University of Colorado Anschutz Medical Campus

Department of Medicine: ***Quality and Patient Safety Program***

Annual Report 2016

Submitted to:
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Submitted by:
Quality and Patient Safety Program
Department of Medicine

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Summary

The Department of Medicine's (DOM) Quality and Safety Program (QSP) has developed, over 5 years an approach to provide a central vision for quality and safety, the leadership and visibility, and needed tools and resources to advance the vision. The QSP's approach is informed by the size, complexity, and diversity of the DOM's clinical enterprise and its faculty. This report summarizes the program's vision and the discrete activities that have contributed to progress toward programmatic goals.

The QSP vision takes at its central tenant that it is imperative to create an environment that supports safety and high reliability in our clinical enterprise, using the concept of the learning organization as described by Senge as its focus. To create that environment, we have designed activities that promote a shared vision, systems thinking, team learning, and shared mental models, while continuing to support personal mastery.

Central to this vision has been the development and deployment of robust forums for reviewing clinical care events as a springboard to learning and improvement. The primary example of this has been the reboot of our Morbidity and Mortality conferences, supported by a team of facilitators, a toolkit, and a case review process and staff (QI specialist), and improvement efforts.

Our improvement efforts are supported by a DOM analyst and QI specialist and have resulted in a variety of discrete projects owned by the QSP, the support of projects owned by other stakeholders, and the development of data dashboards organized by DOM service line to promote transparency toward these goals.

Ultimately a focus on systems learning and improvement is a culture change which is facilitated by providing a leadership, visibility, an ongoing communication strategy, and measurement of tangible progress. The QSP has promoted this vision with important evidence of impact in safety culture.

The mission and vision of the QSP are central to the DOM's success during a period of rapid change in health care, academic medicine, and expansive growth. To support the DOM faculty and patients in 2017 and beyond, the QSP envisions a focus on enhancing our case review capacity, sustaining the Shark Tank program, and growing the quality and safety symposium. Areas for future development are proposed.

Overview of the Department Quality Program

The Department of Medicine (DOM) Quality and Safety Program (QSP) was created in July 2011 to oversee quality and safety activities for the DOM. Heidi Wald, MD, MSPH serves as Vice Chair for Quality in the DOM and Michael Ho, MD, PhD serves as Associate Chair for Quality. They are supported by part-time Quality Data Analyst Homer Atanacio, part-time Clinical Data Analyst Lindsie Stephan, RN, BSN, MBA, and full-time Quality Improvement Clinical Specialist RN, Raven Astrom PhD, RN.

The DOM QSP advances the quality and safety of care delivered to our patients through integrated programs that engage DOM providers in quality improvement and patient safety activities; support DOM providers with skills, structures, and processes necessary to produce optimal outcomes for patients; and align quality improvement activities across the DOM to augment the impact of these activities, reduce redundancy, and strengthen the shared mission with University of Colorado Hospital (UCH).

The Mission of the QSP is to empower the DOM faculty and trainees to innovate, educate, and generate new knowledge in quality improvement and patient safety while providing the highest standard of care to our patients. To do so, we identify synergies and integrate QSP activities across the DOM; adding value to the academic medical enterprise. Our Tagline is: **"**Quality and Safety: The Heart of Medicine"

Our aims are to**:** 1) enhance the culture of safety in the Department of Medicine through transparency around identification, analysis, and feedback of adverse events, with follow up action items; and 2) increase faculty and trainee engagement in quality improvement through support of grass roots activities; department-wide projects; dashboards; and mentorship.

To promote these activites, the department has developed a public webpage which includes an M&M toolkit, links to Maintenance of Certification Resources, and links to monthly Quality and Safety Email Newsflashes. Our internal resources include a protected Sharepoint site which includes our de-identified M&M case database and task plan, our project charters, our dashboards in development, and our DOM quality inventory.

During the first several years of the QSP program, several key partnerships have been developed across the DOM. These include the University of Colorado Hospital (UCH), University Physicians (UPI), and the School of Medicine (SOM). Significant accomplishments of the Quality and Patient Safety Division are described in this report.

Overview of the Department of Medicine's Clinical Portfolio

Presently, the Department of Medicine includes 761 full-time faculty (DOM 7-year report, 2015), with providers based at the University (522), National Jewish Health (58), Denver Health (114), and the Veterans Administration Medical Center (67). In all, there are fifteen divisions within the DOM and there are 41 sites of practice in addition to the Anschutz Medical Campus. The Department of Medicine is a vast clinical enterprise that comprises 40% of the clinical revenue on the Anschutz Medical Campus. National rankings highlight prominence of the DOM clinical programs as presented below:

US News and World Reports 2016

- Pulmonary - #2
- Cancer - #16
- Nephrology - #18
- Diabetes and Endocrinology - #34

Departmental faculty are seen as leaders both regionally and nationally. Annually, departmental faculty are recognized as Top Docs through the 5280 Magazine poll. In addition, faculty hold major regional and national leadership roles such as specialty board memberships and society presidents.

DOM goals for the future include to continue to recruit and retain the best faculty in the country making workplace satisfaction an essential component. A combination of adequate compensation, learner exposure, time for scholarly activity, and a positive workplace environment are key. Further, the DOM will continue partner with colleagues at UCH to ensure an efficient, easy-to-use, and provider friendly system, essential in a period of exceptionally rapid expansion of the clinical enterprise. To do so, the DOM must be committed to the delivery of high-value care focusing on quality and safety with clinical operations. Moreover, the development of innovative programs, for example the Breathing/Lung Center to be fully built by 2017, will be greatly influenced by DOM faculty. Alignment and integration of research and education with an emphasis on clinical growth with learners and the expectation of all services offering robust curricula. Finally, to continue to coordinate care among affiliate institutions resulting in a collaborative approach to clinical care among trainees and faculty.

The Department of Medicine as a Learning Organization

The Quality Improvement and Patient Safety Program has embraced the concept of high reliability as a means of achieving our patient safety goals. We have adapted the work of Peter Senge who describes the domains necessary to become a learning organization as a means to achieve high reliability. Thus, the domains of our safety work and associated activities include: 1) shared vision, 2) systems thinking, 3) shared mental models, 4) team learning, and 5) personal mastery. Our activities in these domains are described below and are visually displayed in **Figure 1**.

Shared Vision

In order to promote a shared vision for the QIPS program, we believe that ongoing communication is essential for visibility and sustainment. To that end, the DOM program has developed a tag line "Quality and Safety, the Heart of Medicine" and has created several strategies aimed at increasing communication and visibility. Activities include events to raise awareness and engagement around safety and quality topics including our annual symposium and our visiting professorships. Central to creating a shared vision is the development of transparency around safety event monitoring and transparency. To that end, we have developed dashboards for our major inpatient services and we have a variety of mechanisms for ongoing event review. Each of these activities is discussed below.

Raising Awareness

DOM Shark Tank:

In spring 2016, the QSP division supported a program to invite learners to develop and present an innovative idea for a quality improvement project to be supported by the QSP team for the 2016-2017 academic year. Guidelines for the proposal included submitting a high value care-focused project which described the target audience, clinical context, process/workflow changes, provider/consumer education, performance measurement, etc. In 2012, the American Board of Internal Medicine launched *Choosing Wisely.* A campaign with a goal of advancing a national dialogue on avoiding wasteful or unnecessary medical tests, treatments and procedures. *Choosing Wisely* focuses on dialogs between providers and patients informed by the evidence-based medicine. Shark tank projects highlighting Choosing Wisely priorities were encouraged.

Several projects were submitted to the Shark Tank and were evaluated by a panel of judges who in turn chose five finalist groups. Each finalist was invited to present their idea to a different panel of judges for final selection. The five finalist teams were represented by Steven Bradley, MD – *Implementation of an extensible method to capture, report, and improve patient health status*; Cecilia Low Wang, MD – T*ransitioning from inpatient to outpatient diabetes care: evaluating the discharge process*; Isaac Hernandez, MD & Erin Bredenberg, MD (two projects combined) – *line placement appropriateness guide: reducing line placement*; and Paul Menard-Katcher, MD – *a novel outreach program to minimize inappropriate PPI use in the outpatient setting.* The line placement project was chosen as the finalist by the team of judges. The inappropriate PPI use

project was chosen as the runner-up project. Due to the exceptional presentations and the potential for successful outcomes, the QSP team is currently working to support both the finalist and runner-up projects. (Further details appear below).

DOM Quality Symposia and Visiting Professors

The DOM QSP program held a symposium in November of 2012 and again in November of 2015. In 2012, the keynote speaker, Patty Gabow, MD, MPH, presented the topic of "Achieving High Reliability Health Care through Quality Improvement and Patient Safety Efforts". Following the presentation were highlights of the DOM quality initiatives and the reviving of the M&M conference. The session concluded with a poster presentation and reception. The quality and safety symposium in fall of 2015, presented a distinguished panel of discussants leading the topic of "How Can Academic Medical Centers Achieve the Quality and Safety Mission?" Following the discussion there was a poster session and reception. More than twenty posters from area institutions and a variety of disciplines were presented on quality improvement in healthcare. (Click <Poster Summary> to view all of the posters.) The planned 2017 symposium for April 7, 2017 will have the topic of "Innovation in Healthcare Delivery"

The DOM QSP has periodically hosted visiting professors including Caroline Blaum, University of Michigan (2012), (Pioneer Accountable Care Organization, geriatric care models) Brent James, Intermountain Healthcare (high value care delivery and research) (2016) and Andrew Olsen, University of Minnesota (diagnostic error) (2016). The faculty and staff can gain access to the expertise of visiting professors through presentations such as grand rounds, small group discussions such as with the Clinical Leadership Council of the UCHealth and UPI practice leadership, and one on one meetings.

Communication – QSP Newsflash

Following the success of the M&M program described below, a monthly department *Newsflash* was developed to expedite the dissemination of new, updated and important information to the faculty of the DOM. Much of these updates were derived from action items as a result of the M&M conferences. To date, more than two dozen articles and updates have been distributed to DOM faculty and staff. The monthly Newsflash is archived on the DOM Website:

http://www.ucdenver.edu/academics/colleges/medicalschool/departments/medicine/FacultyStaffRes/ClinicRes/Pages/Quality--Safety-Newsflash-Archive.aspx

Examples of Newsflash items are presented in **Table 1**.

Table 1 Example of topics presented in the monthly QSP Newsflash.

Month	**Topic**
January 2015	The UCH Antimicrobial Stewardship Guidebook available
March 2015	Airborne Policy Update & New Rule-out TB order-set
June 2015	Stroke Alert
September 2015	Glucose Management Team

February 2016	Adult Code Blue Emergency Resuscitation
March 2016	Peer to Peer Support Network for Residents, Fellows, and Faculty

DOM Morbidity and Mortality in Grand Rounds

Our Morbidity and Mortality redesign is discussed in greater detail below. When the conference emerged as a successful model for engaging trainees, faculty and multidisciplinary team members, we brought it to the DOM Grand Rounds venue as a means to reach a larger audience. In so doing, we also chose to use the larger venue to engage with other departments in the school of medicine, successfully creating conversations for faculty, trainees around clinical care, and relationships between clinical leaders. To date, we have produced 11 of these conferences which continue to attract a packed auditorium and spirited discussion.

Monitor patient safety & transparency of safety data

The DOM Program monitors safety events reported to the University of Colorado Hospital by our faculty and staff, conducts safety event reviews in several venues, and provides summary reports on Morbidity and Mortality conferences. In addition, we have two major initiatives involving measurement and reporting. First, we monitor perceptions of patient safety culture among departmental faculty at UCH, and second, we produce and share quality dashboards for our major inpatient service lines. Each of these is discussed below.

Patient Safety Culture Survey

To determine a baseline for patient safety culture, monitor success of patient safety activities, and progress over time, DOM providers are periodically requested to complete the Agency for Healthcare Research and Quality's (AHRQ) *Surveys on Patient Safety Culture.* Originally surveyed in 2013 using a modified version of the AHRQ survey, providers were again asked to respond to the full survey in the winter of 2016 (hospital and medical office surveys).

Results, incorporating questions which were present in both surveys, are presented in **Table 2**. Overall, results indicate several areas of positive change with regard to patient safety culture, particularly around non-punitive response to error and feedback about responses to events. In contrast, opinions about hospital management did decline between the 2013 and 2016 surveys, indicating opportunities for continued work in this safety culture domain. Complete results available from the QPS team.

Table 2. Comparison of Selected Inpatient Patient Safety Culture Survey Items for 2013 and 2016

Survey Item	**% Agreement**	
	2013	**2016**
Perception – Patient Safety is never sacrificed to get more work done	36	45
Handoffs – Important patient care information is often lost during shift changes	63	43
Non-punitive response – Staff feel like their mistakes are held against		

them	41	10
Non-punitive response – Staff worry that mistakes they make are kept in their personnel file	40	20
Feedback – We are given feedback about changes put into place based on event reports	7	29
Management – The actions of hospital management show that patient safety is a top priority	54	47
Management – Hospital management seems interested in patient safety only after an adverse event happens	66	36

Development of QIPS dashboards by inpatient service line

The Quality Department provides inpatient dashboards across the quality domains of efficiency, effectiveness, and safety (domains of quality described by the Institute of Medicine). Measures include mortality, length of stay, and readmissions for several inpatient services. To date, the services with completed dashboards include Bone Marrow Transplant, Pulmonary, Hepatology, Cardiac Heart Failure, Hospitalist, Neuro-hospitalist, and General Cardiology. A sample dashboard appears in **Appendix 1**. The DOM's "roll up" dashboard summarizing performance of all available services is presented in **Appendix 2**. Each dashboard enables the user to explore monthly data down to a particular individual case. Having reliable data for each variable allows us to evaluate factors contributing to patient issues which in turn provides the department with useful information to improve key elements that are potential contributors. Patient safety events such as mortality, readmissions, and hospital acquired conditions form the majority of the metrics reported.

We have summarized important insights from the DOM Dashboards below:

Areas of strength:

- Observed inpatient mortality index is well below expected for HF, HMG (includes oncology and ACE), Hepatology, and BMT services, is comparable to expected for Cardiology and MICU.
- Inpatient length of stay is well below expected for Cardiology, HMG (includes oncology and ACE), hepatology, and BMT services
- Low rates of events (AHRQ PSIs) for: Falls, Pressure ulcers, Bloodstream infections, iatrogenic pneumothorax

Areas of opportunity

- Readmission rates vary widely across service lines. While this may be an entirely appropriate variation based on patient population, service specific benchmarks are not readily available and the variation may represent an opportunity for improvement.
- Hospital-acquired *C Difficile* infection is a concern on our BMT, MICU, and hospitalist services (including oncology and ACE) and represents a potential area for focused attention in conjunction with the hospital's infection prevention and antimicrobial stewardship programs. Post-procedure complications may be another area for further study.
- Post-procedure complications are an safety concern area that merits further investigation

Systems Thinking

Systems thinking encompasses the concept that outcomes are rarely the result of one individual's action, but the collective interplay of an interconnected system of people working in a system. This type of system is referred to as a complex adaptive system that has characteristics similar to a living organism. Key to systems thinking is the understanding that smart individuals alone cannot create safety, but that the collective intelligence of the system of care delivery is central to safe care.

Morbidity and Mortality Conference Redesign

A cornerstone of the QSP has been the development, implementation, and dissemination of a systems and improvement model for Morbidity and Mortality (M&M) conferences across the clinical divisions of the DOM. Traditional M&M conferences are a time-honored event that sits at the intersection of education, quality improvement, and peer review in academic departments. Historically, M&M conferences fall in one of two extremes; 1) conferences highlighting diagnostic uncertainty or complex management challenges, or 2) conferences that focused on individual failures in technical skill, medical knowledge or clinical decision making. Increased awareness of the complex relationship between systems issues, cognitive factors, and patient safety has prompted refocusing of our M&M efforts. Thus, our redesigned M&M highlights the relationship between patient harm, cognitive error, and systems of care. In addition, to maintain the educational purpose of the conference, we designed the M&M to provide a year-long curriculum on key components of quality and patient safety. The redesigned M and M is supported by a toolkit of materials available at: http://www.ucdenver.edu/academics/colleges/medicalschool/departments/medicine/FacultyStaffRes/ClinicRes/Pages/Quality-and-Safety.aspx

Our approach was initially implemented in the hospital medicine/residency M&M and incorporated 5 best practices selected from the medical literature: 1) multidisciplinary attendance, 2) standardized case identification, 3) standardized case analysis (e.g. Fishbone diagram), 4) development of QI projects, and 5) reporting and feedback to appropriate stakeholders. This approach has been incorporated by other departments in the School of Medicine and is featured in DOM Grand Rounds 4 times a year as an opportunity for exposure and for collaboration with other academic departments and has been published in *Academic Medicine*. (Tad-y, et al 2016)

In 2015, there were fifteen DOM M&M conference series. **Table 3** shows the results of an annual inventory of M & M conferences as well as the percentage of those conferences meeting each of the identified best practices. Our annual inventory allows us to monitor the number of M & M activities which can fluctuate with changes in faculty champions at the Division level and the general trends regarding increased use of the best practices over time.

Table 3. DOM M&M Inventory of Conferences and Best Practices

Best Practice	**Summer 2012 (n=14)**	**Summer 2013 (n=16)**	**Fall 2014 (n=17)**	**Fall 2015 (n=15)**
Interdisciplinary	57 %	75%	76%	73%
Standardized case finding	29%	50%	65%	55%
Standardized analysis	28%	64%	65%	73%
Leads to QI Projects	57%	80%	71%	91%
Use of reporting form	14%	58%	47%	73%

Appendix 3 summarizes Year 2015 topics and a snapshot of the actions items from our primary M and M activity with the residency focused on the inpatient general medicine services.

Since the redesign of the M&M format in 2012 there have been additional divisions of the Department of Medicine which have adopted the new model as a means for education and systems improvement.

Continuous Improvement

The QSP is supports systems improvements based on findings in Morbidity and Mortality conferences and on recommendations from faculty and staff either as the primary owner of a project, or a key participant or stakeholder, depending on the best strategy to effect change. Several examples of this work are described below. This by no means describes all or even most of the QI work in the DOM, or even all of the projects in which the QSP team is involved, rather we have highlighted only selected projects run by the QSP team.

Admission Guidance

The process of admissions from the Emergency Department (ED) to various inpatient medical units and physician services, is incredibly complex because of the number of medicine services. Therefore, an interdisciplinary team developed guidelines to support a safe and efficient process for patient flow from the ED to inpatient units. The Admission Guidance is intended to guide the decision-making process for hospital admission of the acute care patient and is updated quarterly. Click the link below to view the document.

http://www.ucdenver.edu/academics/colleges/medicalschool/departments/medicine/FacultyStaffRes/ClinicRes/Documents/Newsflash/June%202016/Admission%20Guidance%20V12_6-16-16HWRA.pdf

Level of Care Guidance

The Level of Care Guidance was created as a tool to assist in determining level of care necessary for patient admissions without restricting criteria. Level of care criteria are used as a means of promoting collaborative discussion between admitting unit's charge nurse, the admitting primary service, and the ED or transferring unit's charge nurse and provider. An interdisciplinary project which began in mid-2014, the guidance is drawn from preexisting hospital policies informed by content matter expert opinion and presently resides in EPIC for both RNs and providers. Click the link below to view the document.

https://mysom.ucdenver.edu/sites/dom/QIPSNewsflash/Shared%20Documents/December%202015/UCH%20Level%20of%20Care%20Considerations.pdf?Web=1

Respiratory isolation to exclude active tuberculosis (R/O TB) protocol

The number of patients admitted to UCH for R/O TB has increased as the demographics of the surrounding community have changed. The process to assess a patient for active TB is inefficient, time consuming, and costly. Further, delays impact patient care and outcomes. An interdisciplinary committee was convened in April 2014 following an M and M highlighting this issue. A process map of the current state identified 5 areas of opportunity with a primary goal of streamlining isolation hours. A rule/out TB order-set was developed which optimized provider ordering, RN/RT prioritization of sputum samples, and micro lab communication specific to insufficient samples. The new process was presented to the RN education committee, providers and RT in February 2015. In March 2015, this project was implemented. Preliminary data analysis indicated a significant decrease in isolation hours of more than 38% from year 2014 to the same time period in 2015. **Table 4** presents both pre and post implementation data. **Figure 2** shows the pre-implementation process map and identified areas for improvement.

Table 7 Comparison of Isolation Hours for 2014 and 2015

	2014	**2015**	**Difference**	***p* value**
Patients (n)	33	45	12	
Hours/Patient	87.6	54	-33.6	< 0.01

Shark Tank Winner 2016 – Appropriate use of PICC lines

The goal of the project is to ensure appropriate central line use within the University of Colorado Hospital, ultimately to reduce CLABSI rate and central line associated VTE relative to peer institutions. The team has focused on appropriate use of multi lumen PICC lines as higher risk for CLABSI and VTE compared to Midlines and single lumen PICC lines. The team has chosen to use education plus an EHR forcing function to help providers select the safer line when possible and only use the multi lumen PICCs when indicated. Their goal is to decrease inappropriate PICC lines placed by 25% by June, 2017.

Allergy and Immunology - Antibiotic Stewardship Project

Due to a high number of reported "soft" penicillin allergies, patients are frequently given clindamycin and other broad spectrum antibiotics when in fact a cephalosporin would be appropriate in the majority of "soft" penicillin allergy cases. The majority of patients stating they have a penicillin allergy are actually not allergic. Approximately 1/10 of those who state they have an allergy actually have an IgE mediated reaction. The use of broad spectrum antibiotics for soft penicillin allergies negatively affect antimicrobial resistance and may lead to more serious complications[2,3]. An interdisciplinary team chartered a project to work with the surgical and anesthesiology joint team to create a standardized process where patients with a soft penicillin allergy history would be given cephalosporins prior to surgery. This process will involve changes in the EPIC system to create a process flow that does not hinder provider ordering of antibiotics. In addition, a process is being developed to

obtain testing for patients, following their surgical recovery, in order to remove their penicillin allergy history from their medical record if they are not PCN allergic. Initial results from data collection suggest that nearly 1/3 of patients prior to surgery list a soft penicillin allergy. Goals are to improve patient care and decrease the use of broad spectrum antibiotics for soft penicillin allergies, resulting in a decreased risk of side effects from toxic antibiotics and decreased costs to consumers and hospitals. Initial broad spectrum antibiotic use for patients with penicillin allergies is presented in figure 3.

Shared Mental Models

Just Culture

In addition to promoting systems thinking, our case review processes have also provided an opportunity to share the Just Culture model of peer review which attempts to balance individual and systems accountability. Thus, the fundamental question in the evaluation of a provider error is not "who did something wrong" but "would another practitioner with the same training practicing in the same context have reasonably made the same decision?" By using this approach, we avoid reflexive blame and train which pushes error reporting underground and encourage a supportive stance that encourages providers to bring cases forward. This just culture model is used in M and M and all collaborative case review processes. The algorithm is derived from by Reason et al. and was approved by CHCO and UCH with input from the departments of Pediatrics, Internal Medicine, and Emergency Medicine. It was subsequently formally adopted by the Quality and Professional Peer Review Committee of the UCH Medical Staff.

http://www.ucdenver.edu/academics/colleges/medicalschool/departments/medicine/FacultyStaffRes/ClinicRes/PublishingImages/Safety%20Culture%20Algorithm.JPG

Team Training – CREW & Team STEPPS

The DOM strongly supports efforts to improve and teach communications skills as a critical tool in promoting patient safety and quality care. The Clinical Leadership Council of UCH supports team training such as Crew Resource Management Training (CRMT) for all proceduralists within 6 months of hire. To achieve this, the DOM has been able to make use of University of Colorado Hospital resources for CRMT team training for procedure-based specialties. An aspirational goal would be the rollout of team training for non-proceduralists, such as AHRQ's TeamSTEPPS curriculum for hospitals and ambulatory settings, partnering with the health system in such an effort.

Crew Resource Management Training

As a multi-disciplinary approach to procedural care, top leadership engagement and support are key. Crew resource management training formally began with the National Transportation Safety Board as a way to

develop teamwork in procedural areas. CRMT training encompasses a wide range of knowledge, skills, and attitudes including communications, situational awareness, problem solving, decision making, and teamwork, with the goals of reducing communication barriers, streamline inefficiencies, improve patient safety and patient outcomes.

In the summer of 2014 the entire GI lab closed to accommodate CRMT training for all faculty and staff. Subsequently, the DOM encouraged the Cardiovascular Center to ensure compliance with the policy. In the late summer and fall 2015, the Cardiac Cath Lab (CCL) and Cardiac EP (CEP) attendees and nurses, received a full-day CRMT training session. Results from each department suggest a strong briefing process – each team discusses (briefs) the procedure prior to beginning the process to decrease the likelihood of potential problems or errors. The debriefing process, following each procedure, has been impacted by the CREW training for CEP and CCL. While results have shown (see table 6) overall improvement in the debrief process, there is still room for additional learning.

Table 6. CREW Implementation Results of the Brief and Debrief Process from Cardiology. Number if briefs corresponds to the number of procedures.

Department/Year	Briefings	%Briefed	Debriefings	% Debriefed
CEP				
2014	600	100%	568	94%
2015	1272	100%	1209	95%
2016	649	99%	628	96%
CCL				
2014	1172	99%	822	70%
2015	2821	99%	2191	77%
2016	1484	100%	1386	93%

Team Learning

Collaborative Safety Event Review:

To meet the need for event review, the DOM QSP supports several Safety Event Review Processes in addition to the periodic Morbidity and Mortality Conferences: Hospital Medicine Collaborative Case Review (monthly), Ambulatory Care Collaborative Case Review (quarterly), and MICU Case Review (monthly). These meetings include members from the QSP team, risk management, the director of quality, safety, and experience, relevant faculty, and nursing. Cases are referred from multiple sources including incident reports to the hospital system, outside referrals (other departments such as the ED), UCH risk management, and self-referrals. Our QI RN keeps a repository of all cases. These are reviewed, and if requiring in depth review, they are set up for the appropriate venue.

The QSP division has strengthened relationships with UCH Risk Management and Clinical Effectiveness and Patient Safety by increasing cross-talk, reporting, and collaborative initiatives. Partnering with several

stakeholders in the DOM and other Departments, the DOM developed and championed new procedures for case review incorporating the principles of just culture. This approach is embedded in our case review form which was approved by the DOM, EM, and Risk Management, as well as Children's Hospital.

The incorporation of just culture principles is central to our case review. The framework for a just culture ensures balanced accountability for both individuals and the organization responsible for designing and improving systems in the workplace. Dissemination of these principles is slow and usually requires individual faculty attending one or more case review sessions to understand how just culture is used.

While we are proud of our work in supporting case review, our goal is to expand capacity so that we can use standard triggers (unexpected deaths, 7-day readmissions, unplanned escalations of care) to identify cases for review.

Personal Mastery

Maintenance of Certification and Maintenance of Licensure

All providers in the DOM must maintain privileges at the University of Colorado Hospital and are expected to Maintain their Medical License and Board Certification. Between 2011 and 2013, the first 2 years of the program, the American Board of Internal Medicine instituted new requirements for Maintenance of Board Certification that required a variety of performance improvement activities. The DOM was a strong and early supporter of the School of Medicine's MOC portfolio approval process that allowed for participation in a local QI project to count for the MOC requirement. While this opportunity still exists, the ABIM's program is currently on hold and thus the DOM's participation is minimal until the requirements are clarified.

As we assume a level of personal mastery to maintain privileges at UCH, we are committed to working with the UCH Medical Staff Office and the UC School of Medicine (SOM) Office of Professionalism to complete any required Focused Professional Performance Evaluation (FPPE) in the event of personal medical knowledge, medical decision making or professionalism issues, should they arise. In addition, regulatory compliance with Ongoing Professional Performance Evaluation (OPPE). Essential collaboration with Medical Staff Office and UPI to define and operationalize new electronic workflow for OPPE, with engagement of physician leaders from each division to review measures, selecting when possible those directly pulled from EPIC; establishing reliable workflows for those not in EPIC.

Planning for the Future

Five years in, the DOM Quality and Safety Program has advanced its goals of creating a learning organization to promote safe and high quality care for patients and in support of its faculty, staff, and trainees. In this section, we note several trends at University of Colorado Hospital and UCHealth followed by an outline our plans for 2017 and beyond:

1. Population health – the focus of health care activities is increasingly shifting to the ambulatory and community setting, focusing on managing the health of populations. As UCHealth and UPI advance population health activities, the DOM will want active participation in efforts to achieve quality and safety of our patients.
2. Health system expansion – the University of Colorado Health System is aggressively growing its hospital locations and ambulatory practices in the Denver metro area and on the Front Range. These expansions will result in the growth of the DOM full time and affiliate faculty and will impact referral and communication patterns. The DOM will want to consider how to continue and grow the safety and quality program in the face of this expansion.
3. Quality and safety infrastructure at the Anschutz Medical Campus – The environment for quality and safety activities at the Anschutz Medical Campus has changed markedly over the last 5 years with the development of expanded activities by the University of Colorado Hospital, UCHealth, and UPI. These activities including the development of a robust training institute, a commitment to expanded data resources, a structure for leadership accountability for quality will impact the focus of the DOM Quality and Safety Program.
4. Data analytics—the local environment for data analytics is rapidly changing with the development of an enterprise data warehouse and a research program in data analytics. While this has not yet impacted the day to day operations of the Health System, we anticipate that analytics will provide enhanced ability to analyze clinical data closer to real time.

In 2017, the DOM Quality and Safety program will advance the DOM's mission through a focus on:

1. *Patient Safety*: The DOM QSP has a demonstrated strength in patient safety supporting engagement with the goal of identifying and rectifying deficits in patient care; the program will continue to focus on this strength. **Our top priority will be increasing our capacity for case review, triggered by selected indicators such as inpatient mortality.** Given our substantial success with the M & M model, and collaborative case review models, we will continue to promote these activities, build upon them and further disseminate this model in the Department, focusing on bringing these methodologies to Divisions that continue to struggle with them. We will provide mentorship and feedback to divisional M & M leaders, share tools (toolkit, database, workflow), assist with action item completion where appropriate. Additional safety activities will include periodic measurement of safety culture, ongoing review of safety event outliers, and expansion of CREW resource management for our proceduralists.

2. *Healthcare Quality and Data Transparency*: To be an effective steward of departmental resources, the DOM QSP will focus on **growing and sustaining focused QI efforts such the DOM Shark Tank program**. This highly visible and successful event allowed the DOM to focus resources on one priority, and move it forward. As a result, in its first year, we anticipate discrete improvements in PICC line use and complications within the year. Our goal will be to sustain these gains, gain visibility for the faculty and housestaff efforts, and select a new priority for the next academic year. A secondary focus will be QI work stemming from Morbidity and Mortality conferences. To promote a culture of safety and reporting, it is imperative to demonstrate improvements stemming from M and M reviews. Finally, we will continue to provide data support including our inpatient service dashboards. To have continued success, we will ensure that these efforts are synergistic with those of University of Colorado Hospital. Further, we will assist with ad hoc data requests to support the use of the most valid data and identify appropriate measures and benchmarks.

3. *QI Leadership:* The DOM program will continue to provide strong leadership for our faculty and trainees in several realms. First, the program will support efforts to promote our shared vision via flagship events such as our **annual symposium and poster session.** In 2015 our symposium attracted 75 attendees and 30 posters. There is a great opportunity to grow this activity. Next, the vice chair and associate chair will represent the department regarding quality and safety to the SOM, the Physician Practice, the training programs, and the University of Colorado Hospital. Finally, the chair and associate chair have extensive QI and implementation research work and are poised to develop mentorship to clinical and research faculty in for developing sustainable careers in quality and safety for faculty.

4. *Areas for future growth:* The clinical enterprise has a notable gap in the concerted approach to patient safety. QSP aims to expand activities by developing our diagnostic error program in liaison with the burgeoning campus initiative, developing an approach for highlighting and supporting healthcare resilience. In addition, the SOM need to foster the career development of leaders in clinical care and innovation. The QSP aims to develop a mentorship program for trainees and junior faculty interested in these areas. Attention to these areas will place the DOM as a leader on the campus, the region, and the nation in patient safety activities.

References:

1. Tad-y D, Kneeland P, Pell J, Pierce R, Stephan, L, **Wald HL**. Leveraging a Systems-Based M&M to Interweave Clinical and Educational Safety Missions. *Acad Med.* 2016 Mar 15. Epub ahead of print.
2. Picard, et al., 2013. (I'll get complete references for 2 and 3)
3. Pichichero and Zuqursky, 2014.

Figures

Figure 1 Senge's Learning Organization Adapted to Achieve High Reliability in the Department of Medicine

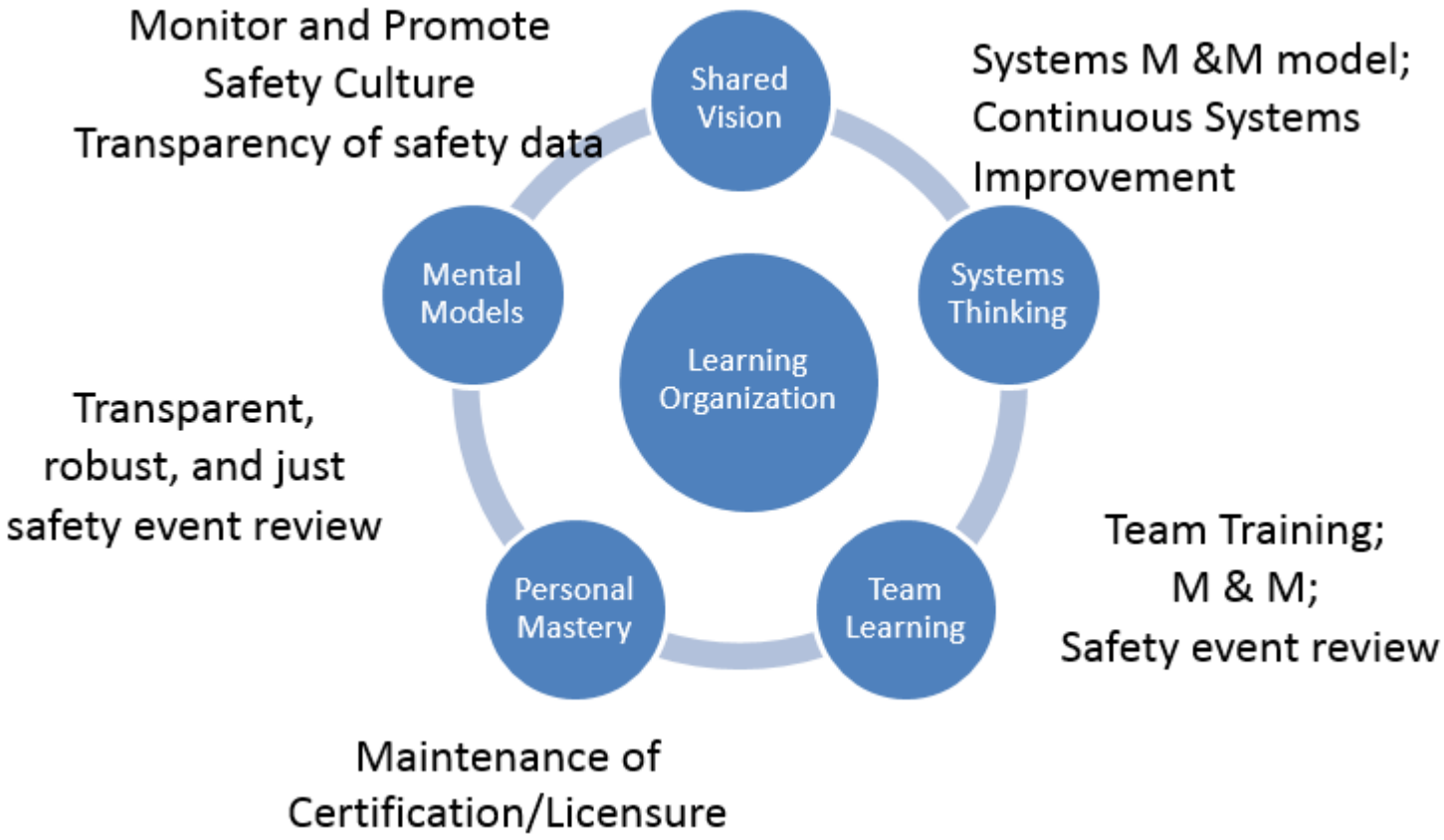
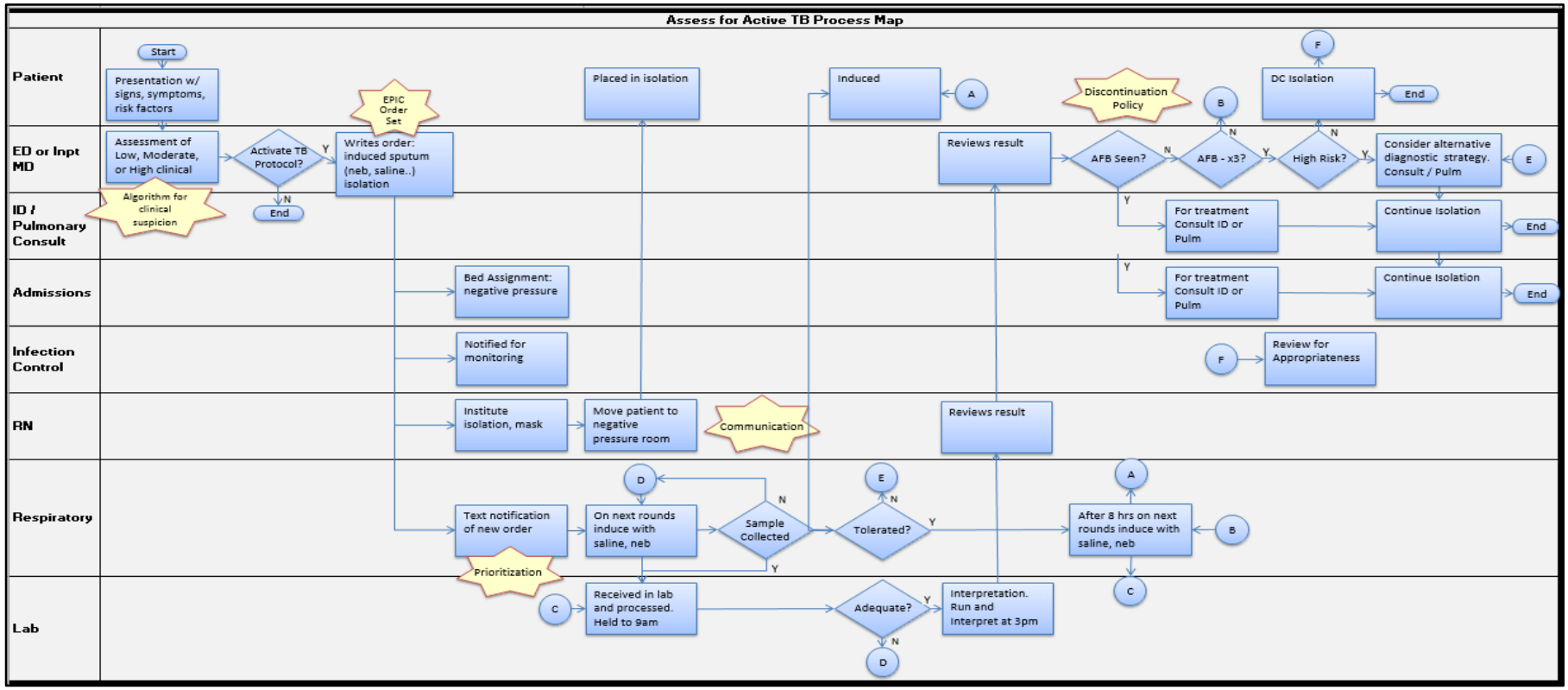


Figure 2 Rule out TB Process Map prior to improvement project



Appendices

Appendix 1 Sample DOM Inpatient Service Dashboard

DOM Quarterly Dashboard https://mysom.ucdenver.edu/sites/dom/qips/Shared%20Documents/Quarterly%20Dashboard/DOM%20Quarterly%20Patient%20Safety%20and%20Quality%20Dashboard%20CY%202015_Q1-Q3%202016.xlsx?Web=1

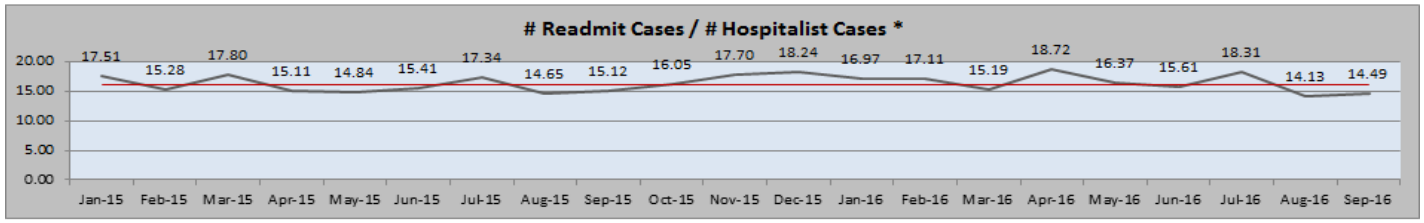
Department of Medicine Patient Safety and Quality
Quarterly Dashboard - CY 2015 & Q1 - Q3 2016

	Advanced Heart Failure							General Cardiology							BMT							Hospitalist						
	15 Q1	15 Q2	15 Q3	15 Q4	16 Q1	16 Q2	16 Q3	15 Q1	15 Q2	15 Q3	15 Q4	16 Q1	16 Q2	16 Q3	15 Q1	15 Q2	15 Q3	15 Q4	16 Q1	16 Q2	16 Q3	15 Q1	15 Q2	15 Q3	15 Q4	16 Q1	16 Q2	16 Q3
Mortality																												
Inpatient Mortality Index (observed / expected)	0.63	0.46	0.56	0.69	0.90	0.48	0.44	1.12	1.02	0.83	1.08	1.34	0.52	0.88	0.42	0.24	0.58	0.42	0.24	0.33	0.33	0.26	0.22	0.21	0.19	0.27	0.38	0.28
Effectiveness	Median = 21.62							Median = 9.89							Median = 21.88							Median = 16.05						
30-Day Readmission Rate (%)	15.38	19.81	23.33	21.55	26.15	25.93	24.26	14.29	10.80	12.29	13.54	8.94	11.06	8.00	21.09	21.78	28.13	26.48	17.95	23.39	24.22	16.81	15.41	16.27	17.67	16.60	16.88	15.90
Case Mix Index (CMI)	1.91	1.73	2.14	1.80	2.71	1.92	2.05	1.96	1.98	2.01	2.05	1.91	2.24	2.11	2.93	3.06	2.90	3.26	3.24	3.16	3.12	1.41	1.38	1.39	1.55	1.47	1.46	1.49
Efficiency																												
Inpatient Length of Stay Index	1.16	1.20	1.17	1.18	1.25	0.90	1.01	0.86	0.82	0.78	0.76	0.81	0.81	0.78	0.93	0.82	0.88	1.04	0.93	0.89	1.00	0.85	0.90	0.85	0.86	0.88	0.84	0.86
Inpatient Direct Cost Index (observed / expected)	1.44	1.33	1.32	1.16	1.28	1.07	1.16	1.14	1.14	1.20	1.23	1.31	1.21	1.32	1.20	1.09	1.38	1.47	1.37	1.24	1.47	0.82	0.83	0.79	0.78	0.77	0.77	0.80
Safety (Complication Numerator)	Convert to Rate per 1000 cases																											
Hospital acquired c-diff enteritis	-	-	-	-	3	-	-	1	-	-	-	2	-	1	8	1	3	9	6	5	5	9	6	7	6	9	10	4
Falls and trauma	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	-	1	-	-	-	-	-	-	-	-	1
Manifestations of poor glycemic control	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	
Pressure ulcer-prior and/or decubitus ulcer	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	2	2	-	1
Iatrogenic pneumothorax	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-
CVC bloodstream infections-prior and/or infection due to medical care	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-
Perioperative hemorrhage or hematoma	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-	-
Postop respiratory failure	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-	1	-	-	-
Perioperative PE or DVT	-	-	-	1	-	-	1	1	-	-	1	-	1	1	-	-	-	-	1	-	3	2	-	-	2	2	3	2

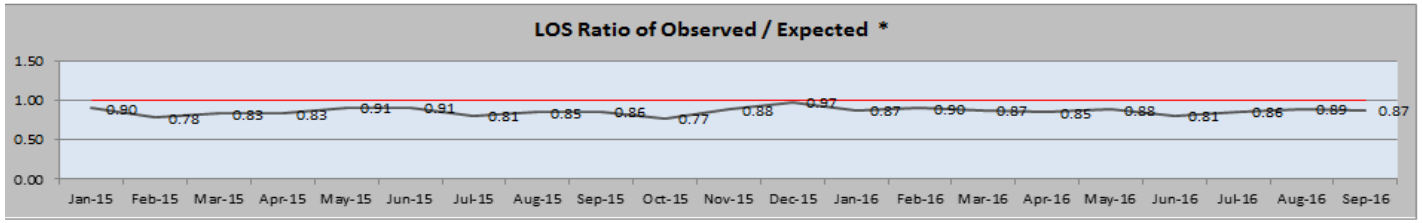
Appendix 2 DOM Monthly Dashboard https://mysom.ucdenver.edu/sites/dom/qips/Shared%20Documents/Dashboard%20Custom%20List/Hospitalist%20dashboard_custmlist_byDc.xlsx?Web=1

Hospitalist: 30 day Readmission, LOS, and Mortality
January 2015 to September 2016

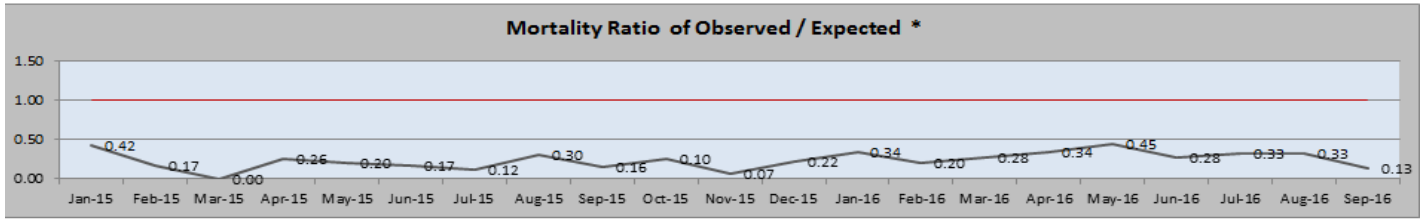
* Definitions | Inpatient Direct Cost | CMI | Patient Safety



Month and year	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
% 30 Day Readmit	17.51	15.28	17.80	15.11	14.84	15.41	17.34	14.65	15.12	16.05	17.70	18.24	16.97	17.11	15.19	18.72	16.37	15.61	18.31	14.13	14.49
Median	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05	16.05
# of 30 Day Readmit Cases	100	81	68	79	76	96	95	75	75	83	80	81	83	84	79	114	102	81	102	79	60
# of Hospitalist Cases	581	533	382	528	516	627	550	518	499	522	453	448	508	494	526	615	633	529	576	585	426



Month and year	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
LOS: Obs / Exp	0.90	0.78	0.83	0.83	0.91	0.91	0.81	0.85	0.86	0.77	0.88	0.97	0.87	0.90	0.87	0.85	0.88	0.81	0.86	0.89	0.87
Mean LOS (Obs)	5.17	4.25	4.62	4.45	4.93	5.43	4.51	4.98	4.86	4.65	5.08	5.67	4.95	5.21	5.25	4.76	5.24	4.97	5.24	5.08	5.40
Mean LOS (Exp)	5.77	5.41	5.57	5.33	5.40	5.96	5.55	5.85	5.66	6.03	5.80	5.84	5.67	5.78	6.01	5.60	5.96	6.10	6.11	5.73	6.18
# of Hospitalist Cases	581	533	382	528	516	626	550	518	499	522	453	448	508	494	526	615	633	529	576	585	426



Month and year	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16
Mortality Obs / Exp	0.42	0.17	0.00	0.26	0.20	0.17	0.12	0.30	0.16	0.26	0.07	0.22	0.34	0.20	0.28	0.34	0.45	0.28	0.33	0.33	0.13
% Death (Obs)	1.72	0.56	0.00	0.95	0.78	0.64	0.36	1.16	0.60	0.96	0.22	0.89	1.18	0.61	1.14	0.98	1.58	0.95	1.22	1.20	0.47
% Death (Exp)	4.13	3.35	3.59	3.68	3.90	3.80	3.01	3.84	3.81	3.68	3.26	3.98	3.52	3.09	4.14	2.91	3.52	3.32	3.69	3.65	3.63
# of Deaths	10	3	0	5	4	4	2	6	3	5	1	4	6	3	6	6	10	5	7	7	2
# of Hospitalist Cases	581	533	382	528	516	626	550	518	499	522	453	448	508	494	526	615	633	529	576	585	426

Appendix 3 2015 M & M Topics and Action Items

Month	Topic	Action Items
January	Hypoglycemic Seizure	Standardize communication tool for providers to use when receiving handoffs on a patient from an OSH
February	Electrolyte Repletion	Update electrolyte repletion protocol
March	Communication/delay in treatment	Create a process map for the admission process to determine key areas for improvement
April	Narcotic Management	MET protocol was presented and distributed in a Newsflash
May	Stroke Alert	Work with Neuro to develop education for residents related to Stroke Alert
June	Rhabdo/Statin Use	Clarify with Interpreter Services workflow and disseminate through a Newsflash
July	Unexpected death after thoracentesis	Ultrasound guidance training
August	Insulin Pump/Iatrogenic DKA	Newsflash about GMT/DM Education
September	Delay in diagnosis of pneumoperitoneum	Update and roll out the DOM Admission Guidance
October	Factitious disorder	No action items
November	Unexpected death of oncology patient	Share the Level of Care Document. Placed in EPIC for both providers and staff. Newsflash disseminated.
December	Outpatient delay in diagnosis of cerebellar hematoma	Create a triage algorithm for MHC similar to the one that currently exists for phone triage.