followed by adversarial posturing in claims management. The MedStar Institute for Quality and Safety is a leader in challenging this paradigm, through advancing implementation of Communication and Optimal Resolution (CANDOR), an evidence-based, state-of-the-art tool kit for driving and sustaining individual behavior and organizational culture change that optimizes continuous improvement in reducing preventable harm. Developed by innovators with support from the Agency for Healthcare Research and Quality, the CANDOR tool kit is being used in hospitals and health systems to embed a comprehensive, principled, and systematic approach of responding when unexpected outcomes occur. CANDOR training normalizes open and honest communication after unexpected harm events, coupled with emotional first aid for involved staff and a commitment to learning and prevention. Key components of the CANDOR approach include

- Rapid reporting and response to unexpected outcomes when they occur.
- Early, open, and honest communication with patients and their families.
- Emotional support for provider staff, as well as patients and family members.
- Investigation of harm events using the human factors theory to maximize understanding of causes.
- Fair and timely financial and nonfinancial resolution with apology when the harm is caused by a breach in the standard of care.
- Continuous learning and improvement that serves to prevent future harm.

Intervention Detail. Evidence supporting the case for CANDOR continues to accumulate. Learning to date is summarized below.

Improved patient safety processes and outcomes:

- Statistically significant increase in the reporting of near misses, unsafe conditions, and unexpected harm events to patients and staff.
- Substantial increase in interprofessional event analyses with associated process improvements and redesign.
- Significant reduction in serious safety events.
- Financial benefits exceeding \$1 million per hospital in a 10-hospital system (MedStar Health) that

includes a major academic medical center (AMC; MedStar Georgetown University Hospital).

Patient engagement and satisfaction:

- Improved Hospital Consumer Assessment of Healthcare Providers and Systems scores.
- Patient perceptions of courtesy and respect.
- Nursing and physician listening.
- Physician explanation.

Physician and staff engagement and well-being:

- Care for the caregiver component increases sense of well-being.
- Assists with suicide prevention.
- Fosters less burnout.
- Decreases nursing turnover.
- For an AMC: >\$1.8 million savings per year with reduced nurse turnover and decreased nursing vacancy.
- Time from event to final resolution reduced from a mean of 5 years to 1 year—4 fewer years of emotional stress during the legal discovery period.
- Significantly decreases the practice of “defensive medicine” with substantial cost savings to organizations. For patients with a chest pain diagnosis, the savings in fewer laboratory tests and radiographic studies resulted in a mean savings of approximately \$200 per discharge.

Liability metrics:

- Substantial decrease in claims and lawsuits with \$25 000 to \$50 000 savings per claim prevented.
- For lawsuits filed: >\$100 000 reduction in liability expenses per case.
- Average annual reduction from \$3 million to \$5 million in actual versus predicted payouts after first 2 years of program.²

Outcomes and Impact. CANDOR implementation and training produced the following results: baseline communication skills are measured prior to commencement of CANDOR training. This includes a task for the participant to describe exactly what they would say to parents of a daughter who had just experienced an unexpected cardiac arrest. These responses were scored using the Communication Skills Assessment Tool in the CANDOR tool kit, available at <https://www.ahrq.gov/professionals/quality-patient-safety/patient-safety-resources/resources/candor/module5-guide.html>. In a 2018 Iowa training series supported by the Centers for Medicare & Medicaid Services, only 2 of the 26 people who completed the

communication skills assessment demonstrated a high level of empathic communication during the task completion. A qualitative approach was used to determine the degree of empathy employed and effectiveness of communication after CANDOR training. Participants demonstrated a progressive increase in the degree to which they empathically communicated to patients and loved ones. Pre- and post-workshop self-assessments were conducted of participants' knowledge and confidence in the following domains: (a) communication following harm, (b) how to learn and improve following unexpected harm, (c) providing emotional first aid to peers, and (d) approaching families about financial resolution following harm events. Participants demonstrated a progressive increase in the degree to which they understood the usefulness of empathic communication in these domains, as well as their degree of confidence in using empathic communication skills. Detailed results set forth in: CANDOR: Special Report, Iowa Healthcare Collaborative (November 30, 2018). More information is available at <https://www.ihconline.org/files/images/Tools/Health%20Services/HIIN/Special%20Project%20Candor%20Final%20Report.pdf>.

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A Concurrent Collaborative Documentation and Coding Project Yields High Outputs

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Memorial Hermann Health System

Background. Memorial Hermann noticed an unfavorable sudden shift in case mix index (CMI) with ICD-10 (International Classification of Diseases, 10th Revision) implementation. In addition, the average number of codes per case was consistently low compared to Vizient peers. Service line–level data revealed cardiology, cardiac surgery, and vascular surgery performance were constantly low without any improvement trend during 2 years after ICD-10 implementation. Physicians wanted to improve documentation, but lacked the necessary expertise, and though clinical documentation improvement specialists (CDIS) were located inside the hospital, they worked outside of patient units and were not readily available for questions during clinical rounds. A coding and documentation pilot project was chartered with support from the system vice president of revenue cycle, hospital executives,

and physician leaders. A special task force was created with the following key stakeholders: hospital chief medical officer of quality, medical director for CDI, physician staff, and team members from CDI, coding, and Six-Sigma/comparative analytics. Project goals were to increase CMI and severity of illness (SOI), while simultaneously improving working diagnosis-related group (DRG) assignment accuracy and taking Vizient quality and efficiency metrics to a higher level of performance. *Intervention Detail.* Our performance improvement project began with customized clinician education. A “coat pocket” tip card was created, arranged by organ system, that provided a summary of 30 frequently captured major complication or comorbidity (MCC) and complication or comorbidity (CC) diagnoses, along with 30 high-risk variables for mortality and length of stay that were cost-specific to each service line. This pocket guide served as a reminder of how to document for better coding capture. The process of assigning ICD-10 codes to a patient medical record was in progress throughout the inpatient stay rather than after discharge. Coders coded the history and physical as soon as it was available, usually within 24 hours of admission. Coders periodically updated the “working DRG” based on new information and then completed the coding process upon patient discharge. This process produced a more accurate working DRG, which enables better case management within geometric mean LOS. With concurrent coding, all diagnoses were visible—facilitating quick identification of gaps between what was documented and clinical realities as the CDIS rounds with physicians. This process promoted contemporaneous querying of physicians on opportunities identified. It also was an opportunity for ongoing physician education. This process was highly valued by physicians and hospital administration. *Outcomes and Impact.* The Vizient Clinical Data Base was used to measure effectiveness of the study. Statistical analysis was conducted using data from 2 control periods: same month prior year and 1 month prior to study period. Improvements observed from same month prior year baseline were as follows: a 14% improvement in CC/MCC capture rate, a 54% increase in MCC capture rate, an 11.8% increase in CMI, and a 14.9% increase in SOI. Because many performance improvement projects were already in progress, improvements as compared to recent month prior to study baseline were less, yet still significant: a 4.1% improvement in CC/MCC capture rate, an 18% increase in MCC capture rate, an 8.4% increase in CMI, and an 18.7% increase in SOI. Accurate working DRGs facilitated better care management and an improved discharge process. This project generated an average of 5.3 additional diagnoses per patient and increased the expected mortality score by 17%. CDIS' reluctance was initially high; however, repeated discussions improved CDIS buy-in and

participation. Timing of physician rounds varied and gradually CDIS identified the best time to capture the maximum number of physicians during rounds. On average, it took CDIS 3 hours daily on the floors rounding with physicians. After the study period ended, a decline in performance was seen, which further attested to the project's true benefits.

Innovative Electronic Medical Record Safety Measures for Complex Therapies

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Nebraska Medicine

Background. Many complex and novel treatments in all areas of health care, especially in the care of cancer patients, have received Food and Drug Administration (FDA) approval over the last several years. These therapies may offer hope to patients with few treatment options, but they often carry significant safety risks and pose potentially serious side effects. These risks must be proactively addressed to maximize patient safety. Chimeric antigen receptor (CAR) T-cell therapy is an example of a recently approved therapy that potentially includes significant side effects. CAR T-cell therapy involves genetically engineering the patient's own T-cells to recognize and attack cancer cells. The patient's T-cells are collected, genetically modified, grown in the laboratory, and then infused into the patient. These modified cells multiply within the patient's body to kill cancer cells. The first commercial CAR T-cell product was approved in August 2017, followed by a second commercial product approved in October 2017. Institutions planning to use CAR T-cell products for treatment must go through a stringent authorization process with each manufacturing company prior to implementation. The FDA has mandated that hospitals develop processes that focus on patient safety and demonstrate compliance with the Risk Evaluation and Mitigation Strategy (REMS) program. Institutions need to identify internal processes that maximize patient safety. However, there is limited literature available regarding tools and processes for implementation of CAR T-cell therapy or for other types of novel therapy. This project helped maximize electronic medical records (EMRs) to enhance safety for patients undergoing complex and novel therapies. *Intervention Detail.* Developing resources and processes within the EMR can enhance patient safety, facilitate documentation, and help meet manufacturing company and FDA requirements. For our institution, we developed a specific flow sheet to document the administration of all CAR T-cell products. The administration flow sheet is included

in a CAR T-cell synopsis report consisting of key laboratory tests and assessments relevant to the care of a patient who has recently received CAR T-cell therapy. The administration flow sheet also drives the patient's EMR header to display the CAR T-cell product's name and days post infusion. A patient education template with all mandated teaching points was created to ensure patients and caregivers receive appropriate education and documentation, demonstrating compliance. Specific treatment plans were developed for each product. Our pharmacy developed a standardized note template, called an iVent, to document information on the availability of rescue agents and specific patient dosage information, an FDA requirement. Once patients are discharged from the inpatient setting, they are required to stay close to the treating institution for monitoring for at least 4 weeks. Patients receive education to contact our on-call team and come to our 24/7/365 treatment center. However, if a patient comes to our emergency department (ED), we have developed several EMR tools to assist the ED and to notify the on-call team that a patient has presented to the ED. Upon admission to the ED, a banner displays in the ED module of the patient's EMR for patients who have received CAR T-cells within the last 90 days. The banner notifies ED staff to contact the on-call team and lists specific CAR T-cell side effects. At the same time, the on-call provider pool receives an automated in-basket message and pager alert via the EMR. *Outcomes and Impact.* The EMR tools we have developed have enhanced patient safety efforts by helping us easily identify patients who have received CAR T-cell therapy, standardize treatment processes, and meet the stringent FDA and manufacturing company requirements. Documentation can be easily located by all team members, and backup systems assure that our patients receive prompt primary team involvement in managing serious side effects. The automated alerts that trigger when a patient presents to the ED have fired 4 times since implementation. This has allowed a trained oncology provider to meet the patient in the ED shortly after her/his arrival and assist the ED team in assessing and caring for the patient. Creating standardized flow sheets has helped ensure that all required documentation is complete and facilitates demonstration of compliance with internal policies and mandated FDA REMS-required elements. The CAR T-cell product's name and days post infusion that display in the patient's EMR header have become one of the most important tools to easily identify our patients to all team members. Clicking on the header allows any team member to quickly access key information about the patient's CAR T-cell therapy. Use of this and other tools had expanded to other patient populations within our institution. CAR T-cell therapy presents unique side effects for patients that may mimic other medical conditions. Tools built into

our EMR have enhanced safety for our patients and allow us to deliver extraordinary care to recipients of this novel therapy. Utilizing resources and developing tools within the EMR can help programs enhance patient safety when introducing novel therapies. The EMR processes we have developed would be beneficial to other centers performing or considering CAR T-cell therapy or other novel treatments with serious side effects.

Strange Bedfellows: Medicine and Law Partnering to Improve Care

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Nebraska Medicine

Background. A medical-legal partnership was established at Nebraska Medicine at the request of a gynecologic oncologist who was being recruited for the cancer service line. Modeled after the National Center for Medical-Legal Partnership, this program integrates attorneys into health care settings to help patients navigate legal systems that affect their care. This physician had experienced firsthand the value of bringing legal expertise to the patient as another element of care. She witnessed the burden that custody, divorce, foreclosure, and other legal matters placed on her patients' care trajectory and wanted to champion such an offering at our facility. The collaboration would provide dedicated resources to manage a wide range of legal issues that affect care. Nebraska Medicine recognized that there was no mechanism in place to access and deliver timely legal counsel for patients in need. The key was finding a leader to work with the physician champion to develop a road map. The cancer service line administrator volunteered to work with the physician to explore the feasibility of a program and was given \$25 000 in start-up funding to design a pilot to test the value of a partnership. Nebraska Medicine established a medical-legal partnership to provide benefits to patients facing legal challenges while also bringing value to the health care organization. *Intervention Detail.* A working group was convened to develop the medical-legal partnership and provide oversight during the pilot. The gynecologic oncologist and the cancer service line administrator led the team, recruiting leaders who had appropriate patient responsibilities, authority, and staff members who were struggling to manage patient situations with legal components. Because social workers were on the front line, identifying legal issues affecting patients, and because they had the most experience with attempting to secure resources, their input was critical. Nursing was asked to participate to address care concerns. Legal aid representatives joined from Nebraska and Iowa, states where many of our patients

reside. An analyst was added to assist with data collection and tracking outcomes. The initial focus was on education about program goals, patient needs, infrastructure requirements, and each member's role. Social workers were instrumental in providing compelling patient stories, the physician and nurses addressed care implications, and the attorneys discussed ways their expertise could be leveraged. Two high-risk patient populations were identified: cancer and solid organ transplant patients. A process map was created outlining assistance that could be provided, role clarity, referral channels, and resource activation. A memorandum of understanding was signed providing on-site attorney coverage 1 day per week, with daily phone consultation and a part-time paralegal. Any individual on the health care team could bring forth an issue, but social workers were responsible for the referral to legal aid, which committed to perform an assessment within 48 hours to determine future activities. Program promotion included strategies to ensure all stakeholders received communication. A letter was sent to targeted physician groups from the physician champion, announcing the pilot partnership. Presentations were scheduled with relevant multidisciplinary teams, support groups, financial counselors, senior leadership, and the hospital board. An educational brochure reinforced the message. With these activities completed, the program was launched. *Outcomes and Impact.* The pilot resulted in helping more than 100 patients recover \$150 000. Assistance was provided in a variety of cases involving custody settlements, foreclosures, and employment rights, to name a few. These pilot results demonstrated value that allowed for additional funding and expansion of patient populations. Currently, the partnership also services perinatal, primary care, trauma, inpatient psychiatry, and the emergency department. Since inception, more than 1400 patients have been touched by this unique assistance. Legal interventions have improved issues such as housing, employment, and income maintenance, which in turn improves care compliance and quality. The growth of the medical-legal partnership has demonstrated a substantial return on investment. The financial arrangement has changed from a payment for a portion of dedicated time to a contract based on case numbers. Funding increased from an original contribution of \$25 000 to \$235 000 for managing 400 cases annually. The switch to caseload numbers has been negotiated to provide legal expertise for 450 cases annually. The investment in the program has resulted in the recovery of more than \$14 million in the last 6 years. In addition, patient and provider satisfaction is high, barriers in care have been removed, and program growth continues. Opportunities to advance the partnership continue. New patient populations are being identified, grant awards are funding further outcomes analysis, philanthropic sources are being accessed, and collaborative efforts with the College of Public Health

are under exploration. It is evident that establishing a medical-legal partnership can add significant value to patients and health care systems. Furthermore, the professions of medicine and law gain an unexpected appreciation for their respective contributions.

Journey to Zero Harm

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Background. Our senior leadership and board made a commitment to zero harm for our patients more than 2 years ago. As we embarked on this journey, we started by focusing on our institutional values—Respect, Teamwork, Innovation, Responsibility, Excellence, and Empathy—implementing an enterprise-wide credo concentrated on these core principles and reinforcing that every role and every person counts. With respect as the cornerstone of these values, the groundwork for minimizing patient harm was set. At the beginning of each year, we purposefully outlined our goals for patient harm reduction in the areas of central line–associated bloodstream infections (CLABSIs), catheter-associated urinary tract infections (CAUTIs), *Clostridium difficile* infections, surgical site infections (SSIs), and Agency for Healthcare Research and Quality (AHRQ) Patient Safety Indicators (PSIs). We formed an accountability structure that included an executive sponsor, 2 owners (preferably a nurse and physician), and a member team, along with a performance improvement specialist who served as a facilitator for the improvement team. The teams used a combination of performance improvement tools such as plan-do-study-act, define-measure-analyze-improve-control, and Lean principles to ensure best practices were implemented and used. For harmful events, an infection control specialist reviewed each case (initially for CLABSI, CAUTI, and *C difficile*) and conducted a root cause analysis with the team involved in the patient’s care to identify opportunities for improvement. Quality and patient safety dashboards were used to track harm and results were shared in multiple forums, including daily huddles, weekly meetings with the chief medical officer, monthly quality improvement (QI) council, and the board of trustees’ QI meeting. Through this organized approach, we have decreased patient harm related to hospital-acquired conditions (HACs) by 50% and successfully fostered an environment of teamwork and a culture of accountability. We believe other hospitals can also move closer to zero harm using a similar approach.

Intervention Detail. Our journey to zero harm began in 2017 with the introduction of the respect credo to all employees. Various forums, including senior leadership huddles and an all-employee retreat, focused on respect

and created opportunities for employees to share examples of respectful behaviors with their peers. In fall 2016, New York-Presbyterian Queens introduced daily leadership safety huddles, which evolved in early 2018 to include both operational and safety events. In late 2018, 2 additional tiers were introduced both at the unit level (tier 1) and at the director level (tier 2). These activities laid a strong foundation to help foster teamwork and develop a high-reliability framework to improve our culture of safety. In conjunction with these activities, our performance improvement teams for CLABSI, CAUTI, and *C difficile* implemented evidence-based best practices across all nursing units, including nurse-driven Foley catheter removal, removal of unnecessary central lines, and ensuring appropriate care of lines and dressing changes. Decreased use of inappropriate *C difficile* testing was achieved through use of an alert in the electronic medical record and through education of medical and house staff. Other performance improvement initiatives included the development and implementation of a colon bundle and total abdominal hysterectomy bundle to decrease SSIs, as well as thorough case reviews by a quality specialist and surgeon for each PSI to ensure that each PSI met AHRQ inclusion and exclusion criteria. Additionally, HAC and PSI scorecards were developed and monitored weekly for trends.

Outcomes Impact. The performance improvement work done by our teams to improve patient safety is reflected in the Vizient Quality and Accountability studies. In the 2018 study, our safety domain was ranked number 8 out of 100 complex teaching medical centers. Through the first quarter of the 2019 study, our year-to-date performance was number 10 out of 100, showing a consistently high safety ranking. Specific HACs have shown sustained improvement from 2016 to present. The hospital’s CLABSI standardized infection ratio (SIR) decreased significantly from 1.841 in 2016 to 0.591 in 2017, and further declined to 0.0165 in 2018. Twenty-three CLABSIs occurred in 2016, which declined significantly to 6 in 2017 and 3 in 2018. The CAUTI SIR remained stable between 2016 and 2018, not rising above 0.600. From 2016 to 2018, respectively, 13, 10, and 11 CAUTIs occurred. The *C difficile* SIR declined from 0.846 in 2016 to 0.487 in 2017 and to 0.411 in 2018. From 2016 to 2018, respectively, there were 97, 55, and 43 health care–onset laboratory-identified *C difficile* occurrences. For total abdominal hysterectomies, there were 2 SSIs out of 129 hysterectomies in 2017, with no SSIs for 155 hysterectomies in 2018. For colon SSIs, there were 4 out of 204 procedures in 2017 and 7 colon SSIs for 221 procedures in 2018. The absolute number of PSIs fell from 91 in 2016 to 71 in 2017 to 61 in 2018. The overall reduction in HACs, excluding falls, was more than 50% over 2 years, which we attribute to a cultural transformation, hardwiring of our evidence-based practices, a strong

accountability structure, and a review of every HAC. We have been a leader and role model for our 10-campus enterprise, and we feel our stepwise approach to zero harm can be deployed by other organizations across the country.

Virtual Urgent Care: Leveraging Technology to Connect Patients and Providers

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NYU Langone Health

Background. NYU Langone Health partnered with Epic to leverage existing video-conferencing integration with the Vidyo platform in order to build NYU Langone Virtual Urgent Care (VUC). This integration eliminated the need to partner with an additional third-party telemedicine vendor. Integrating directly with Epic allows patients and providers to use Epic as the single enterprise electronic health record for all in-person and telemedicine encounters. This is an approach that many health systems are aiming to replicate as their telemedicine strategies evolve. Our data have shown that patients are highly satisfied with the quality and convenience of the service. Patients often seek immediate access to medical providers for nonemergent care. Prior to VUC, patients seeking nonemergent care would physically visit a doctor's office, an urgent care center, or even an emergency department (ED). This predisposes a patient to possible spread of infection, and the avoidable inconveniences of wasted travel time and higher co-payments. In addition, given the investment required to build a brick-and-mortar urgent care center, NYU Langone leadership was interested in leveraging telemedicine to better address these nonemergent care needs. Health system leadership tasked the information technology (IT) department and ED operations to design, implement, and support a VUC service. *Intervention Detail.* With the advent of VUC, patients no longer need to leave the comfort of their home or experience long wait times in an ED or urgent care center. The benefits of VUC are evident among a broad range of stakeholders, including patients, their employers, health care organizations, and third-party payers. These key stakeholders are all beneficiaries of the cost savings and convenience afforded by this alternative method of health care delivery. The proliferation of health IT and the market saturation of mobile devices have helped expand the reach of real-time virtual health care video consultation. We designed and developed an integrated scheduling and online check-in experience for our VUC patients, all of which can be done using a smartphone, tablet, or computer. Patients can then connect with an NYU Langone doctor

through our integrated video platform. The provider can access the patient's full medical history in Epic and conduct the clinical encounter. After the visit, the provider can document a progress note and enter follow-up orders such as labs, prescriptions, and imaging. The service is available to millions of patients in the tristate area, and commercial insurance is accepted for Aetna, Blue Cross Blue Shield, Cigna, and UnitedHealthcare patients. Real-time eligibility is used for immediate insurance verification, eliminating the need for front-end registration staff and facilitating proper co-pay collection, with the remaining balance billed to insurance. *Outcomes and Impact.* We measured the effectiveness and value of our VUC service and technology using key performance indicators (KPIs) such as clinical volume, operational efficiency, and patient satisfaction. We performed a review of the VUC dashboards and analytics to better understand the consumer's experience regarding (1) ease-of-use, (2) perceived usefulness, (3) overall patient satisfaction, and (4) perceived value to stakeholders. A literature review also was conducted to develop a framework of current telemedicine practices and to better understand discipline best practices. The data show that VUC is convenient, cost-effective, and promotes health-seeking behavior. Since launching in September 2017, NYU Langone VUC has serviced 6047 patients. Patients can receive treatment if they are in New York, New Jersey, Connecticut, or Pennsylvania at the time of their visit. Patients treated ranged from 5 to 97 years of age. Overall, feedback from patients surveyed demonstrated a service quality rating of 4.6 out of 5. The majority of patients share that (1) they are likely to use VUC again, (2) the technology was fairly easy to use, (3) their medical needs were well managed, and (4) they were satisfied with their visit. When asked what they liked about the service, patients highlighted convenience and access to NYU Langone's world-class providers.

Patient Flow: Building Capacity, Minutes at a Time

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NYU Winthrop Hospital

Background. Persistent emergency department gridlock created by the inability to transfer admitted patients to inpatient beds prompted our organization to examine the contributing factors. Senior leadership challenged the organization to find a solution. Typically, the care team focused initially on newly admitted patients, deemed to be the sickest on the unit, relegating the patients awaiting discharge as the least urgent. It was quickly noted that

there was no standard approach to identify and prepare patients and families for discharge. The discharge process affected the patient experience, as expressed through survey responses and discharge phone calls. The process was primarily service- and provider-dependent and varied from unit to unit. It was determined that the care team struggled with timely communication to patients and family members about impending discharge, and the discharge process was cumbersome and lengthy, with an organization-wide average time of discharge of 3:30 PM. These factors created a lack of capacity to accept newly admitted patients from all entry portals timely and efficiently. The Institute for Healthcare Improvement performance improvement methodology was used to develop smart and global aims, as well as primary drivers and interventions to support and sustain change. *Intervention Detail.* The project began with focus groups for all levels of staff involved in the discharge process. Process maps were created for each discipline to identify barriers and issues related to discharge. One medical and one surgical pilot unit were chosen to reflect different service lines. Team leaders and champions were selected for each unit. We also selected initial process measures for Plan-Do-Study-Act cycles, including patients identified for discharge the day prior, what was required to be completed for the patient to be safely discharged, and when the targeted discharge time was communicated to the patient. The provider, nursing leadership, and a case manager rounded on patients in the afternoon to identify those who were ready for potential discharge the next day, and we placed those patients in a pended status using the Teletracking patient portal. Any orders associated with the medical plan were reviewed for completeness and outstanding items were placed on a list for the care team to complete prior to multidisciplinary rounds the following morning. This list was generated and sent electronically to ancillary areas (laboratory, radiology, noninvasive cardiology) to prioritize pended patients for test completion and results. If all criteria were met during multidisciplinary rounds, the patient was changed to confirmed discharge in the patient portal system. The patient and family were offered one of the following targeted discharge times; 10 AM to noon; noon to 2 PM; or 2 PM to 4 PM. This was to accommodate families and engage the patient in the decision while driving an earlier time of day selection. Most families chose to be discharged between 10 AM and 2 PM. Delay reasons for not meeting the targeted discharge time were collected and shared with the care team. As the pilot units established processes and workflows that were deemed successful, the organization made 2 decisions: to change the targeted discharge time to a standard prior to noon and to roll out the process to all patient care units. *Outcomes and Impact.* The early discharge initiative affected 3 metrics that are being collected and

evaluated within the corporate goal structure of the organization: percentage of patients out by noon (process measure), observed over expected length of stay (LOS) index (countermeasure), and median discharge time of day (outcome measure). Baseline data collected prior to organizational rollout in January 2017 included the following: percentage of patients out by noon was 11.2%, observed over expected LOS index was 1.11, and median discharge time of day was 2:59 PM. Process refinements and continuous improvement have been ongoing. Physician/nurse leader dyads have been established on all patient care units. Physician advisers have been deployed to assist unit-level teams, remove barriers, and advance the medical plan. Unit-level data are shared with unit leaders daily and reasons for discharge delays are shared monthly. All metrics showed significant improvement by January 2019. Examples include the following: percentage of patients out by noon was 27.5%, observed over expected LOS index was 1.0, and median discharge time of day was 1:57 PM. Patient benefits included safer discharge as a result of leaving the hospital during daylight hours, as well as the opportunity to obtain prescriptions and follow-up with providers if they have questions or concerns. As a result of this project, the organization has been able to build capacity at the unit level; improve patient throughput from portal entry to the inpatient units, reducing gridlock; and enhance patient flow.

Quality and Financial Improvements Through Revenue Cycle Partnership

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Ochsner Health System

Background. Ochsner Health System is a complex system, comprising many hospitals, clinics, and multispecialty outpatient service centers. Thus, our pharmacy model for contracting, acquisition, provider orders, and administration is particularly intricate. In a future of rapid compression (a term we use to define increasing costs and decreasing reimbursement), our pharmacy and revenue cycle leadership simply had to align to mitigate issues in both drug cost and pricing, as well as threats to insurance and patient nonpayment. A dedicated strategy was devised in 2016 to align cross-divisional leaders, who were tasked with designing innovative initiatives to review and adapt processes to reduce costs and improve net revenue performance. Our steps, in order, included the following:

1. Monthly meetings to create a “rhythm” for attendees, including pharmacists, drug contracting, revenue cycle operations, reimbursement, decision support, and analytics.

2. What to analyze to maximize our time together: we focused first on the largest area of perceived opportunity/threat to optimal reimbursement—outpatient oncology and infectious disease infusion. These are high-utilization, high-cost, and high-vial/billing increment variation areas. We agreed that efforts to drill down in these encounters would be worthwhile because we would either find opportunity from errors that were made or confirm that our workflows and billing performance were strong, allowing us to focus on other areas.
3. Analytics necessary to guide our review: we employ Tableau, a data visualization software used to interactively present data and showcase insights. By dynamically merging our cost accounting and revenue cycle billing data, Tableau provides optimal analysis. Additionally, we can quickly spot trends and hone in on particular data elements that give us road maps for investigation.

We believe our strategy for partnerships between divisions perfectly demonstrates the alignment needed for strong financial performance and patient-centered care. We also believe other organizations already have the structure and leadership necessary to implement strategies similar to ours. *Intervention Detail.* Our meeting rhythm and collaborative approach instantly paid dividends. We immediately began reviewing potential problems and opportunities such as

- Variations in drug margin across different regions in our system for the same drugs/therapies.
- Incorrectly built e-prescriptions (eRx), which led to drug billing increment errors and resulting revenue loss.
- 340B opportunities and different phenomena with pass-through status drugs.
- Medical necessity denial threats for newer oncology drugs with narrow indications.
- Unexplained variations by specific disease site that led to therapeutic equivalent drug usage evaluation.

This structure of review creates specific opportunities for investigation that jump off the screen and stimulate rigorous and detailed discussions about how we manage our pharmacy, ordering models, and revenue cycle management. Because we merged drug cost and billing data, we were able to set some performance baselines for what our margins should look like by disease site (eg, breast cancer, leukemia, rheumatology), by payer, and by region. From there, variation from our standard could be viewed instantly, giving our team immediate accounts to review.

When the Tableau platform highlights an area of concern, we then consult tools and data such as drug contract terms; Epic eRx build in Willow (pharmacy application); provider formularies and order sets; chargemaster and billing dispositions; denials data for payer remittance remarks; and patient out-of-pocket impacts. Through these interventions we can better understand the underlying outcomes the data have revealed to us. In the outcomes and impact section, we will show dramatic findings and modifications we made in our processes to avoid costly pitfalls in our oncology and infectious disease infusion business. *Outcomes and Impact.* The availability of quality, dynamic data is helpful, but having the collaboration of all the divisions that affect the financial performance of an organization's infusion business is a game changer. Improvements in our models include

1. eRx build errors: Our detailed payer margin analysis highlighted variances against what we expected to be paid for 2 drugs. These were not found in our denials management and were part of large courses of complex therapy, so unfortunately, we had no alerts before our collaboration. Issue: billing increments built incorrectly. Outcome: ~300 administrations compliantly recharged, recouping approximately \$700 000 in additional net revenue across payers.
2. Appeal support and write-off reversals: pharmacy/revenue cycle partnership at Ochsner has impacted our ability to quickly, and with key knowledge, better fight denials and compliantly reverse inappropriate write-offs of net revenue. Issue: payer denials/write-offs for complex medical necessity appeals. Outcome: in 2018, more than \$100 000 was recovered related to our collaborative approach in assuring proper diagnosis and administration compliance.
3. Therapeutic equivalent opportunities: This drill-down analysis reveals alternative drug utilization opportunities that present higher margin. Pharmacists in the room can immediately clarify equivalence options. Issue: higher utilization of less-favorable margin drugs. Outcome: collaboration with pharmacists and providers has pushed to more cost-conscious behaviors.
4. More education about coverage/new drug indications: One ancillary but important outcome of this partnership is a much greater awareness of coverage/reimbursement threats for new biologicals hitting the market. Our pharmacy team is educated and prepared to seek clarity on new drug formulary proposals and is, in turn, educating providers and clinical teams. We have a dedicated team tasked with confirming payer coverage

guidelines prior to any usage in the system. Issue: coverage and reimbursement/denial threats. Outcome: thoughtful and financial savviness has dramatically increased throughout our system to leverage quality, cost, and reimbursement factors for all new-entrant drugs.

Optimizing Care on Medical-Surgical Units Utilizing Virtual Innovative Care

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Ochsner Health System

Background. Virtual innovative patient (VIP) care is a redesigned patient care model in medical-surgical and telemetry units utilizing a technology platform that allows virtual nurses to be part of the bedside clinical care team and provide care for a group of patients. This disruptive innovation of the medical-surgical patient care model positively affected cost, quality, and patient outcomes on these units. *Intervention Detail.* Virtual care has been used to improve patient outcomes in intensive care unit (ICU) settings; however, there is little evidence regarding its use in medical-surgical units. Telehealth ICU programs have been linked to lower ICU and hospital mortality rates and decreased length of stay (LOS) in the ICU. One case of using continuous monitoring in a medical-surgical setting was found in the literature, and it was reported that the virtual care resulted in decreased LOS. Our organization is a mid-size community hospital and part of a large health care system. The medical-surgical and telemetry units were experiencing rising health care costs, increased employee turnover, high vacancy rates, and unbalanced workloads—not allowing for optimal patient care, patient experience, or employee experience. Prior to VIP care, a modified primary model of care was in place. VIP care utilizes a team model of care, which includes a registered nurse (RN), a licensed practical nurse (LPN), a patient care technician (PCT), and a virtual RN (VN; experienced medical-surgical nurse), along with telehealth technology. This technology includes advanced computer and video technology such as a camera, speaker, secondary screen monitor, and a bedside tablet that the patient can use to access the VN and the bedside team. The VN coordinates with the bedside team, mentors new nurses, rounds on assigned patients throughout the day to provide patient education, performs assessments and discharge teaching, reviews and updates the plan of care, reviews the medical record, and documents activities as needed. *Intervention Detail.* The Six Sigma Define-Measure-Analyze-Improve-Control process was utilized for this project. During the initial planning phase, it was critical for project leaders to identify and bring together the various team members who

were required to bring this project to reality. Key team members included information technology, bedside nurses, nurse leaders, physicians, facilities, nursing informatics, and supply chain. As the project took shape, the team defined end goals and what was in and out of scope, while also identifying measures of success. A key part of the planning process was to outline the future workflow of the new team model of care using telehealth technology. Members of the new team model included a VN who supported 2 bedside care teams, which included an RN, an LPN, and a PCT. Clear definitions of each role were developed to maximize each team member's scope of practice. VN responsibilities included admission assessment, medication reconciliation, patient teaching (eg, new medications; wound, dressing and catheter care; deep vein thrombosis), meeting family needs, order initiation and follow-up, discharge documentation, lab follow-up, care plan updates, 24-hour chart review, core measure management, and nurse mentoring. Telehealth technology was installed in 74 patient rooms, and a bunker was built for the VNs in a separate area of the hospital. The VN bunker houses 4 VN workstations; each includes 4 monitors and telehealth video technology for 2-way video integration. Each patient room includes a camera, monitor, speaker, and bedside tablet. The bedside tablet had 2 applications: One application allows the patient to access her/his electronic medical record, while the second application is used to contact the VN and bedside care team. Parameters were established with key milestones to meet the go-live deadline and monitor the measures of success. *Outcomes and Impact.* The goal of VIP care is to improve cost, quality, and outcomes for patients on medical-surgical and telemetry units by using revolutionary technology and a new team model of care. Prior to implementation of the pilot, real-life simulation trials were conducted on 2 day shifts (6:45 AM to 7:15 PM) and 1 night shift (6:45 PM to 7:15 AM). Members of the planning team simulated the role of the VN and shared patient care with 1 to 2 bedside nurses. Bedside nurses were educated on the role of the VN and responsibilities were discussed and divided among the bedside nurses and the VN. The primary findings from the real-life simulation trials include

- Nurses simulating the VN role reported that the responsibilities as conceptualized by the planning team were mostly accurate.
- The VN conducted patient teaching; interfaced with the medical team regarding medication and abnormal lab results; and assisted with care planning, admits, and discharges.
- Added value includes the fact that the VN was able to catch missed care and improve quality and was readily available to support less-experienced bedside nurses.

The VIP Care pilot went live on the 30-bed medical-surgical unit, as well as 18 of the 34 beds on the telemetry unit in mid-December 2018. Measures of success include

- Cost: hours per patient day and cost per unit of service.
- Quality: falls, codes outside the ICU, and pressure injuries.
- Outcomes: Hospital Consumer Assessment of Healthcare Providers and Systems was utilized for nurse communication, medication, discharge information, and preliminary findings from patients and a patient care team.
- Patients could restate discharge education.
- Patient interviews revealed enhanced satisfaction with nurse communication.
- VN identified elevated lab values and contacted physicians to intervene, preventing patient deterioration.

Creating a “Wait Less” Emergency Department in an “Under-Bedded” Environment

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Orange Regional Medical Center

Background. The Orange Regional Medical Center (ORMC) emergency department (ED) has 51 treatment spaces, with an average daily census of 216 patients. The department routinely surges to patient volumes in excess of 70 active patients with admit holds within the ED treatment space. The department is routinely overcrowded without enough space to care for the daily volume of patients. The ED needed to improve patient throughput and efficiencies to create additional capacity. Improved efficiencies also were needed to meet the patient volume demands without any immediate construction or large capital solutions. ORMC, part of Greater Hudson Valley Health System, is an academic medical center located approximately 1½ hours northwest of New York City. With 383 licensed beds, ORMC is a designated Magnet institution. The ORMC ED specializes in trauma, stroke, and cardiac care. In 2018, the ED was experiencing long patient wait times. The ED significantly reduced left without being seen and arrival to provider times by routing patients through a rapid assessment zone (RAZ). The RAZ improved some metrics but created multiple patient moves and handoffs. Patients would see a provider, get care started, but then were handed off to a different provider and nursing staff. The ED was staffed to average

patient arrival times, as is common in many EDs across the country. Nursing and provider staffing were analyzed to identify incongruence with patient arrivals that led to getting behind, which created exponentially long wait times. Nursing and provider staffing were found to be behind the 75th percentile patient arrival curve for several hours per day, which created a queuing effect that led to inefficiencies. Patients were waiting to get a room, to see a provider, for nursing, for ancillary services, and for providers to interpret results. At times, providers were waiting for the next patient, despite multiple patients being in the waiting room. *Intervention Detail.* The case for change became clear, and the ED needed a better way of doing business. Greater Hudson Valley Healthcare System partnered with Sg2 and Vizient to provide analytics tools and expert advice to confidently formulate a strategy needed to succeed today, while positioning for tomorrow. A team from Sg2 and Vizient performed data analysis, identifying potential constraining challenges with a granular focus, looking hour to hour. The teams deployed on-site to further analyze the ED, performing direct process observations and work content observations that yielded a directional focus of process improvement. A multidisciplinary leadership team of providers and staff was formed to redesign patient flow based on the findings with a focus on what the customer values. The team deployed Lean/Six Sigma methodologies focusing on reducing the 8 forms of waste. Waiting, motion, transporting, and excess processing were some of the many opportunities for waste reduction. The nursing staff, provider staffing, and available treatment space were aligned with the 75th percentile of patient flow. The goal was to have enough nurses, providers, and treatment spaces to accommodate the hourly patient arrival pattern. The front end of the ED was redesigned, reducing excess processing with a focus on getting every patient to a treatment space within minutes of arrival. Ambulance patient arrivals were redesigned with the goal of sending each arriving patient to a treatment space on arrival, reducing the queuing effect of multiple patients. Patients would queue up waiting to see a nurse upon arrival to the ED and not be directly bedded. Registered nurses, providers, and treatment spaces were aligned to assure that no variable created a constraint. The staffing model assured enough nurses and providers were available to direct-bed patients on arrival. The new design assures patients are routed to one of 3 care zones. Each zone is specifically staffed to care for patients with like acuity levels. Virtual treatment spaces were created in each zone to allow expansion of patient care space to meet patient arrival patterns. *Outcomes and Impact.* Prior to go-live, staff and providers were educated on the effects of getting behind the patient arrival curve and the exponential effects of waiting in a queue. A go-live event was set, with all

changes set to occur simultaneously on a Monday—consistently the busiest day for this ED. Sg2 and Vizient team members provided on-site coaching support for staff and providers, assuring adherence to mutually agreed-upon changes. Sg2 and Vizient worked with ED and hospital leadership to remove barriers impeding success. Monitoring of leading indicators to success was measured and reported on an hourly cadence post go-live. The leading metrics were (1) available open treatment spaces and (2) virtual treatment spaces currently utilized. Trailing metrics were also utilized, including arrival to room, arrival to provider, and length of stay (LOS) for discharged patients. The ED experienced immediate metric improvement on day one and has continued to demonstrate improvement to date. Metric improvements include arrival to room was reduced 67%, arrival to provider was reduced 57%, and discharge patient LOS was reduced by 16 minutes. These improvements also corresponded with improvement in patient satisfaction scores from 58.8% to 64.1%. Patients are waiting less time with a lower overall LOS, which has created incremental capacity in an “under-bedded” ED.

The Hitchhiker’s Guide to Wrangling Case Cost

Mel Thompson, MHA, Tim Brookshire, MHA, and Robert Allen, PhD

Prisma Health

Background. Case supply cost, also known as cost per case, is an elusive metric to track. Unreliable cost data and gaps in documentation can make reporting and tracking financial case data a nightmare. Although difficult to track, knowledgeable practice managers will want to know how much it costs surgeons to perform their cases. Transparency in cost data from vendor to practice managers has been historically difficult to obtain and validate, but this information is crucial in determining appropriate opportunities to target reduction in supply costs. In addition, the clinical need for supplies and items is only known by the physician performing the procedures, and subsequent changes to doctors’ preference cards will have to be approved. This presentation showcases our road map to successful implementation of our supply chain scorecard and interventions to reduce supply costs for surgical cases in our hospital system, while also presenting lessons learned, outcomes, and future steps. This work is important because of the scope of the problem, scale of opportunity, and the methods undertaken. *Intervention Detail.* The development and distribution of a supply chain scorecard was Prisma Health’s way of “wrangling” supply costs within our system. The initial development of the

scorecard began in January 2017. The scorecard included time series data on supply expense per case, year-to-date average cost per case for each surgical service, supplies as a percentage of net revenue, and the percentage of spend in each dollar range. Our hospital is composed of 10 separate locations where surgical cases are performed. The largest hospital is the only Level 1 trauma center in the area, and therefore is a referral center for complex cases. The hospital has 32 operating rooms and performs more than 25 000 surgeries a year—approximately half of the total system volume. This scorecard was produced at each facility and served as an early indicator of substantial change or inappropriate variance at the facility level. In addition to the scorecard, it was important to also look at the variance of case cost between providers on similar surgeries to actually improve supply chain costs. For example, why does it cost \$4000 for one surgeon to perform an arthroplasty and \$8000 for another surgeon to perform the same procedure? This discrepancy and variance in cost per case was previously unknown. Obtaining this information allowed us to define the opportunity for improvement and disseminate findings to physician leaders to promote change. Separately and in parallel, educational information about supply waste (contaminated, dropped, and unnecessarily opened) was distributed to frontline staff because most individual supply costs are items costing less than \$500. *Outcomes and Impact.* Improvement was measured and maintained since the inception of the scorecard. Opportunity for improvement was found to be more than \$12.7 million across the system since the beginning of the study (2 years). This number is based on bringing all above-average case costs down to the current average. This huge number turned heads and sparked engagement from physician leaders across the system and prompted a closer look at item costs. Sequentially, a deeper dive into physician- and service line-level variances was needed to identify the most logical next steps. We identified the top 10 procedures for supply cost savings opportunity and found that those 10 procedures accounted for \$3 million of the opportunity, with \$2.4 million being contained at a smaller outlying facility. The top 10 procedures at that facility accounted for \$1.3 million in opportunity, with the majority being orthopedic supplies and implants related to total joints. Detailed item cost and cost variance detail reports for those identified cases were disseminated and discussed with the system’s orthopedic surgeons. Using this information, we were able to swap out more expensive items for less expensive items already being used, reducing the cost per case for total knee arthroplasties from \$6090 to \$5232—resulting in a \$324 000 annual savings. Future steps in this project aim to provide real-time cost data to surgeons upon completion of their cases. This is a new feature provided by our electronic medical record that will take cost transparency

directly to the surgeon. They will be able to see both their own surgery case cost, as well as the average cost of their peers. As indicated by our current work, this transparency in cost data will prompt providers to look more closely at case cost discrepancies and seek to improve their cost per case in the future.

Living the Data-Informed Life

Saria Saccocio, MD, MHA, and Scott Hultstrand, JD

Prisma Health—Care Coordination Institute

Background. Clinical quality expectations have never been higher in the ambulatory setting because of the proliferation of value-based contracts with payers and self-insured employers—and physicians and clinical staff have never been more overwhelmed. Brought into this maelstrom are reams of data and analytics that are difficult to digest and prioritize, and that also are rarely actionable. Saria Saccocio, MD, ambulatory chief medical officer (CMO), with the ambulatory team, faces the task of organizing an effort to improve clinical quality in the ambulatory environment for the Prisma Health-Upstate affiliate, which has 1100 physicians and nearly 3 million outpatient visits a year. Prisma Health-Upstate also serves as a conduit for scaling primary care quality initiatives across the newly merged Prisma Health organization, which is now the largest nonprofit health care system in South Carolina. In light of the scope and scale of this effort, several critical components are required: (1) a nimble leadership team able to proactively develop operational ideas related to quality; (2) a strong source of data and analytics that can provide up-to-date and actionable clinical quality data to inform decisions; (3) a scalable operational plan that motivates physician and clinical staff buy-in and transformation; and (4) an overarching commitment to patient health outcomes and experience. This initiative incorporates implementable ideas and renewed motivation to tackle the challenge of aligning physicians with quality efforts, along with creative ways to let data inform difficult decisions about next steps in the journey toward value-based care.

Intervention Detail. The primary solution to the quality improvement (QI) challenge involved creating an interdisciplinary team, including the ambulatory CMO, the director of ambulatory optimization and integration, the director of ambulatory nursing, the director of performance improvement, the senior quality specialist, and a data scientist. This ambulatory team (“A Team”) has responsibility over operations related to physician, nursing, clinical staff, and practice administrative duties across the health system, while incorporating several members directly responsible for the implementation of

QI plans and providing/collecting data relevant to these efforts. The A Team analyzed the current state of various quality measures across value-based contracts, prioritized a focused approach based on input from system leadership and clinically integrated network initiatives, and selected a digestible number of measures to incorporate into an annual curriculum calendar. This work started with the family and internal medicine departments, but its success quickly generated interest and resulted in expansion to pediatrics and Ob/Gyn. Data sources included direct reporting from the electronic medical record (EMR), claims data from payers and a proprietary scorecard based on EMR data. Data specific to specialty-related issues were analyzed to ensure that operational plans were relevant to those specialties and aligned with system clinical initiatives. The annual curriculum calendar focused on one measure at a time to avoid overwhelming the clinical teams. Each month the A Team met in advance with physician leaders from each department to set the agenda for a monthly/bimonthly quality meeting with all of the specialty’s physician leaders. At this meeting, the A Team delivered a clear pathway to success, offering supportive analytics while featuring a physician champion. Physician leaders left the meeting with a transparent understanding of how their practice compared with others and how to improve, and also with the knowledge that support would be provided to generate success. *Outcomes and Impact.* Our work’s impact is a renewed excitement and embracing of change by physicians and their clinical teams, resulting in significant patient outcomes and an acceleration of transformative efforts, with the following examples.

Family and internal medicine:

- Accountable Care Organization measures: aggressive measure targets exceeded (many of which had 90th percentile goals) include diabetes HbA1c, breast and colorectal cancer screening, depression screening, falls risk, and body mass index (BMI). Although not exceeded, controlling hypertension showed notable improvement.
- Epic Primary Care: a fast-acting committee formed to keep up with new QI ideas. This committee has implemented dozens of ideas that have reduced the number of clicks, provided new insight, or offered avenues to easily record QI efforts.
- Medicare annual wellness visit (AWV): a new priority on Medicare AWVs, addressed with physician education and focused transparency at the monthly leadership meetings, resulted in a system-wide increase of almost 30 000 AWVs in 2017, including an increase from 15% to 45% in just 8 months.

Pediatrics:

- Depression screening: rates increased from 6.1% to 54.4% in 2018.
- Pediatric BMI: counseling rates increased from 17.3% to 41.2% in 4 months when our EMR solution was implemented.
- Influenza vaccination: data revealed disparities between Medicaid and insured patients, and leadership agreed to address next flu season.
- Well visits for Medicaid patients: rapid-cycle Plan-Do-Study-Act resulted in a successful phone outreach effort to the Medicaid population at 6 practices (scaled to 17 practices in 2019).

Ob/Gyn:

- Depression screening: low depression screening rates revealed a need for more focused efforts, and leaders agreed to incorporate the Patient Health Questionnaire-2 into their rooming workflows.
- Flu vaccine for all: data identified rates that were lower than expected, and further investigation revealed that only pregnant women were being vaccinated. Leaders committed to vaccinating all women next flu season.

Episodic Bundles in a Large Health System: Achieving Scale and Shared Success

Thomas Griffin, MBA, and Jordan Mitchell

Providence St. Joseph Health

Background. Providence St. Joseph Health (PSJH) is the third-largest health care system in the United States, spanning 7 states with more than 50 hospitals. Within the PSJH system, the clinical care and personalized health division supports clinical institutes, including the Orthopedic & Sports Medicine (O&SM) Institute. The O&SM Institute engages more than 100 orthopedic surgeons across more than 50 hospitals. Initially, 20 PSJH hospitals across 4 states were included in the comprehensive joint replacement (CJR) program. Though some hospitals could have opted out after the Centers for Medicare & Medicaid Services (CMS) reviewed the mandatory list, favorable reimbursement from CMS and the wish to maintain the focus of our orthopedic teams within our hospitals drove the desire to continue with CJR. Success within the CJR program required a level of engagement evenly distributed across our health care system. While reduction of clinical variation and provision of the highest quality of care to our patients at an affordable cost was top of mind in our hospitals, each facility was at a different stage of

improving value to our patients. The O&SM Institute (made up of system leaders, regional service line leadership and local, aligned physician champions), along with PSJH finance and data analytics partners, developed a system approach to success in the CJR model. That approach included providing financial and quality performance updates and guidance, introducing a data tool that shows cost in comparison to outcomes in a transparent way, and organizing regular interdisciplinary team meetings on programmatic and clinical topics. Furthermore, each PSJH hospital site was assigned a cost reduction target at a per-case level. We consider this effort to be a strong example of collaboration between an interdisciplinary team within a large health care system and its aligned physician partners. Using this opportunity to also drive innovation of strong analytic tools can lead to sustained success under these new episodic bundled payment models. *Intervention Detail.* An interdisciplinary team was created that included orthopedic directors, aligned physician leaders, nursing, finance, data analytics, and those responsible for the post-acute phase of patient care. The interdisciplinary team met on a monthly basis. Clear communication between O&SM program managers, project managers, and hospital leaders was critical to the program's success. Hospital CJR data were reviewed by local leaders, and the O&SM Institute was on point for the programmatic submission of data to CMS. The Institute shared data with hospital orthopedic leaders, including target prices and trends, length of stay, and discharge disposition. Leaders were made aware of the quality metrics that affected potential reimbursement. During the time that PSJH was participating in the CJR program, a new data tool was developed called Value Oriented Architecture (VOA). VOA was not designed specifically to inform the interdisciplinary team regarding CJR. However, the VOA tool did demonstrate cost and quality variations by surgeon and facility within the inpatient encounter and served to better align program leaders and surgeons on opportunities to improve value. Users of the VOA tool can drill down into cost categories including operating room time, hospital stay costs, pharmacy, imaging, lab, implants, and supplies. The VOA tool resulted in increased physician alignment through transparent data sharing while also reducing unwanted clinical variation and improving the value equation for our patients. Program leaders develop a regular cadence of investigating cost variations together with surgeons and discovering from peer practices more cost-efficient ways of taking care of patients. As above, these opportunities spanned a wide range of cost categories. The virtual display of the tool, incorporating both cost and outcomes for surgeons across our system and allowing drill-downs into the drivers of practice variation, was key to successful implementation. *Outcomes and Impact.* As measured by CMS reimbursement to PSJH, our CJR program performance

year 1 was very positive. Year 1 total system aggregate amount of reconciliation was \$876 356. Year 2 initial reconciliation was \$3 928 853. CMS presents CJR data in terms of both target prices and a facility's reimbursement or penalty, and the quality ranking includes Excellent, Good, Acceptable, and Below Acceptable. Within the PSJH system there were facilities whose cost position was favorable, but whose quality scores were not favorable, thus resulting in nonpayment from CMS. Of the 15 hospitals engaged in CJR, 10 performed better than target in performance year 1. In the large multidisciplinary team, and in many of the CJR teams across PSJH, this combined view of financial and quality data was inspiring and helpful. Team members whose focus was traditionally on quality were thankful for the inclusion of financial data. Likewise, team members whose focus was on finance or accounting recognized that without the attention paid to providing high-quality care, the potential for reimbursement was eliminated. The outcomes of PSJH's approach to bundle opportunities have been significant in several ways. First, the tools have provided teams throughout the system with a level of both cost and quality information, displayed simultaneously, that previously had been unavailable. Second, the cultural shift toward looking at cost and quality at an episodic level—in the case of CJR, 90 days—expanded the thinking of leaders whose previous focus was on the acute care phase. Last, the O&SM Institute facilitated recognition throughout the system that bundled opportunities that may present themselves as commercial options can be a real and growing mechanism for potential growth, brand recognition, market share, and delivering on the value promise that is core to the mission of Providence St. Joseph Health.

Personalizing the Patient Experience With Consumer Engagement Platforms

Shannon LeBleu

Providence St. Joseph Health

Background. At Providence St. Joseph Health (PSJH), the Patient Engagement Center, with highly trained personalized health liaisons, was created to help patients and providers navigate care. A consumer engagement platform that integrates the ecosystem of technology was developed, allowing us to engage more with consumers. It includes customer relationship management (CRM) and connects various patient interactions into a 365-degree view of the consumer engagement platform technology that can be used for high-touch personalized contact centers, targeted and tailored digital marketing, and, ultimately, quality care delivery. Notably, caller data from the CRM platform led to the identification of various operational improvements, such as enhancing self-service capabilities for password

resets and driving digital strategies with significant impact across the organization. *Intervention Detail.* In looking at the overall patient experience, we found that only 28% of patients were booking appointments. Many callers needed help navigating the system. They wanted to speak with a human rather than interact with a computer search. Eighty percent of website searches were for conditions or specialty. *Outcomes and Impact.* These interventions led to a 50% reduction in overall talk time with patients, improved conversion rates from 28% to 75%, increased web conversion rates by 95% with use of photos, increased 40-fold the number of clicks for profiles with completed professional statements, and increased by 180% the amount of search engine traffic.

The Stars Are Not Aligned: The True Measure of the Centers for Medicare & Medicaid Services' Star Rating

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Background. Since July 2016, the Centers for Medicare & Medicaid Services (CMS) has publicly released its overall rating of hospitals on the Hospital Compare website. The overall rating gives each hospital a score of 1 to 5 stars. The overall rating is based on several domains, including mortality, readmissions, safety, patient experience, effectiveness, timeliness, and efficiency. The stated purpose of the overall rating is to help consumers pick high-quality hospitals. Increasingly, health systems are finding that payers are incorporating the star rating into network decisions and reimbursement. The stakes have never been higher for hospitals to perform well in this rating. The methodology to create the stars is statistically complicated. Techniques such as hierarchical logistic regression models, latent variable models, and k-means clustering are not easily understood by consumers or even the most skilled health care professionals. Although the original purpose of using these models is noble, their use has led to several unintended consequences that make the overall ratings difficult for hospitals to comprehend. Our team at Rush has partnered with health care and academic leaders throughout the country, including Vizient, to research the implications of these methods on a ranking system. Understanding the measurement systems used to judge health care quality is critically important for health care leaders. This information enables them to direct their strategies appropriately and, additionally, influence payers and national policy makers to develop systems that appropriately measure health care quality. *Intervention Detail.* Prior to the release of the June 2018 Overall Ratings, Rush was investigating why our star rating was

going to fall from 5 stars to 3 stars. To do so, we used the SAS software code provided by CMS on qualitynet.org to recreate the December 2017 release ratings. We then modified the SAS data set to update the measure performance corresponding to the June 2018 release. We found that the Rush score should not have dropped to 3 stars, but should have stayed at 5 stars. Something had significantly changed that was not communicated by CMS. During this research, we discovered that in prior releases, despite 8 measures in the safety domain, almost all the score was based on 1 measure, Patient Safety Indicator 90 (PSI-90). This was further confirmed by modifying the SAS software to mimic various situations. After several conversations with CMS, a collaborative webinar with Vizient, and a *Modern Healthcare* article featuring our findings, CMS decided to hold the June 2018 release. In fall 2018, CMS released another pass of the Overall Ratings, with minor changes. The Rush preview report showed a drop from 5 stars to 4 stars. Continuing our research, we highlighted additional issues not previously discussed with CMS until recently. We used additional data sets from data.medicare.gov hospital-specific reports, preview reports shared with us from other leading hospitals, and Resource Manager, a Vizient Clinical Data Base tool, to take a deeper dive into the Overall Rating. We then collaborated further with the Association of American Medical Colleges, the American Medical Association, and Vizient to share these findings with CMS. Most recently, we created a blog post summarizing our findings and highlighting various journal articles supporting our findings. We also used Twitter to broadcast results. CMS heard our latest concerns and is deciding on a path forward. *Outcomes and Impact.* We have identified a number of issues with the Overall Rating and shared those with CMS and other stakeholders. We initially found that the 6 health care-associated infections (HAIs) in the safety domain were insignificant and that PSI-90 carried almost all the weight. For the unreleased June 2018 version, there also was an unexplained move, based on the latent variable model, to peg a hospital's safety domain score on the narrow measure of total hip arthroplasty and total knee arthroplasty (THA/TKA) complications and not PSI-90. A number of concerns were additionally identified by Rush prior to the February 2019 release. Socioeconomic status (SES) adjustment is not used in the overall rating; however, due to the 21st Century Cures Act, the Hospital Readmissions Reduction Program adjusts for SES. We found the Overall Rating was significantly correlated with SES factors. Next, the Overall Rating via the readmission domain was influenced by high-acuity outliers receiving lifesaving care at tertiary care centers. Then we found that hierarchical logistic regression models heavily adjust small hospitals' results to the national average, thus displacing large hospitals to the extreme rankings, biasing the distribution of stars by

hospital size. Finally, and despite using the same measures, the Value-Based Purchasing Program, the Hospital-Acquired Condition Reduction Program (HACRP), and the Overall Rating each resulted in drastically different safety performance. More than 200 hospitals penalized by the HACRP had better than average safety scores in the Overall Rating, a result of the latent variable model. In February 2019, CMS released a version of the Overall Ratings. On the same day, they also opened a public comment period on the program. Rush submitted a detailed response. Following the comment period, CMS announced a process to accept applications for a technical expert panel on the program, convening in late 2019. Finally, they announced the current program would be used again in 2020, and then would undergo major revisions for 2021.

Mortality: Using Vizient to Put the Pieces Together

Heidi Allbee, RN, BSN, and Wanda Lanz, RN, BSN

Sanford Health

Background. The Vizient Clinical Data Base was implemented in early 2017 as Sanford's primary tool for on-demand access to data to guide continuous improvement in quality, cost, and utilization in care. We used the Vizient Clinical Data Base as our source of truth in data reporting. The penalties associated with mortality in the Centers for Medicare & Medicaid Services Value-Based Purchasing program, coupled with our high Vizient Clinical Data Base mortality index, indicated that we had a significant opportunity for improvement. In 2018, Sanford recognized risk-adjusted mortality as an area for improvement and included it in its 2018 performance improvement plan. *Intervention Detail.* Decreasing mortality index is a complex process. Much like a puzzle, we determined that we would tackle it one piece at a time. We implemented a 3-pronged approach to assemble the pieces of this project, which we continue using today.

Documentation:

- We learned the basics about the Vizient Clinical Data Base. This included education about observed/expected, mortality risk, and risk model groups.
- We partnered with our clinical documentation team, as well as physician champions, to educate on the importance of accurate documentation, including present on admission and treatment.
- Using the Vizient Clinical Data Base, we discovered that we were not accurately capturing the admission source and status. A new process was implemented.

- We developed an internal tool used to help educate providers on the importance of documentation.
- We used the Vizient Clinical Data Base to isolate conditions that were not being coded as present on admission. Education was provided.

Clinical care:

- Physician champions perform chart reviews to determine areas of opportunity. We use the Vizient Clinical Data Base to determine those that are below or well below the risk for mortality.
- We use the Vizient Quality and Accountability Study to determine our greatest areas of opportunity. Based on that information, we are delving deeper into those service lines.
- When opportunities are identified, those cases are forwarded to a peer review process.
- It was determined that our rapid response program was not appropriately utilized in some cases.
- We participated in the Reducing Risk of Failure to Rescue Events Collaborative 2018-2019.

Hospice:

- We discovered that the utilization of general inpatient hospice could greatly affect mortality index.
- We partnered with our hospice to make efforts for timely assessment of patients. We also included our palliative care team to help identify patients who may be appropriate for general inpatient hospice.
- We increased efforts to promote advanced directives.

Outcomes and Impact. Our team is committed to decreasing our mortality index and Vizient has helped us to be successful in this goal.

- Vizient helped us to identify that an accurate admission source and status could greatly impact our mortality index. With that knowledge, we improved our process to accurately reflect patient demographics.
- Using the comparative abilities of Vizient, we discovered hospice discharges would impact the mortality index. Since implementing new workflows with hospice and general inpatient hospice, we have been able to exclude these patients from our numerator. We are beginning to see the impact in the decrease of our mortality index.
- Our successes so far have been related to an interdisciplinary approach. We included members of quality, nursing, clinical documentation improvement, physicians, health information management, executive directors, and our chief medical officer.

- Our overall mortality index decreased from a high of 1.63 in January 2018 to 0.83 in June of 2019.

Coming Clean: Improving the Accuracy of Vizient Clinical Data Base Data

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Background. The Vizient Clinical Data Base (CDB) has multiple safeguards in place to ensure fair comparison of performance data among hospitals. Accuracy of these data is extremely important because it is used to change workflows and patient care with the goal of improving outcomes. Use of the Vizient CDB data quality report helped Vizient CDB coordinators identify 6 specific data elements with opportunity to improve standardization and consistency. The 6 elements are admit type, admit source, physician specialty, accommodation code, Medicare Severity-Diagnosis Related Group, and present on admission (POA) status of diagnosis codes. We followed the principles of our own Sanford Improvement Model, where the patient is at the center. This was a multidisciplinary project, so leaders of multiple departments were engaged to guide decision making and implementation of process changes. We had to address appropriateness of job scope, education and training of staff, and issues that were not previously resolved by the integration of hospitals into one system. We do not believe there is recognition of the amount of inaccurate data that are used to guide improvement work and prioritization of initiatives. People may be harmed by improvement projects based on inexact data that lead to workflow changes with a negative impact, by stopping practices that are actually effective, or by failing to change practices that are harmful. A lot of resources are wasted on unnecessary projects or projects that are misled by variation in the data not caused by patient care. Some of the underlying causes of these data issues can and should be addressed. We would like to share our journey to clean up our data for the benefit of patients. *Intervention Detail.* Six specific data elements were targeted for improvement. Issues were identified using the Vizient Clinical Data Base data quality report and from chart reviews. First, we had to identify all stakeholders. This included health information management, patient access, information technology (IT), credentialing, coding, clinical informatics, clinical documentation improvement, and quality department staff. Some of these teams are not routinely involved in quality improvement. The data elements were grouped according to workflows and multiple meeting series were established. Centers for Medicare & Medicaid Services guidelines were our primary external source of information.

Department leaders chose to change ownership of the admit type and admit source fields from patient access staff to health information management. The credentialing department, billing, and IT worked together to develop an improved process for managing updates to physician specialties. Standardization continues with accommodation codes, although some major changes have already occurred. A Vizient CDB coordinator met with coding leaders to review metrics. Coders used specific case examples to educate staff. Change in a data element affects any metric or report using that data element in a calculation or algorithm. For admit type, whether certain surgical cases are elective or not influences 3 Patient Safety Indicators (PSIs). These PSI measures are in the Hospital-Acquired Conditions (HAC) Reduction and Value-Based Purchasing programs and are used for the Quality and Accountability (Q&A) Scorecard. Transfers are indicated by admit source, which affects mortality risk adjustment and the Q&A Scorecard. Physician specialty corrections included all applicable physicians in reports. Because accommodation codes relate to charge codes and intensive care unit patient day statistics, there is potential for an impact both on reimbursement and staffing for acuity adaptable units. This also influences direct cost for the Q&A Scorecard. Diagnosis-Related Group determines reimbursement, service lines, and Q&A Scorecard cost measures. Whether or not a condition is POA impacts risk adjustment, coding of complications or comorbidities, and reimbursement.

Outcomes and Impact. An interdisciplinary group formed in August 2017 to address missing and inaccurate admit types and admit source. In less than a year the group reduced unknown values from more than 1200 to zero per quarter for inpatient admit type in one hospital alone. The reduction in outpatient unknown values was even more dramatic, decreasing from more than 28 000 per quarter to less than 10 for the system. The number of system cases admitted through the emergency department (ED) with an admit type of emergency more than doubled in a 6-month period (although there was only a 7% increase in total ED admissions). During the same time period the number of elective patients admitted through the ED dropped from 250 to less than 5 per month. Correctly assigning elective admit types excluded cases from PSI-90 measure numerators and improved scores. If we substituted the PSI-90 scores from third-quarter 2018 for those in fiscal year 2019 HAC Reduction Program, both of our hospitals receiving HAC penalties would no longer have penalties. Implementing a change in workflow for health information management staff almost tripled the admit source capture rate for transfers from another hospital or skilled nursing facility. Inaccurate physician specialties also have seen major improvement. A batch of 180 physician specialties was corrected to make credentialing

and IT systems match. Proper workflows are now in place to ensure specialties are entered and maintained correctly. A major change is currently in progress to address accommodation code issues. In 2018, 2295 units were underreported. We will reassess after implementing the current solution and uploading corrected data to the Vizient CDB. Collaboration with coding has had a positive impact on unknown and undeterminable POA statuses as well as POA mismatches. Mismatches have dropped 40% and unknown and undeterminable POA statuses have dropped 93%. Issues with DRGs dropped 96%.

Prevention of Delirium in Medical-Surgical Units: Is It Really Possible?

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Background. Delirium is an acute change in mental status affecting 10% to 64% of hospitalized patients. Clinical presentation can vary from extreme agitation to lethargy. Delirium has been associated with higher mortality, morbidity, and long-term cognitive deficits. A 2011 study reported 1-year direct health care costs attributable to delirium in the United States of up to \$152 billion. Delirium may be preventable in up to 30% to 40% of cases. When unable to prevent delirium, early identification may provide an opportunity to shorten the duration or severity of delirium; quickly address any potentially reversible precipitants of delirium; and prevent or reduce the cognitive and functional decline, morbidity, and mortality that may be associated with delirium. Delirium affects patients of any age. It has been reported in 19% to 31% of hospitalized patients younger than age 65, and 15% to 56% of patients older than age 65. Incident delirium has been reported in 3% to 29% of patients in medical-surgical units, 20% to 83% of patients in intensive care units (ICUs) and in 37% to 46% of patients postoperatively. Because delirium is more common among elderly or surgical patients or those in the ICU, prevention and management strategies have traditionally focused on these subgroups of patients. However, rates of delirium in younger patients, medical patients, and those not in the ICU also are substantial. Therefore, implementation of a widespread protocol for prevention and early identification and management of delirium is warranted. In October 2013, Stanford Health Care formed a multidisciplinary task force to implement an initiative for prevention and early identification of delirium across 18 medical-surgical

units. This initiative has shown sustained results and may provide a reproducible model for other institutions. It has a unique focus on prevention, with high clinician engagement, simple workflows, and low overhead costs.

Intervention Detail. Measures for prevention and early identification of delirium have been implemented in ongoing Plan-Do-Study-Act (PDSA) cycles. In PDSA cycle 1, between October 2013 and July 2014, the delirium task force (a) reviewed the existing literature and discussed the variation in clinical practice at our hospital; (b) assessed the burden of delirium at our hospital; (c) implemented nursing screening for early identification of delirium using the confusion assessment method (CAM); and (d) disseminated education about delirium among clinicians. CAM screening was built on a nursing flow sheet in our electronic health record (EHR). Beginning on April 1, 2014, nurses now perform CAM screening on every patient admitted to a medical-surgical unit once during their shift. If a patient screens CAM-positive on any nursing shift, the bedside nurse pages the primary team and follows any further orders from the primary team. In PDSA cycle 2, between August 2014 and June 2015, the delirium task force implemented: (a) an additional screening to identify patients at high risk of delirium (in whom preventive measures could be implemented and delirium had not yet occurred), (b) nonpharmacological measures for CAM-positive and high-risk patients, and (c) a physician order set for delirium prevention and management on medical-surgical units. Clinician education on delirium continued, and nurses continued to do CAM screening for early identification of delirium, as in PDSA cycle 1. Beginning on June 24, 2015, nurses now perform delirium risk screening on every patient admitted to a medical-surgical unit once daily. If a patient screens at high risk of delirium, the bedside nurse implements nonpharmacological measures to prevent delirium. When nurses page the primary team for a high-risk or CAM-positive patient, nurses can suggest the use of the physician order set for delirium. PDSA cycle 3 has been ongoing since July 2015. The delirium task force continues to provide education to clinicians. There have been ongoing unit-based efforts to effectively implement nonpharmacological measures. In October 2018, we created a single-screen delirium summary report in our EHR to help clinicians round faster and quickly identify any deliriogenic medications their patient may have received.

Outcomes and Impact. Approximately 105 455 patient encounters discharged from our hospital between November 2013 and January 2018 were studied. We excluded patients who spent >1 day in the ICU. We used generalized estimating equations to assess for trend by discharge year (while adjusting for age, Charlson comorbidity index, and ICU stay) for our outcomes. We identified 5333 (5.01%) patient encounters with delirium. Patients with delirium were more likely to be ≥ 65 years

old (58.3% vs 39.8%) and were more medically complex (Charlson comorbidity index ≥ 3 in 40.5% vs 27.3%). Patients with delirium had higher use of benzodiazepines (39.3% vs 20.9%) and anticholinergics (27.5% vs 25.4%). There was no difference in the use of opiates among patients without and with delirium (72.7% vs 71.2%). Since 2014, an average of 98.8% of patient encounters have had CAM screening. Since 2015, an average of 99.6% of patient encounters have had delirium risk screening; 34% of patients were identified to be at high risk of delirium; only 11.6% of patients developed delirium. Since November 2013, there was a 5% per year decrease in the odds of use of opiates ($P < .001$), and an 8% per year decrease in the use of benzodiazepines ($P < .001$), with no significant change in the use of anticholinergics ($P = .414$). Since June 2015, there was a 25.3% per year decrease in the odds of delirium among high-risk patients ($P < .001$). Since June 2015, among high-risk patients or those diagnosed with delirium, the estimated length of stay decreased by 0.13 days per year ($P < .001$), the odds of inpatient mortality decreased by 16% per year ($P = .011$), and the odds of discharge to a nursing home decreased by 17.1% per year ($P < .001$). Although many delirium prevention initiatives target smaller subgroups of hospitalized patients, such as elderly, surgical patients, or those in the ICU, 41.7% of our patients with delirium were younger than 65 years of age, 61.7% were medical patients, and 58.9% never went to the ICU during their hospitalization. Implementation of a hospital-wide protocol for delirium was therefore both imperative and effective. Quality improvement initiatives are particularly vulnerable to the dynamic environment in hospitals. While there may be initial success, sustaining efforts is far more challenging. We believe the delirium initiative at our hospital has shown sustained results and may provide a reproducible model for other institutions.

Comanagement by Hospitalists: Bang for Your Buck? Yes!

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Background. Clinically complex patients with multiple medical comorbidities are undergoing surgeries. The 2004 National Heart, Lung, and Blood Institute working group reported 1.25 million surgical patients per year have medical complications after surgery. Value in health care rests on providing high-quality care with good patient outcomes in a cost-effective way. Traditionally, in the consultation model of care, surgeons consult medicine for management of medical complications that already may

have occurred. In this model, the window of opportunity to optimize a patient's medical comorbidities preoperatively and prevent complications may be lost. To address these limitations in the care of surgical patients, we transitioned from the consultation model to a surgical comanagement (SCM) model in orthopedic and neurosurgery at Stanford Health Care in August 2012. In our SCM model, the same hospitalists are dedicated to each of these surgical services year round. We have reported the impact of our SCM program on patient outcomes over the past 5.8 years. The SCM model has had sustained success in orthopedic and neurosurgery at our institution since 2012, with new surgical services such as otolaryngology requesting SCM hospitalists. This project may serve as a model for delivering high-quality, efficient, and well-coordinated care for surgical patients in other institutions. *Intervention Detail.* We have a unique model where the same 4 hospitalists are dedicated to orthopedic surgery and the same 2 to neurosurgery year round. Every patient admitted to these services is screened daily by an SCM hospitalist. Because of their strong relationship with surgical services and the unique skill set that SCM hospitalists have developed over the years, surgeons proactively request SCM hospitalists to "co-follow" their patients. SCM hospitalists have the opportunity to diagnose and optimize patients' comorbidities perioperatively, gain experience in understanding the common medical complications associated with specific surgeries, and build trusting, professional relationships with surgeons. SCM hospitalists provide timely intervention in cases of acute medical decompensation by intervening themselves or facilitating Rapid Response Team (RRT) calls to prevent code blues. They can spend more time on patient units, which fosters better communication between physicians, other medical consultants, patients, families, and staff while surgeons may be in the operating room. SCM hospitalists also play a vital role in improving post-hospitalization outcomes by providing care coordination at the time of discharge, connecting with outpatient or post-acute care providers, handling diagnosis and appropriate management of medical comorbidities or complications during hospitalization, reducing medication errors, and providing education to patients or families at the time of discharge. Our SCM hospitalists in orthopedic surgery see patients in preoperative clinics and assist in preoperative medical optimization of these patients, and sometimes dissuade surgeons from elective surgeries on patients in whom the risk may seem prohibitive. With value-based payment, there are incentives associated with fewer medical complications, better patient satisfaction scores, shorter length of stay (LOS), fewer readmissions, and reduced cost of care. SCM hospitalists are uniquely positioned to help achieve these outcome metrics and streamline pathways by preventing complications and reducing unnecessary testing,

as well as reducing discharges to skilled nursing facilities to limit post-acute care costs. *Outcomes and Impact.* In 2016, we performed and published one of the largest-ever studies in SCM, comprising 22 590 patients. In its first year of implementation in orthopedics and neurosurgery, our SCM intervention was associated with a decrease in medical complications, LOS, number of medical consultants, 30-day readmissions, and cost of care. There was no change in patient satisfaction in that study. In this follow-up study, we evaluated if there was a sustained decrease in medical complications, LOS, number of medical consultants, RRT calls, code blues, patient satisfaction, and the cost of care since implementation of SCM from 2012 to 2018. We used regression models to assess for trend by discharge year and patient outcomes except cost of care, while adjusting for age, primary insurance, race, Charlson comorbidity score, general or regional anesthesia, surgical department, and duration of surgery. Between September 2012 and June 2018, there was a significant increase in the median age of patients (from 60 years to 63 years), the mean Charlson comorbidity score increased from 1.07 to 1.46, and the median case mix index increased from 2.10 to 2.36. In the adjusted analysis, between September 2012 and June 2018, the odds of patients with medical complications decreased by 3.8% per year ($P = .0129$), the estimated LOS decreased by 0.3 days per year ($P < .001$), the odds of RRT calls decreased by 12.2% per year ($P = .001$), and the odds of top-box patient satisfaction scores increased by 8.4% per year ($P = .0363$). There was no change in the number of medical consultants or code blues. There was an estimated average direct cost savings of \$3424 per patient encounter based on LOS, and an estimated savings of more than \$5 million between 2012 and 2018 as a result of reduced medical complications. To our knowledge, this is the largest study evaluating the benefits of SCM over 5.8 years. We believe our results are related to the unique structure of our SCM program, and other medical centers may consider this model for the care of their patients. With the evolving value chain and increasing medical complexity of surgical patients, SCM by hospitalists may serve as a model for delivering high-quality care that can be sustained over the years.

Engaging the Frontline Physicians: Decreasing Inappropriate Use of Intermediate Intensive Care Unit Level of Care Accommodations

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Background. Patients spend more time on the intermediate intensive care unit (ICU) level of care than is medically

necessary. IICU costs are significantly more per day than general acute care. From fiscal year 2016 to fiscal year 2017, after conversion to acuity adaptable units, IICU costs increased by \$13 million at our institution. Audits in November 2017 using McKesson InterQual Level of Care Criteria showed 45% potentially inappropriate IICU use in noncardiac services. This project, identified and created by hospital medicine physicians, brings together nursing, case management, and physician champions while also utilizing clinical decision support to decrease inappropriate use of IICU in 17 divisions hospital wide. *Intervention Detail.* Problem analysis revealed top barriers to inappropriate IICU use were lack of transparency of current level of care and inconsistent discussion by providers regarding appropriate use of IICU. We engaged physician champions in participating divisions to promote appropriate IICU use with an extensive multidisciplinary rollout hospital wide. We did weekly audits to measure inappropriate IICU use and sent these results to the physician champions. Weekly IICU use by service line also was sent to all participating service lines. Monthly finance cost savings data also were collected and shared with physician sponsors. To address lack of transparency of current level of care, we automated the current level of care designation into patient lists that were found in the electronic medical record (EMR) and rounding reports. We also made the McKesson InterQual Level of Care Criteria visible to all in the EMR (whereas it used to be in a separate system only seen by case management). To address inconsistent discussion by providers regarding appropriate use of IICU, we partnered with case management and nursing to include discussion of appropriate IICU use as part of standard work. We created EMR best practice alerts to promote daily assessment of appropriate IICU use by providers. Balancing measures of inpatient mortality index were monitored during the project. *Outcomes and Impact.* From April 2018 through March 2019, IICU length of stay decreased by 0.5 days overall in the 17 divisions ($n = 21\,779$ cases) compared to the previous year. McKesson InterQual Level of Care Criteria showed significant improvement of appropriate IICU use, from 50% to 80%. The hospital mortality index also dropped during that time frame. The project realized \$5.7 million in savings over 1 year. All of this was accomplished without significant resources from the hospital, as it was driven mainly by the front line and did not require any additional staffing or other resources. We believe it is key to engage and incentivize frontline providers to identify and design high-value care programs.

Flip or Flop: Retrofitting Primary Care to Deliver Population Health

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Stormont Vail Health

Background. The vision of Stormont Vail Health (SVH) is to become an integrated population health organization that focuses on the wellness and health of individuals. To accelerate our progress toward that vision, SVH engaged in both a Medicare Shared Savings Plan and a commercial Accountable Care Organization contract. In this new care/payment model, our primary care clinics were not meeting metric goals around primary prevention, care management, readmissions, avoidable services, and attribution. With the health system moving away from shared savings and into downside risk within 3 years, performance improvement was imperative to the financial success of our organization and would require a fundamental change in our approach to care. Earlier efforts in primary care to standardize workflow at specific touch points of the patient's experience were critical to efficient staff interactions with patients, yielded moderate metric improvements toward outcome goals, and resulted in increased staff engagement in performance improvement initiatives. However, these strategies received variable support by the medical group, causing performance to plateau at a level that was still well under our organizational targets. In order to develop a care delivery approach that would be both sustainable and produce breakthrough improvement in patient outcomes and experience, the organization engaged a forward-thinking group of physicians and their clinic location to serve as the comprehensive innovation laboratory. Their aim was to design, test, and trial population health strategies that ultimately would transform our primary care model and be transferable to the remaining 26 clinics in the system. While administrative staff would serve as the single point of accountability to handle process steps, it was critical that physicians take the lead as developers and champions in practice redesign to ensure sustainability. *Intervention Detail.* Changing the delivery of primary care services in an ambulatory clinic involves critically examining workflows that have historically been provider- and staff-centric, then pairing that understanding with innovation to create a future state that will meet the challenges of tomorrow. The leadership team leveraged a Lean-based improvement approach known as 3P (production, preparation, and process) to provide the team with a structured way to understand the current state and to systematically design new strategies. Facilitated by the internal Performance Excellence team with the support of Vizient Consulting Services, 6 primary care physicians dedicated 4 clinic days with a multidisciplinary team to examine every step of the patient care experience. During the current state mapping, staff and physicians were challenged to draw from patient comments, as well as from their own experiences, to scrutinize each process through the lens of the patient and to create new processes that were both patient-centric and oriented toward optimizing population health. The team

developed a number of new strategies, including daily team/management huddles, care management team integration, and incorporated pre-visit planning and patient outlier work—both completed by a medical assistant data specialist. Medical assistant data specialists place phone calls to patients who do not have a completed primary care visit in the past 366 days and who do not have an upcoming visit scheduled. Patients are then scheduled for a physical with a member of the primary care team (physician or advanced practice provider). After the initial 3P design workshop, the hard work of project execution began. Over the course of an 8-month period, the teams designed these new processes and multidisciplinary connections and implemented all identified tactics. Another unique and key management structure that enabled our timely and thorough execution of this project was the use of a divisional board (project status board) and status huddle. This huddle occurred every other week and included key project stakeholders, physician champions, and executives. This provided a consistent forum so that as barriers to execution arose, the right resources and decision makers were consistently available to assist in overcoming them and ensuring timely course correction if needed. *Outcomes and Impact.* At the beginning of the improvement effort the team had specific goals to improve preventive screening and wellness metrics, as well as to reduce unnecessary utilization in the form of hospital admissions, emergency department visits, and readmissions. The team improved the colorectal cancer screening rate at double that of the clinic as a whole (from 70% to 78%). The group also demonstrated a nearly 30% improvement in completed well-child visits for patients who are from newborn to 15 months and 3 to 6 years old. Improvement also was observed in the percentage of patients who had been lost to follow-up, as measured by the percentage of the patient panel who had had a visit with their primary care provider within 1 year, from 79% to 86%, while the rest of the clinic remained flat at 77%. Apart from the quantitative results realized, there have been many compelling patient stories demonstrating the patient-specific impact associated with the changes. These include patients who were reattributed to the provider through the new processes who are now 6 months sober and reengaged in improving their health with their care team, and other patients who, by getting their preventive cancer screens, were able to catch cancer early and have treatment before it became more advanced. The changes made at this model clinic by this engaged multidisciplinary team have ushered in a new practice model for primary care at Stormont Vail Health and undoubtedly will have a lasting, positive impact on the health of our patients and community.

Mobile Integrated Health: Partnership Between Nurses and Paramedics

Evangeline Thompson, MSN, RN, CNML

SwedishAmerican Health System

Background. Emergency department (ED) recidivism was determined to be a major source of avoidable visits and lost revenue, related to payer status, for the health system. A team was formed to determine the potential positive patient, financial, safety, and quality impacts that potentially could be realized. It was determined that most patients who accounted for avoidable ED visits came from a central city geographic area. The team researched opportunities for outreach to this patient population and came to the decision that a community paramedic teamed with a nurse could provide resources and be partners in change. SwedishAmerican Health System financially committed to subsidizing the paramedic, nurse, electronic documentation system, and support staff. In early 2016, the health system partnered with the Rockford Fire Department to form a joint Mobile Integrated Health (MIH) program. The program partnered a registered nurse with a paramedic. The team identified patients based on ED utilization, diagnosis, and location. Goals were to improve overall health, decrease avoidable visits, promote self-reliance, improve environmental safety, and increase patient satisfaction. *Intervention Detail.* SwedishAmerican Health System provided a case management nurse and paramedic to make home visits to patients selected for the MIH program. Home visits were completed to increase participant compliance with their physician-directed care plans through education and wellness promotion. Our model consisted of visits aimed at screening the home for safety, equipment function, and necessities such as medications and food, while working to increase patient understanding. Participants were screened for rationale for visiting the ED and were provided alternatives. Physical assessments were completed as necessary. Participants were provided resources for self-management, including care plans, journals for key contacts, education, and frequently asked questions. Summaries were sent to providers. Medical providers were informed of the MIH program and whether their patients were identified as program candidates. If the patient had a primary care physician (PCP), progress notes were faxed to the appropriate physician. In the event a patient did not have a PCP, they were assisted in obtaining one. The MIH paramedic/nurse team does not provide home medical care, but instead serves to connect patients with our pharmacy for medication education and to community resources for home safety equipment, food, transportation, and potential need for social visits. The nurse/paramedic team contacts the PCP for any orders or adjustments to patient orders. If the patient is identified as

needing immediate medical attention during a scheduled appointment, the paramedic follows their protocol for 911 intervention. Patients are discharged from the program when the program medical director and the PCP agree that the patient has reached a point of compliance with their self-care in the home. Patients also may be discharged for noncompliance or if they are transferred to a nursing home or become established with hospice or palliative care. All communications for discharge are discussed with the PCP. *Outcomes and Impact.* SwedishAmerican Health System's finance department provided information that states the difference between true cost avoidance and what constitutes a cost avoidance opportunity. The information here represents an opportunity for cost avoidance because no positions have been eliminated and our par levels of supplies have not decreased. Chronic obstructive pulmonary disease (COPD) is the primary comorbidity for 50% of our MIH patients, and congestive heart failure (CHF) is the primary comorbidity for 15%. Data below represent a 6-month time frame:

- Cost avoidance for SwedishAmerican Health System = \$946 699.91.
- Cost avoidance for Rockford Fire Department (RFD) = \$373 460.
- Total cost avoidance for the MIH program = \$1 320 159.91.
- Total cost avoidance for COPD/CHF = \$836 057.92.
- Total cost avoidance for SwedishAmerican Health System for COPD/CHF = \$593 308.92.
- RFD/MIH support = \$88 000 annually.
- Administrative support = \$6785 annually.
- Clinical nurse support = \$36 400 annually.
- Net return on investment = \$1 188 974.91.

Outcomes/results:

Participants' program successes:

- A 54% reduction in ED visits.
- A 25% reduction in hospital admissions.
- A 29% reduction in observation admissions.
- A 57% reduction in readmissions.
- A 38% reduction in ambulance runs.
- Improved transitions of care: developed discharge plans with/for program participants; connected with other medical professionals to hand off or transition participant care.
- Improved self-management: linked participants to available resources.
- All participants who successfully completed the program verbalized additional knowledge of their health status as a result of education.

- 100% of participants had a reduction in frequency of ED visits.
- 75% of participants had a reduction in ambulance runs.
- 75% of participants had a reduction in hospitalizations.
- Participants gained a greater understanding of the proper use of community and hospital resources.
- All participants expressed satisfaction with the services provided.

Changing Postprocedural Care With Telemedicine

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Background. The purpose of this initiative was to help reduce unplanned hospital admissions by bridging the gap between patient and provider communication. Communication is particularly important in organ transplant recipients, as they can be highly unstable. The Lung Transplant Application was designed to supplement the traditional methodology for managing patients by immediately alerting providers of concerning symptom changes. Temple University Hospital has been the leading lung transplant center by volume in the nation for 2 consecutive years, performing 144 lung transplants in 2018 alone. Prior to this initiative, providers relied heavily on patient phone calls and office visits for health status updates post procedure. The Lung Transplant app provides a new way to gain insight into patients' day-to-day health by presenting daily vitals and symptoms in an organized portal and, more importantly, by creating alerts whenever a change from baseline is detected. This insight gives providers a unique opportunity to reach out to patients with symptoms, potentially allowing us to intervene with medication, office visits, or planned hospital admissions prior to the patient becoming acutely ill. This ultimately helps reduce hospital admissions and length of stay (LOS)—effectively reducing health care costs. Early intervention for patients who need highly skilled, complex care is critical to positive outcomes—not only on a patient care level, but on a cost-savings level as well. *Intervention Detail.* Temple University Hospital was facing high readmission rates and excess patient days within particular service lines, which were identified using data from the Vizient Clinical Data Base. Alongside admissions, LOS was significantly higher than expected—particularly in the lung transplant recipient population—indicating an obvious need for intervention. The Lung Transplant App initiative began in January 2018

with the enrollment of 50 lung transplant recipients, which has now grown to 167 patients. Participants are enrolled into the program post transplant and instructed to submit a daily digital “check-in” through an application on their smartphone, tablet, or PC. Patients report 10 disease-specific symptoms and vitals each day, which are algorithmically compared to a personal baseline. If a change from baseline is detected, the lung transplant nurse coordinators are alerted. The coordinators then triage and contact patients to arrange proper care, from administration of antibiotics to urgent clinic visits. This also has reduced unnecessary calls to patients who did not require an intervention. *Outcomes and Impact.* Since the program launched, this population has submitted a total of 29 757 daily check-ins. Approximately 19 576 (66%) of these depicted a change in one or more liver transplant-specific symptoms, with 10% of all check-ins flagging for medical intervention. Average program compliance rate for this population was 73%; this rate was 80.1% when we excluded outlier patients who were frequently hospitalized with complications or who were technologically challenged. A comparative analysis was done comparing patients enrolled into the telemedicine program to lung transplant recipients at our facility who were not enrolled (control group). The telehealth group spent less time in the hospital overall, with a significantly lower average LOS of 9.3 versus 11.5 days, respectively. Telehealth patients had nearly twice as many clinic referrals because they were more connected with the transplant team. This communication also helped avoid unplanned emergency department visits, and patients were directly admitted if needed. Telehealth patients saw an average of 1 less admission per patient compared to the control group, 2.7 versus 3.7, respectively. This group also spent less time in the intensive care unit (ICU) compared to the control group—about 6% fewer ICU days. Telehealth patients saw an 87% discharge-to-home rate, compared to 75% of control group patients. This shows a reduction in the cost of care continuation post discharge.

Innovations in Safety for Behavioral Health Management

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Background. According to literature, up to 60% of admitted patients have concurrent behavioral health needs. Reduced funding, diminished mental health services, and a lack of med/psych designated beds makes caring for

these patients difficult. Often patients with severe behavioral health issues also express violent or aggressive behavior. Health care workers are 4 times more likely to be victims of workplace violence resulting in staff-related stress and injury. The volume of patients with behavioral health needs likely will continue to increase with reduced funding for mental health services. The organization noted an increase in assaults, behavior response team (BRT) activations, elopements, and suicide attempts. The Complex Behavioral Health Patient Oversight Committee was formed to develop strategies to improve care for patients with complex behavioral health needs, as well as patient and staff safety. The program is supported at the executive level with feedback from frontline staff providing care for complex patients. A failure modes and effects analysis was utilized to examine the current management of patients with complex behavioral health needs. Subcommittees were then formed to address high-priority issues, including identification, patient management, environmental safety, a constant observation program, and education. Lean tools, such as standard work, were used to ensure consistency in process. The standard work was developed with input from key stakeholders and modified based on ongoing feedback and evaluation of performance measures. This work is unique because of the comprehensive, proactive approach put in place to care for these patients, and it has been shared with other organizations locally and nationally. The management of patients with behavioral health needs in acute care settings remains a patient safety concern and this initiative provides unique strategies to improve patient and staff safety. *Intervention Detail.* The Complex Behavioral Health Patient Oversight Committee was formed to oversee interventions to improve staff and patient safety, and includes executive leadership, bedside staff, nursing, social work, physicians, psychiatry, education specialists, informatics, risk management, and regulatory. Data reviewed included number of reported physical assaults, BRT utilization, elopements, suicide attempts, and utilization of constant observation. Data supported the need to innovate and standardize the management of patients with complex behavioral health needs. When a patient is identified as having complex behavioral health needs, the nurse manager facilitates the huddle and includes all necessary participants. The team collaborates to develop a plan of care to keep both the patient and staff safe. The plan is communicated in the electronic medical record (EMR) to the team and to the patient and family. The plans are utilized throughout the continuum of care and expanded on during future encounters. A banner can be seen in the patient-level medical record, whether the patient is inpatient or at an ambulatory clinic, to indicate the patient has complex behavioral health needs. A standardized sign is placed on the door when the patient is hospitalized to indicate to other staff to check in with the nurse

before entering the room. A standardized environmental risk assessment procedure was developed and is completed every shift and after visitors leave for patients with complex behavioral health needs. The environment is swept for contraband and other items in the room that could present a risk of harm to self or others. This process helps create a safer environment for both patients and staff. An elopement risk assessment was developed with specified interventions for patients at increased risk. Patients at high risk for elopement are placed in a yellow gown and a banner presents in the chart, indicating risk.

Outcomes and Impact. From April 2017 to January 2019, there have been 186 documented complex behavioral health patient huddles for 156 unique patients. BRT activations decreased by 10.2% during this time. Reported physical assaults on nonbehavioral health units decreased by 44.1%. Repeat BRT activations decreased by 14.1%. There has been a recent increase in reported assaults because of an education campaign emphasizing the importance of reporting. The yellow elopement gowns were implemented on all inpatient units in July 2018. The elopement risk assessment was implemented in the EMR in September 2018. Our data show a 62.6% reduction in elopements after implementation of these interventions. There has been an increase in the number of patients indicating thoughts of harming themselves. The Columbia-Suicide Severity Rating Scale was implemented in spring 2019. The team anticipates a reduction in suicide attempts related to the stratification of risk and appropriate interventions for each risk level. The team has partnered with the education department to provide increased training to equip staff with the tools needed to care for patients with complex behavioral health needs. A daylong symposium was held in August 2018 about the management of patients with complex behavioral health needs. The team also hosted the First Annual Suicide Prevention Symposium in September 2018, along with a screening of *Suicide: The Ripple Effect*. Mental health first aid was provided to 30 staff members. Crisis prevention intervention training is offered several times a month and is available to all staff, with high BRT utilization units requiring all staff to attend. A new patient safety assistant (PSA) training program for unlicensed staff was developed to strengthen the care provided by constant observers. Forty PSAs have been trained to date. This work has demonstrated that proactive planning and collaboration have a positive impact on the care received by patients with complex behavioral health needs.

Patient Assistance: It Just Makes Cents

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The University of Toledo Medical Center

Background. The University of Toledo Medical Center (UTMC) located in Toledo, Ohio, is a 340B-covered entity providing pharmacy services across several pharmacy locations, including 2 outpatient pharmacies, a Ryan White-funded HIV pharmacy, and a concierge specialty pharmacy. The largest of the pharmacies, the traditional outpatient pharmacy, hosts a hospital-wide, opt-out, med-to-beds program that identified a need for increased financial support for discharged patients who were uninsured or had pending insurance. The specialty pharmacy also identified a need for increased financial support for the patient population receiving generic oral oncolytics for which manufacturer-based programs are not available and disease-state funding resources do not apply or are often fully allocated. This widespread need led to the development of a homegrown Pharmacy Patient Assistance Foundation channeling 340B savings to provide medication access to patients demonstrating need. Furthermore, the foundation exemplifies the intent of the 340B program to enable covered entities to stretch scarce resources by providing additional comprehensive services. The creation of the foundation was based on the previous successes of a voucher program in our Ryan White Clinic and since has been extrapolated hospital-wide to serve patients after identifying an increased need for prescription assistance in our indigent patient population. Contractual relationships with outside specialty pharmacies is a common practice for many university hospitals, but challenges arise with utilization of funds and increased scrutiny of overseeing bodies. These challenges presented an opportunity to reallocate contractual funding to the patients themselves through the creation of our Pharmacy Patient Assistance Foundation. Utilization of 340B savings is a frequent topic that continues to gain attention on institutional and national levels, and this unique approach has provided tangible substantiation of our institution's use of the savings.

Intervention Detail. The foundation was constructed using a phased approach of development, implementation, and evaluation. During the development phase, a committee was formed consisting of key stakeholders from pharmacy, hospital finance, social work, and compliance. The criteria for patient utilization of funds, foundation procedure including billing, and the various data points for collection were established. The implementation process consisted of training for all pharmacy staff and key stakeholders to ensure proper allocation of funds and tracking. The foundation currently has an evaluation component in which a quarterly meeting is held to provide oversight of financials and review specific impactful patient cases on providing financial assistance for medications, as well as key data points being tracked. Since implementation, tracking has consisted of the number of patients assisted, the number of prescriptions filled, the amount of foundation dollars utilized, payer mix, patient care location (cancer center vs

discharge vs specialty clinics), and the reason for providing assistance. Metrics are tracked and data are utilized to link cost avoidance/cost savings, in addition to examining opportunities for expansion of the program to further stretch resources. These data have been used to determine the impact on length of stay (LOS) and readmissions for UTMC patients as compared to the academic medical center (AMC) comparator group. *Outcomes and Impact.* An evaluation of the Pharmacy Patient Assistance Foundation from July 2018 to May 2019 demonstrated assistance provided to 144 patients across multiple settings. More than 400 prescriptions were filled for patients who otherwise would have been unable to afford their medications. Overall, we have utilized a total of \$16 545 in 340B pharmacy funds to support dispensing these prescriptions, with a majority of patients receiving assistance upon discharge. While the greatest number of patients requiring assistance have been uninsured (39%), other various payer types have been included, such as commercial, Medicaid, Medicare, and patients required to use Veterans Affairs pharmacy services. Further evaluation of patient type has demonstrated increased utilization for the transplant patient population, particularly those required to fill antirejection medications at in-network pharmacies. By utilizing the Pharmacy Patient Assistance Foundation, we demonstrated a decreased LOS and circumvented lapses in therapy by avoiding delays associated with utilizing outside specialty pharmacies. Specific patient cases have involved cost avoidance. For example, a Medicare patient with liver disease received a course of rifaximin to avoid a second hospitalization, and a cancer patient avoided using a 5-fluorouracil pump by receiving access to capecitabine, demonstrating that the foundation optimizes patient care by providing medication access. Further analysis of data collected from July 2018 through May 2019 indicated UTMC foundation patients had an average LOS of 4.85, compared to 5.09 for all UTMC patients and 6.01 for the AMC comparator group (Resource Manager, a Vizient Clinical Data Base tool). We also used Resource Manager to perform an analysis of hospital readmissions that displayed a decrease in both all-cause (11.3% UTMC vs 11.79% AMC comparator) and related hospital readmissions (4.29% UTMC vs 5.33% AMC comparator).

Creating an Evidence-Based Practice Culture Through the Nurse Residency Program

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Background. Nursing is challenged to keep up with rapidly changing and evolving nursing practice. Engaging the nursing workforce is paramount to meet the Institute

of Medicine (IOM) goal to make practice decisions based on evidence utilized to improve care. An institution must create a cultural norm for using evidence to provide the most up-to-date practice. Nurses have numerous competing, and at times conflicting, demands in practice. Providing a structure, resources and a cultural expectation is necessary to advance evidence-based practice (EBP). This academic medical center began a Nurse Residency Program (NRP) in 2007. Each year approximately 90 to 150 nurses from different practice settings participate in a yearlong NRP offered through a practice-academic partnership. Engaging new nurses in EBP at the beginning of their careers is part of the nurse residency curriculum. One of the crucial goals for the nurse residency program is for nurses to incorporate EBP in the care they provide. Nurse residents have just completed an EBP course as part of their undergraduate education. The new-to-practice nurse enters the hospital environment eager to learn, equipped with basic EBP skills and an expectation of EBP for professional practice. As nurse residents examine their nursing practice and ask a clinical question specific to their setting, they involve other nurses in their EBP project. Exposing other nurses to the benefits of EBP and practice improvements strengthens the culture of EBP for nursing throughout the institution. Institution leadership shows their commitment to EBP in their support of the NRP, establishing an expectation for practice. All institutions strive to meet the IOM goal of EBP, and examining strategies to engage and empower nurses in developing their professional practice is imperative. *Intervention Detail.* The nurse residency curriculum encourages new nurses to ask why and seek answers as a natural default in their practice. As nurses critically question the care provided and use the EBP process to tackle clinical issues, the quality of health care improves. Small groups of nurse residents work together on an EBP project, developing not only the project but also enhancing teamwork and leadership development. To gain nurse resident engagement, we learned it is essential to have the resident select an EBP topic that is of interest and importance to their specific practice. Blended education is provided to reinforce EBP concepts and skills introduced during pre-licensure education. The Johns Hopkins EBP model is used to provide structure and a systematic approach to the project. Nurse residents are mentored to review current evidence to answer a practice issue they identified. Nurse residents formulate a question based on the PICO Model of Clinical Questions, perform a literature search, appraise the evidence, apply the evidence, and evaluate the outcome. Through the process, nurse residents learn about hospital EBP infrastructure and resources, such as access to online journals, hospital mentors, and academic faculty. They work with other nurses on their unit, clinical nurse specialists, the nurse

residency director, internal experts, and librarians to complete the project. After examining the evidence, if supported by evidence, residents work to implement practice change. If limited evidence is present, nurse residents are mentored by a doctorally prepared nurse to begin a research project. *Outcomes and Impact.* Institution leadership and the academic partner provided resources and structure for the NRP. By completing the EBP project, nurse residents build confidence in their ability to create change. Since 2016, nurse residents accomplished 116 EBP projects. Nurse residents develop a poster and abstract to present at EBP day. Nursing leadership, faculty, nurse managers, clinical nurse specialists, and clinical nurses attend to support the residents and learn about their exciting work. Depending on project topic, nurse residents have presented at unit council, interdisciplinary meetings, and conferences. One of the NRP goals is to have nurse residents present at local, state, and national conferences. Each year, more nurse residents are submitting abstracts and presenting at conferences. In 2018, 6 nurse resident groups shared their work as either a poster or podium presentation at conferences. Residents, managers, and educators evaluate the nurse residency EBP projects. Nurse residents rate the EBP overall as an excellent learning experience that enhanced their understanding of the impact of the project. They stated unit nurses, the charge nurse, and educators helped identify the unit-specific clinical issue, participated in surveys, and supported project completion. Nurse residents felt participation in the nurse residency EBP gave them more confidence in improving care. Nurse managers and educators agreed the nurse residency EBP project impacted practice. Managers stated that the EBP curriculum provides the tools and sets the standards for involvement in EBP as part of professional nursing.

Build a Juggernaut Opioid Stewardship Team to Stomp Out Adverse Events

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UC Davis Health

Background. In 2016, a gap analysis revealed opportunities to improve the existing structure for opioid use. Our organization lacked a uniform opioid guideline for treating patients with acute or chronic pain. Policies and procedures existed but were targeted to special populations such as pediatrics, or situations such as range orders; a generalized policy on pain management was needed. Pain orders were located in more than 150 different order sets; therefore, many different approaches to treating pain existed, which generated confusion, order duplication, and waste. Nursing assessments post opioid administration were

focused primarily on pain scores and the timing of reassessment was not linked to predicted peak medication effect. Sedation assessments were not temporally linked to opioid administration and did not utilize a sedation scale specific to opioids. Patient screening and education also were not standardized, and there were large gaps in patient monitoring. In December 2016, UC Davis was selected to participate in Reducing Adverse Drug Events related to Opioids, a mentored quality improvement program through the Society of Hospital Medicine. Our chief quality officer and chief medical officer identified funding to start an Opioid Stewardship Program consisting of a part-time physician champion and a part-time pharmacist, as well as key participation and co-leadership from our medication safety officer. Our electronic health record (EHR) medical director and chief medical information officer were enlisted to help identify ways to use information that already exists in the EHR to build novel EHR tools to assess and display patient risks for opioid adverse events. These included coexisting diseases, renal dysfunction, concomitant benzodiazepines, obstructive sleep apnea, and age. We worked closely with nursing leadership to develop new workflows to enhance patient assessment following each dose of opioid to include comprehensive respiratory and sedation assessment. *Intervention Detail.* In order to improve the safety of opioids, our first step was to squeeze more value from our EHR system. We developed an algorithm for the EHR to constantly screen for discrete data points and identify patients at high risk for developing respiratory adverse events from opioids. It is done in real time such that it continuously updates if patient characteristics change during their hospitalization. The tool creates a banner in the patient chart that notifies care teams and displays the patient's one or more characteristics that increase risk with opioids. We created and deployed an electronic STOP-Bang tool to screen for obstructive sleep apnea, including compliance aids to promote use. Both types of screening were applied to all patients in our intervention units, along with enhanced registered nurse assessments following opioid administration, staff education, and patient education. An Inpatient Pain Task Force led by the Opioid Stewardship physician champion and the executive nurse director of patient care services developed Pain Guidelines, an Inpatient Pain Policy, and a Standardized Multimodal Pain Management Order set. The order set can stand alone or be embedded into existing subspecialty-specific order sets and includes nonpharmacologic, scheduled nonopioid pharmacologic, and opioid treatments. Opioid "range orders" are replaced by "rescue" orders, a method to start low and provide rescue doses to titrate to the lowest effective opioid dose utilizing a preferred oral route of administration. It also includes non-sedating supportive medications for respiratory depression, itching, nausea, and bowel care. The

urgent and emergent triggers and response to sedation or respiratory depression also are now uniform. We created animated pain education videos for acute and chronic pain patient education, via a collaborative project with the UC Davis design department, that are displayed for patients receiving opioids. The outpatient videos are distributed via patient portals and the Emmi platform. The inpatient video is shown on the inpatient TV educational channels.

Outcomes and Impact. Overall, we reduced our inpatient intravenous opioid administered doses by approximately 30%. Oral opioid dosing also decreased by 7%, reflecting an overall decrease, despite advocating for a preferred oral route of administration. During the same months that opioid doses decreased, patient satisfaction data regarding pain management increased on pilot wards. This appears to be attributed to increased conversations, assessments, and patient and staff education surrounding pain management. One hundred percent of patients on pilot wards received screening for opioid high-risk factors as a result of the EHR tool design. Patients who met the criteria for being at high risk for opioid-induced depression were identified in the EHR by a decision-support banner that displays continuously. The decision-support banner is effective and remains part of the EHR tool design. Compliance with the completion of the STOP-Bang assessment tool for obstructive sleep apnea is sustained above 90% completion. To expand the impact of our work, we presented our EHR tools at the Epic XGM expert group meeting in 2018. Furthermore, our pain education videos are now utilized by many hospitals (including Vizient members), posted on public websites, and available with subtitles in various languages. We are planning a spring 2020 “big bang” launch to continue to shape our culture of pain management. This will include system-wide implementation of the pilot project tools and enhanced nursing assessments, as well as new pain guidelines, an inpatient pain policy, and standardized multimodal order sets. As part of the launch, we are creating one education module that will target physicians, pharmacists, and nurses as a team—a novel approach to our usual method of providing separate education modules for each.

Innovative and Evidence-Based Bundle Reduces Hospital-Onset Clostridium difficile by 53%

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Background. Annually, there are 500 000 *Clostridium difficile* (CDI) cases and 15 000 related deaths in the United States. Our academic hospital exceeded internal and

national hospital-onset CDI (HO-CDI) benchmarks. Our 2014 HO-CDI rate, at 5.85 per 10 000 patient days, far exceeded our internal target. In 2015, the National Healthcare Safety Network introduced the HO-CDI standardized infection ratio (SIR), a risk-adjusted calculation. Our January to June 2015 SIR was 1.326; our target was a SIR of less than 1. Our unique care bundle stems from our root cause analysis. First, growing evidence points toward asymptomatic *C difficile* carriers as a significant source of HO-CDI transmission, and carriers may outnumber infected patients by up to 10 to 1. Second, injudicious use of antimicrobials increases the risk of developing CDI. Third, a significant proportion of our HO-CDI cases actually displayed CDI symptoms at admission, yet were not tested until on or after the fourth hospital day—thus classified as “hospital-onset,” when likely they were truly community-onset. Finally, some of our patients (carriers and noncarriers) were inappropriately tested for CDI for nonclinically significant diarrhea or while receiving laxatives. In 2013, our original small project group identified these root causes and sought the support of hospital administration. Together with the executive suite, we secured a generous grant from the Gordon and Betty Moore Foundation. Executive leadership supported the creation of a multidisciplinary team with all stakeholders engaged. Extensive planning included developing strategies to mitigate a potentially negative impact on hospital throughput, because one bundle element included initiating isolation on an estimated 4% to 7% of patients who otherwise would not have been identified as contagious. With patients as our end customers, much care also went into patient education and satisfaction. It was important for our patients and their families to understand that we care about their health, as well as their safety.

Intervention Detail. In early 2014, an adult antimicrobial stewardship program (ASP) was implemented by our infectious disease colleagues. This included recommending de-escalation, cessation, or even escalation of antimicrobial therapy in our high-risk patients. In order to launch *C difficile* active surveillance and isolation of carriers, nursing, physicians, bed control, environmental services (EVS), pharmacy, information technology (IT), and the microbiology laboratory were extensively educated. Multiple new systems were put into place, such as an isolation rooming guide, policy revision, automated electronic medical record (EMR) alerts/reminders, laboratory protocols/new equipment, EVS cleaning protocols/signage, and patient/provider scripting and education in 5 languages. Screening and isolation of carriers via perianal/rectal swabbing began in June 2014, with an encouraging 23% CDI reduction in the 10 pilot units. The practice was expanded to all eligible adults house-wide in late 2017. In mid-2017, our group created real-time EMR decision support, which

discouraged inappropriate testing and increased our positive predictive value. As a result, overall testing decreased by 30%. In late 2017, the prevention workgroup was restructured and additional resources were allocated. We added a second lead registered nurse (RN) to the workgroup, who implemented nearly real-time monitoring of diagnostic *C difficile* testing and ensured samples were collected in an appropriate and timely fashion. This RN also rewrote and vastly improved patient education materials and relevant policies and helped spearhead the redesign of our house-wide isolation protocols. Additional IT support allowed for the creation of multiple reports and dashboards, which were shared with all stakeholders. The additional resources also allowed an already robust ASP program to expand. In 2018, we took a fresh look at our EVS practices. Disinfection protocols, techniques, training, products, and follow-up monitoring were examined and redeveloped. In addition, leadership from the emergency department joined the effort, putting processes into place to more promptly recognize clinically significant diarrhea isolate and test for CDI. *Outcomes and Impact.* Once all bundle elements were fully implemented, our HO-CDI infection rate and SIR decreased dramatically and have remained at or below target. In 3 of the last 4 quarters, we have achieved a SIR of less than 0.7, with corresponding infection rates of 2.5 to 3.5 per 10 000 patient days. Overall, we have sustained a 53% reduction in HO-CDI. This team effort involved nearly every hospital department and could not have occurred without the unwavering support of our administration. Interestingly, our patients have accepted the surveillance testing with very few problems. Test refusal is tracked and is uncommon. Our nurses have done a convincing job of explaining the reasoning behind the test, with an emphasis on patient safety and protection. Combining evidence-based approaches with cutting-edge strategies has led to a desirable and sustainable outcome. When we were able to leverage administrative backing and break down our organizational silos to effect change, our patients reaped the benefit in the form of illness prevention and lives saved.

Decreasing Intensive Care Unit Length of Stay: An Innovative Approach

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Background. UCLA Health recently created a performance improvement infrastructure designed to strategically align

projects and resources to influence goals set by senior leadership. The performance improvement infrastructure focused on 3 main goals: improve access, improve quality, and improve financial performance. To improve quality, the Value Care Redesign team (ValU), a health system improvement team focused on increasing health care value, was tasked to support a length of stay (LOS) reduction initiative across intensive care units (ICUs). The project workgroup included a physician champion, nursing champion, clinical quality improvement nurse, and ValU. This workgroup reported progress to the Critical Care Committee, composed of physician and nursing leaders from the ICUs, and co-chaired by the project workgroup's physician champion. UCLA Health has 9 ICUs (6 adult, 3 pediatric/neonatal) across 2 hospitals. Traditional LOS projects focused predominantly on discharge processes from the floor units, with less focus given to the ICU phase of care because of high patient acuity and low frequency of discharges from ICUs. However, due to patient throughput and capacity challenges, a unique approach was required to investigate upstream effects to overall LOS, including phases of care not previously included in traditional projects. *Intervention Detail.* Guided by Lean process improvement methods, the workgroup first conducted a literature review to identify best practices to impact ICU-specific LOS barriers. The limited results primarily examine how the integration of palliative care¹ and early mobilization in the ICU² can decrease ICU length of stay and have potential cost savings. To understand UCLA-specific barriers, the workgroup employed a mixed-methods approach, combining quantitative analysis (to capture metrics for ICU patients) with qualitative analysis to understand LOS challenges from clinical stakeholders' perspectives. The workgroup prioritized a stakeholder-centric model to integrate frontline patient care staff as much as possible throughout the process. The quantitative analysis initially had a fundamental limitation: the Vizient inpatient data set only identified ICU patients as those who were admitted and/or discharged from an ICU. Patients who transferred through an ICU were unidentifiable. This was resolved by layering Epic reports onto the existing Vizient data set, creating a complete and robust data set that allowed the flexibility to tie LOS and clinical metrics to any single ICU. The analysis showed that 100% of excess bed days (EBDs) could be attributed to ICU patients (17% of the inpatient population) during the baseline period of fiscal year 2017. To conduct a root cause analysis of factors affecting LOS from ICU stakeholders' perspectives, we constructed a loosely structured interview guide to understand 3 categories of patient movement: Transfer to Floor Unit, Discharge from ICU, and Expiration in ICU. This qualitative analysis gathered input from a total of 68 physicians, nurse practitioners, nurses, and care coordinators. Interviews were categorized into themes and sub-themes within each patient movement category. Results

were presented to the Critical Care Committee and a real-time, interactive voting platform gathered aggregated feedback on subthemes that the committee wanted to prioritize within each patient movement category. *Outcomes and Impact.* As of July 2019, 4 initiatives targeting a variety of the 12 subthemes prioritized by the committee are live. Under the Expiration in ICU patient movement category, a Palliative Care Workgroup was created to improve the goals of care discussion and cultural and behavioral practices surrounding hospice and palliative care. In November 2018, a pilot was launched to engage the palliative care team earlier in the patient stay. Early results show positive feedback from ICU nurses and physicians who have historically experienced both clinician and patient dissatisfaction surrounding palliative consults. The Discharge from ICU category yielded subthemes that prioritized optimizing ancillary services (eg, physical therapy) role in discharging patients. Two initiatives, staffed by different groups under the Performance Improvement Infrastructure, were launched: one to optimize ancillary services and another to standardize case management onboarding and staffing. The fourth initiative, housed under the Transfer to Floor category, aims to create a standardized process to facilitate transfers between the 2 hospitals in the system, specifically designing protocols for movement between the ICU and intermediate levels of care. In addition to understanding that all of the inpatient EBDs could be attributed to patients who had an ICU stay, 2 other patterns emerged: 5 of the 6 adult ICUs had negative EBDs for patients who were admitted and discharged from the same ICU, while all 6 showed that true ICU transfer patients (admitting/discharging through non-ICUs) contributed the highest number of EBDs. These patterns also were observed in fiscal year 2018. Highlighting EBD sources in the ICU population helped internal stakeholders prioritize areas of opportunity. We are currently engaging with individual ICUs on various improvement efforts. Though this project remains ongoing, UCLA has observed an 81% decrease in total UCLA EBDs and a 29% decrease in ICU EBDs between fiscal years 2017 and 2018.

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Innovative Academic-Community Hospital Tele-Critical Care Partnership Improves Mortality

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Background. Critical care demand will continue to increase over the next 2 decades. Patients 65 years and older use critical care resources at 3.5 times those younger than age 65.¹ In Alabama, the population of patients older than age 65 is projected to grow by 74% between 2010 and 2040.² Critical care resources have gravitated to urban areas, resulting in fewer rural hospitals with access to critical care providers. In order to help address this issue, University of Alabama (UAB) eMedicine Critical Care is partnering with rural hospitals to create novel programs to augment support in their intensive care units (ICUs). In July 2018, UAB critical care faculty created a telecritical partnership with a hospital in Dallas County, Alabama, with a 10-bed ICU. Patients are admitted primarily by family medicine and internal medicine physicians. Through this program, UAB intensivists support the on-site physicians and nurses by participating in the care of critically ill patients. A US Department of Agriculture grant provided funding for the telecritical care equipment and software. UAB medical critical care leadership worked with the on-site family medicine program to implement a 24/7 critical care consultative service, including interprofessional rounding focused on improving ventilator care and use of a standard ICU checklist. Following implementation, UAB leadership remains engaged in identifying ways to improve the application of evidence-based critical care, including education of physician staff on critical care topics and conducting reviews of challenging cases to identify opportunities for improvement. Three rural hospital ICUs have been added since summer 2019. As our network grows, we anticipate increasing opportunity for patients to receive ICU-level care closer to home by reducing the number of patients requiring transfer to tertiary care hospitals. The ability to transfer intensivist-level care and oversight into areas without on-site access to these resources may be an important way to improve and coordinate care in rural areas. *Intervention Detail.* UAB intensivists perform daily virtual rounds with the on-site family medicine providers. Also, UAB intensivists are available 24/7 for on-demand consultations. Prior to implementation, UAB eMedicine critical care leadership worked with the on-site physicians to understand their workflow and needs. The physicians agreed to standard consultation requirements, checklist use, documentation practices, and approaches to mechanical ventilation strategies. Nursing is routinely included as part of interprofessional rounds each morning. The standard daily checklist is consistent with the checklist used by UAB physicians in the UAB medical ICU and includes evaluation of Foley catheters, central venous lines, ventilator parameters, sedation practices, and nutrition. As the program has evolved, it was recognized that additional critical care education would help provide context for clinical decision-making.

Given engagement with the family medicine residency program, UAB intensivist faculty now participate in the residency curriculum. UAB faculty provide monthly video lectures on a variety of pulmonary and critical care topics for family medicine residents and faculty. These didactics also can be used for case review to identify opportunities to improve the program and provide feedback on opportunities for quality improvement. *Outcomes and Impact.* Clinical outcomes including observed-to-expected (O/E) ratio and mortality were tracked before and after implementation. Before telecritical care implementation in July 2018, the average O/E mortality ratio over 6 months was 1.26. In the 6 months following implementation (from July to December 2018), the O/E mortality ratio was 0.69 ($P = .01$). Observed mortality in the time period prior to implementation was 1.72%, compared to 1.01% ($P = .027$) following implementation. In addition to these data supporting a benefit, we have seen more rapid diagnosis of critical issues. One such case was the ability to use critical care ultrasound to rapidly evaluate a patient in shock. Intensivist evaluation resulted in a diagnosis of cardiac tamponade, which required emergent transfer to another facility for evaluation by cardiac surgery. This program facilitating collaboration between an urban academic medical center and a rural community hospital can facilitate and promote a system for shared learning and, more importantly, overcome resource limitations in rural areas. This type of relationship occurring outside of a preexisting hospital network is a novel approach to coordinate care between tertiary care centers and referring hospitals. A unique aspect of this model is that it incorporates the specific needs of the referring hospital to provide care for local patients and support for on-site physicians. As we implement telecritical care coverage in 3 different rural Alabama communities, we will encounter different challenges. Though mortality also may improve in these hospitals, we anticipate a steady reduction in transfer rates and an increase in case mix index. It is possible that mortality actually may increase in some areas with implementation as patients with higher acuity are able to remain at their community hospital; therefore, it will be important to follow a variety of metrics to establish the impact of the program.

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Coordinating Optimal Referral Experiences (CORE)

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Background. According to a national survey from the National Ambulatory Medical Care Survey and National Hospital Ambulatory Medical Care Survey (1993-2009), the use of subspecialty medical services has risen rapidly, with referrals to specialists more than doubling from 1999 to 2009. During that time period, the probability that an ambulatory visit to a physician resulted in a referral to another physician increased from 4.8% to 9.3% ($P < .001$)—a 94% increase. Along with increasing referral rates, the quality of communication and coordination between primary care physicians (PCPs) and specialists has decreased over time. Patients are faced with poor access to specialists, high costs, and fragmented care. At the same time, organizations are shifting their care delivery models from volume-based to value-based care. The University of Colorado School of Medicine implemented Project Coordinating Optimal Referral Experiences (CORE), which aims to improve quality of care and the patient experience while reducing overall cost by enhancing communication and coordination between PCPs and specialty physicians. Through CORE (1) patients have improved access to specialty care, greater convenience, and fewer unnecessary visits, tests and costs; (2) PCPs have timely access to specialty input, clearer roles in comanagement, and improved continuity and comprehensiveness of care for patients; (3) specialists have a more structured approach to consults and referrals, improved access for higher-acuity patients, and more efficient referrals; and (4) leadership sees improved quality, reduced costs, improved access in high-demand specialties, the opportunity to extend the referral network, increased provider alignment, a better position for negotiations with payers, and improved patient and provider satisfaction. *Intervention Detail.* The CORE model uses tools embedded in the electronic medical record (EMR) system, known as enhanced referrals and eConsults, that provide point-of-care decision support. These decision-support tools enhance clinical workflows, improve communication and coordination of care at the interface of primary care and specialty care, and enhance quality and efficiency of care. The first part of the intervention is enhancement of the traditional referral process. An enhanced referral provides point-of-care decision support for the referring health care provider through the use of condition- and

specialty-specific templates in the EMR. These templates convey pre-consultation guidance from specialists at the point of referral, which streamlines the transmission of the clinical question and key diagnostic data. This process maximizes the effectiveness of the first specialty visit, thus preventing unnecessary follow-up visits for reviewing diagnostic tests. eConsults are asynchronous exchanges initiated by a PCP between that provider and a specialist colleague. In lieu of an in-person visit, a specialist responds through the EMR to a PCP's inquiry. eConsults are responded to within 72 hours. These exchanges use structured templates in the EMR to create a seamless, point-of-care pathway that facilitates high-quality coordination and communication between providers. For appropriate questions, typically about straightforward, low-acuity issues, eConsults allow for significantly more efficient specialist input and more cost-effective care delivery. At any time, a specialist can convert an eConsult to a referral. Patients have the option to request an in-person visit rather than an eConsult. In recognition of the effort involved, the PCP who initiates the eConsult and maintains responsibility for care and the specialist who addresses the question each receive credit in the form of 0.5 work relative value unit. Our PCPs and specialists have embraced this innovative project. *Outcomes and Impact.* The University of Colorado School of Medicine went live with Project CORE in April 2018 with 2 specialties. Since that time, we have added 4 to 6 specialties to the project each quarter, with a goal of having more than 30 specialties live with the project by summer 2020. Through July 2019, more than 1700 eConsults were sent. Seventy-eight percent of eConsults were answered by the specialist, 15% were converted to an in-person visit, and 7% were declined because of the question being unclear or other logistical issues. More than 12 500 patients were referred using the enhanced referral workflow. This project has been linked with improvement in the lag time associated with in-person appointments, and with a larger percentage of patients being seen within 15 to 30 days, compared to more than 30 days pre implementation of the project. When surveyed, 90% of our responding PCPs have seen value in the project. Eighty percent of respondents said that without the use of eConsults, they would have sent a standard referral or asked for a curbside consult. Nearly 90% of specialists surveyed have found eConsults to be valuable to their department, with a common theme of being able to see more acute patients while addressing lower acuity patients via eConsults. Specialists also have found satisfaction in helping PCPs work at the top of their scope. Data collected from the project have been used nationally in discussions with health plans around reimbursement for eConsults. Additionally, this project has demonstrated value to patients, PCPs, specialists, and leadership. Modeling

based on data from our institution estimates that patients who can forgo a specialty visit because of an eConsult can save an estimated \$103 in expenses related to average out-of-pocket expenses, transportation expenses, and lost wages for time off from work.

UI HEART: The Service Line Story

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University of Illinois Hospital

Background. Transitioning from traditional fee-for-service payment models to value-based models has contributed to closer alignment and partnership between care providers across diverse disciplines at the University of Illinois (UI) Hospital and Clinics. This change calls for improved quality outcomes and more efficient, less costly health care. This has created opportunities to review and assess current models of care and measurements in the cardiovascular space. UI Health used a horizontal service line approach to improve quality and performance, making use of quality improvement methodologies and developing several focused work groups. One repeating characteristic was a loosely coordinated care delivery model that our team decided to assess in detail. After considerable review and discussion, the team decided to create a new, comprehensive, and seamless delivery system that goes beyond the acute hospitalization phase. *Intervention Detail.* Developing the UI HEART program began with integrating foundational building blocks, including the creation of a unified vision for all clinical departments and sections involved, such as cardiothoracic surgery, interventional cardiology, cardiology, the emergency department, hospital administration, nursing, pharmacy, and social work, among others. The close partnership between clinical and hospital leadership was essential in securing a unified vision of the future state. Another motivator and push behind establishing a common goal was our current performance as compared to other academic medical centers (AMCs) via the Vizient Clinical Data Base. We felt that our length of stay (LOS), readmissions, and cost index were not competitive. Operational and tactical tasks that targeted standardizing processes, provided necessary tools to support standardized care, and measured compliance with agreed-upon goals also were implemented. We analyzed our readmissions data and identified that our biggest barrier was medication compliance related to socioeconomic factors. To address this our team implemented a program called "Meds to Beds" in which all of our cardiology patients leave the hospital with their cardiac medications in hand—even those who cannot afford their medication receive up to a 90-day supply. This occurred after we

completed a cost analysis of all the usual and customary cardiac medications that would add actual cost to the health system. Another intervention was improving communication between all providers and support staff. We started physician-led multidisciplinary discharge rounds that drove additional programmatic discussions with the entire clinical team on a daily basis. Based on these discussions, a number of transitional care appointments were scheduled prior to a patient leaving the hospital. We kept track of multiple metrics related to these interventions (and more) that were implemented and looked for gaps in patient care and care delivery model. This has helped us track our performance and act on any anomalies that required immediate attention. *Outcomes and Impact.* As a result, we worked to help UI HEART strive to become a program with exceptional quality, lower LOS, improved readmission rates, and improved clinician and patient satisfaction. Our readmissions rate for acute myocardial infarction dropped by 47% (calendar year [CY] 2017 to CY2018) and LOS decreased by 18% (CY2017 to CY2018) compared to our baseline prior to program development. We increased our compliance with post-discharge appointments scheduled prior to discharge from zero to >90% (November 2018 to June 2019). In addition, our Medicare Severity-Diagnosis Related Group (DRG)-based rankings compared to other AMC hospitals available in the Vizient Clinical Data Base shifted positively in the majority of our cardiac-related DRG groups. Our dyad leadership model in which the administrator is in sync with the physician leader(s) has proven to be most important. The structure within our service line has helped align our quality and financial goals to more closely resemble the goals of the institution. This unique blending of optics between clinicians and administrators has helped us design and deliver a higher quality, better synchronized care model that is not only more efficient but also seamless to our patients and their families.

Service Line Optimization: Right Care, Right Time Improves Patient Outcomes

Paul Gorski, MPH, Keir Mitchell, PT, PhD, GCS, and Zaneta Ahuja, MBA, MA

University of Illinois Hospital

Background. With the changing landscape of health care including episodic payment models and value-based care, the need for service line approaches to leadership management has become imperative. At University of Illinois (UI) Health the preponderance of our patient population can have multiple social determinants in addition to their clinical medical literacy complexities. UI Health's call to action was not only the ability to stay competitive in the

marketplace but also to create a preeminent joint reconstruction program that will serve the needs of our patients while fully engaging employees, while also striving to achieve the highest levels of clinical excellence and patient satisfaction. Review of our data indicated multiple opportunities to continue optimizing the care continuum. Prior to the start of this project, our joint replacement program was largely uncoordinated, with limited success in achieving marketplace norms. After identifying the key members (change agents) for the joint reconstruction service line, we garnered support through sharing of data and establishing a common goal of providing exceptional care to our patients and supporting our staff. We utilized those change agents from various disciplines, reached out to high-performing organizations to assess their practice and how it would fit into our system, and reviewed multiple best practice literature sources to develop our plan for improvement. One technique we used was the Plan-Do-Study-Act (PDSA) model for process improvement. Our consensus opinion was that providing the right care at the right time in the right setting results in better patient outcomes and satisfaction. From leadership engagement through frontline staff involvement, it has been a team effort to improve patient outcomes and satisfaction. Key outcome improvements include a 24% reduction in length of stay (LOS), a 26% reduction in cost, a 59% reduction in venous thromboembolism (VTE) rates, and a 64% improvement in patient satisfaction between 2015 and 2017. These improvements have been sustained over time. *Intervention Detail.* After attending the 2014 Vizient improvement collaborative on reducing variation in care for surgery patients, a project charter was developed to help determine our focus and scope based on benchmark data. Guided by project charter goals, the Multidisciplinary Joint Reconstruction Quality Team (MJRQT) was established to focus on improving care for patients undergoing joint reconstruction. The MJRQT, led by the department head of orthopedics and hospital administration, included joint replacement surgeons, nursing, outpatient clinic providers and administrators, anesthesiology, the quality and safety department, rehabilitation services, social work, and discharge planning. Baseline data were obtained for key areas, including LOS, cost, VTE, and patient satisfaction. The MJRQT team and subcommittees focused on improving preoperative patient education, updating clinical pathways and order sets, and engaging patients in their care. LOS, VTE, and costs were determined from the Vizient Clinical Data Base and patient satisfaction was obtained from Press Ganey. Patient engagement and education was a major initiative, if not the most significant work the team(s) needed to address. Standard preoperative care, including mandatory joint replacement class, was developed and implemented. Surgeons empowered social workers to remove patients from the surgical

schedule if they did not participate in class. Additionally, transitioning social work and discharge planning activities to preoperative versus post surgery was another focus to ensure patient engagement and understanding prior to having joint reconstruction. Another initiative focused on updating pathways and order sets that reflected up-to-date VTE prophylaxis, multimodal pain management, and increased postoperative patient activity. A third major goal surrounded cost savings. Strategies around reducing implant costs also were rolled out. An additional strategy for improvement focused on root cause analysis (RCA). RCA of every outlier case was performed, with process improvement opportunities implemented based on findings. *Outcomes and Impact.* The results of this coordinated group effort include a decrease in average implant-related costs of more than 26% from pre intervention to post intervention. Cost initiatives have been sustained and we are going through another PDSA via a Vizient collaborative to look for additional cost savings opportunities around implant-related costs and processes. UI Health's observed/expected ratio for LOS for a patient following joint reconstruction are the following: 1.33 pre service line compared to 1.01 post implementation of the above interventions, and it remains at 1.03 currently. Our VTE rate went from 32.6 to 14.0 pre and post intervention and is currently at 13.3, including a 14-month period with no VTEs. Patient preoperative education went from 10% prior to service line intervention to 100% postintervention, with resultant patient satisfaction for Likelihood to Recommend improved by 64%. The percentage of patients who discharged home improved by 29% and patient satisfaction related to Discharge Information improved by 83%, with coordinated care being provided to the patients. Through coordinated efforts, the MJRQT positively affected the care received by patients undergoing joint reconstruction. Data comparison outcomes related to LOS, cost, VTE, patient education, discharge to home, and patient satisfaction all show improvement. With a coordinated program that is focused on continuous process improvement, improvements have not only been actualized but also sustained. The team continues to update goals once targets are met so that we become the preeminent place for joint reconstruction care. The MJRQT continues to work toward improvement in care of patients receiving joint reconstruction.

*Often Considered, Rarely Diagnosed:
Adherence to Heparin-Induced
Thrombocytopenia Testing Guidelines*

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Background. The 4T score is used to guide appropriate testing of heparin-induced thrombocytopenia (HIT), where a low-probability score of 0 to 3 equates to a 99.8% negative predictive value for HIT. In an effort to promote cost-conscious care and efficient use of health care resources, the American Society of Hematology (ASH) recommends against testing for HIT if the 4T score is ≤ 3 . The transition from heparin to an alternate anticoagulant therapy may engender risk in the form of medication error and lapses in treatment. Heparin costs just \$0.04 per mL, while argatroban costs \$3.81 per mL and bivalirudin costs \$12 per mL, resulting in a 100- to 300-fold cost increase, respectively. In addition to the increased cost of care resulting from unnecessary HIT workup, patients often have no alternate anticoagulant therapy during evaluation for HIT, increasing risk of thrombotic complications. Variations in practice regarding HIT testing and anticoagulant therapy were recognized as a patient safety issue by our Anticoagulation Committee, at which point an interdisciplinary working group composed of physician, pharmacy, and pathology stakeholders convened to investigate root causes. HIT is often high on the differential for thrombocytopenia in the hospitalized patient, but most providers are unaware of the rarity of the disease (occurring in about 2% of those evaluated) and the associated risks of treatment. Although the 4T score is well validated with a strong negative predictive value, most providers did not calculate it prior to starting HIT workup. By adding a 4T score calculator to the HIT order in Epic, we made this tool more accessible to providers not usually familiar with calculating the score. Overtesting for HIT is prevalent and adding the 4T score calculator is a highly portable solution that has had a positive impact on ordering practices among our providers. *Intervention Detail.* A retrospective review was conducted, including patients who had a heparin-induced platelet antibody assay ordered October 1, 2016, to July 1, 2017, to assess how our institution's lab utilization compared to ASH's Choosing Wisely recommendation. The 4T score was retrospectively calculated for all patients who had HIT testing during this time period and data were collected on alternate anticoagulant use. We listed the primary service and if patients had a surgical procedure prior to HIT evaluation. Data demonstrated that institution-wide, we failed to adhere to national guidelines surrounding laboratory testing for HIT. Fifty-seven percent of patients tested for HIT antibody had a low pretest probability with a 4T score = 3, resulting in \$32 305 of unnecessary lab testing and \$70 512 in alternate anticoagulant cost. Seventeen patients being evaluated for HIT had heparin continued after the assay was sent, which poses additional risk if HIT is present. Fifty-six percent had heparin discontinued without an alternate

anticoagulant being ordered, which substantially increased thrombotic risk in this group of medically complex hospitalized patients. Data suggested that providers either were not routinely calculating the 4T score or were not using it to guide diagnostic workup. Discussion with faculty and house staff representatives revealed that most providers did not calculate a 4T score as part of the diagnostic workup, with most citing time constraints or lack of familiarity with the tool. We hypothesized that adding the 4T score to the order would encourage providers to assess the pretest probability prior to commencing workup for HIT. The working group from the Anticoagulation Committee developed a 4T score calculator that was added to the Epic order in May 2018. This required providers to enter a 4T score at the time of lab ordering, allowing for collection of prospective data on ordering practices following the intervention. *Outcomes and Impact.* The 4T score calculator was added to the order set in May 2018, and data collected between May 2018 and January 2019 showed an overall 36% decrease in HIT lab orders compared to pre-intervention data. The calculator does not restrict ordering for score = 3 but only 14% of orders had a low pretest probability, a 43% reduction from pre-intervention data. Heparin was continued after testing was initiated in only 2 patients post intervention, while 55% received an alternate anticoagulant during evaluation for HIT, up from 43% pre intervention. This suggests that providers had a higher suspicion for HIT at the time the HIT lab was ordered. The decrease in HIT lab ordering represents a cost savings of \$20 475. The estimated cost savings for alternate anticoagulant therapy is \$2938 per patient, or \$132 210 total. Together this represents a savings of \$152 685 post intervention. The percentage of positive HIT confirmed by serotonin release assay increased from 3.6% to 7.6% post intervention, confirming a reduction of testing in patients with a low pretest probability. Reducing unnecessary HIT testing resulted in a cost savings to our institution but also increased patient safety by reducing transitions between anticoagulant therapies. The addition of the 4T score to the HIT order panel had a positive impact on provider ordering practice by highlighting patients with a low pretest probability for HIT who should not undergo lab testing. For low-risk patients, the calculator suggests repeating the 4T score in 24 to 48 hours for those patients in whom HIT is still a concern. This creates a safety net to prevent a missed diagnosis in a patient for whom clinical suspicion is high but the 4T score is low. In light of the data from this project we are planning to institute an anticoagulant stewardship program to assist with HIT workup and anticoagulation management.

Reducing Sepsis Mortality With an Aligned, Phased Improvement Model

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Background. Improving sepsis care represents the largest opportunity to save lives at UT Southwestern Medical Center (UTSW). In 2015 and 2016, 40% of overall in-hospital deaths were sepsis-related. Sepsis observed–expected (O:E) mortality rate (MR) was 1.5 and MR was 16%. Counterintuitively, MR was highest for patients with low-to-moderate expected mortality risk. Benchmarked to other academic medical centers (AMCs), UTSW ranked in the bottom quartile. Vizient reporting tools, SEP-1 data, mortality reviews and process analysis tools informed the subsequent plan for system-wide improvement. The Surviving Sepsis Campaign Care Bundles are the current standard of care for sepsis. When completed in a timely manner, bundled care is associated with decreased risk of mortality. Specifically, delays in antibiotic administration correlate with increased mortality risk. Hospitals with sepsis care pathways designed around the bundles report decreased mortality, lower length of stay, fewer intensive care unit (ICU) days, and fewer discharges to skilled nursing facilities. At UTSW, variations in sepsis treatment patterns favoring definitive diagnoses result in slower completion of the sepsis bundles, a challenge characteristic of the AMC environment. Improving sepsis outcomes requires earlier diagnosis and fast, consistent bundle implementation by all clinical services across the institution. Realizing this goal in a university hospital system with 430 acute care beds providing care for more than 105 000 hospitalized patients and 370 000 emergency department (ED) visits each year demands a model for improvement that aligns organizational strategy, culture, technology, and structure. Our experiences planning and executing complex, system-wide quality improvement for sepsis serves as a basis for future initiatives. *Intervention Detail.* UTSW made sepsis mortality a defining strategic priority with a goal of achieving top decile performance. The chief quality officer leads a steering committee composed of quality directors who support a physician-led improvement team. The team enables and guides improvement across the health care system. Planned improvements occur in 3 deliberate phases based on the greatest impact to sepsis mortality: Phase I—ED; Phase II—ICU and transitions in care; Phase III—medical-surgical units. In each phase the sepsis team partners with unit-level interdisciplinary teams. Efforts to increase bundle adherence focused heavily on measuring and achieving faster times to antibiotic

administration. Phase I began with the ED, where 80% of all sepsis patients are admitted. The ED initiated sepsis screening at arrival, nurse-activated standing delegated order sets, simplified diagnostic and treatment ordering, and visual cues for expedited antibiotic completion. Although only a small number of patients develop sepsis in the ICU, 50% of sepsis patients transition to the ICU during their stay. Phase II implements a sepsis-specific team handoff for all sepsis ICU transitions from the ED and medical-surgical units. A standardized checklist was developed to ensure bundle completion. All ICUs implemented simplified sepsis screening on each nursing shift and an escalation protocol for positive screens. Finally, Phase III targets the remaining 15% to 20% of patients who develop sepsis after admission to a medical-surgical unit. Standardized screening and alerting will improve earlier recognition of sepsis. Units will implement standard medical order sets for code sepsis activation. The same handoff checklist will be used to ensure bundle completion. The rapid response team will assume responsibility for coordinating code sepsis and patient transfers to the ICU. *Outcomes and Impact.* At an organizational level, the sepsis team ensures that activities in each phase align to create seamless, standardized sepsis care processes across the health care system. Currently, Phase II sepsis handoff implementation and expanded ICU screening improvements are in progress. Phase III is beginning. Improvement plans extended through the end of 2019. The lessons learned from previous process improvements inform later phases of process improvement. To date, the process changes implemented across multiple care settings have saved an estimated 113 lives by improving timely delivery of care for sepsis patients. For 2018, sepsis mortality O:E and MR decreased to 0.9 and 9%, dropping as low as 0.6 and 5.9%. MRs for patients with low-to-moderate risk scores decreased significantly. In comparison to similar AMCs, performance increased from the bottom 25% to the top 10%. Monthly sepsis mortality O:E and MR are associated with reductions in antibiotic administration times. Early successes in patient outcomes can be attributed to faster treatment times in the ED and increased bundle completion. Further reductions in mortality are expected with the expansion of aggressive screening practices, enhanced medical-surgical unit sepsis protocols, and adoption of standard sepsis handoffs for all ICU admissions. As a model for system-wide improvement, 3 defining features are most important: (1) a team structure, including strong physician leadership supported by systems engineering, project management, and analytics; (2) a cohesive work strategy segmented into smaller achievable phases; and (3) accountable organizational and clinical leaders who dedicate time, attention, guidance, and resources to create capacity for change. The impact and value of this approach serves as

a pragmatic model for planning and executing complex, system-wide quality improvements in the academic setting.

Transforming the Cost of Care: Integrating Clinicians Into Supply Chain Operations for Long-Term Financial Stability

Larry Dean, MD, FACCC, MSCAI, and Dan Salmonsén

UW Medicine

Background. UW Medicine is an academic health system based in Seattle, Washington, that consists of 4 acute care hospitals, dozens of neighborhood clinics, and a full-service helicopter and fixed-wing ambulance program that serves a 5-state area in the Pacific Northwest, including Alaska. In 2017, we realized that our mission was in serious financial jeopardy. In our market, reimbursements were declining at a faster rate than expected as payers were quick to adopt newer payment models. Compounding this reality was a 10% shift in payer mix from private to public insurance over the past decade. Lastly, costs for drugs and medical supplies were increasing constantly at a 4% to 5% annual rate. In 2017, all of these factors combined to result in a significant loss to the health system. Because of this, UW Medicine embarked on a financial recovery plan named Project FIT: Financial Improvement and Transformation. Project FIT is a multimillion-dollar financial recovery plan. Our goal was to address medical device and supply costs in a challenging academic medical center environment where multiple missions needed to coexist. In order to facilitate our journey, we began a collaboration with Vizient Advisory Services to review our costs and, more importantly, to help us understand our maturity in physician engagement and its role in cost-containment strategies. We quickly discovered that our faculty-based physicians had limited participation in the “business” side of the practice of medicine and were focused, as is appropriate, almost solely on clinical care. We recognized this as an important opportunity for us to transform our hospital operations with a higher level of physician engagement and alignment, and to this end we developed a program called Clinical Products and Smart Innovation (CPSI)—the first physician-led integration of hospital supply chain in the history of UW Medicine. *Intervention Detail.* Based on research from Harvard Business School,¹ we believed that a matrix committee structure led and staffed by key physicians would result in better and more innovative medical device and supply contracts, along with improved adoption by our physician staff. According to the aforementioned research, at least in the case of orthopedics, hospitals that developed joint

physician and hospital committees paid an average of 17% and 23% less per hip and knee implant, respectively. We believed that we could adopt this model on a much larger scale so that it would encompass all of our major clinical service lines. Therefore, we created 7 new committees (“core groups”) in the areas of orthopedics, spine, cardiovascular and cardiothoracic surgery, cardiology, interventional radiology and peripheral vascular intervention, general surgery, and patient care services. Last, we created an oversight committee to provide strategic guidance and a process for review and approval of decisions made by the core groups that made up our CPSI ecosystem. Each core group consists of 10 to 15 members, and 70% of the membership is clinicians by design. Six of our core groups were assigned a physician chair, with our patient care services cochaired by 2 of our chief nursing officers. The core groups are charged with 3 primary areas of focus within UW Medicine: (1) establish clinically-led sourcing integration; (2) use clinically-led utilization management; and (3) review and decide on the acceptability of new technology (aka “Smart Innovation”) and therapeutic practices. The process, size, and scope of the operation make this program unique and innovative. When the final structure was put into place, this new ecosystem consisted of 115 members, with more than 80 physicians and other clinicians participating. Assigned to lead this operation were Larry Dean, MD, oversight committee chair and medical director, and Dan Salmonsens, program director. We use the Vizient suite of analytics products (Vizient Savings Actualyzer, Vizient Clinical Data Base, Service Line Analytics, and Procedural Analytics) to identify opportunities and clinical variation. *Outcomes and Impact.* Our program has been in place for a little more than a year. All 7 of our core group committees are established and actively pursuing more than 65 initiatives. The results are encouraging and present a strong indicator of future success. We have built a work plan of initiatives with more than \$15 million in expected annualized financial benefit that is managed by our core groups. One example of success is a decrease in annualized orthopedic implant costs for total joints and trauma of more than \$6.4 million, representing an approximately 20% reduction in category spend. We also have changed the way we conduct negotiations with our suppliers. We put standard negotiation processes in place, and in most cases, key physicians sit beside supply chain staff in face-to-face negotiations with suppliers. This provides a consistent message to the vendor community on the goals of the program and specific initiatives. Through this process, we have come to realize that some of our physicians are the best negotiators in our system. In addition to reducing costs for the system, we have conducted a number of technology reviews we call “Smart Innovation” through this evaluation process. One example is the use of remote patient monitoring

(virtual sitters) for patients at high risk for falls and other adverse events. The analysis suggested a significant savings over traditional, at-the bedside patient monitoring.

1. Haas DA, Bozic KJ, DiGioia AM, Song Z, Kaplan RS. Drivers of the variation in prosthetic implant purchase prices for total knee and total hip arthroplasties. *J Arthroplasty*. 2017;32:347-350.

Poster Presentations

Effectiveness of Bedside Capnography to Reduce Opioid-Induced Respiratory Depression

Paul Milligan, PharmD, Kathryn Dickhut, MPH, Wm. Dunagan, MD, MS, and Marin Kollef, MD

BJC HealthCare

Background. At BJC HealthCare, a 15-hospital Midwestern health system, we identified that emergent reversal related to an opioid or sedative was the second-most common measured adverse drug event (only severe hypoglycemia was more common). Nationally, one third of cardiopulmonary arrests in hospitals are related to respiratory depression, with half of those patients having received an opioid proximal to the event. Meanwhile, inpatient use of opioids is ubiquitous, even in nonsurgical patients, ranging from 33% to 64% of all patients. Capnography, the monitoring of the concentration of carbon dioxide in exhaled respiratory gasses, has long been used to monitor ventilation in critical care units and recently has been recommended by many professional organizations for monitoring inpatients at high risk of respiratory compromise. Both the Anesthesia Patient Safety Foundation and The Joint Commission released statements that capnography is indicated to monitor adequate ventilation when supplemental oxygen is needed to maintain acceptable oxygen saturations. At a time when the community standard was to monitor patients on patient-controlled analgesia, we found this population only accounted for 18% of our events, whereas 52% of patients were concurrently on supplemental oxygen and had an order for a parenteral opioid. We validated these findings on a larger and more recent data set, and now use these criteria to define high-risk patients for whom monitoring with capnography should be instituted. To reduce the incidence of inpatient emergent reversal of opioid-induced respiratory compromise, we implemented a system-wide core policy of bedside capnography monitoring for inpatients receiving supplemental oxygen with a concurrent order for a parenteral opioid at 7 of our community hospitals. *Intervention Detail.* Bedside capnography

was implemented as a system policy, one hospital at a time, with leadership buy-in and support; however, each hospital could choose strategies to identify patients and order capnography. Although most elected to have an automated order for capnography, some used alerts to the respiratory therapy department. Nurses and providers were educated on the policy and were able to add capnography for patients as they saw fit; however, we evaluated only patients meeting our core policy. Data on oversedation events, capnography readings, and patients at high risk of oversedation were collected from June 2015 to June 2016. Oversedation events were identified by a manual, dual, independent review of triggers generated when the opioid reversal agent naloxone was removed from an automatic dispensing cabinet. Events were counted only when an opioid was given and subsequent subjective or objective documentation of an improvement of respiratory function, hypotension, or prolonged sedation after naloxone administration was found. Reviewers then assigned a severity score based on the National Coordinating Council for Medication Error Reporting and Prevention (NCC MERP) harm scale. Patients who had an event no more than 24 hours after a capnography reading, generally charted every 8 hours with vital signs, were defined as having an oversedation event while being on capnography. Events occurring in the emergency room were excluded from analysis. Data from 7 adult acute care facilities were included. These community hospitals were of various sizes and served diverse populations (urban, suburban, and rural). The data collection period began at each hospital only after implementation (a range of 3 to 6 months of data collection time for each hospital). Oversedation event analysis was completed using a χ^2 test and calculating a relative risk. The length of stay (LOS) analysis was completed using an analysis of variance with outliers (stay >90 days) removed from the analysis ($n = 2$). *Outcomes and Impact.* During the study period, 43 248 (54%) of the 79 941 inpatients had orders for an opioid and 17 557 (22%) had concurrent orders for supplemental oxygen. Of the 17 577 high-risk patients, 7580 (43.12%) were placed on capnography. We found a statistically significant difference in the proportion of oversedation events between high-risk patients on ($n = 9$; 0.12%) and off ($n = 29$; 0.29%) capnography (relative risk = 0.55; 95% confidence level = 0.31-0.97; $P = .02$). After implementing bedside capnography monitoring for inpatients considered high risk, we reduced the risk of emergent reversal by 59%. Encounters that had an oversedation event while not on capnography had a significantly longer LOS than encounters that had an oversedation event while on capnography ($F = 17.88$, $P < .0001$). Also, by manual chart review, 2 of the 29 events not on capnography met the NCC MERP criteria for category F severe harm,

requiring transfer to a higher level of care, versus none on capnography. Emergent reversal of opioids is a common occurrence that can lead to patient morbidity and mortality, as well as consume additional health care resources, including hospital and intensive care unit days. Before implementing our pilot study, we validated the simple criteria of concurrent supplemental oxygen and parenteral opioid as a marker for initiating capnography monitoring. In this study, we implemented capnography for these high-risk patients at 7 community hospitals and found that the use of capnography more than halved the rate of emergent reversals and resulted in less severe events as evidenced by the significantly reduced LOS and fewer transfers to a higher level of care. These findings suggest that capnography may have alerted nursing personnel earlier in the course of an oversedation event, thereby either preventing it or catching it early enough to ameliorate patient harm.

Partnering With Skilled Nursing Facilities: Your “How-To” Manual

Cathy Fischer, MSN, RN, CIC, and Jaime Drake, RN, CMSRN

CarolinaEast Medical Center

Background. Approximately 10% of our overall discharges go to skilled nursing facilities (SNFs). There are 2 SNFs from the same parent organization that have common staff and are near our hospital. Both facilities receive patients from the entire state, as well as locally. The emergence of new epidemiologically significant multidrug-resistant (MDR) organisms can be difficult to identify, track, and control. In our community, our hospital lab does all cultures for SNFs and the hospital infection preventionists (IPs) monitor culture results as part of surveillance. In 2017, we saw a pan-resistant *Acinetobacter baumannii* emerge from one of the facilities and an MDR-*Acinetobacter baumannii* sensitive only to meropenem emerge from the other facility. In addition, we began to see carbapenem-resistant *Enterobacteriaceae* from both facilities. The IPs contacted the North Carolina Statewide Program for Infection Control and Epidemiology, the North Carolina Department of Health, and area health education consultants to brainstorm and develop a process for collaboration that included local health care facilities. A targeted education plan was developed based on results of the Infection Control Assessment and Response (ICAR) conducted in SNFs across the state. This education program would be provided by the hospital IP free of charge to all local SNFs. This was an innovative program that was novel to our state. We leveraged existing relationships that our

discharge planners had with the SNF teams. This provided an avenue to share data and present the proposal. *Intervention Detail.* Identified opportunities and strategies were developed based on initial feedback from staff, as well as ICAR and surveillance data. Surveillance data showed that during the 12 months prior to implementation 13 patients were affected by the newly emerging organisms. Infections among these patients caused admission to the hospital, sepsis, antibiotics, surgery, amputations, and substantial patient harm. The team intervened with a multipronged approach targeting key areas through education and practice changes. Top priorities identified included organism transmission, bathing, wound care, environmental services, and communication. Education was provided in concentrated 15-minute in-services designed to be interactive and utilizing return demonstration, and stories and visual tools that could be shared with others. The interactive design and storytelling proved to be successful tools in building and establishing trusted relationships. This trust led to open communication and confidence in the IP's ability, as well as empowerment of staff to ask questions without judgment. Each individual in-service was designed to target a practice that had been identified as problematic in the ICAR data. In-services were provided monthly for 6 months and the need was then reevaluated. Practice changes that occurred began with bathing. Bath basins were used and reused for an indefinite period and reported by staff to sometimes have residue on them. After the in-service, defined disposal days were identified for basins, along with more consistent cleaning techniques. Other changes included implementation of chlorhexidine gluconate bathing for high-risk patients, single-patient-dedicated instruments for wound care, and changes in wound care technique. Environmental rounds with the director of nursing and the IP were started and led to direct changes in cleaning practices. *Outcomes and Impact.* During the 12 months prior to implementation 13 patients were known to be colonized and/or infected with the newly emerging organisms compared to 3 patients for the 12 months following implementation, with zero in the most recent 6-month period. This program completely halted a MDR organism outbreak in both facilities. Some of the original patients are still residing in the SNFs, but the facilities have maintained a zero-transmission rate for the last 6 months. Initially only one facility participated, but this quickly "spread" to a second sister facility and later to a third unrelated SNF that had a higher-than-desired surgical site infection rate. Similar dramatic improvement was noted in all 3 facilities. At the end of 12 months, all facilities were asked if they felt the program was helpful and should be continued. The desire to continue for at least 12 additional months was unanimous. This model has implications for other acute and post-acute facilities. We

learned that analysis and sharing of infection data, engagement with state resources and use of ICAR data, networking with access resources such as discharge planners, and a multifaceted intervention plan are key elements for success.

Owned and Operated by Engaged Staff: How to Reach Zero

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CarolinaEast Medical Center

Background. Urinary tract infections account for nearly 40% of all health care-acquired infections (HAIs), and 80% of those are attributed to indwelling urinary catheter use.¹ This national statistic is similar to our own internal rates. Central line-associated bloodstream infections (CLABSIs) are not as common but can be catastrophic for patients. To allow us to gain knowledge about the actual process and engage staff we conducted a Gemba Walk. We assessed every Foley catheter and central line in place on a given day and found that although we had bundles, staff did not understand and/or use all of the elements. A team of frontline staff, facilitated by infection preventionists (IPs) and a clinical nurse specialist (CNS), developed an audit tool and then performed audits to guide strategizing and prioritizing opportunities. This tool was designed to encourage peer accountability through coaching. After initial audits the team developed an innovative action plan to engage the workforce to drive their own performance in infection prevention efforts. Baseline audits showed zero percent compliance with the central line bundle and 52% compliance with the Foley catheter bundle. To transition data to a forward-facing location for staff members, they were engaged in discussions about the data and their performance and they became highly motivated. They chose team leaders and collaborated with each other to refine processes. There were defined project drivers, the IP and CNS, to keep the project moving forward during the engagement process. The audits identified specific bundle elements to target, including chlorhexidine gluconate (CHG) bathing, Foley catheter maintenance, and central line dressings. *Intervention Detail.* The team that conducted the initial audits trained staff in the intensive care unit to conduct audits and also shared strategies for coaching. Instructions on all elements of patient care bundles and return demonstration competencies were conducted. Elements of the bundles that were emphasized included CHG bathing, maintenance of clean and occlusive dressings, aseptic

technique during insertion, securement devices, and the importance of not having dependent loops. Visible quality boards were placed on all units where they could be reviewed during morning safety huddles. The boards included the units' current data, "days since" last catheter-associated urinary tract infection (CAUTI)/CLABSI, and other "days since" goals that were established by staff. Data were reviewed daily during safety huddles, enabling staff members to take ownership of the information. When a goal was met, there were celebrations that included members of leadership, unit staff, and project drivers. Two project drivers (CNS and IP) from the original team rounded every week and engaged in coaching discussions with staff. Staff received monthly feedback on audits and rates of compliance. Staff members quickly took ownership and made suggestions for improving processes. They brought forward a Foley catheter insertion checklist, which included a 2-person insertion technique. This was trialed and implemented house-wide. Staff members identified weaknesses in the central line process and redesigned the central line dressing kit. The direction of safety huddle conversations changed from "Why does she have that line?" to "Why can't we remove that line?" *Outcomes and Impact.* Bundle compliance increased to an average of almost 90%, which resulted in resounding project success. There was a 92% reduction in CAUTI/CLABSI, with all 3 participating units reaching a zero CAUTI/CLABSI rate and all showing sustained improvements. The overall CAUTI/CLABSI rate for the 12 months before intervention was 2.84 per 1000 catheter days, with 17 CAUTIs in 3 units over 12 months. The 12 months post intervention showed a dramatic reduction to a rate of 0.23 per 1000 catheter days, with a total of only 3 CAUTIs in all 3 units. Success has continued with sustained outcomes for an additional 8 months. All 3 units have "days since" stretches of greater than 1 year. The staff now own the processes and the project drivers have stepped aside but remain proud of the extraordinary achievements that have prevented patient harm. This project resulted in improved processes that led to sustained improvement and fostered innovation and confidence as the staff brought forward ideas, forged relationships among outside departments, and improved patient safety by hardwiring evidence-based bundles into everyday practice—all owned and operated by engaged staff.

1. Institute for Healthcare Improvement. Catheter-associated urinary tract infections. <http://www.ihp.org/Topics/CAUTI/Pages/default.aspx>. Accessed January 15, 2019.

How Strategy Can Overwhelm Culture: A System Approach to Reducing Deferrals

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Charleston Area Medical Center

Background. For years, Charleston Area Medical Center (CAMC) has struggled to meet the demand of patient referrals from outside facilities. At its worst in 2016, CAMC was deferring >300 patients per month attempting to be sent to its facilities. Multiple attempts to improve access and decrease deferrals for its services had been unable to achieve sustained improvements. In 2017, a new chapter in this work was opened when deferrals became a corporate strategic goal. A new task force was assembled to drive change and aggressively pursue performance improvement as measured by decreases in system-wide deferrals. Improvement in these deferrals meant access to high-quality, tertiary care services for our community and also presented a growth opportunity for the system. Our facility needed to manage growth demands while balancing limited resources. *Intervention Detail.* Our new task force reviewed prior efforts and attempted to integrate those learnings into a system-wide process that centered on decreasing length of stay (LOS) for patients in an observation status while becoming more agile at ensuring bed availability. Internal strategies utilized to improve performance generally fell into one of the following categories we called FLO: (F)eedback loops in real time that are highly visible regarding in-process metrics, senior (L)eadership oversight/accountability, and strategic deployment of key (O)perational processes. Specific initiatives included (1) establishing daily metrics for capturing and measuring deferrals; (2) daily administrative/operational calls at noon with the chief operating officer and the chief medical officer to report on system-wide flow and deferrals; (3) a standardized template for monitoring LOS of observation patients; (4) standard forms for the Transfer Center to log not only deferrals but also additionally annotate "capacity" at the time of referral; (5) weekly deferral/flow task force meetings with emphasis on Define-Measure-Analyze-Improve-Control performance improvement methodology; and (6) real-time data analysis by Six Sigma. Trial and error cycles (rapid learning cycles) were encouraged to address long-standing barriers and drive improvement. Feedback channels were created and accountability established through the development of standard reporting and tracking tools. Successes and failures were evident and reviewed in real time. The team was relentless in its pursuit of decreasing deferrals. Local culture was a significant barrier to both process and outcomes. Careful attention to the design of key processes and

leadership oversight of measurable goals, in real time, assisted in overcoming those barriers. *Outcomes and Impact.* Improvement was noted in the following areas between 2016 and 2018:

- System-wide deferrals averaged >300/month in 2016. We completed 2018 with an average of 26 deferrals per month.
- Acceptance of referral patients averaged less than 45% per month in 2016. We finished 2018 with an acceptance rate of 82%.
- Emergency department boarder hours per patient dropped from 3.9 hours to 2.3 hours (a 41% decrease).
- A 5% drop in discharges after 3 PM occurred.
- Observed LOS dropped from 46 hours to 33 hours (a 28% reduction).
- Inpatient MRI turnaround time improved from 26 hours to 7 hours (a 73% reduction).

Focusing Sepsis Efforts

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Cleveland Clinic

Background. Our sepsis team needed to identify a process metric that would drive improvements in both mortality and SEP-1 compliance that was readily reportable, easily attributed to appropriate caregivers, and expected to lead to significant improvements with focused effort. *Intervention Detail.* The team analyzed the elements of the Centers for Medicare & Medicaid Services 3-hour sepsis bundle and narrowed down the focus to both the timeliness of appropriate antibiotics and use of the sepsis order set as the key indicators for reduced sepsis mortality. *Outcomes and Impact.* Efforts put into addressing these specific metrics have provided not only significantly reduced mortality in present-on-admission patients but also provided significant improvements in SEP-1 compliance.

Improving Emergency Room Throughput Without Spending a Penny

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Deaconess Health System

Background. Patient left without being seen (LWBS) rate is an important patient safety concern. Triage time, seasonal variation, and emergency department (ED) overcrowding have a significant impact on LWBS. Working proactively to avoid contributing factors, hospital

administration challenged the ED to improve selected Hospital Outpatient (OP) Quality Reporting Programs (Hospital OQR) ED measures for calendar year 2019 payment determination: OP-18 Median Time from Door to Departure for Discharged Patients (Disch-LOS); OP-20 Door-to-Diagnostic Evaluation by a Qualified Medical Professional (door to physician); and OP-22 LWBS (measured by percentage). ED physicians were consistently voicing concerns over triage being the patient flow bottleneck. Physicians and nursing staff expressed frustration over throughput issues related to lab and radiology ancillaries. With the chief operations officer as champion, a Throughput Steering Team (TST) was formed, which included the medical director, service line director, nurse managers, practice manager, representatives from nursing staff, and a Lean Six Sigma Black Belt (LSSBB) resourced to the ED. For accountability, median Disch-LOS of <145 minutes was established as a compensation pay goal for all team members and ED staff. The ED is a complex system with inputs (front end), throughputs (wait times for lab and radiology), and outputs (back end). As a result of a rapid Kaizen event, the “Pull till Full” immediate bedding process was implemented in Phase 1. Process issues were substantiated with data and ancillary leadership was included in problem-solving. This objective approach fostered collaboration and helped break down silos. In Phase 2, ED-LSSBB assists ED ancillaries to identify and eliminate their process wastes. Our project provides a functional prototype of an ED-ancillary model that has transformed a fragmented system into a synergistic relationship that provides efficient and cost-effective care. We also addressed techniques to improve internal flow and build a foundation for ED ancillary improvement. *Intervention Detail.* The TST reviewed baseline pre-intervention data and found that regardless of the median Door-to-Physician time at 15.10 minutes (benchmark [BM] = 30 minutes) and LWBS at 1.34% (BM < 2%), median Disch-LOS was struggling at 168.98 minutes (BM = 134 minutes). Best practices for front-end improvement, such as bedside registration and protocols/order sets, were already in place. Expanding capacity to handle more patients was an obvious solution; however, it would add significant costs and prevent root cause identification. To improve Disch-LOS, door-to-roomed time needed to be reduced. Phase 1 focused on improving door-to-roomed time, using the “Pull till Full” immediate bedding process that bypasses triage when rooms are available. Upon patient arrival, a quick registration occurs. The triage registered nurse (RN) performs a quick visual assessment and asks clarifying questions for appropriate room assignment. When no beds are available, the triage RN reverts to traditional triage. Metrics for success were established as door-to-roomed time <2

minutes; door-to-physician time <10 minutes, Disch-LOS <145 minutes, and LWBS <1%. Data were collected from the electronic health record (EHR) and monitored daily. A Disch-LOS of >145 minutes would trigger a root cause analysis of the previous day's processes, which also included staffing-related issues. Root cause analysis also includes ED ancillary key performance indicators (KPIs) of lab blood specimen turnaround time and CT turnaround time. If needed, ancillary KPI data would be shared with ED ancillary leadership to help them understand the process delays. Development of an electronic rounding tool enabled TST members to receive daily feedback on the process from ED staff, physicians, and providers. Data from rounding enabled real-time and rapid changes in the process. Progress also was reported monthly to C-suite executives within an Obeya setting. *Outcomes and Impact.* The Mann-Whitney-Wilcoxon test was used to compare pre-intervention matrices (n = 29 493) to post-intervention matrices (n = 31 807). Door-to-roomed time reduced by 77%, from 7.16 to 1.68 minutes ($P < .001$; 95% confidence interval [CI; 4.68, 4.83]); door-to-physician time reduced by 47%, from 15.10 to 8 minutes ($P < .001$; 95% CI [5.33, 5.70]). For discharged patients, Disch-LOS reduced by 14%, from 168.98 (n = 19,733) to 145.75 minutes (n = 20,590; $P < .001$, 95% CI [24, 27]). LWBS reduced by 57%, from 1.34% to 0.57%. Comparing post-intervention LWBS to baseline showed that the ED was able to treat an additional 251 patients, which made this process fiscally value-added. The decrease in door-to-roomed time allowed ED providers more timely access to patients. As a result, patients are less likely to leave without being seen. The "Pull till Full" process has improved the patient experience and created a safer environment by reducing wait times. Compared to peers using similar EHRs, percentile rankings also boosted. Door-to-roomed time improved from 78th to 95th percentile, Disch-LOS improved from 56th to 74th percentile, and LWBS improved from 47th to 83rd percentile. While door-to-physician time is not traditionally captured in the EHR, improvement was obvious. This methodology establishes that, although the ED can start a Lean transformation, Lean cannot succeed without ED ancillary improvement. Early outcome examples of Phase 2 Lean transformation, coached by ED-LSSBB, include implementation of red-colored bags to expedite STAT specimens in the laboratory. With a Phase 1 root cause analysis identifying the need for a dedicated radiology CT transporter, radiology offered to share their tech with the ED for transport trial. Progress has also been made toward improving behavioral health consult (Care Team) turnaround time. Future state is to be an organization without silos.

Delirium Care Redesign: A Multidisciplinary Team Approach to Harm Prevention

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Duke University Health System

Background. Delirium is associated with serious complications, including increased length of stay, increased chance of falls, higher mortality rates, and increased readmission rates. Delirium is common, especially in older patients, and can affect from 20% to 50% of critically ill patients. In affected persons, delirium is underrecognized by as many as one third of physicians and nurses. It is estimated that 30% to 40% of delirium is preventable. The combination of delirium being common, underrecognized, and preventable make it a prime opportunity for developing a coordinated, standardized approach to detection and intervention. *Intervention Detail.* A multidisciplinary and interprofessional approach was utilized. The components include an electronic health record (EHR)-based risk assessment, screening every patient for delirium once per shift, and nursing and provider interventions. Prior to any specific screening, patients are classified as having normal or increased risk for delirium. Nurses were trained to employ the Nursing Delirium Screening Scale (NuDESC), a validated nursing delirium screening tool, once per shift for every patient. For patients who receive a positive NuDESC screen, nurses are prompted to create and implement a nursing care plan focused on mitigating a patient's delirium. Additionally, for patients identified as high risk via the EHR-based risk assessment, nursing is prompted to create and implement a delirium prevention care plan focused on specific, actionable interventions. In either case (high risk for delirium or screening positive for delirium), providers are prompted with a modeless (non-interruptive) alert within the EHR to view a patient-specific report highlighting orders and patient conditions that can be altered to reduce the risk (or effects) of delirium. These include medications, tethers (restraints, telemetry, catheters), elimination/voiding, pain, nutrition, activity (planned), and sleep (planned). The provider alert appears as a clickable, color-coded banner on the summary overview page. This delirium status banner is visible and accessible for both nursing and providers to support coordinated delirium care for patients. *Outcomes and Impact.* Comparing pre-delirium intervention to post intervention, patients diagnosed as delirious showed the following improved outcomes: (1) the mortality index improved by 42.5%; (2) the 30-day readmission rate improved by

14.1%; and (3) Consumer Assessment of Healthcare Providers and Systems scores improved by 23.8%.

Picture This: Ensuring High-Value Imaging at Duke Health

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Duke University Health System

Background. As payment models transition, it is necessary to ensure only high-value and clinically necessary imaging procedures are being performed. When benchmarking against 48 other major academic medical institutions in Resource Manager, a Vizient Clinical Data Base tool, Duke University Hospital was found to be among the highest utilizing hospitals for MRI (magnetic resonance imaging). Additionally, the impact and requirements of the Protecting Access to Medicare Act of 2014 (H.R. 4302) relating to imaging services made it necessary for the organization to initiate a process improvement project focused on high-value imaging utilization. As a result, American College of Radiology (ACR) clinical decision support was implemented in the Epic order composer to provide insight into clinical appropriateness scores for all imaging studies ordered. Dashboards were developed to provide feedback to ordering providers on their ordering practice to stimulate performance improvement and reduce variation. *Intervention Detail.* Data from Resource Manager were used to identify the service lines responsible for high utilization compared to peers in order to focus quality improvement (QI) efforts. The areas with the greatest opportunity were neurology, neurosurgery, trauma, and general medicine. The team identified 3 primary interventions that were developed to ensure high-value imaging at Duke University Health System (DUHS). These interventions were (1) ACR decision support tool and provider feedback dashboards; (2) improved provider communication; and (3) a subspecialty QI task force. To facilitate this change, the team deployed a clinical decision support tool across all care locations of Duke Health. The tool provided evidence-based decision support for appropriate utilization of most high-cost diagnostic imaging procedures and included a best practice advisory (BPA) to prompt ordering providers toward higher-yield imaging if the initially requested study was low yield. The tool also provides an appropriateness score based on the ACR criteria. *Outcomes and*

Impact. The DUHS Inpatient MRI Utilization rate was reduced by 4.09% (from 13.56% to 13.01%) for patients discharged during 2018 Q3-2018 Q4 when compared to the rate for the previous year (2017 Q3-2018 Q2). Compared to other major academic medical centers (case mix index $\geq 2500+$ inpatient beds), the utilization percentile improved from the 80th percentile to the 67th percentile. The key contributing factors for success and sustainment of this improvement are an increased focus on ensuring high-value imaging by the subspecialty QI teams, implementation of the BPA, and visibility of performance for the rate of imaging studies scored “not appropriate” at the individual physician level. Since implementation of the required structured indications on June 19, 2019, DUHS has increased the proportion of MRI orders scored for appropriateness from 25% to 65% and increased the proportion of orders with a reason for exam from 37% to 96%. With this increase in imaging studies scored by ACR, the team is now able to utilize the dashboards to understand trends in appropriateness and identify areas for further quality improvement.

Utilizing Automation for Better Sepsis Care and Core Measure Compliance

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Duke University Health System

Background. The Centers for Medicare & Medicaid Services (CMS) Core Measure for sepsis, SEP-1, was launched in October 2015 with the aim of facilitating efficient and timely care for septic patients. Along with the other core measures, SEP-1 is publicly reported data designed to be meaningful to patients and physicians alike. Compliance with the bundle has shown to decrease inpatient mortality. The SEP-1 bundle compliance rate is calculated as an all-or-nothing measure; if a single component of the bundle is missed, the case is counted as having failed the bundle. From third quarter 2016 to second quarter 2018, the SEP-1 compliance rate for Duke University Hospital (DUH) averaged 29.9%. One of the components of the bundle that is missed the most across Duke University Health System is the repeat lactate measure. Per CMS guidelines for SEP-1, if the initial lactate results with a value >2.0 , a repeat lactate must be collected within 6 hours of severe sepsis or septic shock criteria being met. Between third quarter 2016 and second quarter 2018, 19.8% of the health system's SEP-1 failures were caused by a missing repeat lactate. *Intervention Detail.* To reduce the number of SEP-1 failures caused by a missing repeat lactate, the process of ordering the repeat lactate was automated. Cara O'Brien, MD, working

together with emergency department (ED) leadership, the electronic medical record (EMR) team, and the clinical laboratories team, built an automatic repeat lactate order into the EMR at DUH in August 2018. With this new feature in place, lab orders originating from the ED with a lactate component that results with a value >2.0 automatically trigger a repeat lactate order. The frequency of the repeat lactate is set to “Starting After Two Hours” to allow time for any interventions (eg, intravenous fluids, antibiotics) to take effect. *Outcomes and Impact.* With implementation of the automatic repeat lactate, DUH has seen the following results:

- The percentage of orders with a lactate >2.0 that had a repeat lactate order placed increased from 69.7% (January through May 2018) to 100% (August through November 2018).
- The average time taken from verification of the first lactate to the ordering of the second lactate decreased from 296 minutes (January through May 2018) to zero minutes (August through November 2018).
- The average number of SEP-1 failures caused by a missing repeat lactate decreased from 3 per quarter (third quarter 2016 to second quarter 2018) to 0.5 per quarter (fourth quarter 2018 to first quarter 2019).
- The average SEP-1 compliance rate increased from 29.9% (third quarter 2016 to second quarter 2018) to 62.8% (fourth quarter 2018 to first quarter 2019).

Because of its success and proven effectiveness at DUH, the automatic repeat lactate order was also implemented at the EDs in the health system’s other 2 hospitals in June 2019—Duke Regional Hospital and Duke Raleigh Hospital.

Tenth Time’s a Charm: Increasing Hand Hygiene and Reducing Hospital-Acquired Infections

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Floyd Medical Center

Background. Reducing hospital-acquired infections (HAIs) is a goal of Floyd Medical Center, as it is of all hospitals. The Joint Commission requires all accredited facilities to increase hand hygiene compliance; however, measuring and improving compliance is a challenge because it is difficult to hold staff accountable without a reliable way to

measure compliance. Floyd Medical Center encountered a variety of challenges regarding data collection of hand hygiene compliance. Self-observation is not always accurate, decreasing the validity of collected results. Corrective action did not occur in real time when observed by “secret shoppers,” which led to decreased staff accountability. Observations conducted by an infection preventionist led to the Hawthorne effect, where a provider was 3 times as likely to perform hand hygiene because they were aware that they were being observed. In addition, the number of observations was limited, leading to an unreliably small sample size, and the number of observations was disproportionately performed during weekday shifts. Over the past 10 years, Floyd Medical Center has tried 10 different interventions to measure and increase hand hygiene, as well as reduce HAIs. These included having providers sign a hand hygiene pledge, measuring soap and sanitizer product usage, adding more dispensers to the facility, having new employees watch a hand hygiene video, and training coaches to observe and intervene, among other actions. Additionally, “You’ve Been Spotted!” cards with a Dalmatian theme were provided to colleagues when they were spotted performing hand hygiene, which could then be submitted for prizes. However, none of the initial 9 initiatives was effective in increasing hand hygiene compliance or reducing HAIs. *Intervention Detail.* In June 2018, hand hygiene monitoring technology was installed in 2 units with the highest HAIs. The technology system selected included badge reels that identify each provider and Internet of Things (IoT) motion sensors on soap and sanitizer dispensers. When a provider enters or exits a patient room, the provider is given a certain number of seconds to clean her/his hands before a voice-active sensor reminds her/him to “please sanitize.” To explain further, the voice is the only thing that we have found to change behavior. When the person breaks the motion sensor—they have 10 seconds to hit the dispenser. If they do not hit the dispenser, the voice will remind them to wash *and* they still get credit. This technology allows us to overcome the limitations of self-observation, secret shoppers, and direct observation by infection preventionists. The continuous surveillance system can gather all hand hygiene opportunities, averaging 20 000 opportunities per week. The surveillance system eliminates human observer bias and the Hawthorne effect. As a result, we are able to gather a large volume of accurate data. Providers can log into the system anytime and see their own data. Additionally, leaders can see data for their entire group or unit. Data visualization allows us to easily identify the individuals and hospital rooms that are most at risk on any given day, allowing managers to intervene and hold staff accountable in real time. The system has advanced capabilities to send a text message to a unit manager if hand hygiene drops to an unacceptable

level in an individual patient's room. More important, the voice reminder changes behavior and improves hand hygiene by reminding providers to sanitize if they forget. *Outcomes and Impact.* The system gathered baseline data prior to voice application being turned on, revealing our average hand hygiene compliance rate as 49%. Once the voice application was implemented, hand hygiene compliance hit a high point of 66%, an increase of 17 percentage points, and nearly a 35% increase. As a result of increased hand hygiene compliance, HAIs, including catheter-associated urinary tract infection, central line-associated bloodstream infection, methicillin-resistant *Staphylococcus aureus*, multidrug-resistant organisms, and *Clostridium difficile*, were reduced significantly in the pilot areas. Six months after initiation of the voice-active hand hygiene reminder, there was a statistically significant reduction in HAIs by 75% in comparison with the 12 months prior to the voice application reminder implementation. Because of the success of this initiative, Floyd Medical Center is expanding use of this technology to more units. It is estimated the hospital would save nearly \$1 million in direct costs associated with HAIs every year if the system was implemented house wide.

Change Readiness Is the New Change Management

Samantha Genz, BSN, RN

Froedtert & the Medical College of Wisconsin

Background. Despite implementing evidence-based best practices to reduce and eliminate catheter-associated urinary tract infections (CAUTIs), our organization was not seeing the expected results. We were expending many resources and had individuals from various levels of the organization participating on a multidisciplinary workgroup to implement those initiatives, yet we were not achieving the intended outcomes. We had to reflect and ask: Where are we failing? Why isn't this working? We found our focus was on the best practices and tactics we needed to implement, and not necessarily on how we were implementing them. The word "implement" was used loosely, and if something was communicated or trained on, we checked the box and moved on to the next best practice. We were throwing many solutions at the problem trying to see what would stick, often seeing no improvement. When it did result in improvement it was not clear which one of our tactics was at work and it was not a sustained change. We were missing major elements of a robust change management approach—measuring, providing feedback, adjusting—and those elements that we were doing were not executed in a comprehensive way. What resulted was a lot of great initiatives without

noticeable improvement. As an example, maintaining hygiene is an important and well-known practice to prevent CAUTIs, and an area in which we knew we had opportunities. We adopted a new product and process for daily catheter care that would simplify the task and ensure clean technique. The product was stocked on units and staff were trained—check and on to the next thing! Months later when we began measuring, we were surprised to find Foley catheter care was occurring only 31% of the time. The product and streamlined process were great, but they make no difference if they are not being utilized. *Intervention Detail.* Everyone can recite the principles of change management, but our approach to executing those principles is innovative and successful. Some of the key components of our approach include the following:

- Test: failure modes and effects analysis can be done before the process ever leaves the conference room to proactively find failure points and make adjustments. To further pilot test on a small scale, think single step or single unit. Know what you are testing for and assess it, but be open to unexpected learnings too.
- Communicate and train: our motto is 8 times, 8 ways. Utilize a variety of venues and styles, and always articulate the "why" and "what's in it for me." Develop specific plans for each stakeholder group and continue training and communication even after implementation.
- Measure: define what success looks like and identify metrics (process, outcome, balancing) for every initiative. Ensure measures are meaningful to the front line.
- Create ownership and accountability: you cannot hold leaders accountable for performance until they thoroughly understand the metrics. Then coach leaders in analyzing and reacting to the data and have regular check-ins during sustainment.
- Real-time feedback: keep stakeholders informed of their performance with weekly feedback of process measures during the vulnerable sustainment phase. Consider use of visual management displays.
- Coach: nothing can replace at-the-elbow, boots-on-the-ground support and coaching during the vulnerable sustainment phase of a new initiative. Be intentional with prepared support persons and dedicated time.
- Tools and resources: create the tools that stakeholders need and keep them at the point of use/care where they can be accessed easily. Make it easy to do the right thing. Change agents and champions are tools too.

- Adjust: operationalize improvements at the unit level. While there are certainly elements that must be kept standard, be flexible where you can. One size does not fit all.

Outcomes and Impact. Since taking a more disciplined approach to change management, we are finally achieving the results we have been looking for. It has allowed us to sustain best practices across the life cycle of a Foley catheter and resulted in substantial improvement. Outcome metrics for each of our CAUTI prevention initiatives includes Foley device days and CAUTI occurrences, and we have seen a drastic reduction in both. There has been a >30% reduction in Foley utilization for the division, with every individual inpatient unit trending below their National Healthcare Safety Network-expected Foley device days. One critical care step-down unit has a standardized utilization ratio of 0.39, meaning they are utilizing 61% fewer Foleys than expected for their population. We have also accomplished a median shift from 3 to zero CAUTIs a year. Our division has now gone >1 year without a CAUTI, with one of our hospitals having a recent record of >2 years. Our organization's overall culture and acumen of change has shifted drastically. Leaders and frontline staff alike have transitioned from our "check in the box" mentality to understanding the various components that need to be addressed and worked through for successful change. Our organization is better prepared and has come to expect continuous change. What we are implementing has not changed—but how we implement the improvement and support the change has. You have seen our examples as applied to CAUTI, but the concepts and tools are transferrable to any performance improvement initiatives to foster and sustain improvements.

Reducing Readmission Risk by Adding Vital Signs to the Discharge Bundle

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Froedtert & the Medical College of Wisconsin

Background. At Froedtert & the Medical College of Wisconsin, the average 30-day unplanned readmission rate in the first half of fiscal year 2017 (quarters 1 and 2) was 14%; one out of 7 patient discharges returned to the hospital within 30 days, with 20% of these readmissions occurring within 72 hours of discharge. Fifty percent of the quickly readmitted patients ($t \leq 72$ hours, $n = 763$) were discharged by a provider belonging to the general

internal medicine department and the 30-day readmission rate was reported at 18%. Institutional efforts began in early 2017 with implementation of a discharge bundle, composed of tactics such as completion of the hospital discharge summary within 24 hours, medication reconciliation at discharge, and care coordination and transitions for high-risk patients from hospital to the community. These efforts held the readmission rates steady. In a retrospective study of a convenience sample of patients (April 2017 to June 2017, $n = 410$), 53% were identified to have had ≥ 1 abnormal vital signs at discharge. The average length of stay difference between patients readmitted within 72 hours to a nonreadmit was 3.1 days, raising concerns that patients were discharged prematurely before they were clinically stable. Upon further analyzing the data and doing a literature review, an article published in the *Journal of General Internal Medicine* connecting vital sign instability and post-discharge adverse outcomes inspired us. The study reported (09-10, $n = 32,835$) that 18.7% patients were discharged with ≥ 1 vital sign instabilities.¹ The presence of any ($= 1$) instability was associated with higher risk-adjusted odds of either death or readmission (adjusted odds ratio 1.36, 95% confidence interval = 1.26-1.48) for these patients. *Intervention Detail.* Between January and May 2017, we assembled a multidisciplinary team of physicians, advanced practice providers (APPs), nurses, administration, process improvement, and data analytics resources to charter the discharge time-out project. Using the Define-Measure-Analyze-Improve-Control method of process improvement, Lean tools, and Plan-Do-Study-Act (PDSA), care teams developed a detailed process and project plan to address the problem of vital sign instability at time of discharge. We obtained consensus initially to implement this tactic in our general medicine units by June 2017. The discharge time-out process is designed to assist bedside nurses in discussing the plan of care for patients with the provider (MD/APP) within 1 hour of discharge order placement. The nurse is empowered to complete a progress note, which extracts and identifies abnormal vitals and other associated values outside the reference range, which includes the following:

- Vitals (heart rate >100, systolic blood pressure <90 mm Hg, oxygen saturation <90%, temperature >100.3°F, respiratory rate >24)
- Labs (leukocytosis >11 500, hemoglobin drop >2 g/dL, blood sugar >250 or <70 mg/dL)
- Diarrhea (in absence of laxatives, >5 episodes in 24 hours)

Once the abnormal values are reconciled, the nurse communicates with the provider (MD/APP) to discuss the final plan to either continue with discharge or cancel the

discharge order. If a decision was made to continue with discharge, then multiple added interventions prior to discharge are considered, including but not limited to changes in common medications (beta-blockers, antibiotics, addition of inhalers/nebulizers, insulin), closer outpatient follow-up with primary care doctor/specialist, and home health care for medication management and patient education. If the discharge is cancelled, then the process is repeated if applicable at a future discharge time. *Outcomes and Impact.* While our initial efforts focused on refining the discharge time-out process, we collected process measures to understand acceptance and adherence to the workflow. In the 3 months post implementation (June 2017 to August 2017, n = 1164), we found the discharge time-out process was performed on 76% of patients discharged, and the readmission rate decreased to 16.5% in the general medicine units. We used change management strategies to improve awareness, gather stakeholder input, and obtain leadership buy-in for including this tactic in the discharge bundle. Additional training and education were provided to staff and physicians through department meetings and e-learning. In September 2017, the discharge bundle with the time-out tactic was rolled out uniformly. Rapid-cycle PDSAs and weekly leadership rounding on the units enabled bedside staff and providers to communicate process and system barriers and work on action plans. In a 6-month study following full implementation, the team measured the process and outcomes results. Adherence to the discharge time-out process increased 5% and bundle compliance improved by 7%. At the end of fiscal year 2018, the readmission rate saw a decrease from 17.98% (December 2017) to 16.05% (June 2018), and the 3-day readmission rate dropped by 38.5%. Future work includes instituting enhancements in the electronic health record using a predictive analytics tool, deployment of a post-acute care bundle, care delivery optimization by hardwiring care coordination, and improving palliative care access for patients. We anticipate that the interventions deployed will further decrease unplanned readmission rates and help sustain our institution's top decile performance as measured by Vizient.

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Use of a Shock Response Team Approach to Reduce Mortality Risk

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Background. As a quaternary academic medical center (AMC), patients with shock are frequently referred to

Froedtert Hospital from external sources for care management, in addition to those patients who develop shock internal to our organization. The historical mortality rates for these patients were unacceptably high, and the referral process was frequently disjointed and lacked coordination among the relevant teams. Therefore, we sought to develop a coordinated system to facilitate rapid-cycle triage, transfer, and coordination of resources to reduce the risk of mortality for patients with cardiogenic shock. Published data support the use of multidisciplinary shock response teams that have shown to be effective to reduce mortality, particularly when patients are identified early and referred promptly. Although many of these teams have focused on sepsis specifically, many other types of shock patients are referred and need urgent coordinated care. The Froedtert and the Medical College of Wisconsin shock response team was launched in February 2018, specifically to address the high mortality rates of these patients. We identified critical team members, including critical care anesthesia, advanced heart failure cardiology, cardiac surgery, interventional cardiology, perfusion, general cardiology, and our access team, and built a system around rapidly engaging these providers within minutes of a shock activation. Initial triage occurs with the critical care anesthesia team, and once initial patient-level data are gathered, other team members are contacted through a group page method. Using this system, the optimal timing, location, and initial stabilization approach can be developed and implemented quickly. Rapid-cycle performance improvement techniques are utilized to refine the approach and data are reviewed monthly by a multidisciplinary shock committee, with joint leadership from advanced heart failure and interventional cardiology. We believe this innovative approach is effective to manage cardiogenic shock patients and reduce mortality from historically high levels. *Intervention Detail.* What can be done to improve cardiogenic shock mortality? This highly fatal condition requires timely recognition, system rapid response, and lifesaving interventions to reduce national rates that are approaching 50% mortality. Froedtert Health system implemented a cardiogenic shock pager in March 2018 to pull together key providers and nursing leaders for timely communication and to identify whether a patient is eligible for lifesaving mechanical circulatory support (MCS). Preparation for the multidisciplinary call using a standardized checklist to capture important patient information is completed during a transferring provider report to a cardiovascular intensive care unit (CVICU) critical care anesthesia provider. The same checklist is used during a transferring registered nurse (RN) report—RN to CVICU. The CVICU nurse activates the shock pager when the report is complete (within 15 minutes). The critical care anesthesia provider accepts the patient 97% of the time. While the

patient is in route, the report is shared with the multidisciplinary team, which includes interventional cardiology, cardiac surgery, advanced heart failure, and critical care anesthesia. This process has required multiple workflow iterations. The process and recommended changes are finalized at the cardiogenic shock monthly meeting. The meeting includes case presentations, which allows for retrospective review to identify opportunities for improvement. Vizient observed mortality and mortality index is trended and compared to the comprehensive AMC top decile. Eleven months post redesign the cardiogenic shock overall observed mortality dropped 6.1% to 32.34%, and the mortality index has dropped from 1.07 to 0.97. Slices of data that include shock/ST-elevation myocardial infarction (STEMI) and transfers from an acute hospital also are reviewed. We identified our transfers from other acute hospitals as an opportunity for improvement, so we conducted an internal survey of referring physicians from community hospitals to identify areas that needed improvement. The goal is to receive early onset cardiogenic shock transfers. Early referring provider feedback has been positive. *Outcomes and Impact.* Cardiogenic shock mortality rates are measured for Froedtert Health system hospitals. Overall mortality at our 3 hospitals is reported monthly. Prior to redesign (March 2017 through February 2018) and implementation of the shock pager, the observed mortality was 32.50%, N = 80. Eleven months post redesign (March 2018 through January 2019), the observed mortality dropped 5.9% to 26.58%, N = 79, and the mortality index dropped from 1.11 to 0.87. Our relative rank post redesign is 37/86 compared to the top decile 2019 comprehensive academic centers 18.09% observed mortality with ≥ 20 shock cases. Cardiogenic shock with STEMI mortality also is reported. Prior to the redesign and implementation of the shock pager, the STEMI/SHOCK observed mortality was 29.17%, N = 24. Eleven months post redesign the STEMI/SHOCK observed mortality dropped 5.4% to 23.81%, N = 21, and the mortality index dropped from 1.05 to 0.64. Our STEMI/SHOCK relative rank post redesign is 6/62 compared to the top decile 2019 comprehensive academic centers 28.79% observed mortality with ≥ 20 shock cases. Cardiogenic shock transfers from another hospital also are reported. Prior to the redesign and implementation of the shock pager, the transfer observed mortality was 42.86%, N = 28. Eleven months post redesign, the STEMI observed mortality dropped 18.62% to 24.24%, N = 33, and the mortality index dropped from 1.38 to 0.58. Our transfers from acute relative rank post redesign is 12/76 compared to the top decile 2019 comprehensive academic centers 21.52% observed mortality with ≥ 20 shock cases. We evaluate each case at our monthly meeting. We developed a referring provider feedback report and added a next-day phone

call from our critical care anesthesia provider to provide a quick status report.

Successful Respiratory Therapist-Driven Team Approach to Reducing Chronic Obstructive Pulmonary Disease Readmissions

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Background. Chronic obstructive pulmonary disease (COPD) is the third leading cause of 30-day readmissions that affects more than 12 million adults in the United States and accounts for more than \$15 billion annually in health care costs.¹ In our complex teaching hospital, the Readmission Reduction Committee identified a COPD rate that was higher than the national average. In an effort to reduce the 30-day all-cause readmission rate, a collaborative multidisciplinary workgroup, led by directors of case management and respiratory care and a pulmonary physician champion, was created. The team was comprised of physicians, pharmacists, nurses, case managers, respiratory therapists, volunteers, hospital leaders, and other ad hoc members such as Patient Family Advisory Council (PFAC) participants. *Intervention Detail.* During monthly meetings, our multidisciplinary COPD workgroup reviews readmission scorecards, patients with an unplanned readmission within 30 days, and current inpatients with a primary COPD diagnosis. Through analysis, we identified the need for a clinical pathway, including a more comprehensive education program, more consistent follow-up appointments, and phone calls to assess transition of care post discharge. The COPD workgroup developed a clinical pathway and education booklet in partnership with the PFAC committee that is used to provide real-time education by a dedicated respiratory therapist. Utilizing the education booklet, the respiratory therapist teaches patients medication administration, pulmonary exercises, how to identify early signs of a COPD exacerbation, and appropriate interventions to manage the disease process via a stoplight tool. In order to measure our outcomes, respiratory therapists track all patients with interventions. To further improve our program, the dedicated respiratory therapists call patients post discharge to discuss their follow-up appointments and identify any barriers such as obtaining medications, transportation issues, or home equipment needs that may increase their chances for readmission. We developed a collaborative volunteer program whereby the volunteers visit patients in hospital to assist with scheduling follow-up appointments with their pulmonologist or primary care physician prior to discharge. A

process map and structured scripting were designed to assist volunteers with scheduling follow-up appointments. Data were tracked, including the number of appointments made, declination rate, show rate, and readmission rate of those who attended their appointments, those who declined, and those who did not show up to their appointments. Based on the data collected we continued to improve our processes. *Outcomes and Impact.* Our multiple comprehensive interventions have proven successful in reducing our 30-day readmission as evidenced by the quantitative and qualitative outcomes to date. The initial expected outcomes were to decrease our COPD readmission rate below the Centers for Medicare & Medicaid Services (CMS) penalty threshold. We have far exceeded our goals every year. Over the 2-year period, respiratory therapists identified more than 1090 patients who qualified for the COPD initiatives. Respiratory therapists provided the identified patient list to volunteers, who then assisted patients with scheduling follow-up appointments prior to discharge. Volunteers assisted 783 patients and scheduled 180 follow-up appointments. Out of the 180 appointments, 135 patients attended their appointments, which translated to a 76% show rate. Of the 135 patients who attended their appointments, only one patient was readmitted, for a readmission rate of 0.07%. In 2018, our readmission rate for patients who belong to the COPD CMS group was 10.6%. Patients who were educated by the respiratory therapist and were included in the clinical pathway yielded a 6% readmission rate for January 2018 through October 2018. In comparison, patients who were not in the respiratory clinical pathway yielded a 19% readmission rate. Through these initiatives, we sustained the decrease in our readmission rates from 23.4% in 2016, to 16.1% in 2017, to 10.6% in October 2018. Sustainability of our success was related to our ongoing process improvements through multidisciplinary collaboration and action-oriented interventions. As part of this continuous improvement, we added an additional respiratory therapist to make follow-up phone calls post discharge to ensure safe transition. During our monthly COPD meetings, we discuss readmitted patients with the pulmonary intensivist and emergency room physician to identify any opportunities for improvement.

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When the C. diff Hits the Fan

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Background. Hospital-onset *Clostridium difficile* infections (HO-CDI) are one of the most common health care-acquired infections in the United States, affecting approximately 500 000 people annually.¹ In 2011, an estimated 15 000 deaths were associated with CDI, at a cost of \$4.8 billion annually to acute care facilities.¹ According to the most recent published literature, the average direct cost of a CDI incident is \$34 157.² Because of Centers for Medicare & Medicaid Services (CMS) reimbursement rules, health care organizations often are not fully reimbursed for the cost of HO-CDI. In addition, hospital accreditation rules mandate that HO-CDI incidents are publicly reported to CMS and the state of Texas. Therefore, hospitals with a high prevalence of HO-CDI are not only susceptible to financial losses but also to the potential impact of a negative reputation in the community. In 2016, the acute care community hospital identified 71 cases of HO-CDI. This was above the national benchmark of 52 expected cases, resulting in a standardized infection ratio (SIR) of 1.365. *Intervention Detail.* The chief nursing officer planned a comprehensive, inter-professional CDI prevention program. Stakeholders consisted of nurse managers, clinical nurses, physicians, infection preventionists, dietitians, pharmacists, environmental services, information technology, and laboratory staff. Improvement strategies included the following:

- Educating staff to appropriately don and doff personal protective equipment.
- Offering yogurt or probiotics to patients on antibiotics.
- Utilizing Lean methodologies to improve environmental cleaning and disinfection practices.
- Utilizing ultraviolet light surface disinfection in CDI isolation rooms as an enhancement to terminal cleaning.
- Changing environmental surface cleaning and disinfecting agents to a sporicidal solution product which does not cause damage to furniture and equipment (from OxyCide).
- Implementing an electronic screening tool in the emergency department.
- Developing and implementing an algorithm to guide staff on appropriate testing stewardship for CDI.
- Instituting an antibiotic stewardship program.

Implementation of these interventions started in February 2016 and was ongoing through September 2016. Initial results demonstrated improvement; however, team leadership recognized that in order to achieve further improvements and maintain significant reduction in HO-CDI, elements of sustainability must be applied to the initiative. A comprehensive patient-focused total quality management

model was implemented that included modules related to continuous process improvement, employee empowerment, and a cohesive multidisciplinary team. Time and effort were invested in reinforcing education to the nursing staff, conducting monthly meetings with the interprofessional team, performing drill-down investigations for all HO-CDI cases, developing and initiating corrective action plans, focusing attention on antibiotic stewardship practices, and enlisting a physician champion to address medical staff concerns regarding CDI. *Outcomes and Impact.* Baseline data showed a SIR of 1.365 in 2016. After initial interventions the SIR decreased to 0.497 in 2017—a ranking better than the National Healthcare Safety Network national benchmark. With continued attention and hardwiring changes, the SIR further improved to 0.228 in 2018 ($P = .000$, 95% confidence interval 0.137, 0.356). This resulted in an estimated savings of \$1 844 478 annually. In addition to improving outcomes related to HO-CDI, this project has created a model for process improvement across the hospital system. This experience has proven that proper application of quality improvement practices allows organizations to tackle some of the most difficult problems facing health care today.

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The Formula for Formulary Standardization

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MedStar Health

Background. As stand-alone hospitals merge into larger health systems and new system-wide formularies are created, each new hospital contributes some distinct and often historical medication practices. Not only could these unions result in an excessive number of products available for use, the continued access to particular products may perpetuate less than optimal medication practices. At MedStar Health, we embarked on a mission to streamline the shared formulary in order to optimize medication therapy, improve operational efficiency, enhance purchasing opportunities, facilitate order entry processes, and simplify order set creation and maintenance. We implemented a system-level, integrated approach to streamlining available formulary products across a 10-hospital health system. We embarked on this

journey utilizing currently available resources and our well-established medication use management (MUM) program. Our intent is to share our successes and to help others avoid pitfalls when undertaking this endeavor. *Intervention Detail.* The project aim was to generate a system medication formulary that supports cost-effective patient care while enhancing operational efficiency. Specific measurable goals were established, including reducing our charge master description (CDM) quantity by 15%, reducing inventory and medication spend, and increasing the use of system therapeutic substitution protocols to reduce non-formulary requests. At MedStar Health, we designed and implemented a system-level MUM program, one role of which is to support the formulary decision-making process. In parallel with ongoing MUM activities, those processes were leveraged to provide formulary reviews for 56 therapeutic categories. For each drug class within the categories, all formulary products were identified, medication utilization was quantified, and key stakeholders were engaged. Key stakeholders included bedside pharmacists, pharmacy residents, pharmacy informaticists, provider-based clinical practice councils, and other subject matter experts. Initial efforts focused on quick wins such as removing products not commercially available and eliminating unused or very low-use products. Next, products were streamlined when multiple versions were used across the health system, and clinical reviews commenced to identify new therapeutic substitution protocols and remove clinically unnecessary products and costly products with comparable formulary alternatives. Last, if reviewers identified the need for a full class review or a drug monograph, those requests were funneled into the MUM program cycle. *Outcomes and Impact.* After 2 quarters, we have taken 8 full therapeutic categories, 4 partial therapeutic categories, and other miscellaneous CDMs through the system MedStar Pharmacy and Therapeutics (P&T) Committee for streamlining. The MedStar P&T Committee accepted all proposed changes. We have inactivated 723 CDMs from the formulary, for a reduction of 12%. Ten new system therapeutic substitution protocols have been implemented, accounting for the removal of more than 40 CDMs from the formulary. In addition, these automatic substitutions have resulted in reduced provider and pharmacist time to enter and verify orders, as well as improved medication reconciliation efficiency and accuracy. We have realized these additional benefits for at least 85 products through this therapeutic substitution process. We are on target to attain closer to a 30% reduction in CDMs, exceeding the initial goal of 15%. Although a financial target was not set initially, a preliminary analysis reveals a significant inventory reduction cost savings that may approach \$500 000.

Delivering Optimal Care to Delivering Patients: Clinical Care Redesign of an Obstetric Service Line

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Memorial Hermann Health System

Background. The current practice of obstetrics, like health care in general, faces the challenges of rising costs, changing patient demographics, provider dissatisfaction, and poor marks on quality and patient satisfaction.¹ According to the call for action related to quality maternity care, the facilities where women seek obstetric services must address poor quality related to timeliness and excessive intervention. By implementing Six Sigma methodology, an 11-campus academic health care system (including a Level IV campus with 25 000 deliveries a year) utilized benchmark data to identify significant opportunities to reduce cost and length of stay (LOS). Further analysis revealed significant variation in care within the obstetric service line, resulting in inefficiency and errors. By utilizing a 4-pronged approach to clinical care redesign, Memorial Hermann Health System focused on care progression, care variation reduction, case management, and clinical documentation integrity. By combining clinical pathways and nursing work streams, implementing daily multidisciplinary discharge rounds (MDDR), and developing real-time key performance indicator (KPI) dashboards, the health system has (1) decreased safety errors by omitting newborn screens and RhoGAM administration; (2) decreased LOS; and (3) saved \$1.6 million to become a profitable service line through increased clinical efficiency and effectiveness. **Intervention Detail.** Through multidisciplinary collaboration with a focus on the nursing work stream, the Obstetric Milestone Pathway was developed through a series of workshops with frontline representatives throughout the system. The pathway was implemented at all 11 campuses from January through April 2018. The development of the Obstetric Milestone Pathway, designed to standardize care for the obstetric patient, addresses safety, timeliness, and improved communication through frontline nurse development and focus on key tenets of the work stream. Evidence-based practice was integrated into the work structure through detailed tasks in the progression of the care plan. Based on the Obstetric Milestone Pathway, MDDR were created, including all bedside clinicians, case management, social work, and operational leadership, to discuss patient plan of care and expected milestones. Barriers to discharge were identified, resulting in immediate follow-up. Systemic barriers also were identified, resulting in a focused collaborative quality and process improvement effort. The development and implementation

of real-time, patient-level KPI dashboards ensured sustainability and control. Real-time visualized performance data are provided to frontline teams as a tool for targeted performance improvement through communication, outlier identification, and benchmark data. **Outcomes and Impact.** This initiative accomplished multidisciplinary and interdepartmental collaboration across system obstetric services that improved LOS without increasing the readmission rate. By collaborating among all disciplines and departments, systemic barriers were identified and focused resources were applied to improve effectiveness and efficiency of care. During the intervention, 85% of patients completed the milestones within the 30-hour time frame. This resulted in a decrease in LOS from 3.6 days to 2.6 days and saved \$1.6 million. There were also zero reported safety events related to omitted tasks with the implementation of the pathway. Key process indicators such as orders written to discharge, admission to discharge, and delivery discharge were all reduced through utilization of the pathway. Sustainability has been ensured and dashboard data are used to continue improvement throughout the system.

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Hardwiring Appropriate Use and Increasing Cost Transparency of Lab Tests

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Background. Managing costs through appropriate utilization of laboratory tests is a challenge facing all health care organizations. While best practice guidelines on appropriate use have been defined by many professional organizations, lack of guideline integration into the ordering workflow within the electronic health record (EHR) makes it difficult for ordering providers to make informed decisions to adhere to these best practices. Additionally, lab cost information is not readily available to providers at the point of ordering. The Nebraska Medicine Clinical Effectiveness (CE) program partnered with leaders from the Lab Utilization Committee and the Antimicrobial Stewardship Program (ASP) to improve utilization of laboratory tests. The first initiatives focused on improving adherence to existing guidelines for the gastrointestinal pathogen panel (GIP) and respiratory pathogen panel

(RPP). The GIP, a faster, more sensitive—yet costly—test, was introduced in 2015 to replace the traditional stool culture. Guidelines on appropriate use, disseminated by the ASP, recommended inpatient ordering once per admission and not after hospital day 3. A pre-implementation review of inpatient GIP testing found 20% noncompliance with these appropriate use guidelines. Further review by ASP validated that no meaningful pathogens were detected in these inappropriate tests. A similar review of RPP testing revealed approximately 7% duplicate testing within the same admission, with no meaningful pathogens being detected upon repeat testing. In fiscal year 2017, 68% of all inpatient RPPs returned negative results, and only 8% returned meaningful results used to augment patient care. Goals were set to reduce the total number of GIP orders by 20% and the number of duplicate RPPs to less than 5% with implementation of active and passive decision-support tools in the EHR.

Intervention Detail. In April 2017, decision support tools were implemented within the EHR, eliminating the ability to order GIP duplicate testing and tests in patients hospitalized for >72 hours. Providers attempting to order outside the guidelines received an alert notifying them of the restrictions. Providers with requests outside of these guidelines could consult the microbiology lab director, who could place the order if approved after providing education and evaluating the legitimacy of the request. A similar workflow was implemented in December 2017 for RPP testing. In addition to creating an alert preventing duplicate testing within 14 days, a dynamic report was created to provide just-in-time decision support for the ordering provider when the order is being placed. The report also provided guidance on appropriate ordering, inclusive of alternative testing options, and improved transparency of direct cost and panel components to clearly define what is included in the panel. In addition, direct cost values for inpatient lab orders were displayed in the EHR beginning in August 2017. Information indicating “send-out” lab orders was added in April 2018. This information is displayed to ordering providers in a column when searching for and selecting orders. With each of these initiatives, strategies were implemented to ensure appropriate information was displayed to providers across the care continuum, including inpatient, ambulatory, emergency department, and community-based hospitals with Nebraska Medicine’s extended EHR.

Outcomes and Impact. Through these initiatives, Nebraska Medicine realized cost savings totaling more than \$600 000 with minimal build effort in the EHR. A year after implementation, Nebraska Medicine saw a 30% reduction in GIP orders compared to the year prior, and an additional 16% savings in GIP orders prevented (after accounting for the number of times a GIP order was entered but not signed by the ordering provider). These

savings totaled approximately \$167 000 during fiscal year 2018. RPP decision support was rolled out from December 2017 through January 2018 and resulted in an 83% decrease in duplicate testing. Savings also were estimated for times when an RPP was entered but not signed and alternative, less-costly testing was selected instead. Reductions in duplicate testing and alternative testing improvements resulted in approximately \$80 000 in savings during calendar year 2018. Additional savings occurred from displaying inpatient lab cost and send-out information alone. Compared to baseline, lab costs decreased from 58 cents to 56 cents per patient day over a 21-month time frame and send-outs decreased 73 cents per patient day over a 12-month time frame. This combination of displaying lab costs and send-out information to the ordering provider resulted in nearly \$400 000 in savings. Providing relevant, patient-specific information in conjunction with cost and appropriate use guidelines at the point of ordering led to meaningful improvements in ordering, along with a reduction in cost and waste. These achievements also demonstrate the value of multidisciplinary collaboration, with the CE team, informatics, ASP, and lab working together. Integrating “appropriate lab use” best practices—hardwired into the EHR—allows ordering providers to make well-informed, cost-conscious decisions when choosing lab testing, while continuing to provide quality patient care.

Planning for Success! The Implementation Road Map for System Case Scheduling

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Prisma Health

Background. Appropriately posting surgical cases is simply getting the patient, staff, equipment, and resources in the right place at the right time, but this is easier said than done. Most surgical cases are widely variable in duration, delays can be unpredictable, and resource availability can be difficult to foresee in mutually exclusive workflows. In addition, the efficient use of operating room time and coordinating relevant supporting services are paramount to preserving thin profit margins across the system.¹ Scheduling has proven to be one of largest factors or components in promoting efficient operating room use.² Improved scheduling can affect capacity planning, surgical services portfolios (eg, block schedules), staff assignment and scheduling, capital resource planning, and operational decision making.³ In short, an accurate schedule can improve coordination of support services and inform strategic decision making. Our hospital is composed of 10 separate locations where surgical cases are

performed. The largest hospital is the only Level 1 trauma center in the area, and therefore is a referral center for complex cases. The hospital has 32 operating rooms and performs more than 25 000 surgeries a year—approximately half of the total system volume. Traditionally, this system of operating rooms was managed locally, leading to a lack of coordination for shared benefit. This project showcases a road map to successful implementation of our standardized and centralized scheduling framework.

Intervention Detail. By January 1, 2018, our lengthy and methodical journey to improved case scheduling across our surgical services at Prisma Health had begun. Our largest system-wide project to date began as 2 separate interventions: first, the organizational structure for hospital scheduling staff was centralized under one manager, and second, processes and workflows were standardized to enhance accuracy and improve efficiency of scheduling cases. Previously, case scheduling staff for each facility would have mixed responsibilities and report to the operating room manager. Scheduling staff would have no visibility into any other facility's schedule and often would make decisions that made sense for their facility, but that could put the system at an overall disadvantage (eg, overbooking shared equipment or resources). The plan was to centralize scheduling staff to one manager, improve visibility between facilities, ease training of the scheduling staff, improve staff productivity, and enforce new block scheduling rules at the system level. The standardization of scheduling processes included moving away from physician-informed case lengths to historical averaging of case data through the electronic medical record's case entry and scheduling module. This all but eliminated both intentional and unintentional bias in the estimation of case length durations by surgeons. This interventional undertaking required a multidisciplinary team of nurses, physicians, administrators, information technology support, and a system engineer. Alignment around a common goal, how to measure success, and, ultimately, the pathway for success, were all instrumental in securing buy-in from affected physician practices and service administrators. One specific opportunity surrounding an improved case schedule was the ability to improve patient wait times for our outpatient pediatric surgery population. A statistical analysis of on-time case starts allowed us to develop an algorithm for determining patient arrival times for surgery and redefine protocols in our pre-anesthesia assessment appointments to convey more accurate start times to patients.

Outcomes and Impact. We tracked scheduling accuracy for each facility as we transitioned to the new case scheduling framework. We observed a scheduling accuracy improvement of 21% (45% to 66%) at our main campus facility, where scheduling accuracy is measured by whether or not the case length is within 30% of the posted case duration. At other

facilities, we improved scheduling accuracy between 10% and 41%, with post-implementation metrics steadily reporting between 66% and 81% of cases being scheduled accurately. Operationally, we saw measurable improvements in both turnover time and on-time starts for the main campus hospital. We reduced our turnover time by 7 minutes and achieved our target for the on-time starts metric, with 73.6% of first cases starting on time. Separately, our redefined pre-anesthesia assessment protocol for preoperative patient arrival times resulted in 31 minutes of saved preoperative patient wait time per outpatient pediatric surgical patient during our trial study. This also resulted in similarly reduced fasting requirements (NPO) as well, which was a significant factor in patients' low Hospital Consumer Assessment of Healthcare Providers and Systems scores over the study period. In addition, redesign of the system's block schedule was implemented with a 3% growth in volume over the prior year. This signifies that redistribution of volume and capacity planning across the system can be load leveled without negatively affecting case volumes of outlying hospitals. Future work leading up to the next Vizient Connections Education Summit will include standardization of key performance indicators across the system and an investigation into the effectiveness of scheduling accuracy on other supported projects. Initial results in inventory management models suggest that providing just-in-time delivery of case supplies to the operating room could result in inventory reduction of some items by as much as 50%, which would not be possible under the previous scheduling framework.

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From Stop-Go to a Steady Flow: Rapid Process Improvement Workshop

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Background. New patients were experiencing difficulties accessing and making an appointment with the urology clinic on Rush University Medical Center's main campus. New patient access at Rush is tracked through the "percentage of new patients scheduled within 14 days" standard metric. For urology, only 60% of new patients were scheduled within 14 days, so 40% had to wait more than 14 days for an appointment and see a doctor. The goal was to improve the "percentage of new patients scheduled within 14 days" metric to at least 70%, as set by department leadership. We approached this issue as a supply-demand problem. To meet the demand from our new urology patients, we needed to increase the supply of new patient appointment slots within 14 days. To increase supply, sometimes the response is to hire more staff and/or add more clinical space, which can be time-consuming and costly options. The route we chose to pursue was to evaluate and improve our current processes via a 5-day Rapid Process Improvement Workshop (RPIW). Our hypothesis was that by increasing the efficiency of the clinic's workflows for both patients and staff, more new patient appointment slots would become available, thereby improving new patient access. This work showcases how improvement work can be achieved in a short amount of time with a highly engaged and collaborative multidisciplinary team. *Intervention Detail.* To increase urology workflow efficiency, we deployed a 5-day RPIW, which brought together a multidisciplinary team to observe processes and map workflows and complete waste and gap analysis. The team also brainstormed ideas and experimented on solutions to move toward the future state. Following are some solutions from the RPIW. While some of these improvements may seem small, all of them together resulted in improved processes and increased efficiency of the clinic's workflows for both patients and staff.

1. Check-out process: the check-out process varied across the clinic and was time-consuming for front desk coordinators. Often, coordinators had to find physicians to ensure the appropriate follow-up appointment was made. The team developed a process for physicians to complete check-out notes in Epic. Physicians now must include the type of follow-up appointment that should be made and when in Epic. The change has streamlined the check-out process and now saves time for coordinators, physicians, and patients.
2. Exam space: staff found the floor plan in the exam/procedure room cumbersome. The team made the decision to remove the door that separated the 2 sides of the room. Staff members can move more quickly between the spaces.
3. Printer locations: staff members who need regular access to printers had to leave their space to access printers. In collaboration with information systems, the office printers were moved and remapped. The printers are now more accessible and workflow has improved.
4. Supplies: time was wasted looking for supplies. The main supply room was organized via the Six Sigma 5S method (sort, set, shine, standardize, and sustain). Time spent searching for supplies was eliminated and efficiency was improved for the clinic. In addition, the clinic plans to improve collaboration with supply chain to streamline organization and replenishment processes for supplies.

Outcomes and Impact. The urology clinic has already seen great improvements. The percent of new patients scheduled within 14 days has already improved from 60% (pre-RPIW) to 65% one month, and to 78% two months following the event (the goal was 70%). More important, we have seen our overall patient satisfaction increase from 88% to as high as 94%. Our patient satisfaction for ease of scheduling increased from 89% to 93%. To help sustain changes and drive continuous improvement, the team regularly gathers to review its work and track its completion plan. Clinic staff also implemented daily readiness huddles and standard work practices. Not only does this work affect satisfaction and access to care for urology patients, but Rush is also looking to replicate the solutions and utilize the standard work developed during the RPIW throughout the organization to continuously support efficient, organized, and collaborative clinics.

Sweet Decrease in Length of Stay Index: Neonatal Hypoglycemia Management

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Background. At Rush University Medical Center, late preterm and term infants constitute the vast majority of admissions to the neonatal intensive care unit (NICU). While their care may require fewer resources (because of

lower acuity) than very preterm infants, the volume of these infants necessitates that intensive care resources are appropriately used in this population. We examined our short-stay infants that we defined as <10-day hospital stay. One metric used for benchmarking is the length of stay (LOS) index (LOSi), which is the ratio of observed LOS to expected LOS. National LOSi benchmarks characterize a NICU's efficiency and potential cost waste. Utilizing Vizient Clinical Data Base data and reporting, it was identified by the Rush University Medical Center Clinical Resource Management team that the NICU had a 2017 fiscal year LOSi >1 for infants born at a gestational age = 35 weeks, specifically for infants who were diagnosed with hypoglycemia. This was greater than comparison hospitals not only in the area but also across NICUs nationwide. With a sizable patient population that meets the defined criteria, there was a clear opportunity for improvement within this group. There is a limited, evidence-based consensus for the management of neonatal hypoglycemia, which is associated with brain injury and worse neurodevelopmental outcomes. This allows for variation in care management that results in inconsistencies in neonatal hypoglycemia management and discharge criteria. The aim of our quality improvement (QI) effort was to standardize the management of neonatal hypoglycemia in the NICU to decrease the LOSi by 10% (from 1 to 0.9), and reduce cost waste within 1 year for low-acuity infants who were admitted to the NICU primarily for hypoglycemia with no other comorbidities that would prolong their NICU stay. *Intervention Detail.* An interdisciplinary champion team was formed in October 2017, including neonatal physicians, nurses, nurse practitioners, educators, pharmacists, and clinical resource management leaders. We identified our cohort as infants born = 35 weeks gestational age treated with intravenous dextrose fluid for the diagnosis of neonatal hypoglycemia with the following risk factors: late preterm infant, early term infant, small for gestational age, large for gestational age, infant of a diabetic mother, and intrauterine growth restriction. We excluded infants who required respiratory support or had other comorbidities prolonging their NICU stay, such as antibiotic treatment, feeding problems, or phototherapy. We used a process map to identify variation in neonatal hypoglycemia management from the time of NICU admission to discharge, including thresholds for treatment and criteria for discharge. A fishbone diagram and analysis revealed multiple barriers to efficiency and areas of waste, which led to the following primary key drivers: (1) standardization of neonatal hypoglycemia definitions and management, based on the medical literature regarding short- and long-term consequences of hypoglycemia: blood glucose <45 mg/dL within 24 hours of life and <50 mg/dL after 24 hours of life; (2) feeding practices; (3) optimization of equipment

utilization; and (4) staff education. A practice guideline was written to reinforce hypoglycemia definitions and criteria for admission, weaning glucose infusion rate, and discharge criteria. Multiple Plan-Do-Study-Act cycles led to practice guideline additions for a formal rollout in February 2018. The guideline was revised in June 2018 with still no improvement in LOSi. In July 2018, a hypoglycemia order set rolled out with a subsequent trend in decreased LOSi. The QI outcome measure was LOSi. The process measures were LOS observed, number of glucose infusion days, and order set utilization. The balancing measures were hyperglycemia and hypoglycemia. Neonatal hypoglycemia cases were reviewed weekly. *Outcomes and Impact.* Utilizing the Vizient Clinical Data Base, we tracked our improvements in LOSi from 1.08 in fourth quarter 2017 to 0.72 in fourth quarter 2018. This LOSi decrease of 0.36 also correlates to a reduction of observed days by 1.67. This decrease in LOS applied to our following 53 hypoglycemia patients in 2018 and translates to 88.51 avoided days, which equals an approximate savings of just less than \$9000. We also were able to reduce waste in frontline staff waiting for approval to wean patients off intravenous fluids and instead established an order set by which weaning could be determined at the bedside under normal conditions. Decreasing LOSi for neonatal hypoglycemia is a quality metric indicator for efficient management and decrease in cost waste. This ongoing QI effort seeks to standardize neonatal hypoglycemia management to optimize resource utilization and may increase family satisfaction by decreasing unnecessary LOS and the associated separation of infant and mother.

Impact of a Pharmacy-Driven Opioid Stewardship Initiative

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Background. Long-term opioid use often begins with treatment of acute pain, and data suggest that patients undergoing orthopedic surgery are at highest risk of becoming chronic opioid users. Based on inpatient and discharge opioid prescribing at our institution, pharmacists identified the need for adjustment of pain practices. Patients undergoing elective joint replacement surgery (EJRS) were typically prescribed oxycodone for postoperative pain. If a patient's pain was not well managed initially, long-acting opioids, or escalating doses of opioids were sometimes prescribed without consideration for

nonopioid treatments. Upon discharge, the majority of patients were prescribed at least 60 tablets of oxycodone 5 mg, irrespective of hospital usage. Pain management also was not a focus in the perioperative surgical home (PSH) pharmacist's patient assessment, which focused mainly on medication reconciliation, review of the Prescription Drug Monitoring Program (PDMP), high-risk medications, and deep vein thrombosis prophylaxis. To address these concerns, a pharmacy-driven opioid stewardship initiative (OSI) was implemented utilizing the PSH pharmacist to update our institution's approach to pain management and assess pain in all patients undergoing EJRS. *Intervention Detail.* The PSH pharmacist developed standardized pain management recommendations based on patient characteristics and suggested discharge opioid quantity based on inpatient use, along with patient education. Standardized guidelines were approved by the PSH team, orthopedic team, hospital leadership, and the Pharmacy and Therapeutics Committee. In addition to the pain education handout, verbal instructions reinforcing pain management expectations and appropriate opioid use were provided during the preoperative and postoperative periods. The orthopedic surgery OSI was implemented for all patients undergoing EJRS. To assess the impact of the OSI on postoperative pain management, primary outcomes included hospital opioid usage, peak visual analogue scale scores (scale of 0 to 10), discharge oral morphine equivalents, discharge opioid quantities, long-acting opioid prescriptions upon discharge, and opioid refills within 30 days. Secondary quality measures included length of stay (LOS), same-day discharge, and 30-day readmissions. An electronic medical record and the state's PDMP were utilized to collect all opioid data. Data were retrospectively collected at monthly intervals, which allowed for timely dispersal of information to the patient care team. All opioid data were compared to visual analog scale (VAS) scores throughout the perioperative period, which allowed us to determine if the OSI was negatively affecting pain management. Intermittent discussions with the interdisciplinary team allowed for revisions to the initiative if detrimental changes in patients' pain control were noticed and to ensure that prescribers were successfully adopting the new prescribing practices. *Outcomes and Impact.* There were 143 patients in the baseline group, compared to the 206 patients in the OSI group who underwent EJRS. Patients in the OSI group had significantly decreased average opioid use during hospitalization (47.81 mg vs 94.20 mg, $P < .01$), significantly decreased average opioid amount at discharge (268.77 mg vs 547.82 mg, $P < .01$), significantly decreased opioid discharge quantity (39.45 tabs vs 60.22 tabs, $P < .01$), and significantly decreased long-acting opioid prescribing (0% vs 8.41%, $P < .01$). Average peak VAS scores were unchanged in the medical-surgical unit

and opioid refills at discharge decreased significantly (25.97% vs 42.06%, $P < .01$), suggesting that changes in opioid prescribing did not affect pain management adversely. Average LOS decreased significantly (1.28 days vs 2 days, $P < .01$) and same-day discharge increased significantly (21.36% vs 4.90%, $P < .01$) without any significant change in 30-day readmissions, suggesting greater efficiency without compromising quality of care. Implementation of a pharmacist-driven OSI highlighted the importance of a patient-centric pain management plan and patient education to curb opioid overprescribing without adversely affecting patients' perception of pain management.

We Perform: Driving Culture Change Through Partnership and Collaboration

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Background. Temple University Hospital (TUH) is an academic medical center (AMC) in north Philadelphia. TUH serves as a Level 1 trauma center and safety net hospital in one of the country's poorest neighborhoods. Our patients have a high disease burden and low health literacy, and 85% of reimbursement comes from Medicare and Medicaid. TUH has a highly dedicated staff that includes some who operate under collective bargaining agreements. The leadership and bargaining unit staff operate and embrace the Just Culture philosophy to ensure organizational initiatives are in congruence with the values-based model of shared accountability. In late 2016 and early 2017, at the same time as our department of nursing was on its Magnet Journey, leadership and organization development (L&OD) launched a robust, multitiered leader development strategy alongside a values-based performance management system. The positive energy and organizational embrace of these initiatives prompted leadership from L&OD, nursing, and patient experience to design, develop, and implement a leadership curriculum flexible enough to proliferate across the system, connect staff through a common language, be immediately actionable, and drive culture change as a way to address stalled patient satisfaction scores. The resulting collaboration was our We Perform: Professional Skills Series (PSS). This 1-day workshop, which went live in October 2018, focuses on creating the Temple Experience by highlighting the importance of a civil workplace, the significance of the patient experience, and the value of creating a culture of transparent communication and feedback. While each of these components was

successfully piloted across the system individually, pulling them together as a core requirement and tying the content to our performance management system was key to creating a culture that aligned with our values.

Intervention Detail:

- Quantitative measures: Press Ganey National Database of Nursing Quality Indicators (NDNQI) data, Vizient patient-centeredness domain data (quality and accountability dashboard), Press Ganey Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey data, Advisory Board Employee Engagement Survey Data, and PricewaterhouseCoopers (PwC) survey data.
- Benchmark comparison: NDNQI, Vizient comprehensive AMCs 51st percentile, Press Ganey AHA Region two 50th percentile, Advisory Board employee engagement survey data, PwC survey data.
- Data measures: HCAHPS overall rating, HCAHPS Nurse Communication, Press Ganey NDNQI Nurse to Nurse Interaction, Press Ganey NDNQI Overall Nurse Satisfaction, employee turnover (overall and first year) grievances, employee disciplines, vacancy rate (overall and nursing), employee engagement index.

In reviewing and analyzing HCAHPS outcomes year over year, communication (or lack thereof) was an area of opportunity. Feedback surrounding lack of communication came in the form of not only survey feedback but also grievances and complaints, social media comments, and in speaking with our patient and family advisers. Another intervention that was found to be most impactful was the train the trainer (T3) methodology. We felt the We Perform: PSS content would be most powerful if it were delivered peer to peer. TUH nursing, organizational development, and patient experience teams identified clinical and nonclinical leaders and staff who would be strong facilitators for this content. Facilitators were trained via a standardized approach, and once leadership approved them as facilitators, they were able to conduct segments of We Perform: PSS on their own. Continued monitoring of various human resources–related measures indicated early on that we were heading in the right direction and prompted us to continue with the initiatives. *Outcomes and Impact.* NDNQI Nurse to Nurse Interaction improved from 3 of 34 units outperforming the benchmark in 2017 to 8 of 34 in 2018. Likewise, overall registered nurse satisfaction improved from 7 of 34 units outperforming the benchmark in 2017 to 19 of 34 in 2018. TUH human resources saw a 50% reduction in employee disciplines since the program’s implementation and a 20% reduction in employee complaints about

managers over a 4-year period. Similarly, TUH human resources has seen turnover drop from 14.8% to 6.8%, even in this robust economy. This improvement is a testament to our mission and our changing culture. Our nurse vacancy rate decreased from 8.4% to 1.76% in the last 2 years. The engagement index moved from the 44th percentile to the 58th percentile when compared to all AMCs, and from the 64th percentile to the 73rd percentile when looking at all urban hospitals located in the Northeast. In terms of patient experience, HCAHPS overall rating of the hospital had been stagnant at 66.6% for fiscal years 2016, 2017, and 2018. In the second quarter of fiscal year 2019 (October through December 2018), the HCAHPS overall rating improved from the stagnant 66.6% to 72.1%—the highest overall score TUH has seen in 3 fiscal years. This trend is continuing to hold true for third quarter fiscal year 2019. From second quarter 2018 to first quarter 2019, the patient-centeredness domain improved from the 87th domain rank to the 84th. In focusing on communication, the nurse communication domain improved from the 30th percentile in Press Ganey’s AHA Region 2 to the 46th percentile fiscal year 2019 year-to-date December. Within nurse communication and compared to AHA Region 2, “Nurses Treat You with Courtesy and Respect” improved from the 30th percentile to the 37th. “Nurses Listen Carefully to You” improved from the 46th percentile to the 53rd, and “Nurses Explain in a Way You Can Understand” improved from the 29th percentile to the 54th.

Priming the Pipeline for Psychiatric Nursing

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Background. With the expansion of both our pediatric and adult psychiatric units, we have a need to increase the number of psychiatric nurses. Student nurses present an opportunity to prime the pipeline for psychiatric nursing. However, many nursing schools have eliminated stand-alone courses or clinical placements in psychiatric nursing, leading to a concerning number of graduate nurses with minimal to no experience caring for this population. This concern is demonstrated by the number of clinical hours provided to 10 schools at this academic medical center in the 2017-2018 school year, which showed 4816 hours on psychiatric units, while more than 90 000 hours were offered on medical-surgical units. This deficit in academic and clinical experiences of caring for patients with psychiatric diagnoses may be leading to a crisis of prepared psychiatric health care providers. In response, our organization developed an academic internship focused on providing nursing students the opportunity to learn more about the care provided to patients with psychiatric

diagnoses, beginning with an historical context to the current state of knowledge and practice. Based on a successful internship provided in oncology, a 2-week intensive winter program and a 4-week summer program were created. The objectives for the academic internship in behavioral health include distinguishing between the various psychiatric diagnoses, increasing empathy for patients with psychiatric diagnoses, demonstrating de-escalation techniques, identifying methods of self-care, and valuing the role of the psychiatric nurse with opportunities to observe nurses in practice. Academic partners from across the city agreed to provide college credit for successful participation in the program. *Intervention Detail.* Based on the objectives identified, a variety of activities were implemented. Reflective exercises included using movies to explore the social impacts of mental illness and describing the care observed during observation experiences. Presentations covered the various diagnoses and interventions provided, as well as setting boundaries, emotional intelligence, and trauma-informed care. The roles of both medical and psychiatric comorbidities were explored. Police shared their role in caring for this population. A domestic violence advocate presented on the power of control and provided an empathy exercise for students. Students were certified in crisis prevention intervention (CPI). A program in resilience and self-care was provided. A Hearing Voices simulation and a 5-act play further supported having empathy for the symptoms experienced with psychiatric diagnoses. The human resources department provides training on writing cover letters and resumes and having successful interviews. Managers from our psychiatric services discussed opportunities available to both licensed and unlicensed caregivers and gave tips on what managers look for in new hires. *Outcomes and Impact.* This academic internship was created to help prepare nursing students to care for patients with psychiatric diagnoses, as well as how to care for themselves. The internship received a quality improvement determination by the organizational institutional review board. The MICA 2 survey, specific to measuring provider attitudes toward mental illness, was chosen to measure change in attitudes with data collected both pre and post internship. The opportunity to offer further evaluations via debriefing and online survey also was provided. This program was successful in meeting its objectives. The changes seen in the MICA 2 demonstrated an increase in valuing the role of the psychiatric nurse and other caregivers, and an increased willingness to learn about mental health. Students believed more strongly that primary care providers should fully assess patients with psychiatric symptoms, and not merely attribute pain and other symptoms to mental illness. This demonstrates a deeper understanding of the holistic needs of this patient population. The topics with the highest student evaluations were resilience

training, CPI, domestic violence, and the Hearing Voices simulation. Student evaluation responses further supported program success: “I know that this will make a difference in how I look at each patient,” “This internship was one of the most valuable learning opportunities I have had throughout my schooling,” and “This internship changed the whole trajectory of my life” were some of the comments received. The shortage of nurses prepared for and eager to work in psychiatric nursing is a concern. Since its completion, 11 of the 16 participants have been hired. The academic internship was repeated in winter 2019, and will be repeated in summer 2020.

Taking the Headache Out of the Emergency Department

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Background. The American Migraine Study found that approximately 23% of households contained at least 1 member suffering from migraine, and acute headache is a common chief complaint in the emergency department (ED).¹ The ED is not the ideal provider of care for patients with chronic conditions such as migraines that require long-term management and more complex care. Another concern among physicians, payers, and patients regarding frequent ED use is the high financial cost, in part because of unnecessary neuroimaging studies. A 2011 study found the estimated mean cost for migraine-related care per outpatient visit is \$140 compared to \$775 for an ED visit.² We expect that this difference in health care costs between ED visits and outpatient visits has increased during the last 8 years because overall health care costs have increased. The University of Utah Health wanted to decrease the number of ED visits to reduce financial costs and increase positive patient experiences. *Intervention Detail.* To better address the needs of patients with migraines, the University of Utah Health Outpatient Neurology Service decided to offer walk-in appointments at its headache clinic. For patients experiencing acute headache symptoms, this potentially would reduce the need for expensive and time-consuming care in the ED. The walk-in clinic is available Monday through Friday from 8 AM to 4:30 PM. Clinic nurses triage and provide care by assessing the patient and determining if an intravenous (IV) or intramuscular treatment is needed. At that point, administration of an antiemetic to treat nausea and nonnarcotic medication such as ketorolac for pain occurs, as well as other IV medications that can provide critical relief to a refractive headache patient. The acute headache treatment provided is based

on the treatment plan outlined previously by the patient's provider. To assess the effectiveness of the intervention, we are examining overall patient experience and financial impact, along with using Vizient Ambulatory Quality and Accountability measures such as "patients with 4 or more ED visits per year." *Outcomes and Impact.* Since implementing walk-in appointments at the University of Utah Health Neurology Clinic, there has been an average of 600 patient visits a year. There are 6 clinicians who see patients at the clinic. Patients report a high level of patient satisfaction with the headache clinic and are grateful to have a backup treatment option for migraines besides the ED when home treatments fail. The headache division at the University of Utah Health has seen patient satisfaction scores above the 90th percentile each quarter for the past 4 quarters. Patient care also has improved because of the care protocols established in the outpatient clinic. Physicians at the clinic are migraine specialists and they ensure that each patient receives the best care according to the latest practice recommendations. Patients who normally would utilize critical resources in the ED are able to receive IV infusion medications and care. By having nurses care for these patients at the neurology clinic, patients avoid the high cost of an ED bill and the associated provider professional billing. A detailed analysis is currently being conducted to better quantify the cost savings, and we expect significant results. The outpatient Neurology Clinic and division of headache medicine also is contributing to the organization's overall improvement in the Vizient Ambulatory Quality and Accountability quality measure "patients with 4 or more ED visits per year." This measure decreased from 4.44% in 2017 to 4.39% in 2018, and the University of Utah Health was in the top 20% of our Vizient comparison group.

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No Manikin? No Problem! Inspiring Innovation Through Electronic Medical Record Sepsis Simulation

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Background. Simulation is used in various health care settings to allow providers to practice patient care in a

safe environment. Many of the issues faced in health care today are not amenable to a manikin-based simulation format. Some of these issues include opioid management, hospital-acquired infections, and sepsis. At UAB, sepsis is identified as the leading diagnosis associated with mortality. In October 2016, UAB's quality improvement department, under the direction of the chief medical officer, launched a robust screening, escalation, and management process known as Code Sepsis. Education was and remains an important aspect of ensuring adequate utilization of Code Sepsis. With high staff turnover rates, inconsistent onboarding education for new employees, and inadequate standardization of communication strategies, an innovative approach was needed to hardwire knowledge of UAB's Code Sepsis process. UAB's Office of Interprofessional Simulation for Innovative Clinical Practice partnered with the sepsis coordinator to develop a "tabletop" sepsis simulation designed to guide participants through the identification, escalation, and management of a patient with sepsis. Participants have included nurses, physicians, patient care technicians, pharmacists, and others. Participant feedback regarding early attempts at a tabletop sepsis simulation revealed that the format was difficult to follow, as there were no computers available to simulate the electronic medical record (EMR) elements of Code Sepsis, such as sepsis screening and order entry. Considering this feedback, the simulation design team developed a 1-hour simulation utilizing the EMR to enhance the fidelity of the simulation experience starting in January 2018. This change allows simulation coordinators to identify which interactions with the EMR present barriers to effective patient care. This innovative application of simulation can translate to a variety of processes, with the goals of enhancing interprofessional education and improving clinical outcomes. *Intervention Detail.* Using data, the sepsis and simulation coordinators were able to focus educational efforts on clinical areas that care for high volumes of patients with sepsis. The highly engaged medical and nursing leaders in these areas allowed staff members time to participate in this 1-hour simulation, and often attended the simulations themselves to act as content experts. A patient chart was created in the testing environment of the EMR to allow participants to navigate and document as they normally would. An interdisciplinary group of clinicians designed a scenario requiring staff members to recognize sepsis, initiate Code Sepsis, and enter appropriate orders in the patient's chart. The simulation design incorporated known stumbling blocks based on compliance and utilization data of each piece of the Code Sepsis process. Patient details relevant to the patient population, such as medical history, reason for hospital admission, and current clinical status, are generated and located within the

simulated patient's EMR. If the team requires physical exam information, it is provided by simulation facilitators. When escalation is required, it is performed as it would be in a Code Sepsis, with response from the medical emergency team. Physician learners can enter orders as they would for a real patient, with the intended behavior of utilizing the standardized sepsis order set—a process element with known low application based on established monthly utilization reports. Nurse learners can view orders in the simulated patient's EMR exactly as they would appear for a real patient under their care. When the simulation is complete, a debriefing takes place to explore the impetus behind decisions made by learners during the simulation, affirm positive behaviors, and identify alternative choices if learners did not perform expected behaviors associated with the Code Sepsis process. Learners are asked to share lessons learned from the simulation with their peers. *Outcomes and Impact.* Since the January 2018 implementation of the EMR sepsis simulation, 17 simulations have been completed with 40 physician learners and 98 nurse learners. Each time the simulation was conducted, it was found that team member knowledge of the Code Sepsis process was incomplete. Team members improved their understanding of the process, as well as the importance of interprofessional education as they engaged the system in a realistic fashion and received immediate feedback on the appropriate course of action. All participants completed the standard evaluation survey. On a 5-point Likert-type scale, 98% of learners agreed/strongly agreed that the simulation met its objectives, the learning experience was valuable, the debriefing was valuable, the experience would improve their performance in the actual clinical setting, and they would recommend the event to others. Individuals also noted in their evaluations that they found the use of the EMR beneficial, they had a better understanding of the sepsis screening tools used in our health system, and they had an improved understanding of the interprofessional goals of Code Sepsis. Out of all patients who were admitted to the targeted medical service with a final diagnosis of severe sepsis or septic shock in fiscal year 2017, utilization of the standardized sepsis order set was observed at a rate of 64.66%. These EMR simulations were initiated at the beginning of second quarter of fiscal year 2018. In fiscal year 2018, for the same patient population, utilization of the order set was observed at a rate of 77.37%. Mortality decreased from 18.1% in fiscal year 2017 to 13.1% in fiscal year 2018. For some participants, this simulation was their first encounter with the Code Sepsis process. Giving health care providers the opportunity to simulate care of a patient with sepsis in a safe environment that closely replicates their normal workflow is thought to improve patient outcomes.

Diagnosing Diversity and Inclusion Gaps in Your Patient Population

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UAB Medicine

Background. A budget-neutral strategy for diagnosing the diversity and inclusion status of our patient population was to harness the power of existing data in new ways. Namely, Hospital Consumer Assessment of Healthcare Providers and Systems, Clinician and Group Consumer Assessment of Healthcare Providers and Systems, and Emergency Department Consumer Assessment of Healthcare Providers and Systems contain a wealth of patient sentiment on topics of communication, process barriers, courtesy and respect, and socioeconomic differences. While demographic information is captured in the surveys and reportable, traditional patient experience strategies have focused on location-based reporting, such as units, clinics, or other sites. Identifying disparities across the continuum of care meant slicing consumer feedback results by age, race, sex, education level, zip code, and diagnosis-related group at the organization level, then diving deeper into issues previously uncovered. Ensuring we stayed the course on our inclusivity improvement efforts would mean incorporating demographic patient experience monitoring into existing decision-making processes and reporting platforms. *Intervention Detail.* The starting points of our patient diversity and inclusion analyses and monitoring were age, race, and sex. Each of these areas yielded a unique opportunity to progress in our mission. For age, we identified in the quantitative results a disparity with our 80 years of age and older population in all communication domains, with some questions having as much as a 15% top-box difference from other age groups. Further analysis of patient comments using natural language processing software to classify themes and sentiment showed the underlying gap pertained to engaging families and caregivers to prepare them for the unique needs of this patient population post discharge. Our analysis on race identified that the response rates of our Hispanic population were so low that this demographic was underrepresented in our data. In sharing gender data internally and collaborating with our Healthcare Equality Index team, we uncovered the need to stratify data by sexual orientation and current gender identity. *Outcomes and Impact.* Through this project, UAB Medicine captured more robust and inclusive data. We now administer surveys in Spanish, which increased feedback from Hispanic patients by 22%. More than 50 000 patients have responded with sexual orientation and current gender identity. We collaborated with the

Transition of Care team to tailor strategies on age-related communication and expectation gaps with elderly patients and families. We also are integrating demographic data into existing dashboards and platforms such as Tableau. Additionally, we engaged hospitals statewide through the Alabama Hospital Association and led a pilot of 10 facilities to create updatable diversity dashboards. Pilot partners diagnosed opportunities within their unique patient populations and workforces to focus on cultural competency training. These hospitals also participated in a series of best practice–related calls.

Surviving the Sepsis Guidelines

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Background. The UC Davis Medical Center Sepsis Improvement Collaborative was formed in 2010 with the goal of developing a system-wide plan to advance early identification and treatment of sepsis. In recent years, the team has undertaken a multifaceted, multidisciplinary plan to provide targeted, attributable data to nursing units and physician groups, refine our clinical decision support tools and standardized treatment protocols, and promote clinician education and teamwork. While initial successful efforts were aimed at patients with sepsis present on admission (POA) in the emergency department, we recognized that mortality from sepsis not POA (NPOA) was unacceptably high. We shifted our focus to improving outcomes for patients who developed new or worsening sepsis in the hospital, achieving a 31% decrease in the mortality index for these patients. During the same time period, we were able to maintain quality improvement among patients with sepsis POA, among whom the mortality index declined by 22%. We also saw significant improvements in adherence to evidence-based treatment guidelines, including a 90% relative increase in compliance with the SEP-1 core measure. We realize that many institutions struggle with similar challenges; in fact, we have participated in multiple webinars with other institutions to share our successes and challenges. We believe that sharing our innovative approach for using targeted data to drive process change will help others achieve success in tackling sepsis at their institutions, resulting in decreased patient mortality from this deadly disease process. *Intervention Detail.* In our initial examination of mortality and treatment compliance outcomes from Vizient, we found 2 immediate areas for improvement: the need for input from inpatient providers and the ability to provide timely, attributable data to clinicians. The committee was restructured to have 3 coleads from

emergency medicine, internal medicine, and nursing, plus a project manager. Two highly innovative and interactive dashboards were created. The first provides targeted sepsis treatment and mortality data for nursing units, academic departments, and divisions based on information from Vizient and the electronic medical record, and the second tracks hospital-wide sepsis mortality based on Vizient data, as well as sepsis best practice alert usage. Based on these data and feedback from clinicians, we implemented clinical process changes to facilitate activation of additional expertise at the bedside and improve the coordination of care for sepsis. Two full-time nurses were hired to serve as resources for sepsis identification, treatment, and education with bedside staff on inpatient units. A collaborative progress note was developed for use by nurses and physicians when a patient is assessed for severe sepsis. Regular multidisciplinary sepsis simulations were instituted on acute care units. Refinements were made to sepsis best practice alerts and standardized order sets to streamline identification and treatment and target the patients at highest risk. Because of gaps in usage of best practice alerts, targeted identification and treatment protocols were developed for labor and delivery and cancer center patients. Last, a review process was developed for all NPOA sepsis deaths through a 2-way feedback process involving physicians and unit nurse managers. *Outcomes and Impact.* As a result of our work, mortality for patients with sepsis declined significantly for 2 consecutive fiscal years. Among NPOA sepsis patients, the mortality index decreased by 31%, from 2.83 in fiscal year 2017 to 1.96 in fiscal year 2019 to date, and observed mortality by a relative 13% margin, from 31.2% in fiscal year 2017 to 27% in fiscal year 2019 to date. The mortality index for POA sepsis patients decreased by 22%, from 1.02 to 0.80, and observed mortality by 18%, from 9.6% to 7.9%, during the same time period. Compliance rates with the SEP-1 core measure nearly doubled, from 27.4% in calendar year 2016 to 52.1% in calendar year 2018, exceeding the national average. From calendar year 2016 to calendar year 2018, internally reported data showed improvement in initial lactic acid screening (86.7% to 89%), repeat lactic acid screening (75.5% to 82.6%), timely antibiotic treatment (74.3% to 76.6%), and blood cultures (64.5% to 66.4%). Anecdotally, interest from inpatient units and providers regarding sepsis care has improved. We routinely receive requests for nurse champions to attend meetings to find ways to improve care on their units. Additionally, our feedback process has garnered useful insights from treating providers that we have used to improve our processes. Achieving and sustaining improvements in sepsis treatment and preventing deaths across the medical center required multiple avenues of attack and repeated messaging and feedback. Challenges

remain, including standardizing physician education about sepsis treatment in a teaching institution, recognizing developing sepsis in complex patients, and improving outcomes for sepsis survivors.

Integrating Intensive Care Unit Care Delivery to Reduce Catheter-Associated Urinary Tract Infections

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Background. Catheter-associated urinary tract infection (CAUTI) is a prevalent hospital-associated complication that leads to prolonged hospitalization, higher cost, and increased mortality. Because CAUTI is potentially a preventable harm, hospitals are financially penalized for having higher rates. The estimated attributable cost for each CAUTI in the intensive care unit (ICU) is approximately \$10 000.¹ Although multiple interventions have been shown to be effective in reducing CAUTI, overall success is highest when incorporating multimodal, team-based interventions in routine clinical care. *Intervention Detail.* The team met biweekly from May 2018 through December 2018 to discuss progress and share learnings. Team members learned improvement skills and tools through just-in-time training and applied the skills within their ICUs. Performance improvement coaching was provided to ICU teams between team meetings. *Understanding:* We used the 4 phases of “life cycle of catheter” to simplify the process: indication, insertion, maintenance, and removal. We reviewed literature to identify interventions for CAUTI reduction and prevention in each phase. All participating ICU teams performed “go-see” activities to identify failures in care delivery and gaps between expected and actual patient care. Learnings from each ICU were shared in team meetings and a failure modes and effects analysis was performed for a common mental model of failures that contribute to CAUTI in our context. *Best practices from high-performing units were reviewed.* *Continuous improvement:* We identified key drivers for improvement and updated them with new knowledge during the project course. The major drivers included a shared mental model of key process measures, standard work, staff buy-in and training, timely and transparent data sharing, and adequate supply of materials. Three

process measures were selected with a goal of achieving >90% reliability in daily care: (1) presence of physician order for each Foley; (2) updated daily indication for maintaining Foley; and (3) daily perineal hygiene/Foley care. Iterative Plan-Do-Study-Act (PDSA) cycles were performed in each ICU and learnings were shared in team meetings for rapid spread of best practices. An electronic medical record (EMR) report (“process manager”) was built to identify defects quickly and mitigate them during each shift. This report also facilitated reliable data collection of process measures. Additional interventions included multidisciplinary team consensus on Foley indications and updating EMR order sets, staff training in perineal hygiene/Foley care, availability of external catheters, and physician and nurse education regarding urine culture practices. Performance data on process and outcome measures were shared using run charts (weekly) and control charts (monthly), respectively. *Outcomes and Impact.* Outcomes measure: The rate of CAUTI in the ICU declined by 81% from May 2018 to January 2019 compared to the baseline period, from 1.8 to 0.33 CAUTI/1000 Foley days. A special cause with a system shift was observed on the U control chart (>8-months observations below mean). Days between CAUTIs increased from 7 days during the baseline period to 47.5 days over an 8-month period. Multiple special-cause variations were observed in the “days between CAUTI” control chart. The longest CAUTI-free period was 97 days. *Process measures:* Because the process measures were new for our ICUs, we did not have baseline performance data other than observations from “go-see” activities. The capability of measurement was built simultaneously as interventions were being tested in PDSA cycles. Since November 2018, semi-automated weekly run charts were generated and shared with each ICU. Between November 2018 and January 2019, overall adherence to the 3 process measures was 92%, 95%, and 89%. Prevalence of Foley use (Foley days in ICU patients/total ICU patient days × 100) in ICUs declined from 48% to 39%. Using improvement science methods and a team-based approach, shared learning and rapid escalation of improvement was possible. The expertise of ICU leaders, infection prevention team, and frontline staff was maximized in system redesign by availability of performance improvement coaching. Access to informatics and supply chain teams facilitated codesign. Leadership engagement allowed for system-wide transformation and overcoming barriers. Team members learned and applied quality improvement tools, which will increase organizational capacity in process improvement.

1. Hollenbeak CS, Schilling AL. The attributable cost of catheter-associated urinary tract infections in the United States: a systematic review. *Am J Infect Control.* 2018;46:751-757.

Sustainable Patient Blood Management at a Public Academic Medical Center: Can the Impossible Be a Reality?

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Background. Overuse of medical interventions is a significant contributor to adverse events in health care. In 2012, the National Summit on Overuse highlighted red blood cell (RBC) transfusions as 1 of 5 areas of concern of The Joint Commission and the American Medical Association. This concern was shared by professional societies across disciplines, and patient blood management (PBM), an evidence-based, multidisciplinary approach to optimizing patient care surrounding transfusion practices, grew as an essential quality improvement focus nationwide. The clinical evidence in favor of a restrictive RBC transfusion practice in adult patients is undebatable, and the published returns on investment seem profound. However, developing and sustaining PBM programs de novo can require changes in infrastructure and reporting hierarchy to support new roles, significant monetary investment in information technology, time-intensive education initiatives to address knowledge gaps, strategic recruitment and mentoring of key leaders to ensure continued system governance, and a culture shift from siloed health care delivery to collaborative clinical integration. Barriers to sustainability in a public academic medical center (AMC) often include limited resources, continuous trainee/ordering provider turnover, health care delivery based on individual provider expertise, complex organizational structure, and convoluted executive reporting models. Until 2014, our AMC culture supported a liberal practice of 2-unit RBC transfusions for adults and transfusing to maintain a hemoglobin level >8 to 9 g/dL. We needed a broad system approach to shift our hospital's culture to a restrictive transfusion strategy as the evolving standard of care. **Intervention Detail.** Our institution recruited a hospital chief quality officer (CQO) as a new role in 2015. The CQO and chief medical officer developed a change management plan resembling Kotter's method for blood utilization.¹ They recruited and mentored a physician faculty member with subspecialty training in transfusion medicine and health informatics as project lead, with protected time supported by the faculty department. The CQO established a formal institutional platform to evaluate blood utilization in August 2015: The Transfusing Wisely Quality and Safety Committee. Our first initiative focused on optimizing inpatient adult RBC transfusions. We created a sense of urgency and a guiding team by recruiting physician champions with a passion for evidence-based practice. We secured support by assigning

a project manager and requesting representatives from all essential teams: transfusion data registry analysts, quality and safety dashboard analysts, electronic health record analysts, and nursing management. Over 17 months we reviewed pertinent literature, created a clear institutional RBC transfusion policy with defined exceptions, developed well-defined key performance indicators (KPIs), revised order sets and created clinical decision support to support our policy, validated data acquisition algorithms to acquire meaningful metrics, and created a hospital inpatient RBC transfusion dashboard with filters to exclude patient population exceptions. Through a 3-month education campaign, all hospital quality committees, faculty, and house staff were oriented to the new guidelines and the transfusion dashboard with concomitant release of clinical decision support. **Outcomes and Impact.** We established 2 main KPIs for asymptomatic, stable, hospitalized adult patients: (1) the percentage of RBC units transfused for a pretransfusion hemoglobin level <7 g/dL; and (2) the percentage of RBC unit orders for >1 RBC unit at a time. Through the transfusion dashboard, real-time KPIs are available to all medical center staff, including access to department-, division-, and service-level trends. Our formal system interventions took place between August 2015 and December 2016. From calendar year 2015 to calendar year 2016, the proportion of transfusions for hemoglobin <7 g/dL increased from 42.8% to 49.43%, and the rate of multiunit RBC orders decreased from 46.5% to 40.8%. In January 2017, our committee started a new blood utilization project with only occasional monitoring of inpatient RBC transfusions. In calendar years 2017 and 2018, our inpatient RBC KPIs continued to improve, highlighting the sustainable organizational change. By calendar year 2018, the percentage of RBC units transfused for a pretransfusion hemoglobin level <7 g/dL had increased to 60.1%, and the rate of multiunit RBC orders fell to 25.7%. We also observed a parallel 15% to 16% reduction in units transfused per 1000 patient days beginning in fiscal year 2016, with 900 to 1000 RBC transfusions averted annually. Our estimated aggregate cost savings for 2016 through 2018 was \$2.1 million. Key factors for success included institutional alignment, clear policies and protocols, order set changes with good clinical decision support, well-defined metrics that are available broadly to department/division/service levels, ongoing targeted educational detailing, and anticipating/excluding exceptions. Through our approach, we successfully created a culture shift in the way we transfuse RBCs at our hospital and established a restrictive transfusion practice at our institution.

1. Kotter JP. *Leading Change*. Boston, MA: Harvard Business Review Press; 1996.

Lost in Translation

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Background. There is no gold standard for providing medical interpretation to limited English proficiency patients and their families on pediatric, family-centered rounds (FCRs). At UCLA Mattel Children's Hospital, the FCR occurred in English and then the patient's plan was summarized for the family in Spanish, either by someone on the medical team who spoke Spanish, or by using the over-the-phone interpreter, or the video remote interpreter. Thus, the majority of the FCR encounter was not interpreted. We implemented equipment-assisted simultaneous medical interpretation (EASMI), an interpreting modality developed by UCLA staff interpreters, that allows all of the patient round to be interpreted (history, overnight events, vital signs, physical exam, labs, imaging, assessment, and plan). In addition, family members are able to communicate their questions/concerns during the FCR encounter because the interpreter is present on rounds. The interpreter calls each pediatric team in the morning and schedules herself/himself on rounds. This takes the work off of the residents to coordinate the interpreter. The interpreters have a mobile phone, so they are always easy to reach. In addition, the department of language services blocks off 1 interpreter dedicated to pediatric rounds each morning, Monday through Friday; sometimes 2 interpreters are deployed for rounds depending on census. The voice of the patient and her/his family is captured in every rounding encounter. This work is innovative because we believe we are the first hospital to use EASMI on rounds. This method of interpretation on rounds is groundbreaking. Because language barriers significantly contribute to medical errors, compromising patient safety and quality of care, this innovative method to communicate on rounds holds promise to decrease errors. *Intervention Detail.* In-person Spanish interpreters joined FCRs daily at UCLA Mattel Children's Hospital at Ronald Reagan UCLA Medical Center in March 2018. Interpreters wear a noise-canceling microphone connected to a transmitter and family members are given a receiver with an earpiece. All medical discussion is interpreted simultaneously from English to Spanish. Spanish-speaking volunteers were recruited to conduct interviews in Spanish with family members present on rounds ($n = 25$). The interviews included questions concentrated on their experience with in-person interpreters during FCRs, including if they felt they could participate during rounds, and if they understood the treatment plan for their child. Families who stated

they had experienced phone and/or video remote interpretation during rounds were interviewed on their experiences with these modes of interpretation as well. Coding of these qualitative data was completed in order to identify themes. Online surveys were completed by medical students, residents, fellows, attendings, and nurses ($n = 136$) about their experience and satisfaction during FCRs with in-person interpreters, as well as their previous experience with over-the-phone interpreters and/or video remote interpreters. English- and Spanish-speaking families' satisfaction rates from the Child Hospital Consumer Assessment of Healthcare Providers and Systems (Child HCAHPS) survey (sent to families after discharge) were analyzed using a Fisher exact test 7 months prior to and 13 months after implementation of in-person Spanish interpreters on FCRs. *Outcomes and Impact.* Major barriers to providing medical interpretation on FCRs reported prior to the intervention included difficulty of use and lack of efficiency in using video remote interpreting and over-the-phone interpreting on FCRs, as well as medical team members communicating in proficient and non-proficient Spanish. Themes from family interviews after the intervention included increased understanding, increased involvement in patient care, comfort with interpreter and medical team, and an overall feeling of partnership in the patient's care. Themes from the medical student, physician, and nursing surveys were increased family engagement, improved efficiency of rounds, decreased communication errors, and improved patient safety. Surveys demonstrated that 94% of physicians and 100% of nurses were "very satisfied" with EASMI. The percentage of Spanish-speaking families who reported "always" on the Child HCAHPS to "How often did your child's doctor explain things in a way that was easy to understand?" increased from 58% to 100% ($P < .05$) post intervention. Spanish-speaking families reporting "always" to "How often did your doctor listen carefully to you?" increased from 63% to 100% ($P < .05$). Spanish-speaking families reporting "always" to "How often did your child's nurse explain things in a way that was easy to understand?" increased from 53% to 100% ($P < .05$). Spanish-speaking families reporting "always" to "How often did your nurse listen carefully to you?" increased from 63% to 100% ($P < .05$). For our English-speaking families on these same questions, there were no statistically significant results between the 2 time periods. Overall, families and the medical team were highly satisfied with EASMI on FCRs, and EASMI is an effective intervention to provide interpretation on FCRs. Since implementation, there have been 1660 pediatric FCR-interpreted rounding encounters using EASMI at UCLA Mattel Children's Hospital (an average of 100 per month).

Paging Dr Rosetta Stone: Bridging the Language Gap for Better Care

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UK HealthCare

Background. Two small, young girls from India arrived at the International Adoption Clinic at Kentucky Children's Hospital for their post-adoption health screening. They felt overwhelmed, nervous, and unable to communicate with the doctor and their new parents. Then a face appeared on a screen and calmly spoke to them in Hindi. The girls lit up at the sound of their native language and the face smiling back at them. The "face on the screen" was the video remote interpreter (VRI), one of the first video units deployed in UK HealthCare's pediatric clinics for interpretation for limited English proficiency (LEP) patients and their families. These VRI units are just one of the ways pediatrics found to better serve the diverse local community. UK Healthcare, like other Vizient members and colleagues in the medical field, strives to meet the needs of all LEP patients, in compliance with federal and state guidelines and the standards of care shared across accreditation and quality consortiums. And although language service and nondiscrimination have long been addressed in the Civil Rights Act of 1964, and further clarified for LEP populations in Executive Order 13166 in 2000, Section 1557 of the Affordable Care Act from 2016 was even more in depth. Current requirements for language access are more prescriptive than ever and anticipate the need for expertise in professional, health care-specific services to provide truly meaningful access. Ample data, peer-reviewed studies, and quality and equity guidelines all demonstrate that providing language access in the form of qualified medical interpreters and written translations completed by qualified translators affects every aspect of patient care, from outcomes to readmission metrics to mortality. Using compliance guidelines and available studies for support, pediatrics strives to improve communication for patients and providers across the continuum of care. *Intervention Detail.* Providing language services can present many challenges. Compliance with current regulations and guidelines, access and interpreter use, and educating providers and staff about resources and policies all have to come together for a language service program to work effectively and add value to the overall health program. To face these challenges head-on and provide comprehensive solutions, the pediatrics division examined the whole journey of a child and family across the continuum of care. This approach means not just thinking of a regular checkup for a child, but the experience when a parent calls a nursing triage phone when her child has a fever,

when a family presents as a walk-in for a sick visit, when a referral is needed with advanced specialties, and even how dietitians need to understand different diets and cultures to develop treatment plans. Collaboration across multiple communication platforms allowed providers and clinical staff to tailor access to different situations and needs. Integrating protocols allows for consistency and improved compliance. Other customized tools, such as front desk welcome cards, empower staff to serve a linguistically diverse community with efficiency. In practice, in a complex, high-volume system, what does language access look like? How many languages will there be? Is an interpreter always going to be there? Does every paper have to be translated? How are phone calls going to be made? The initiatives, tools, and techniques implemented in the pediatrics division put theory into practice for patient-centered care. Metrics examined over time—prior to, during, and after each intervention—show measurable, positive impact. Staff engagement and input with language services and leadership teams supports the variety of initiatives and spirit of collaboration throughout the division. *Outcomes and Impact.* In the case of the VRIs, the staff have given them names and costumes to make them more fun and engaging for children. "Dr Rosetta Stone" serves the adolescents' clinic, "Pedro" can be found at Kentucky Clinic South, and "Kevin the Minion" works hard in the UK HealthCare Pediatric Specialty Clinic. For basic compliance with federal law and accreditation standards, pediatrics did not need Dr Rosetta Stone, but setting the bar at the minimum requirements does not allow for the unique adaptations and comprehensive approaches that affect a patient's life for the better. Some of the other adaptive tools applied for a more efficient, system-wide approach include the following:

- Welcome cards in multiple languages to introduce families to clinic processes at the front desk, where patients may arrive prior to the scheduled interpreter or have more difficulty using remote services.
- Dedicated Spanish phone interpreters for the division.
- Directed calls through interpreting service lines for high-volume languages over dedicated incoming call lines.
- Recorded prompts in multiple languages for imaging procedures.
- Subtitled or dubbed videos for patient education.
- Expanded video access, including more languages and extended availability.
- Combining on-site staff interpreting with video and phone interpreting for comprehensive language access.

Many positive effects will be intangible but significant improvements to patient experience and overall care. Some of the measurable results include: a dedicated Spanish phone interpreter resulted in double the number of incoming calls after 1 year; in-language calling for appointments reduced no-show rates by more than 30%; regarding patient recruitment, families report choosing UK HealthCare to have complex procedures and regular care because of interpreting services. Pediatrics reaches across the divide to engage with each family and patient in a meaningful way.

Laboratory Resource Utilization: Harnessing the Power of Data to Impact Change

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UK HealthCare

Background. Laboratory testing is essential to patient care. A recent meta-analysis estimated that health care systems overutilize and underutilize laboratory testing approximately 20% and 45% of the time, respectively. Inappropriate laboratory testing puts patients at increased risk for harm such as unnecessary blood draws, false-positive test results, incorrect or missed diagnoses, unnecessary follow-up testing, and morbidity and/or mortality related to delay in diagnosis. In comparing laboratory resource utilization (obtained from Resource Manager, a Vizient Clinical Data Base tool) to other academic medical centers, we identified opportunities for improvement in laboratory test utilization in several UK HealthCare service lines, including neurology, neonatology, and cardiology. An internal review showed that UK HealthCare providers often ordered tests with limited clinical utility, as well as expensive reference lab testing for inpatients. The latter is problematic because these tests can be expensive and are not fully reimbursed because of a flat diagnosis-related group-based reimbursement from most payers. Also, depending on the test's turnaround time, many patients are discharged before test results return, making it less necessary to order these in an inpatient setting. The University of Kentucky Medical Center implemented a laboratory formulary to drive numerous initiatives aimed at optimizing laboratory test utilization. *Intervention Detail.* Data from Resource Manager was reviewed comparing laboratory resource utilization for UK HealthCare to all Vizient Group A hospitals. The overall trend showed UK HealthCare had a higher resource intensity per case than our peers in fiscal year 2016 (July 2015 through June 2016)—10.81 compared to 9.18 for Vizient Group A hospitals. A laboratory formulary-driven committee had been reviewing the

volume and cost of reference lab testing and saw several service lines ordering a large volume of expensive reference tests. Among these, neurology was targeted for an interventional quality initiative. A detailed report was compiled that compared laboratory utilization by service line. While overall neurology had a lower resource intensity than its peer group, it was increasing year over year. From fiscal year 2016 to fiscal year 2017, resource intensity per case for neurology providers increased from 5.52 to 5.65, while our peer group increased from 5.95 to 6.06. Working in collaboration with information technology and the laboratory's finance business partner team, a database of all reference lab tests by ordering provider was built. Using that database, a custom report was prepared for neurology leadership that identified outlier providers who were responsible for ordering statistically more tests than their peers. Laboratory and neurology leaders partnered to identify opportunities to optimize laboratory test utilization for these providers. An intervention of education and training by department peers was chosen. Neurology leaders were given detailed data of the outlier ordering trends to facilitate discussion of optimal laboratory test-ordering strategies with providers. Laboratory representatives also were invited to speak and provide education to all neurology providers regarding test utilization at a department faculty meeting. Pathology medical directors also review and approve all reference laboratory testing for inpatients prior to sending out for all service lines. *Outcomes and Impact.* One year after the intervention with the main outlier provider, test ordering patterns have improved. Prior to the intervention, an average of 17 reference tests were ordered per week, compared to 5 tests per week after the intervention. In the year prior to the intervention, there were 4 weeks that the provider sent out more than 40 tests in a single week, once even sending out 54 tests. Since the intervention, there have been only 4 weeks when the provider ordered more than 10 tests, peaking at 15 tests in 1 week. The department of neurology has decreased its laboratory resource intensity per case as well. The UK HealthCare providers showed a significant decrease compared to our peers. While our peer group saw an increase from 6.06 to 6.31 from fiscal year 2017 to fiscal year 2018, UK HealthCare neurology decreased from 5.65 to 5.15. This decrease in testing did not adversely impact patient care. From fiscal year 2017 to fiscal year 2018, neurology's length of stay index decreased from 1 to 0.94 and the mortality index decreased from 0.77 to 0.66. The UK HealthCare laboratory formulary-driven partnership between pathology and neurology implemented several interventions—including peer-to-peer coaching, departmental seminars, and laboratory test review and approval—that resulted in a decrease in laboratory resource utilization. This was a reversal in the upward

utilization trend and significantly less resource utilization compared to our peer institutions—without compromising patient care. This approach is in line with recommendations in the Institute of Medicine report on diagnostic error to assemble multidisciplinary teams (including clinical specialists and pathology experts) to reduce these errors. Harnessing the power of data enabled us to demonstrate opportunity and drive necessary changes to improve laboratory stewardship at UK HealthCare.

Not in Vein: Daily Compliance Review Reduces Venous Thromboembolism Risk

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UNC Hospitals

Background. In fiscal year 2015, The University of North Carolina Medical Center (UNCMC) ranked 60th out of 82 peer hospitals in our rate of perioperative pulmonary embolism or deep vein thrombosis (PSI 12), according to the Vizient Clinical Data Base. In response to the hospital's high venous thromboembolism (VTE) rate, a multidisciplinary workgroup was formed with executive sponsorship from the chief medical officer. Initially, the workgroup relied on manual chart abstraction, revised order sets, and educational materials to improve compliance with the Centers for Medicare & Medicaid Services VTE Core Measures. Although the initiative achieved marginal success with Core Measure compliance, adverse patient outcomes did not significantly decrease, indicating a need for more robust interventions. A gap analysis demonstrated a need for providers to monitor VTE prophylaxis compliance for all patients on an ongoing, real-time basis. *Intervention Detail.* The VTE workgroup worked closely with the information services department to develop daily data extracts from the electronic medical record. Each morning, data extracts are imported into an Excel file. The file then analyzes the data, generates compliance reports specific to each care team, and distributes these reports to nurse managers and physician leaders. In the pilot phase of the project, the customization and distribution processes were primarily manual. Today, the VTE daily report is fully automated and distributed each morning using Visual Basic programming. The daily report includes 9 different process measures that focus on 3 key components of VTE prevention: chemoprophylaxis, mechanical prophylaxis, and mobility. For each component, the report tracks whether an appropriate prophylaxis order is active for every patient and whether the patient received the ordered intervention during the previous 24 hours. For example, the mechanical prophylaxis section uses sequential compression device activity to identify issues with patient refusals or insufficient documentation.

Patients who have not received recommended prophylaxis as measured by the report are flagged each day for further review by their care team. In a summary table, clinicians can easily see their unit's daily and weekly compliance for each measure, observe unit trends, and compare performance to similar units to identify areas to focus improvement efforts. The current report is the result of years of multidisciplinary collaboration, feedback, and continuous quality improvement, but it is only a tool in the improvement process. Beyond the tool itself, our substantial success in reducing our VTE rate has come from how providers use this report. Clinical teams have incorporated the report into daily rounding practices to identify patients who are not receiving appropriate prophylaxis, assess the plan of care for those patients, and make any needed changes. *Outcomes and Impact.* The VTE daily report has had a significant impact on PSI 12 rates. Since implementing the report, the hospital's rate of PSI 12 dropped from 9.29 to 2.70, bringing UNCMC's ranking among 80 peer hospitals from 60th to 3rd in 3 years, according to the Vizient Clinical Data Base. Over the course of the project, UNCMC prevented an estimated 160 patients from being harmed by avoidable VTEs. In addition to keeping patients safer, reducing VTEs positively influences length of stay, mortality, and cost of care. The daily report provides a framework for multidisciplinary discussion of new products, protocols, and standards of care on an ongoing basis. As a result, patient education resources have improved, documentation policies have been updated, patient mobility protocols have been established, and recommendations for chemoprophylaxis treatment have been developed. As UNCMC assesses these and explores future initiatives, the impact on VTE prophylaxis compliance can be more easily measured. Efforts are already in place at UNCMC to expand the use of multidisciplinary teams, daily reviews, and access to real-time, case-level data to prevent patient harm in other areas of the hospital. While the tool that UNCMC uses to track daily compliance was developed for a specific purpose at one hospital, the methods used in this project can be applied to other health care organizations to improve patient outcomes beyond the scope of VTE.

Meeting the Needs of Underserved Rural America Using a Multifaceted Approach

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Background. The maldistribution of providers in the United States is a problem for primary care specialists but is especially acute among medical specialties. Sixty-three dermatologists serve 3 million citizens in Mississippi, but broad swaths of the Mississippi Delta, the most

impoverished region in the state, have no dermatologists at all. Unfortunately, patients in these rural areas are the least capable of traveling to a medical center for care. *Intervention Detail.* The University of Mississippi Medical Center has developed a multifaceted approach to attacking the problem of patient access in rural Mississippi. This multifaceted approach includes (1) recruiting and training dermatologists who have an interest in serving in rural Mississippi; (2) utilizing teledermatology to assist primary care physicians in rural areas; and (3) staffing 2 volunteer clinics (staggered monthly) so that a dermatologist is in the Delta every 2 weeks to handle skin problems where teledermatology will not suffice. *Outcomes and Impact.* In the short term, we have seen some success and anticipate exponential growth as the 3-tiered model develops further over time. One of our major successes to date has been our ability to sign out teledermatology consultation requests within 48 hours of receipt. Additionally, we have found that approximately 90% of teledermatology consults are resolved without the need for an in-person office visit with a dermatologist.

From Zero to 70 in Four Quarters

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University of Utah Health

Background. University of Utah Health was able to improve performance on 2 Inpatient Psychiatric Facility Quality Reporting (IPFQR) measures: (1) Transition Record with Specified Elements Received by Discharged Patients from 1.3% to 78% and (2) Timely Transmission of Transition Record from 0.9% to 70.2%. This was from the first quarter calendar year 2017 to the first quarter calendar year 2018. Using data from the Vizient Clinical Data Base Core Measures tool, we realized we had no organized process to meet these Centers for Medicare & Medicaid Services (CMS) measures as a component of the IPFQR program. By designing and continually refining a collaborative process with our care teams and introducing forcing functions built into the electronic medical record (EMR), our compliance has increased drastically. *Intervention Detail.* University of Utah Health pulled data starting from when the Transition Record with Specified Elements Received by Discharged Patients and Timely Transmission of Transition began on January 1, 2017. The data showed University of Utah Health compliance for first quarter fiscal year 2017 was at 1.3% and 0.9%, respectively, which was well below CMS benchmarks and internal expectations. Once we identified the missing elements and which care team was responsible,

we became increasingly transparent by auditing and sharing information with care teams through a real-time reporting system. Increasing the timeliness for care team feedback and moving from quarterly reporting to real-time information facilitated care team engagement and continuous innovative improvement. The real-time report that was created displays responsible care team names, and also identifies which elements of the transition record are needed for compliance with the transition record measures. This allowed behaviors to be changed almost immediately if any parts of the overall process are being missed. Having this information available and drawing attention to needed corrections, compliance rates improved greatly within only a couple of quarters. The ability to (1) create an automated report that pulls information from various documentation sources within our EMR, and then (2) transmit that information automatically via Epic to the patient's next care providers has provided us with effective forcing functions that help increase overall compliance. *Outcomes and Impact:*

- We listened to and incorporated care team feedback and fostered trust and respect for the process. Care team leadership, coupled with information technology reporting capabilities, facilitated a culture shift among the care teams to real engagement in this quality measure, as well as acceptance of transparency.
- We implemented a process in which transition records could be automatically transmitted and documented, creating a forcing function that greatly reduced cognitive load for care teams as they sought to meet these measures.
- All of this resulted in a positive trend line with our compliance rate for Transition Record with Specified Elements Received by Discharged Patients from 1.3% in first quarter fiscal year 2017 to 78% first quarter fiscal year 2018, and Timely Transmission of Transition Record from 0.9% in first quarter fiscal year 2017 to 70.2% first quarter fiscal year 2018.

Standardize Vaccine Practices Across an Enterprise

Nicole Stenzel, PharmD, and Amanda Slinde, PharmD, BCPPS

Sanford Health

Background. Sanford Health is a large integrated delivery network health system. It is the largest, rural, nonprofit health care system in the country, consisting of 45 medical centers and 289 owned clinics. The enterprise's immunization committee determined vaccine standardization across enterprise-owned medical centers and clinics as a

short-term goal. The immunization committee estimated that Sanford Health–owned facilities provide approximately 300 000 vaccines totaling \$24 million annually. Baseline purchase data identified potential for improved alignment to established contracting and prompted intervention. The primary objective of the project was to standardize enterprise practice surrounding vaccine ordering and administering by identifying a list of formulary vaccines. The aim of this standardization was to improve patient adherence and patient satisfaction. After further investigation into potential steps for operationalization, it was determined that financial opportunity was a secondary outcome of standardization. Subsequently, the team negotiated competitive contract pricing with key vaccine manufacturers. The implementation team utilized the electronic medical record (EMR) and staff education to ensure success of the project. The team recognized that patients may be mid-series and would require completion of the series with a nonformulary vaccine. The team developed and provided appropriate education to clinic staff to help navigate this problem. This project demonstrates the importance of standardization, as the literature has shown enterprise standardization improves patient safety and patient satisfaction and also is an emerging practice for many large health systems. *Intervention Detail.* The first step in the project was analyzing purchase history and vaccine spend across the enterprise. There were 5 major vaccine categories identified as potential opportunities for standardization: pediatric vaccines, boosters, meningococcal conjugate, meningococcal B, and rotavirus. At baseline, Sanford Health standardized to contracted manufacturers at 82% in the pediatric vaccine group, 77% in the boosters group, 100% in the meningococcal conjugate group, 46% in the meningococcal B group, and 93% in the rotavirus group. After negotiating and executing the new contracts, the team operationalized the standardization work by optimizing the EMR build. The immunization committee and P&T committee approved the contracted vaccines as formulary vaccines. The team then optimized EMR build by building the formulary vaccines into order sets and care plans. Last, the team moved to standardize through education of providers, nursing staff, pharmacists, and clinic leaders. The team measured standardization progress through monthly purchase history, vaccine administration documented through the EMR, and patient safety reports. Further education was provided to specific clinics and providers, identified through these methods, to optimize standardization and improve outcomes. *Outcomes and Impact.* As of December 31, 2018, purchase history demonstrated the enterprise was standardized at 96.8% in the pediatric vaccine group, 99.2% in the boosters group, 100% in the meningococcal conjugate group, 85% in the meningococcal B group, and 99.6% in the rotavirus group. From

baseline data, this demonstrates a 14.8% increase in the pediatric vaccine group, a 22.2% improvement in the boosters group, no change in the meningococcal conjugate group, a 42% improvement in the meningococcal B group, and a 6.6% improvement in the rotavirus group. There were no medication safety events recorded pertaining to formulary vaccines. The team has projected an annual savings of \$600 000. These data demonstrate the impact and importance of enterprise standardization concerning patient safety, patient satisfaction, and financial opportunity.

Ethical Practices in Using Hospice to Reduce Hospital Mortality Metrics

Natalie McNeal, MBA, MHA, and Jason Lesandrini, HCE-C

WellStar Health System

Background. In 2016, nearly 30% of patients in hospice received services for 7 days or less. These late referrals are often the result of providers contacting hospice when patients exhibit signs of actively dying rather than early identification of patient needs. Health systems across the country are extremely focused on getting patients to the right setting, encompassing the belief that enrolling patients in hospice will provide a solution to mortality metrics—the central idea being that when a patient is transferred to a hospice service, whether inside or outside the hospital, the death of the patient will not count against the hospital. What is often forgotten during this practice is that hospice is about providing the best death for patient and family—not about removing the patient’s death from hospital statistics. These 2 ends appear to potentially conflict. We believe there are ethical ways to utilize hospice services within the walls of a hospital to provide optimal end-of-life care while also achieving a reduction in mortality, but only through proper implementation. This requires coordination with providers, physicians, and other care team members through a strategic approach to a planned continuum of care. Our health system created a unique opportunity to influence patients’ and families’ end-of-life experience, with a focus on ensuring that patients and families receive the benefits of hospice, while at the same time achieving significant hospital mortality improvement. *Intervention Detail.* Hospice, ethics, and palliative medicine teams were invited to participate in a system-wide mortality reduction workgroup. We reviewed the mortality definitions that affect our organization (Centers for Medicare & Medicaid Services and Truven) and determined first how moving a patient to hospice would reduce these statistics. Second, we reviewed mortality patient subsets to quantify diagnoses not served by

hospice at the time of death. We offer a robust hospice program with 2 inpatient units, and we found many patients were already appropriately utilizing hospice services. We identified several subgroups of patients or situations for which metrics could be improved with hospice services offered inside the hospital, including (1) patients who were too unstable to transfer via ambulance; (2) patients unable to transfer because no beds were available on our inpatient units; (3) terminal extubations; and (4) trauma patients without chronic illness. As a result, we decided to create an acute care hospice program inside our hospitals to serve these populations and other outlier situations. We contracted with each hospital, worked with hospital leaders to identify teams to train on hospice care, created a workflow for referral to discharge, identified physician champions, created hospice-specific training for hospital staff, and verified that metrics would reflect these interventions pulling directly from our electronic medical record. Our plan offered services throughout the hospitals, allowing for a patient to be enrolled in a hospice bed independent of their physical location in the hospital. Hospice team members also were invited to participate on mortality and quality improvement committees in each hospital offering in-house acute hospice care. Post-discharge case reviews occurred to determine inefficiencies and misunderstandings of the program, thereby creating continuous process improvement through program redesign and improved education to those providing direct acute hospice care. *Outcomes and Impact:*

- Revenue and cost savings: in a 12-month time frame, 48 additional deaths, or a 4% increase for acute care-level hospice admissions (1127 total), were removed from hospital mortality metrics related to acute hospice utilization; 123 additional billable days were generated on hospice general inpatient, for an additional revenue of \$93 000; overall length of stay was reduced by 123 days; and readmission and revocation of hospice rates were zero percent for these patients. All of this translates into cost savings for the hospitals, in addition to savings from discontinuation of aggressive treatment and the establishment of comfort care.
- Care continuum and bereavement care: with the development of this program, more of our families benefitted from a continuum of care that improves patient access to meaningful care at the end of life and provides families with access to bereavement services. Of the 48 patients and families, all received some form of bereavement services, which include: camps for surviving children, in-person support groups, memorial services, individualized counseling, routine contact through mail and phone, and other bereavement-related services. In particular, 9

(19%) families were connected with community-based bereavement groups and services and 5 (10.5%) of the families asked for and received intensive individualized counseling services.

- Customer satisfaction: customers (ie, hospital employees, families of patients, patients) all report high satisfaction levels regarding the additional layer of care they received. As customers have gained a better understanding of the services offered through hospice, we have seen referrals come in earlier to the units providing hospice care. Families report that they feel more at ease with their decision to pursue comfort care, and patients receive a higher level of palliation for symptoms with hospice interventions in place.

Utilizing Work Queues to Decrease Mortality Observed to Expected and Patient Safety Indicators

Jennifer Shrader, BSN, RN, Terry Kisner, RRT, LSSBB, and Amanda Young, BS, RRT

WVU Medicine

Background. Mortality rankings have a large impact on hospital quality measures. Providing accurate Patient Safety Indicator (PSI) data also heavily affects hospital quality measures. *Intervention Detail.* We identified coding opportunities in patients with a primary diagnosis of acute myocardial infarction, heart failure, or pneumonia. We collaborated with our clinical documentation improvement department, built work queues, implemented reviews for accurate coding of present comorbid conditions, and utilized the Vizient Clinical Data Base to measure and benchmark our PSI data. *Outcomes and Impact.* In reviewing 100% of mortalities, we were successful in reducing our overall mortality index score below 1.0. In addition, PSI occurrences were decreased by 50%. There was also a noticeable decline in coding and documentation errors.

Additional Power Huddle Abstracts

Digital Patient Engagement to Succeed in Bundled Payments

Mike Anderes, PT, MBA, FACHE; Froedtert & the Medical College of Wisconsin

Cleveland Clinic's Surgeon-Designed OR Supply and Equipment Evaluation Tool

Robert Molloy, MD; Cleveland Clinic

From Hub and Spoke to Hubs of Innovation

Frank Volpicelli, MD; Erwin Wang, MD, MHA; Sonia Arnold, MBA; NYU Langone Hospital—Brooklyn

EHR Implementation: Adverse Influence on AMC Efficiency

Henry Pitt, MD; Claire Raab, MD; Temple University Health System

No Pain, Much Gain: Tackling the Opioid Crisis in Gynecologic Oncology

Laura Leal, MSN, RN, CNL, RN-Quality Improvement; Haller J. Smith, MD; UAB Hospital

Herding Hydrocodone: The Prisma Health Data-Driven Approach to Reducing South Carolina's Opioid Burden

Doug Furmanek, PharmD; Kevin B. Walker, MD, FASA; Prisma Health

A Multidisciplinary Service Line Approach to Optimizing Neurology Patient Flow

Catherine Gargan, RN, CNRN, CCRN; Debra Roberts, MD, PhD; University of Rochester Medical Center

Make It Meaningful: Creating a Quality Dashboard Platform for Measurable Improvements

Oren Gottfried, MD; Wes Dickson, BSIE; Duke University Health System

More Than Words: How Storytelling Led to a Family Faculty Program and Patient Story Library

Caroline DeLongchamps, BS; Kelly D. Loyd, BA; The Medical University of South Carolina

MedStar Health's Approach to Translating System-Level Safety Science Interventions to Hospital Department Levels

Mary Herold, RN; MedStar Health; Yasmin Yusuf, MHA; MedStar Georgetown University Hospital

Augmenting Clinical Documentation Improvement Through Automated Detection of Diagnoses

Michael C. Gao, MD; Matthew Oberhardt, PhD; NewYork-Presbyterian Hospital

Right Sizing Robotic Repposable Instrument Inventory to Manage Spend

Brenda J. Kendall, MS, BSN, RN, CNOR; Alice Krumm, RN, BSN, MS, CNOR, NEA-BC; The Ohio State University Wexner Medical Center-James Cancer Hospital

Work Smarter, Not Harder: Leveraging the EMR and Data Analytics to Drive Antimicrobial Stewardship

Nick Bennett, PharmD, BCPS; Sarah Boyd, MD; Erin Johnson, MS, MBA; Saint Luke's Health System

The Never-Ending Story: Creating a Cycle of Appreciation

Bob Page, MBA; Tammy Peterman, MS, RN, NEA-BC, FAAN; The University of Kansas Health System

Eye in the Sky: Marrying Data With a Virtual Care Team

Erin Green, BSN, RN; Mario Scarpinato, BS, MHA; Michael Stadler, MD, FACS; Froedtert & the Medical College of Wisconsin

It Takes a Village to Coordinate Care and Engage Patients

Gaurav Jain, MD; Andy Clark, MSHA; University of Alabama Birmingham

Innovative Behavioral Emergencies: Patient Safety, Reduced Restraints, and Staff Injuries

Amy Heidenreich, MSN, RN, AGCNS-BC, APNP; Jessica Thomey, MSN, RN, NE-BC; Froedtert Hospital

Patient- and Family-Advisory Councils: Using Narrative, Process, and Outcome Data to Improve Readmission Rates

Helen Miyasaki; Jacqueline Baron-Lee, PhD; UF Health

Digital Therapeutics: Building a Robust Formulary for a New Class of Interventions

Erika Smith, PharmD, FACHE; Mike Anderes, PT, MBA, FACHE; Froedtert & the Medical College of Wisconsin

Utilizing Analytics and Dashboards to Drive Sustainable Value Improvement

Michelle Ulrich, BS; Katie Tobin, MPA; Christopher Petrilli, MD; Steve Chatfield, MBA; NYU Langone Health

Missionaries of the Margin: Partnering With Physicians in Financial Improvement

Timothy Tanke, MD; Andrea Werner, MSW; Bellin Health

Emergency Medicine: Optimize for Today, Prepare for Tomorrow

Tom Spiegel, MD, MBA, MS, FACEP, ED; University of Chicago Medicine; Marilyn Sherrill, MBA, CNOR, CPHQ; Vizient

Would You Be Surprised? The Use of a Simple Screening Question to Support Complex Decisions

Nicole Adler, MD; William Winfree, MHA; NYU Langone Health

Coordination of Care in the Justice-Involved Population

Judi Nightingale, DrPH, RN; Riverside University Health System

Biosimilar Adoption: One Size Doesn't Fit All

Molly Leber, PharmD, BCPS, FASHP; Marina Yazdi, PharmD, BCPS; Yale New Haven Health

A Novel Metric That Objectifies and Improves Performance: Medicine Efficiency Quality Index (MEQI)

Brian P. Bosworth, MD; Katherine Hochman, MD; NYU Langone Health

Patients Working in Partnership With Providers to Improve Communication

Kelly Bramson, MS-HCM, MBA-S; Chrissie Blackburn, MHA; University Hospitals Cleveland Medical Center

Fast Pass: Wait List Automation

Carly Pickford, BSc; Anana Reynolds, MHA; Penn Medicine

The Drive to 95: Improving Barcode Administration Rates During Medication Administration

Darlene Simas, MSN, RN; Hasbro Children's Hospital; Donald McKaig, RPh; Rhode Island Hospital/Hasbro Children's Hospital

Using Artificial Intelligence to Transform Self-Service Care Navigation

Kelly Stevenson, MBA; Froedtert & the Medical College of Wisconsin

Making a Difference in Our World: Local Effect, Global Impact

Monique R. Citro; University of Vermont Medical Center; Elizabeth McLellan, RN, MSN, MPH, DrPH (Hon); Partners for World Health

Positive Outcomes With 24/7 Entity-Owned Retail Pharmacy

Philip J. Almeter, PharmD; Stephanie S. Bethay, PharmD, MBA, BCPS; UK HealthCare

Hotels Do It by 11:00, So Can We!

Jeremiah Hargrave, MBA; Shanna Hall, MBA, BSN, RN, NEA-BC; Torrance Memorial Medical Center

Mayo Clinic's Journey Integrating Supply Classifications Into Clinical Workflow

Greg Worden, MBA; Erin Williams, MBA; Mayo Clinic

Temple Health Opioid Prescribing Stewardship

Jonathan Shinefeld, RN, MEd, CPHQ; Temple University Hospital; Matt Philp, MD, FACS, FASCRS; Temple University Health System

Additional Poster Presentation Abstracts**Multidisciplinary Clinical Review Board Reduces High-Cost Drug Write-Offs by >50%**

William Knechtle, MBA, MPH; Duke University Health System

Antimicrobial Stewardship Program-Guided Procalcitonin to Improve Diagnosis of Pneumonia

George D. Rodriguez, PharmD; Nathan Warren, PA-C; NewYork-Presbyterian Queens

Innovative Hand Hygiene Technology Drives Down Hospital-Associated Infections

Nancy Osborn, RN, CIC; The Medical Center Navicent Health

Improving Opioid Stewardship: Standardizing Provider Prescribing and Education for Storage and Disposal

Nathan Woody, CSSBB; UNC Health Care System

Something Out of Nothing: ED Capacity Safety and Profit

Patricia K. Howard, PhD, RN, CEN, CPEN, TCRN, NE-BC, FAEN, FAAN; Daniel Moore, MD, FACEP; Whitney Smith, MBA; UK HealthCare (University of Kentucky)

Discharge Before Noon: Sustained Strategy to Improve Capacity and Efficiency

Nicole Adler, MD, FACP, FHM; NYU Winthrop Hospital; Brian P. Bosworth, MD; Katherine A. Hochman, MD; NYU Langone Health

Our Journey to ERNI: Implementing a Volunteer Program to Reduce Delirium

Christine Cunningham, MPA, BSN, RN; Ryan Sullivan, MPH; Yael Zweig, NP; Ilseung Cho, MD, MSc; Maxine Simon, FACHE; NYU Langone Health

An Innovative Strategy for Providing Mental Health Care

Heidi Robinson, DNP, RN, CMSRN; John Wagner, RN, MA, BC; University of Iowa Hospitals and Clinics

Evaluation of a Nursing-Driven Electrolyte Replacement Protocol in Adult ICU/PCU

Sarah Lester, DNP, APRN, FNP-C, CCRN-K, CNRN, SCRN; UK HealthCare

Post-Acute Readmissions? Not With Your Nurse Practitioner in Charge!

Shelly Evans, BS; Jamie Redman, AGNP; Deaconess Health System

Tackling, Intercepting, and Holding Our Gains in Ventilator Associated Events

Sonya (Dee) Floyd, RN, BSN, CIC; Valerie Fox, RRT; The Medical Center Navicent Health

Oh Behave

Zach Johnson, MPA; University of New Mexico Medical Group

Utilizing Innovation and Technology to Enhance Intraoperative Communication With Families

James C. Miller, CRNA, MS, MBA; Lehigh Valley Health Network

Demonstrating Measurable Value With Coordinated Care

Adam Smith, MSHA; Erika Smith, PharmD, FACHE; Froedtert & the Medical College of Wisconsin

Opioid Prescriptions: Do ED Opioid Prescription Volumes Correlate With Overdose Presentations?

Samir Doshi, MD, MBA, CPHQ; Sarah James, BSN, RN; Sue Spiers, MBA, BS, CLS(ASCP); Saint Luke's Health Systems

Hospital Readmissions: Reduction Through Telemonitoring at Home Health Agency

Jessica Williams, BSN, RN; Prisma Health HomeCare

Go With the Flow: Tech-Enabled Patient Movement With University of California Irvine (UCI) Health

Luyen D. Nguyen, RN; Iman Othman, MSN, RN; UCI Health

Using Telehealth Text Messaging in Diabetes and High Blood Pressure Monitoring

Sheila Byers, BSN, RN; Beth Page, MSN, RN; SLUCare

Red Day Flag: A Visual Control That Reduces Hospital Length of Stay Index and Improves the Efficiency of Patient Care

LaKesha Fountain, MBA; UF Health Shands

Better Coordination Equals Better Care for Pediatric Radiation Oncology Patients

Ann Yager, MHA, BS, RT (R)(T); Nebraska Medicine

Matter of HEART: Implementing an APRN Led Chest-Pain Decision Unit

Amanda McMillon, MSN, APRN, AGCNS-BC; Sarah Thomas, MSN, APRN, AG-ACNP; Bernards Medical Center

Comparing Oncology Centers Is an Art Not a Science

Denise Morse, MBA; City of Hope