



Acting Internship Quality Improvement Curriculum

Tyler Anstett, DO, Samuel C. Porter, MD, Adam Trosterman, MD
University of Colorado School of Medicine

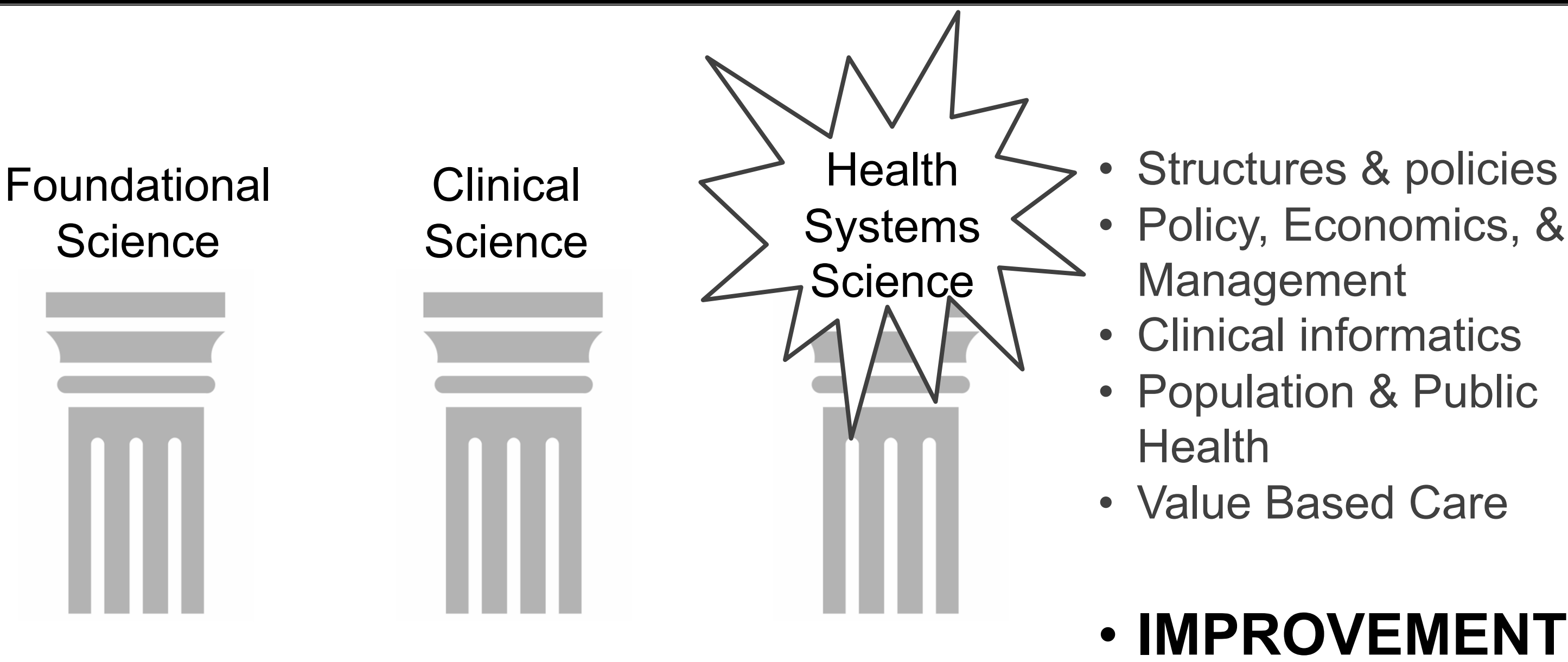


Division of Hospital Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

LEARNING POINTS

- Health system improvement efforts and educational curricula can be integrated and complementary
- QI learning is not impacted by discontinuous project involvement

BACKGROUND



EPA 13

Identify system failures and contribute to a culture of safety and improvement.

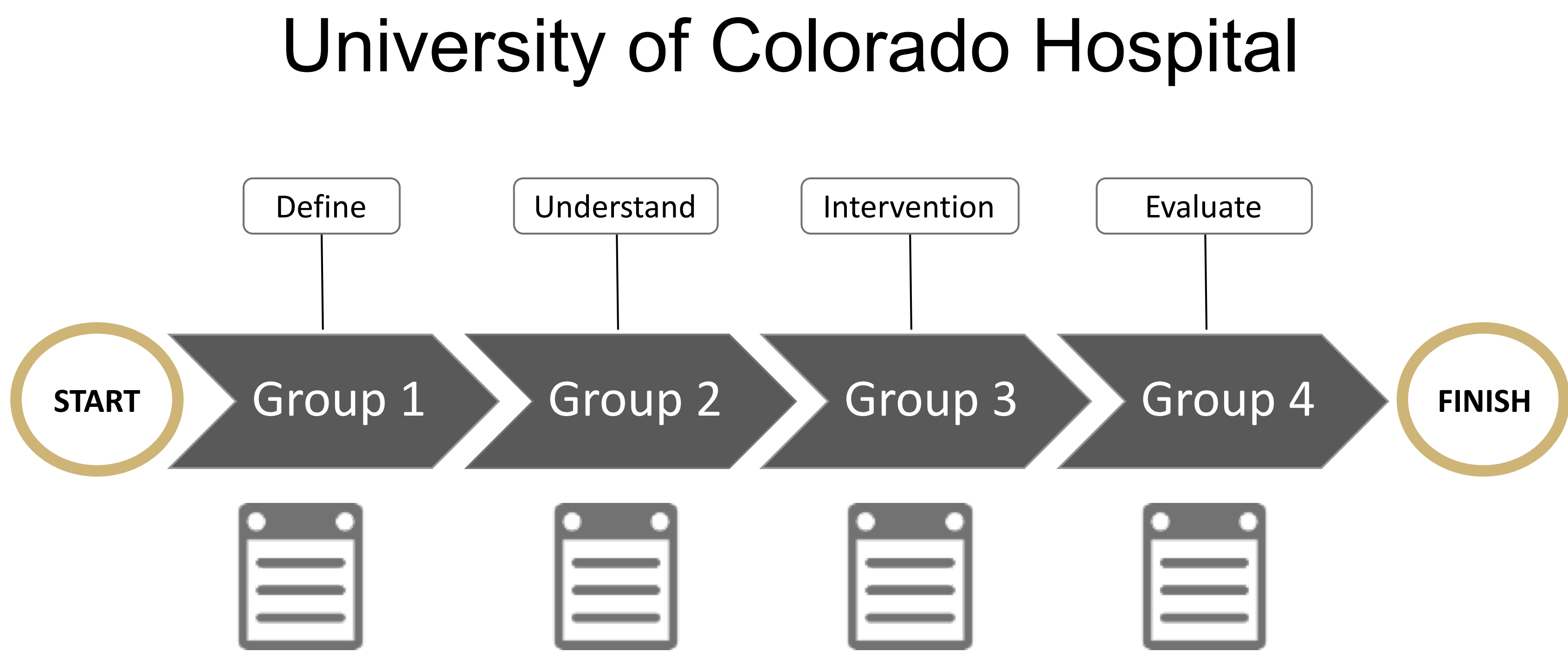
Emerging strategies exist for medical school and health system collaboration involving students in QI projects that transform clinical environments and processes¹

Acting interns (AI) are required to conduct QI projects BUT this has produced many uncompleted projects – a potential waste of our students’ talents and faculty efforts.

INNOVATION OBJECTIVES

- Implement a longitudinal educational Quality Improvement project across groups of learners.
- Assess QI knowledge acquisition to inform program evaluation.

INNOVATION



Pre- and post- assessments from other “control” clinical rotation sites without longitudinal projects

6/2017 through 8/2018

RESULTS

QI Knowledge Assessment

NO difference in Pre- and Post- test scores across any of the sites.
112 Pre- and 78 Post-course (70 paired pre-post)

Program Evaluation

	Mean	Std Dev	Median
I am able to identify problems that can be effectively addressed by the QI process.	4.3333333	0.5257592	4
Active participation in the longitudinal project improved my understanding of how to conduct Quality Improvement.	4.4285714	0.6678271	5
Project participation was critical to understanding Quality Improvement.	4.1707317	0.8916961	4
Quality Improvement projects are important in improving medical care systems.	4.8095238	0.4546827	5
The time spent on Quality Improvement in this Sub-I was useful for my future work as a physician.	4.2857143	0.8635072	4.5



Students contributed to the success of ongoing improvement initiatives.

DISCUSSION

- Though students did not improve their knowledge, implementing a longitudinal project across learner groups did not harm knowledge gain.
- Students rated the experience highly.
- Students contributed meaningfully to active problems in the clinical environment.

Limitations:

- Pre-intervention knowledge was already good

QIKAT-R² Pre-mean = 21.5/27

- Lacking pre-attitude assessment scores.
- Lacking documentation of curricula and attitude assessment from other sites.

Bottom Line

Students and clinical health systems benefit from collaboration

Clinical health system



Educational Curricula

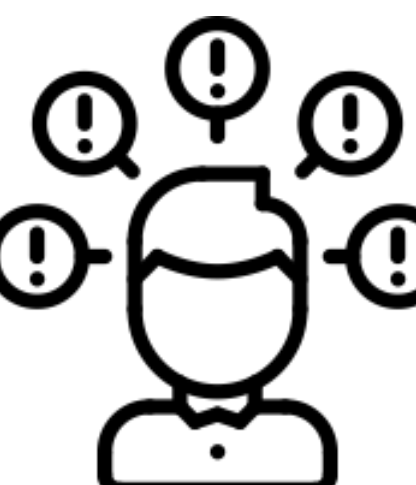
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Teaching Psychology to Undergraduate Students: Internship as A Platform to Build A Pipeline of Future Academic Clinicians



Merlin Ariefdjohan, PhD, MPH
Emmaly Perks, MA, CCRP



RATIONALE

- Undergraduates are often unsure about career paths post-graduation
- Internships provide an opportunity for students to “try on” potential careers
- There is limited internship opportunity for undergraduates in the field of pediatric mental health
- Few internship programs for undergraduates incorporate clinical research, shadowing, & professional development all-in-one
- Internships can inspire undergraduates to consider having a career in the field of psychology/psychiatry



PROGRAM INFORMATION

- 12-week summer intensive research internship program for undergraduates
- Interns are recruited from universities nationwide, with recruitment emphasizing on applicant diversity
- Program receives approximately 50 applicants annually, with 6 to 7 undergraduates selected per cohort
- 0% attrition from the program for all years (2016 – 2019)
- Program is held at an urban teaching hospital affiliated with a medical university
- Interns are paired with a faculty mentor; dyads develop an original research project focusing on the mentor’s primary research
- Interns attend didactic sessions covering:
 - ❖ Research: data analysis & visualization
 - ❖ Scientific communication: making academic poster, conducting oral presentation
 - ❖ Career paths: clinical talks & clinical shadowing
 - ❖ Professional development: drafting resume, interviewing skills
- A modest stipend is offered to each intern
- Program culminates with interns presenting their projects orally & as posters



LESSONS LEARNED

- Thoughtfully designed, interactive curriculum promotes student learning & engagement
- Concepts learned in class (e.g., data analysis) should be solidified through applied components
- Time & commitment buy-in from faculty are crucial in providing a supportive mentoring experience for interns
- Financial support for the interns is needed for optimal participation throughout the program



In just 12 weeks,
a dynamic psychiatry internship
program produced strong gains
in undergraduate students’
knowledge & interest in careers
in psychology/psychiatry



Scan the code
to learn more about this program!

The authors would like to acknowledge
student interns, faculty mentors, staff, and funding sponsors
who have been involved in this program
throughout the years

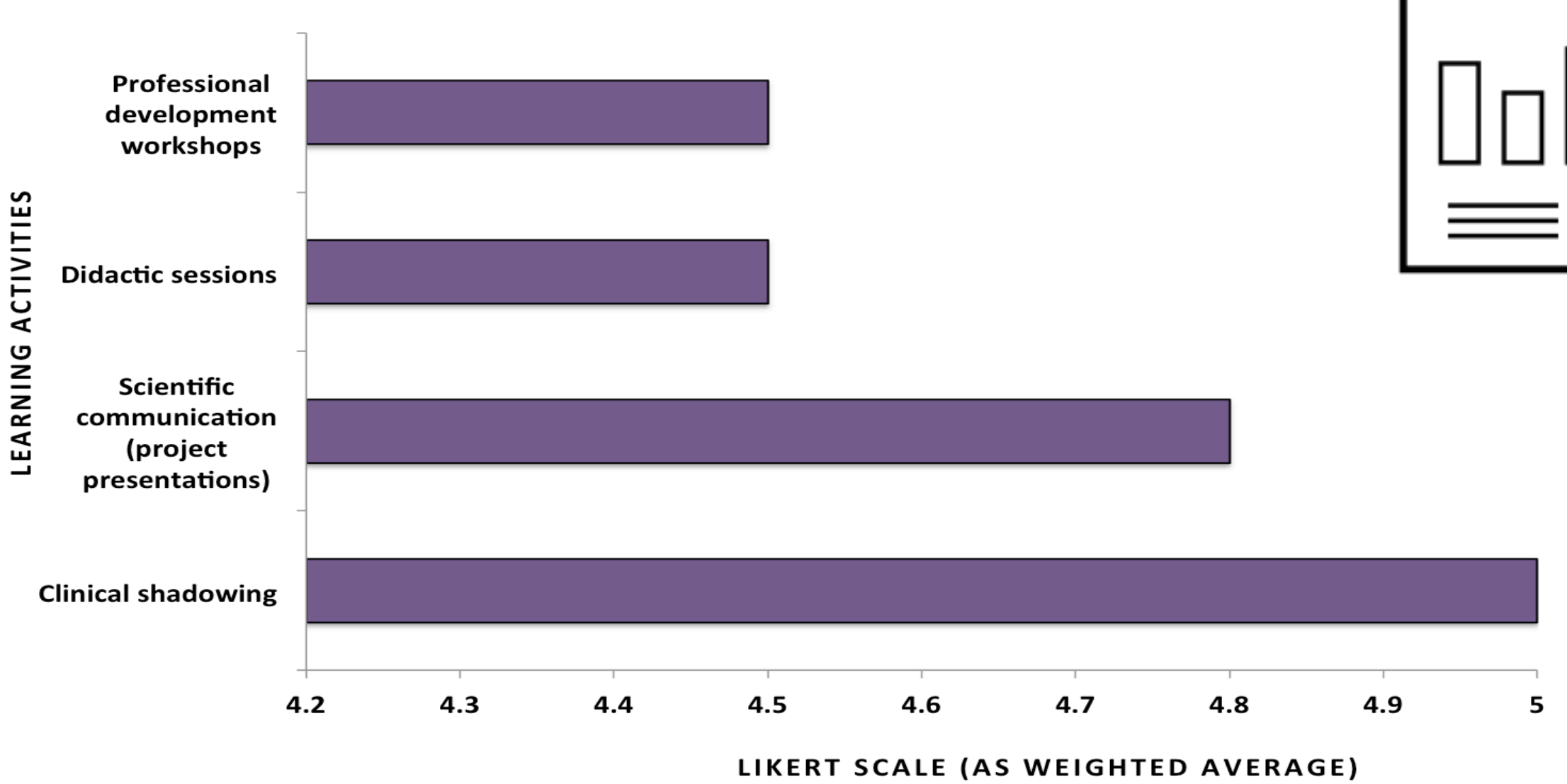


Children’s Hospital of Colorado
Pediatric Mental Health Institute

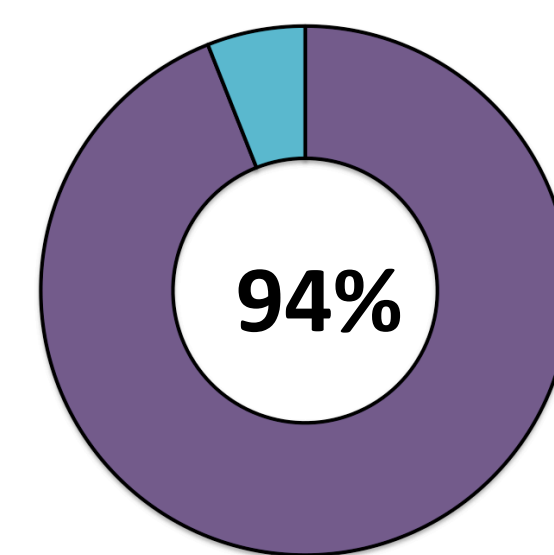


University of Colorado
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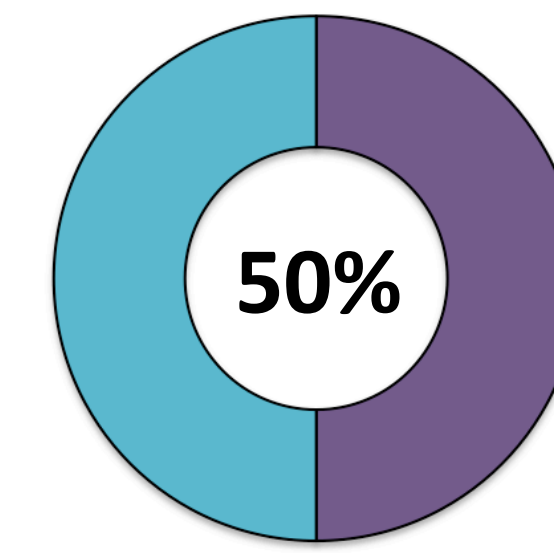
INTERNSHIP OUTCOMES



- Interns highly benefitted from all learning components of the program (as Likert scale: 1-did not benefit, 3-moderate benefit, 5-highly beneficial; 2016 – 2019; n=24)
- 2016 – 2019 cohort (n=24)



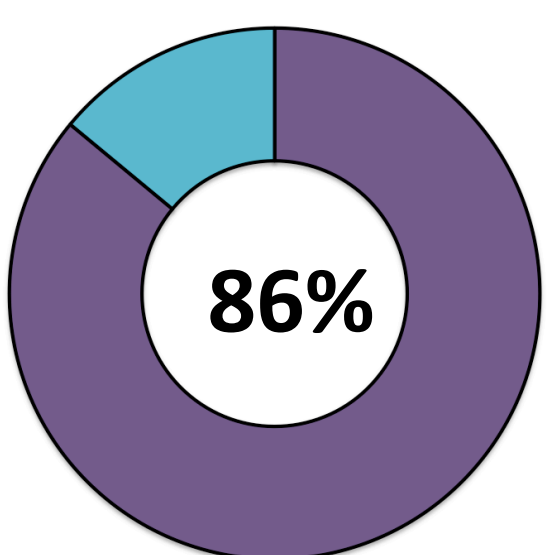
❖ 94% of total interns strongly agreed learning components were challenging but valuable & applicable for future



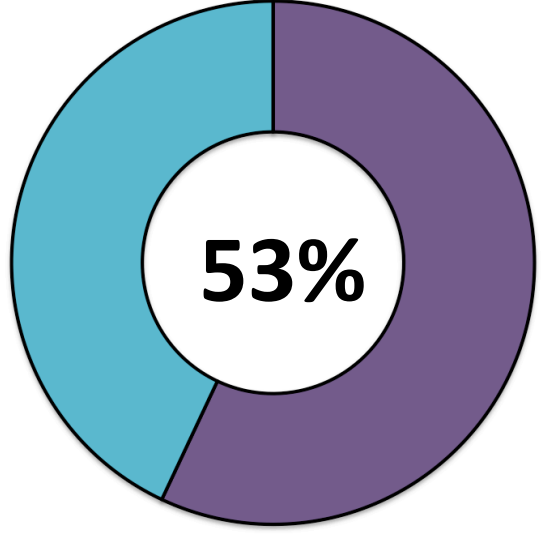
❖ 50% of total interns were hired in the department post-program as research assistants
❖ Others pursued careers in healthcare, research, or enrolled in medical programs

- 2018 cohort (n=6)

❖ 86% of interns expressed increased gains in knowledge related to pediatric psychology/psychiatry



❖ 53% of interns expressed an increased interest in conducting future research in this field



STUDENT INTERNS’ COMMENTS



“...an invaluable experience for me as it provided a safe and supportive environment to develop my skills as a researcher, scientist, and young professional in the healthcare field.”
— Student intern (2016)

“...an amazing experience that combined elements of education with the empowering opportunity to plan and execute research...”
— Student intern (2018)

“I learned so much about what it means to work as a team, seek out answers to improve the lives of others, problem solve, and to make connections in a professional environment, skills that last me far into my professional career.” — Student intern (2018)

FACULTY MENTORS’ COMMENTS

“[This] is truly a pipeline to engage students in possible careers in pediatric mental health and provide them with opportunity to contribute their perspectives to the field early in their professional development.”
— Faculty mentor (2016 – 2018)

“Supporting and working with [the intern] was a rewarding experience and provided an opportunity ‘to give back’”
— Faculty mentor, (2017, 2018)



Medical Student Exposure to Physical Medicine and Rehabilitation During a Third Year Selective Rotation

A QI Intervention

 Deanna Claus, MS4. Eduardo Carrera, MD, Julie Hastings, MD, William Niehaus, MD

BACKGROUND:
Only half of all US medical schools are associated with a Physical Medicine and Rehabilitation (PM&R) department.¹ Due to limited access to PM&R in the curricula, medical students often report a lack of knowledge about the specialty. This may contribute to decreased interest in future rotations and residencies.

Studies show that PM&R rotations increase knowledge and interest in the specialty.^{2,3} However, most PM&R exposure occurs through fourth year electives, often after choosing another specialty.

In addition, 81% of medical students report no training for working with patients with disabilities.⁴ PM&R exposure increases the understanding of a patient’s experience with a physical disability allows for more practice serving patients with disabilities.⁵

- OBJECTIVE:**
To determine the efficacy and feasibility of a **PM&R Selective Rotation** integrated into the third year medical student Neurologic Care Clerkship at University of Colorado School of Medicine (CUSOM).
- The **PM&R Selective Rotation** is a one week optional “selective.” Students rotated through the outpatient spine center, inpatient rehabilitation units, and rehabilitation consultation service at University of Colorado Hospital with exposure to patients with traumatic brain injury, spinal cord injury, stroke, amputation, burn, and transplant.

METHODS:
Quality Improvement (QI) study with anonymous, online pre and post rotation surveys using Likert scale scoring and yes/no questions

- RESULTS:**
- 31 participants over 10 months of data collection
 - 31 students completed pre-surveys, 18 completed post-surveys
 - Statistically significant increase in:
 - Familiarity with PM&R
 - Comfort explaining PM&R
 - Understanding of which patients benefit from PM&R
 - Interest in PM&R Career
 - Comfort in reaching out to potential PM&R mentors
 - Comfort in approaching patients with disabilities

LIMITATIONS AND CONCLUSION:
Limitations include small sample size, inability to match pre and post responses, and risk of selection bias (due to optional nature of rotation and survey).

Given this initial data, a one-week PM&R Selective Rotation appears to increase CUSOM students’ self-reported knowledge and interest in PM&R as well as comfort in approaching patients with physical disabilities.

A Third Year Medical Student Selective Rotation Increases Exposure and Interest in Physical Medicine and Rehabilitation (PM&R)

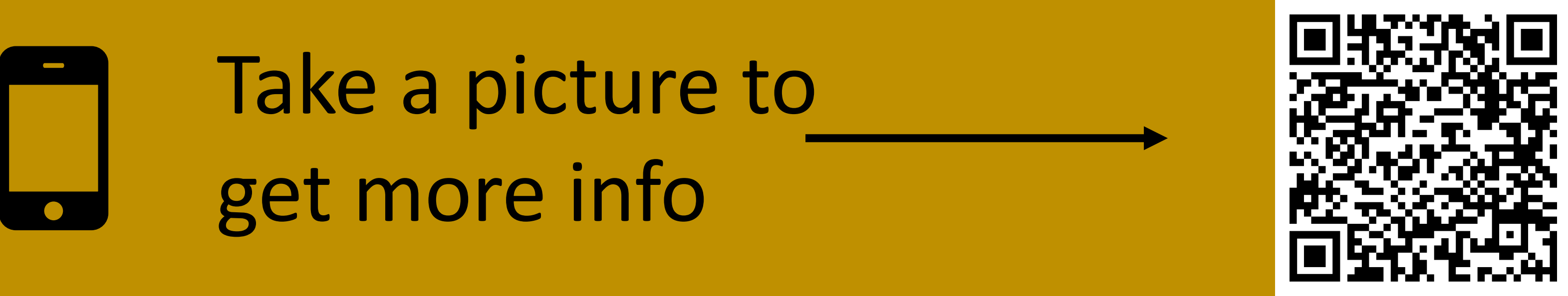


Table 1: Pre and Post Survey Data Using Likert Scale Scoring.

Question:	Pre (N=31)	Post (N=18)	Chi-square p-value
	N (%) with top two positive responses*	N (%) with top two positive responses*	
How familiar are you with the field of PM&R?	2 (6.5%)	15 (83%)	<0.0001
How confident would you feel if you needed to explain PM&R to a colleague?	3 (10%)	17 (94%)	<0.0001
How comfortable do you feel knowing when a patient may benefit from a PM&R consult or referral?	1 (3%)	17 (94%)	<0.0001
How would you rate your interest in a career in PM&R?	1 (3%)	5 (28%)	0.02^
How comfortable do you feel approaching a patient with a physical disability?	9 (29%)	14 (78%)	0.001

*e.g., Moderately/Extremely Confident; **Based on the Likert scale with 1=Not at all and 5=Extremely; ^Fisher’s Exact test

Table 2: Pre and Post Survey Data Using Yes/No Questions

Question	Pre (N=31)	Post (N=18)	Chi-square test p-value
	Yes	Yes	
If you wanted mentorship opportunities, or someone to discuss the field of PM&R, do you have attendings or residents you could comfortably reach out to?	17 (55%)	18 (100%)	0.0007
Do you think more emphasis should be placed on the role of PM&R earlier in your medical school curriculum?	26 (84%)	17 (94%)	0.38^

^Fisher’s Exact test

FUTURE DIRECTIONS AND CURRICULUM REFORM:
A more robust follow-up study with matched responses and more thorough data collection is in progress.

Results from both studies will allow CUSOM and other medical schools adapt and modify this rotation as they help students learn more about PM&R. As CUSOM curriculum reform is happening (pursuing a new LIC model), it may be difficult to continue the Selective Rotation in its current format.

Short selectives may still be an effective way to integrate lesser known specialties into the LIC model (ex. PM&R, Radiation-Oncology, Ophthalmology, etc). Alternatively, PM&R could be included in Neuro and MSK physical exam teaching sessions, MSK ultrasound skills sessions, or interprofessional education sessions.

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Evaluation of this IPE case study pilot showed **significant increases in understanding oral care, scope of practice & care coordination.**



Inter-Professional Education (IPE) with Nurse Practitioner (NP) and Dental Medicine (DM) Students: Evaluation of a Pilot Case Study

Background

- Building on previous IPE activity in Advanced Assessment where students learned oral care. Faculty designed an IPE activity to scaffold in a new case study learning opportunity.
- The ICCAS was used to assess change in skills & behaviors, mapped to IPE competencies, before and after an activity. The self-report tool uses a retrospective pre-post approach where students rate their abilities.

Objectives

- Participants will identify the benefits of adding IPE to their curricula
- Participants will evaluate the utility of a validated survey tool in identifying learning outcomes for an IPE activity

Methods

- Three-person interprofessional student groups were provided case scenarios and eight questions to work through
- Post-session, NP students completed the Interprofessional Collaborative Competencies Attainment Survey (ICCAS)
 - Mean scores of six domains capture collaboration, communication, teamwork, conflict management, roles/responsibilities, patient-/family-centered approach

Analysis

- Paired t-tests to examine overall change
- Individual item analysis and factor analysis by domain completed for responses

Results

- 25 nurse practitioner students & 15 dental medicine students participated in this opportunity
 - 2nd year NP students in FNP & AGNP programs
 - 3rd year DM students

- ICCAS pre-assignment $\bar{x} = 3.96$ (s.d.= 0.27)
- ICCAS post-assignment $\bar{x} = 4.95$ (s.d.= 0.23)
- Paired t-test: $t = 58.95$, $p = 0.001$

NP students showed a significant increase of IPE-related competencies as a result of this case study assignment.

- “Compared to before [this activity], would you say your ability to collaborate interprofessionally is:...”
 - 4.5/5.0, or “*Much better*” & “*Somewhat better*”
- “Participating in the [IPE activity] contributed to my development as a collaborative health care professional.”
 - 4.4/5.0, or “*A great deal*” & “*Quite a bit*”

Finally, all items and IPE domains increased significantly after the IPE activity.

Lisa Diamond¹, DNP, FNP; Lindsey Yates², DDS; Jennifer H. Fisher¹, DNP, WHNP; Scott Harpin¹, PhD, MPH, RN
College of Nursing¹ | School of Dentistry² | University of Colorado | Anschutz Medical Campus

Journaling exercises gave NP students a space to work through feelings of role transition

Introducing Reflective Journaling to Nurse Practitioner (NP) Students to Increase Clinical Self-Efficacy

Background

- A reflective journaling assignment was asked of APRN students to increase competence in problem solving, resourcefulness, ability to remain calm during difficult situations, and reliance on coping skills.

Methods

- We adapted a prior assignment where students wrote a reflection paper with prompts on strengths, lessons learned, barriers encountered and opportunity for growth. In an effort to encourage deeper reflection in the moment, the assignment was adapted to four progressive journal reflections with prompts on behaviors, motivation, effort, professional development, strengths, areas for growth, barriers in building advanced practice knowledge, key learning moments, critical thinking and inter-professional communication. Also, a prompt was added to include personal reflection on emotional issues faced in transitioning from the RN role to the advanced practice provider role.

Analysis

- Students completed the 10-item General Self-Efficacy Scale (Schwarzer & Jerusalem, 1995) prior to the first reflection and again at the end of the semester. Descriptive statistics and paired t-tests were used to assess change in self-efficacy. We will complete brief key informant interviews for program evaluation purposes, in order to improve the assignment in the future.

Results

- Age: \bar{x} = 35 yrs; Range= 27-57 yrs
- Years RN experience: \bar{x} = 7.2 yrs; Range= 3-25
- General Self-Efficacy Score (GSE), range 10-40
- *Higher score indicates more self-efficacy*
- Pre-journaling GSE score (n= 27): \bar{x} = 33.96, s.d.= 5.02
- Post-journaling GSE score (n= 21): \bar{x} = 34.74, s.d.= 4.73
- Paired t-test (equal vars): t = 0.54, p = 0.59, Δ = +0.75

Despite non-significant findings, students said:

- *“Being able to write freely about some raw & unfiltered experiences...has been a breath of fresh air at times when I felt swept under a rip tide...”*
- *“I feel more of an emotional connection with the professor by doing this.”*
- *“Journaling helped reveal my feelings & consider how important this timeline of transition is for me.”*



Resource Stewardship in Pre-clinical Case-Based Learning

Claire Koljack, BA; David Gamble, BSEd; Christopher King, MD



School of Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

BACKGROUND & OBJECTIVES

BACKGROUND

- The US spends more per capita on healthcare than any other nation.¹
- Healthcare debt is the leading cause of bankruptcy in the US.²
- Physicians are responsible for 80% of healthcare costs.³
- The Choosing Wisely® STARS Campaign aims to integrate healthcare value curricula into medical education programs across the US.

OBJECTIVES

Our "Cost Card" lists prices of diagnostic studies for use during case-based learning. With use of these cards, students will:

1. Develop an awareness of the relative patient costs of medical laboratory and imaging studies by the end of a case-based learning course.
2. Identify diagnostic studies that are more costly or more affordable for patients for each case.
3. Appreciate the impact of unnecessary diagnostic studies on patient care value after completing the case-based learning course.

METHODS AND RESULTS

Figure 1. Example Cost Card.

Hematology Study	Price (\$)	Potential Alternative	(\$)
CBC	17 w/out diff. 21 w/ diff.	Spun Hemoglobin	7
Iron studies	17 serum Fe 36 ferritin 23 TIBC 34 Transferrin	Ferritin alone	36
Coagulation panel	11 PT/INR 16 PTT	INR	11
Other blood studies	Price (\$)	Potential Alternative	(\$)
CMP	28	BMP LFT	23 22
ESR CRP	8 14		
Lipid profile	43		
Thyroid panel	44 TSH 17 T3/T4	TSH only	44

- Costs of diagnostic tests derived from:
www.healthcarebluebook.com.
- Medical students used cards in pre-clinical case-based learning.
- Students answered three questions about the cost cards on end-of-year evaluations.

Figure 2. I consider cost when evaluating what tests should be ordered in a case.

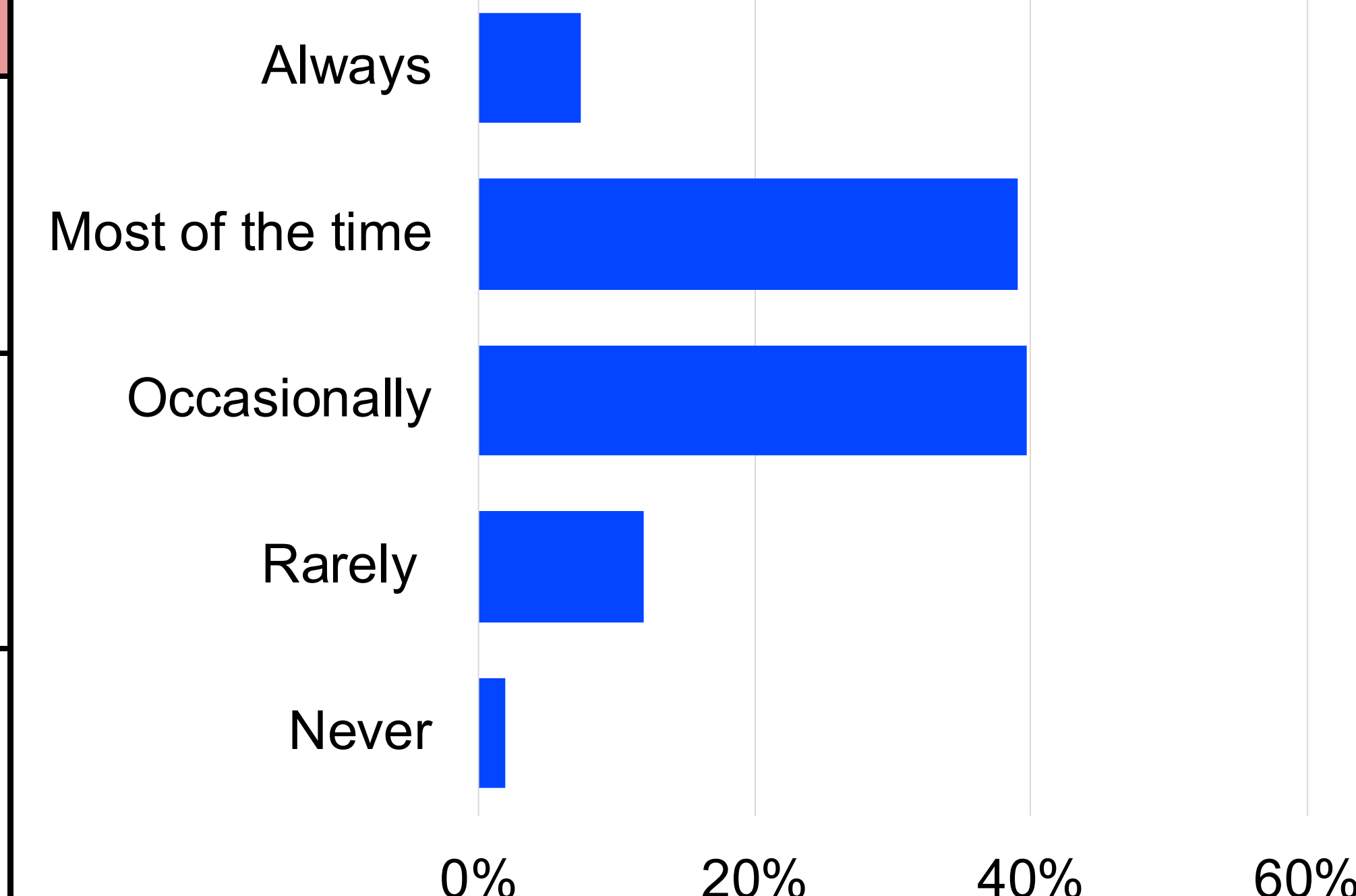


Figure 3. How often did your group use the cost card for labs and imaging studies with their respective prices?

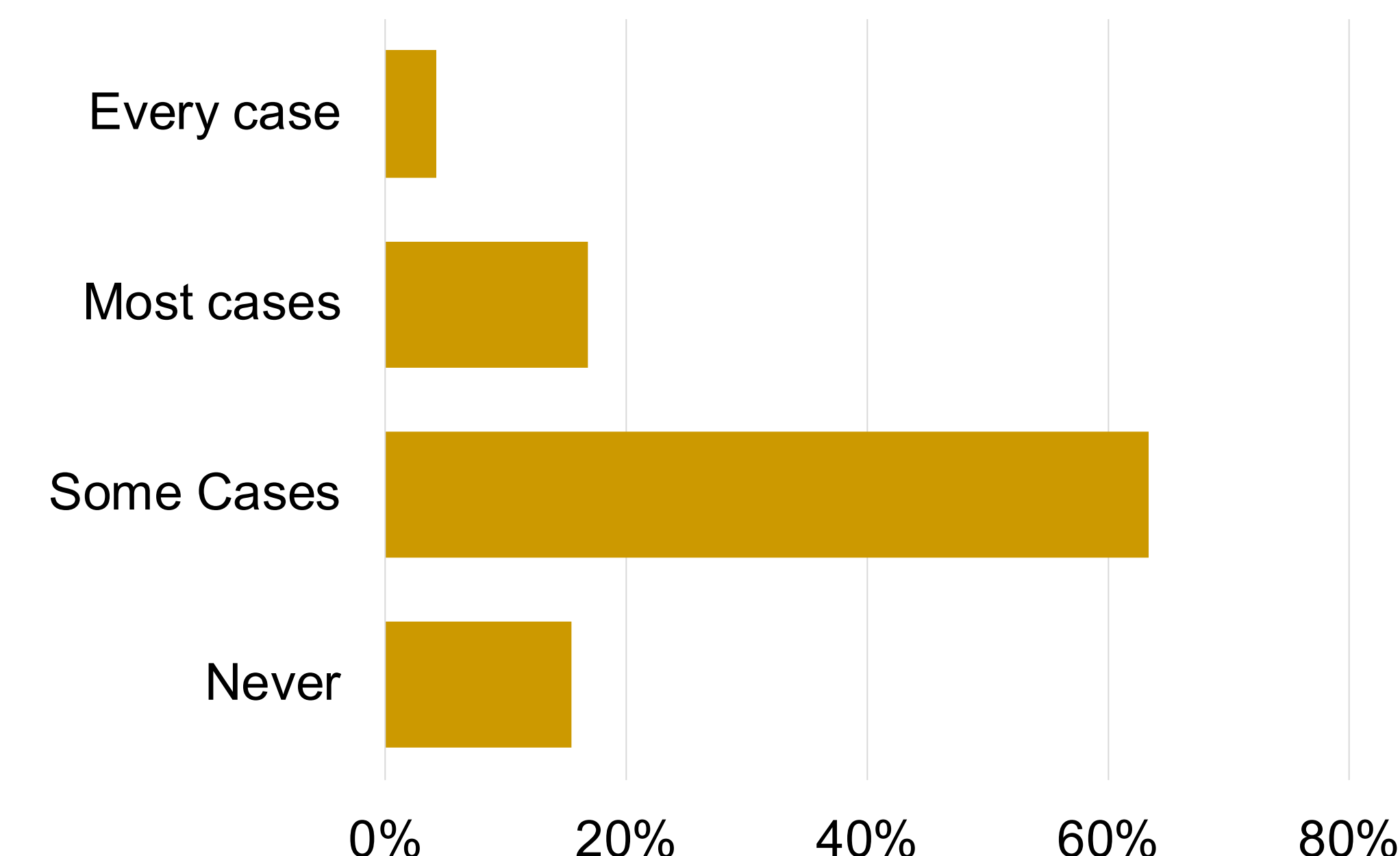
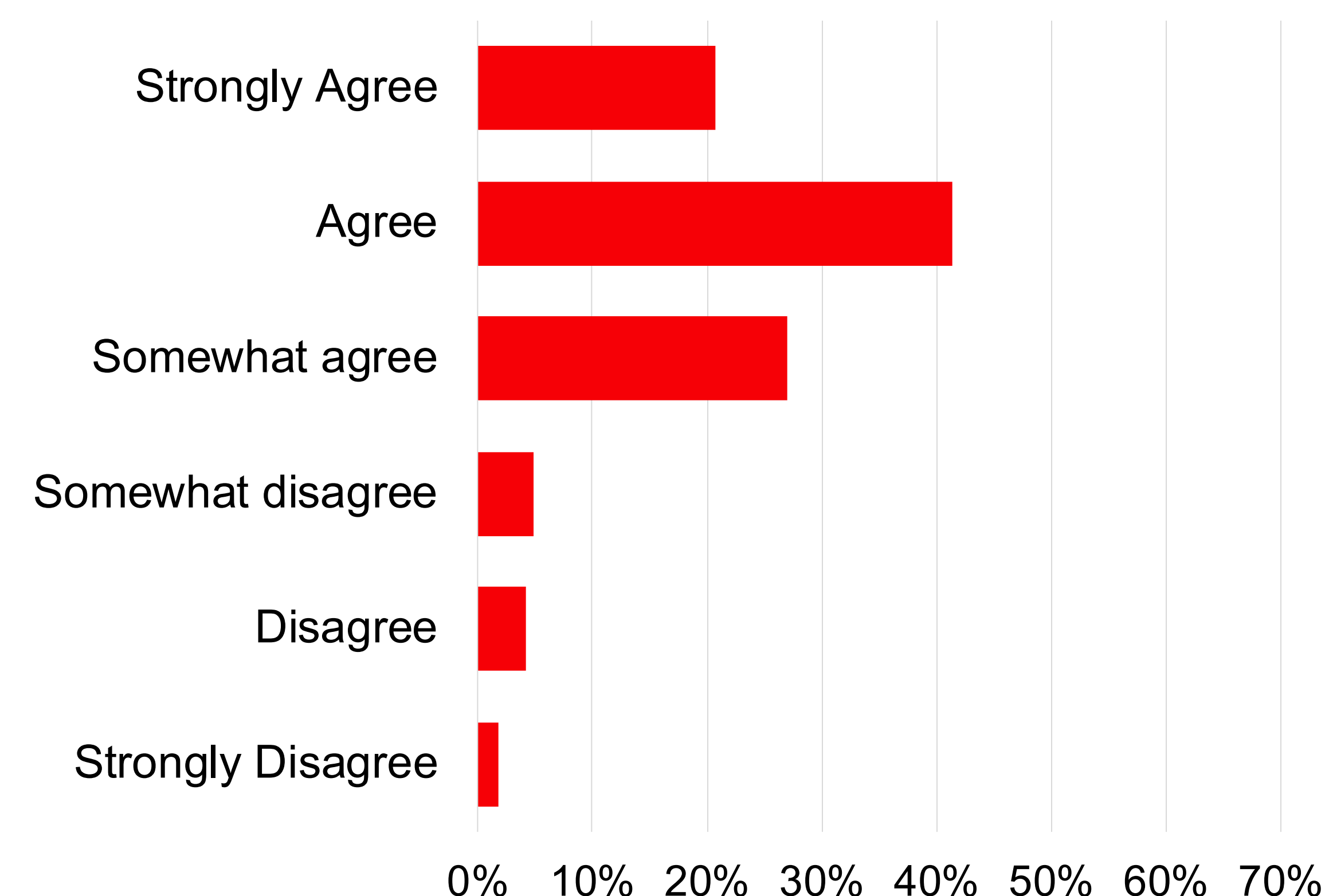


Figure 4. The cost card for labs and imaging studies with their respective prices improved my understanding of relative costs of common tests.



DISCUSSION

- Creating a cost card for incorporation in case-based learning is achievable, used by students, and results in high levels of student attitudinal alignment with healthcare value concepts.
- Including healthcare value concepts early in students' training is possible and further research is needed to evaluate if this will decrease the resource utilization of students as they enter residency and unsupervised practice.

Bottom Line:

We propose that this tool be implemented within case-based curricula as early in medical education as possible in order to communicate that considerations of cost are an integral component of clinical reasoning.

Scan QR Code now to view a digital Cost Card



[VIEW NOW](#)

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A Novel Integrated Critical Care Curriculum Within the Third-Year Internal Medicine Clerkship Improves Learner Experience, Confidence, and Knowledge



Daniel Gergen, MD¹, Joshua Raines, MD¹, Bryan Lublin, MD, MPH², Anna Neumeier, MD³, Christopher King, MD²

¹ Internal Medicine Residency Training Program, University of Colorado, ² Division of Hospital Medicine, Department of Medicine, University of Colorado, ³ Division of Pulmonary Sciences and Critical Care Medicine, Department of Medicine, University of Colorado

Introduction

- Most residents are required to provide care for critically ill patients, yet only a minority of medical schools require Intensive Care Unit (ICU) rotations.
- The University of Colorado third-year Internal Medicine (IM) clerkship at the Veterans Affairs Medical Center (VAMC) provides an opportunity for medical students to rotate through an open-ICU.
- Prior to March 2019, there was no structured critical care curriculum within the IM clerkship to prepare students for this ICU experience.
- To address both a local and national gap in critical care education, we created an integrated critical care curriculum within the third-year IM clerkship at the VAMC.

Objectives

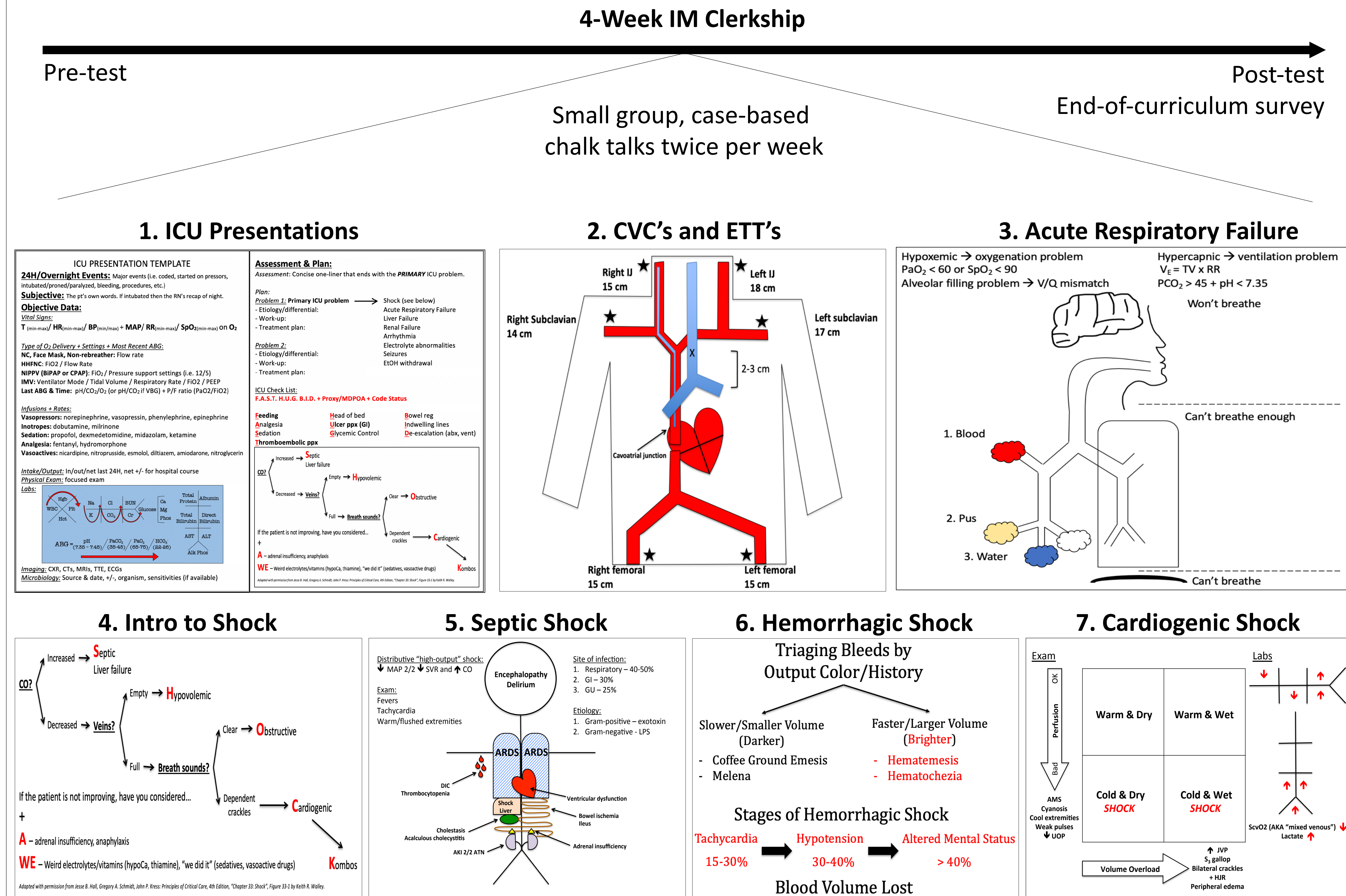
Curriculum Objectives:

- Improve the medical student experience within the ICU while providing foundational training and exposure to core topics in critical care medicine.
- Improve attitudes and confidence in critically ill patient management.

Learner Objectives:

- Apply a standardized approach to rounding presentations in the ICU.
- Describe a physical exam-based approach to the undifferentiated shock patient.
- Describe the management of common ICU diagnoses.

Curriculum Design



Student Perspectives

- “It was helpful and concise. Explained a lot of concepts I would have otherwise never learned.”
- “Very helpful for the shelf and moving forward. Able to connect with [teachers] and ask questions without the pressure of rounds/patient care.”
- “This material isn't taught anywhere else and it provided a brief review, built on what we know as a framework, and ultimately taught us an outline and approach to management of ICU patients.”
- “Exposure to topics that are not well-covered in medical school didactics. The case-based approach was a useful framework for each session.”
- “Provided organized, categorized, or flow-charted ways to think about complex topics.”
- “I liked the small group, chalk talk nature. I thought there was a good flow to the series and that each talk built off each other.”
- “Being taught by the residents was great.”

Conclusion

- An integrated ICU curriculum within the third-year IM clerkship improved the overall clerkship experience while providing foundational training and exposure to core topics in critical care medicine.
- Our curriculum:
 - Improved attitudes and confidence in critically ill patient management.
 - Heightened interest in further ICU training.
 - Improved objective knowledge of ICU topics.
- Our curriculum is the first resource designed to maximize the benefits of an open-ICU for third-year student learners.

Acknowledgements

The authors wish to thank the University of Colorado PCCM Medical Education Working Group for their support and feedback, as well as the University of Colorado IM residents and PCCM fellows who led curriculum sessions.



Scan for facilitator guide and references

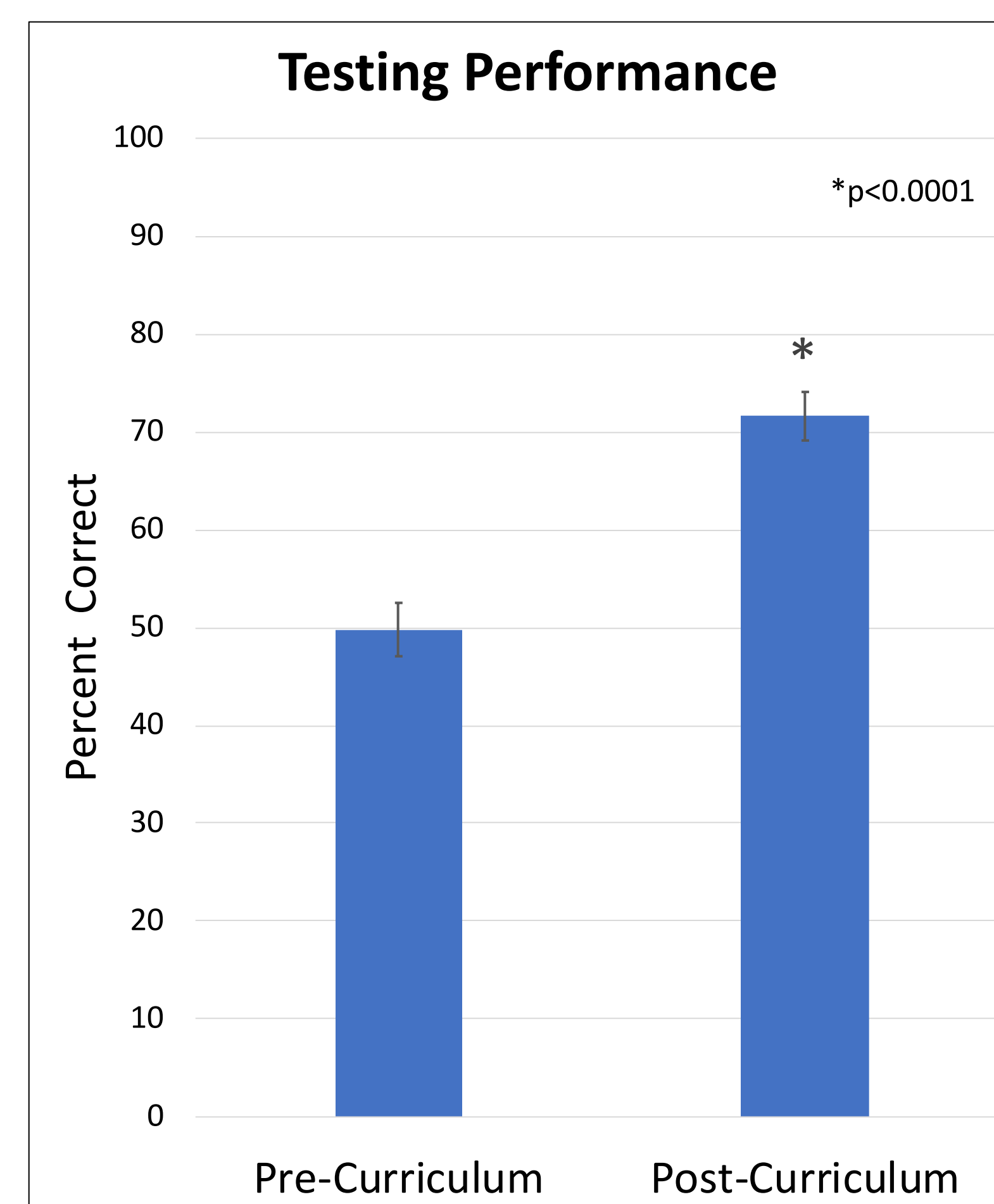
Results

Table. End-of-Curriculum Survey Results (N = 41)

Statement	Percent Strongly Agree (%)	Percent Agree (%)	Mean Likert Scale (SD) ^a
The Critical Care Curriculum improved my overall VA Internal Medicine clerkship experience.	73	24	4.68 (0.60)
As a result of the critical care curriculum:			
I am more comfortable presenting a patient during teaching rounds in the Medical ICU (MICU).	41	41	4.22 (0.78)
I am more comfortable participating in the medical management of critically ill patients.	44	51	4.37 (0.65)
I am more likely to apply for a MICU sub-internship during my 4th year of medical school.	24	32	3.68 (1.00)
I am more likely to select a specialty in which I can practice critical care medicine.	20	32	3.59 (0.96)
I am inspired to create my own chalk talks for future teaching opportunities.	41	29	4.05 (0.99)
The session topics were applicable to my clerkship experience.	71	27	4.68 (0.52)
The duration of the sessions was appropriate.	68	27	4.61 (0.66)
Protected time for the critical care curriculum was a valuable part of my VA Internal Medicine clerkship experience.	66	32	4.61 (0.53)
The material was presented in a manner that was appropriate for my level of training.	73	24	4.71 (0.51)

Abbreviation: SD, standard deviation.

^a Level of agreement assessed on 5-point Likert scale (1 = strongly disagree, 5 = strongly agree).



Integration of an Interprofessional Student Assessment into
Clinical Clerkships: Findings from the School of Medicine Implementation Pilot Site

Eric Gilliam, PharmD; Lela Mansoori, MD; Suzanne Brandenburg, MD

Background

The CU Center for Interprofessional Practice & Education (CIPE):

- Serves six CU Anschutz health profession programs and schools
- Provides a robust curriculum featuring co-curricular engagement, didactic team-based learning, and high fidelity simulation
- Trains students to become “team-ready” through achievement of interprofessional core competencies¹
- Has developed an individual student assessment of teaming behaviors based on the Interprofessional Professional Assessment tool.

The Interprofessional Professional Assessment (IPA):

- Developed by the Interprofessional Professionalism Collaborative
- A validated student assessment tool aligned with interprofessional educational outcomes, including domains for *communication, respect, altruism and caring, excellence, ethics, and accountability*²
- Designed for measurement of individual teaming behaviors in interprofessional clinical settings³
- Intended for assessing trainees of various health professions via uni-professional or interprofessional assessors

School of Medicine, Presbyterian St. Luke’s Hospital Medicine Clerkship

- Is a 8-week experience in an interprofessional inpatient setting for third-year medical students (M3)
- Preceptors intentionally encourage M3 students to engage with interprofessional team members during the rotation
- Students request non-physician team members to evaluate their teamwork and collaborative skills using the CU CIPE Interprofessional modified IPA tool

Methods

Design: Single site programmatic evaluation of CIPE IPAs conducted at PSL

Aim: Evaluate quantitative evidence of successful implementation of the IPA tool via

- Describe student interprofessional performance
- Evaluate the IPA tool design

Included Data: All completed IPAs available submitted at PSL

Data Collection: Qualtrics^{XM} (Qualtrics, LLC, SAP America Inc.)

Data Analysis: Descriptive Statistics: Excel 2016 (Microsoft Corporation); Comparative Statistics: GraphPad.com

Educational Framework

Practice

Student’s Clinical Training Experience

Embedded Interprofessional Experience

Assessment

Assigned clinical educator assesses profession-specific clinical and non-clinical knowledge, skills, and attitudes

Student requests interprofessional team member to complete CIPE ISA tool

Team member assess collaborative behaviors and IPE outcomes

Feedback

Student’s Program

Student

CU Center for IPE

The CU CIPE IPA Assessment Tool

Evaluations Items by Domain (In order of Appearance)

Communication

1. Communicates respectfully with members of other health professions.

2. Communicates with members of other health professions in a way they can understand, without using profession-specific jargon.

Respect

3. Demonstrates an understanding of the roles and responsibilities of members of other health professions as related to care.

Altruism and Caring

4. Offers to help members of the other health professions when caring for patients.

Excellence

5. Coordinates with other health profession and patient/client, family and caregivers to produce an optimal plan of care.

6. Contributes to decision about patient care regardless of hierarchy / profession-based boundaries.

Ethics

7. Works collaboratively with members of other health professions to resolve conflicts that arise in the context of caring for patients/clients.

Accountability

8. Seeks clarification from members of other health professions about unclear information

9. Works with members of other health professions to identify and address errors and potential errors in the delivery of care.

Global Performance (GP)

“I trust this learner to be a member of my interprofessional team”

Response scale (Items 1-9): Strongly Disagree(1), Disagree (2), Neutral (3), Agree (4), Strongly Agree (5), No Opportunity to Observe

Response scale (Global Performance): Yes (1), Yes with Reservations (2), No (3)

Findings

Analysis of Participants

Participants	N (%)
Unique Students	70 (100)
By cohort (Academic Year)	
2017 – 2018	10 (14.3)
2018 – 2019	32 (45.7)
2019 – 2020	28 (40)
Unique Assessors	36 (100)
By Profession / Role	
Nurse	15 (41.7)
Pharmacy	6 (16.7)
Case Manager	5 (13.9)
Social Work	4 (11.1)
Podiatry	3 (8.3)
Clinical Dietitian	1 (2.7)
Nurse Practitioner	1 (2.7)
Patient Care Technician	1 (2.7)

Analysis of Evaluative Item Response

Item	Not Observed, N (%)		Observed, N (%)			Mean Score, Mean (SD)		
	CIPE IPA	Frost et al	CIPE IPA	Frost et al	P-Value ^a	CIPE IPA	Frost et al	P-Value ^b
1	0 (0)	9 (3.9)	70 (100)	224 (96.1)	0.124	4.84 (0.57)	4.71 (0.6)	0.061
2	1 (1.4)	10 (4.3)	69 (98.6)	223 (95.7)	0.01	4.75 (0.59)	4.46 (0.7)	<0.001
3	1 (1.4)	8 (3.4)	69 (98.6)	225 (96.6)	0.69	4.7 (0.64)	4.53 (0.69)	0.0295
4	12 (17.1)	32 (13.7)	58 (82.9)	201 (86.3)	0.562	4.76 (0.64)	4.45 (0.79)	<0.001
5	5 (7.1)	28 (12)	65 (92.9)	205 (88)	0.381	4.82 (0.58)	4.35 (0.72)	<0.001
6	9 (12.9)	30 (12.9)	61 (81.1)	203 (87.1)	1.00	4.75 (0.62)	4.27 (0.7)	<0.001
7	8 (11.4)	51 (21.9)	62 (88.6)	182 (78.1)	0.059	4.77 (0.61)	4.48 (0.7)	<0.001
8	5 (7.1)	24 (10.3)	65 (92.9)	209 (89.7)	0.497	4.77 (0.63)	4.38 (0.76)	<0.001
9	17 (24.3)	73 (31.3)	53 (75.7)	160 (68.7)	0.298	4.79 (0.63)	4.33 (0.76)	<0.001

^aFisher’s exact test with two-sided p-value significance set at 0.05
^bOne-sample t-test with two-sided p-value significance set at 0.05

Analysis of Global Performance

Response	N (%)
Yes	70 (100)
Yes with Reservations	0
No	0

Analysis of CIPE IPA Tool Design

Evaluative statement	Count	SA	A	N	D	SD
The instructions were clear	68	63	4	0	0	1
The definitions of the constructs were clear	68	61	5	0	1	1
The items describing interprofessional behaviors were clear	69	60	8	0	0	1
The behaviors were applicable to my practice setting	69	61	7	0	0	1
The assessment was easy to complete	69	63	5	0	0	1

Response scale: Strongly agree (SA), Agree (A), Neither Agree nor Disagree (N), Disagree (D), and Strongly Disagree (SD)

Results

Use of the CIPE IPA Tool

- Of the 93 medical students assigned to the pilot site for clinical training, 70 (75%) were assessed using the CIPE IPA tool.
- All 36 evaluators were non-Physicians, representing 8 distinct professional roles within the practice setting.

Student Performance

- All students were deemed trustworthy by their evaluator
- The mean student score across all behaviors was 4.75
- Low scores were infrequently documented

CIPE IPA Tool Performance

- Compared to published IPA data, the CIPE IPA tool had numerically fewer (non-significant) instances of unobserved behaviors
- CU SOM students tended to perform better than interprofessional cohorts previously published.
- Assessors strongly agreed the tool was easy to use, clear, and applicable to their practice setting

Limitations

- Evaluation occurred in a single setting without controlling quality of interprofessional educational activity. Results may not be generalizable to other medical student training sites.
- Results may not be generalizable to other practice settings or health professions. Additional data need in these cohorts.
- Results should be interpreted in the context of low-stakes assessment following significant intentional interprofessional education and training.

Conclusions

- The CU CIPE IPA tool appears to be successfully integrated into a school of medicine third year clinical clerkship.
- The tool appears to be designed appropriately for its intended use.

References

- The Interprofessional Education Collaborative (IPEC). Core competencies for interprofessional collaborative practice: 2016 update. Washington DC 2016
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Implementation of a Point-of-Care Ultrasound Curriculum for Pediatric Critical Care Medicine Fellows

Ryan Good, MD and Angela Czaja, MD, MSc, PhD

University of Colorado - Anschutz, Department of Pediatrics, Section of Critical Care Medicine

BACKGROUND

- Point-of-care ultrasound (POCUS) has important procedural and diagnostic applications for critically ill patients
- Fellows in pediatric critical care medicine (PCCM) require POCUS training during fellowship to develop competence necessary for independent practice
- Local needs assessment of the PCCM fellowship at the University of Colorado demonstrated a lack of structured POCUS training

OBJECTIVE

Evaluate the effectiveness of a POCUS training curriculum for PCCM Fellows

PROGRAM DESCRIPTION

- Curriculum started in July 2018 and included both procedural and diagnostic POCUS applications
- Combination of didactic and experiential learning

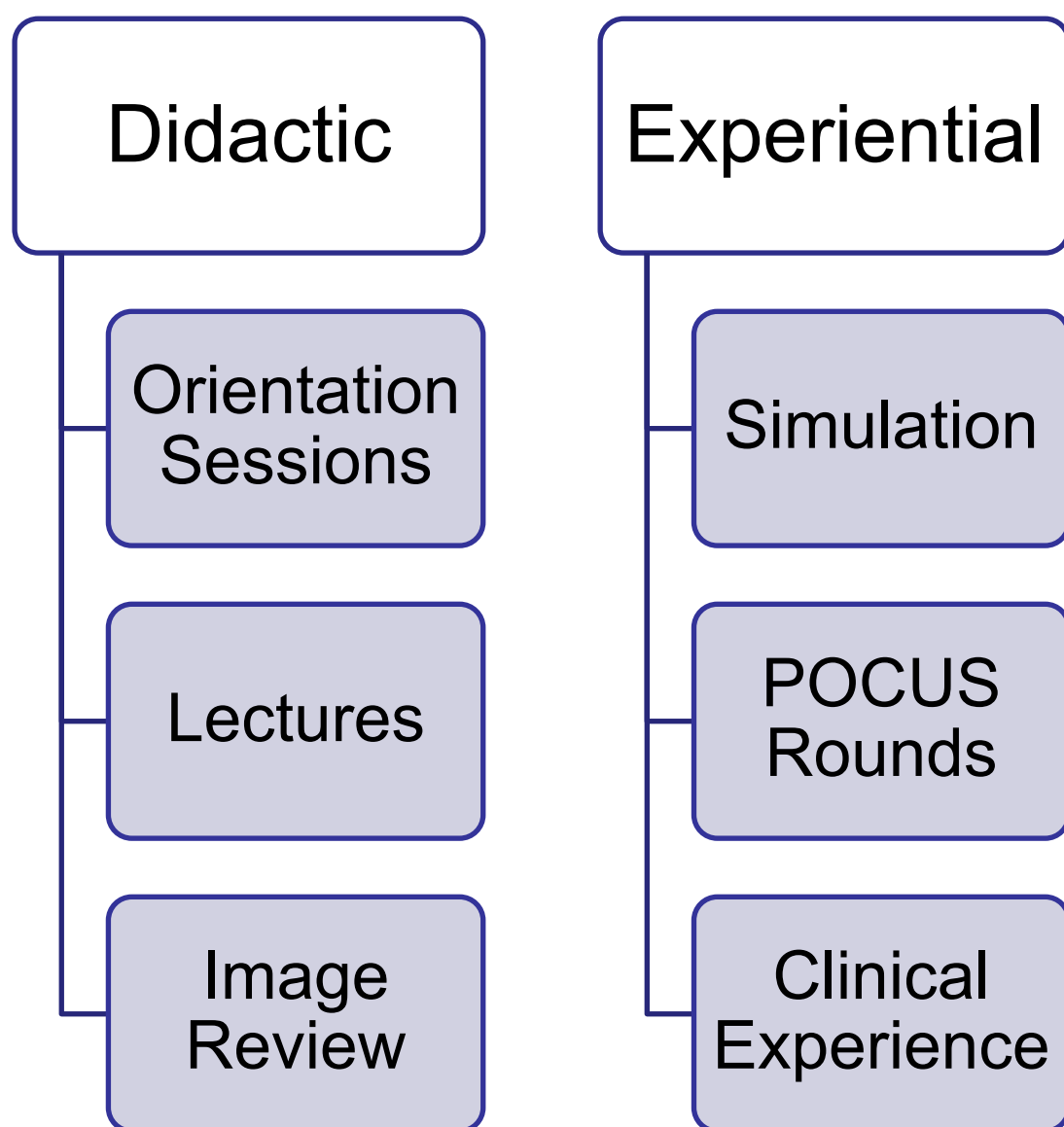


Figure 1: Schematic of POCUS curricular components

METHODS

- REDCap survey distributed to cohort of past/current fellows (pre-intervention) prior to implementation of the curriculum and current fellows (post-intervention) who participated in the curriculum
- Survey items addressed comfort with specific POCUS applications and barriers to POCUS training
- Response rate 14/20 (70%) for pre-intervention cohort and 9/9 (100%) for post-intervention cohort

FIGURE 2: Fellows Maintained Comfort with Procedural Applications and Increased in Diagnostic Applications

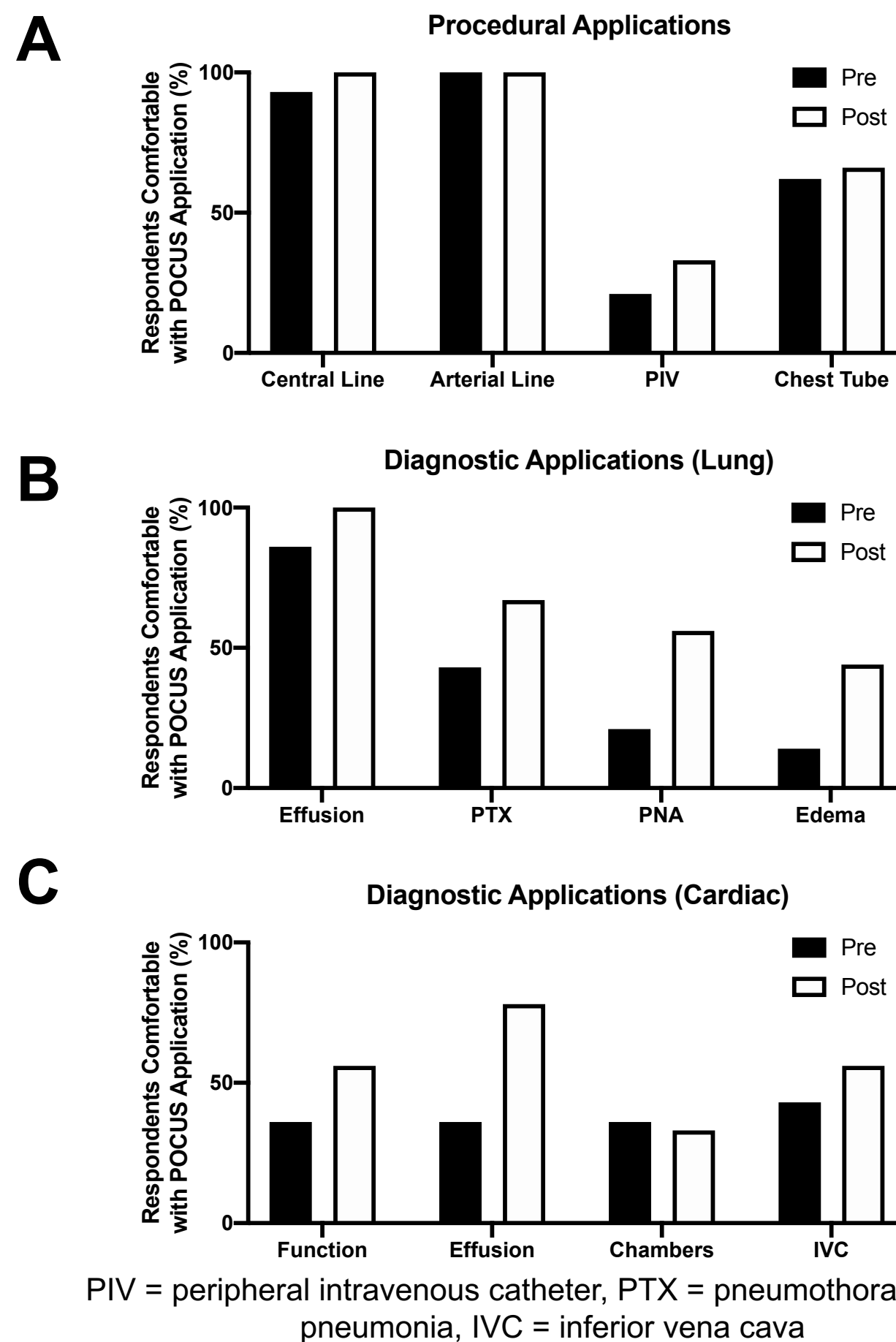


FIGURE 3: Barriers to POCUS Training Decreased After Implementation

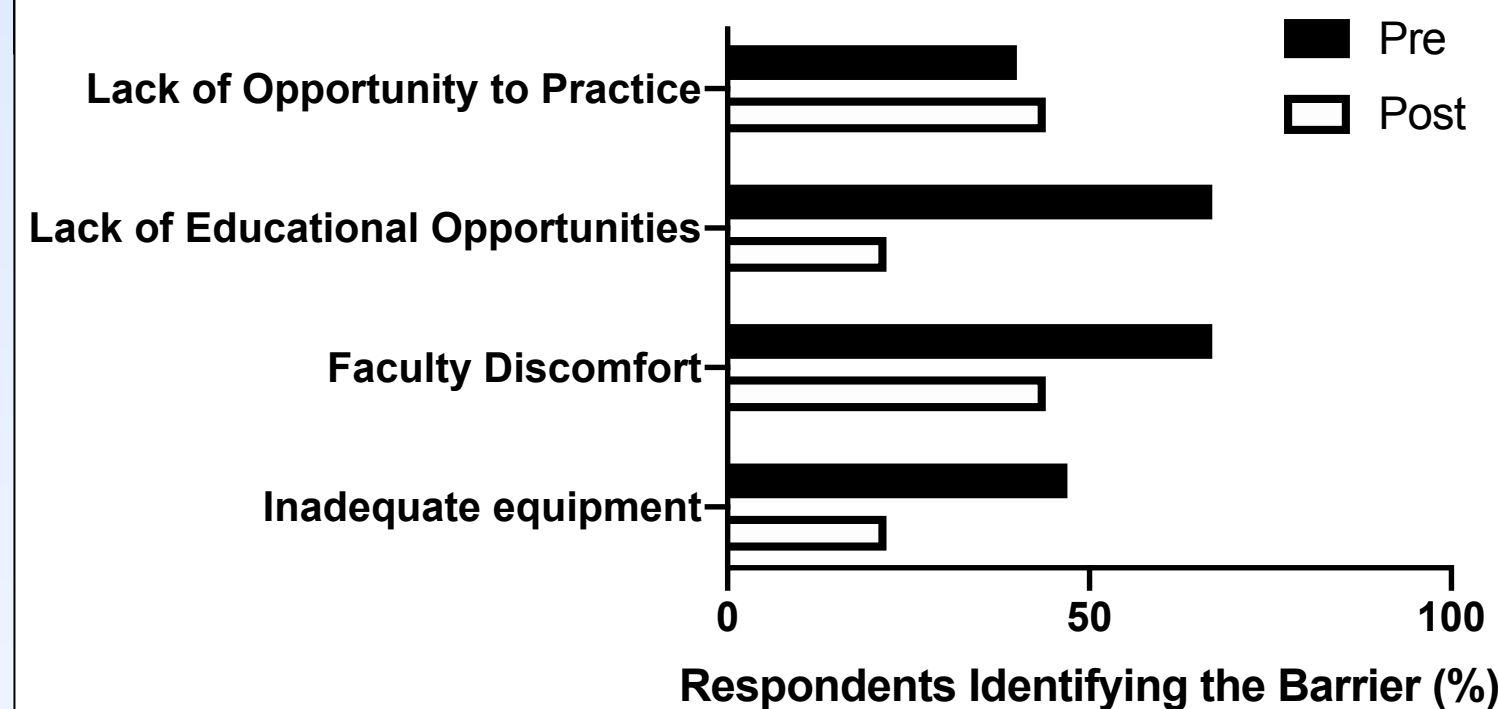
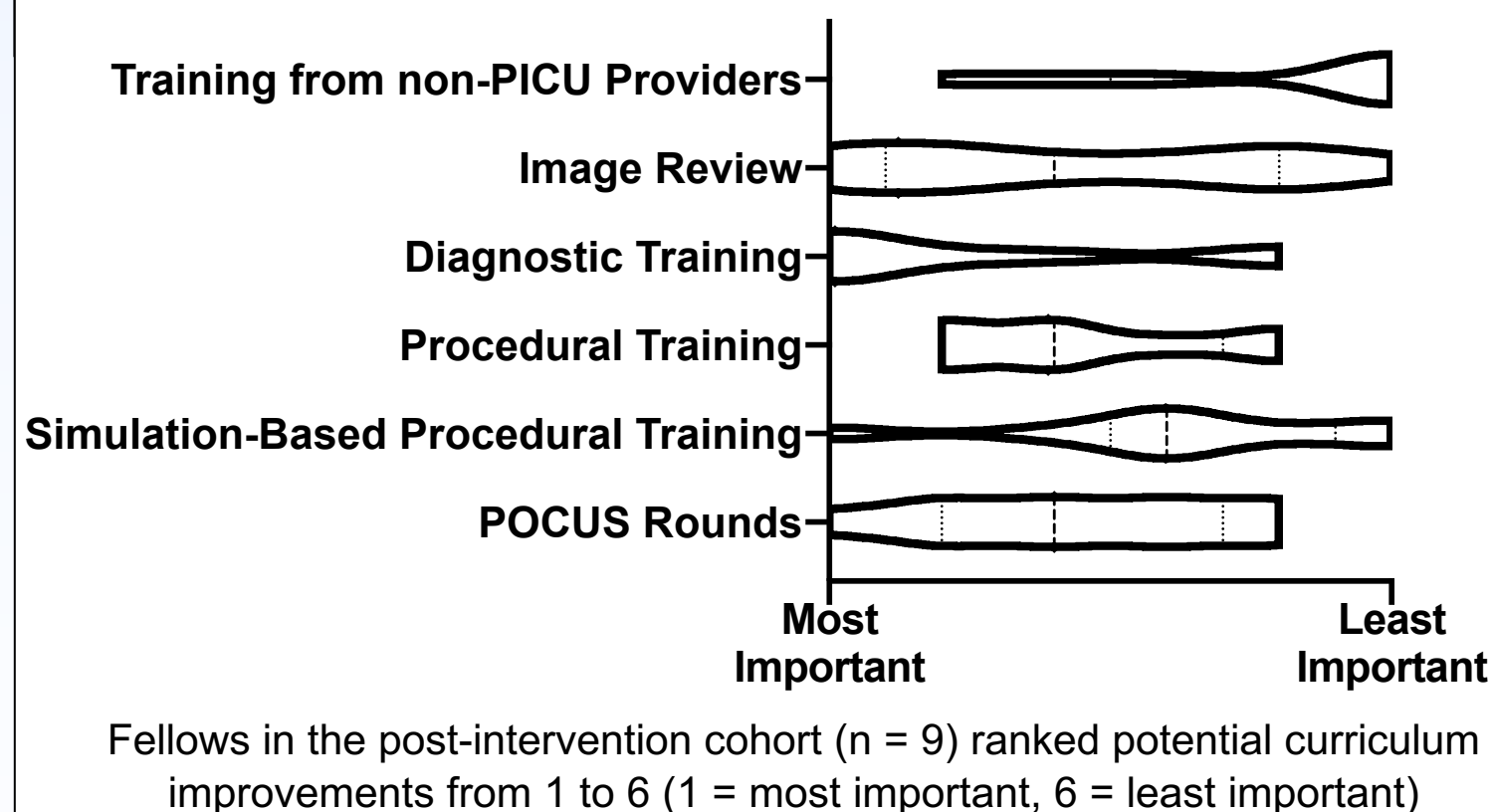


Figure 4: Current Fellows Ranked Training in Diagnostic POCUS Applications Most Important Improvement



DISCUSSION

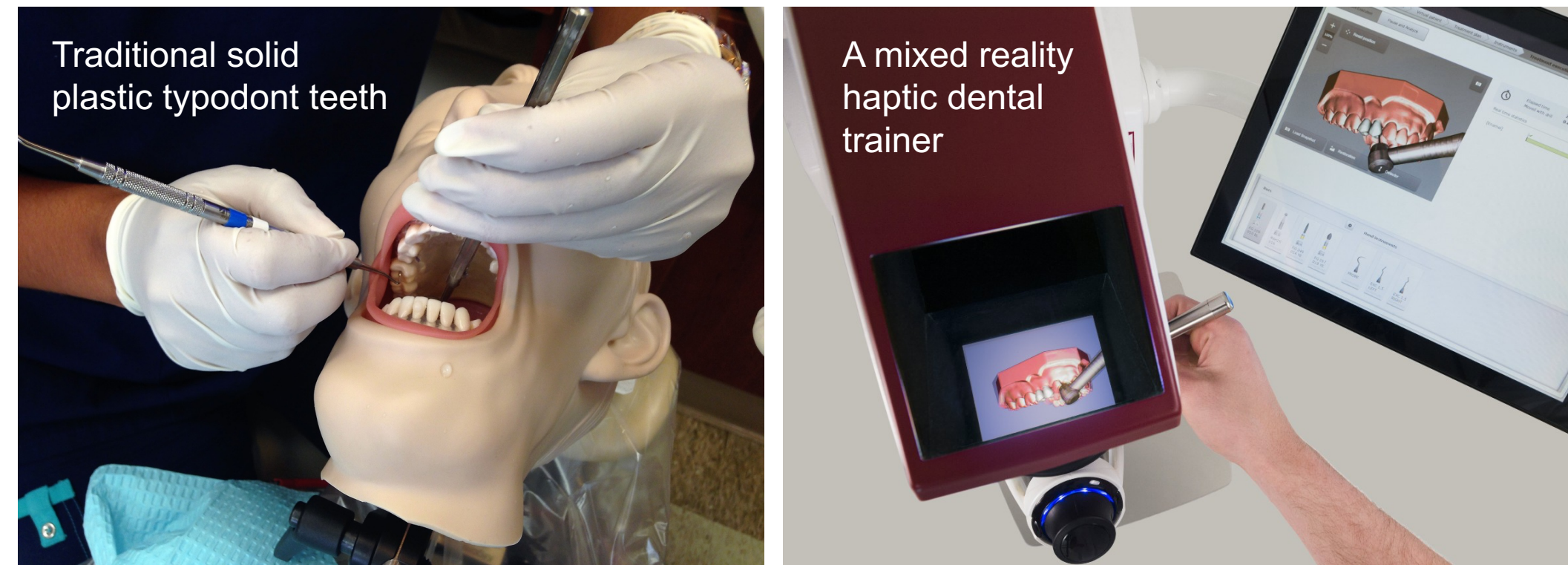
- PCCM fellows who participated in the POCUS curriculum reported increased comfort with POCUS applications and fewer barriers to POCUS training
- Some current PCCM fellows are still not comfortable with important POCUS applications despite the POCUS curriculum
- Next steps for improving the POCUS curriculum include faculty development, increased educational opportunities and improved assessment



A Novel Use of Haptic Dental Simulators to Produce Three Dimensional Tooth Models for Non-Linear Load Simulation in the Development of Tooth Preparation Assessment and Restorability Guidelines

Thomas J. Greany, BS Aerospace Engineering, DDS, Assistant Professor, Department of Restorative Dentistry, School of Dental Medicine; and Modern Human Anatomy Program, Dept. of Cellular & Developmental Biology, School of Medicine | Research Assistants: Alexandria Aitken, DS3; Alfred Li, DS2, CU School of Dental Medicine*

Introduction



Haptic trainers accurately reproduce with good fidelity the clinical sensation of performing actual operative dentistry procedures. Their use in developing hand and indirect vision skills in student populations is not new in dental education. Using the Simodont® haptic dental trainer, a range of restorative dentistry experiences can be simulated including cavity, crown, inlay and onlay preparations.¹ Simulated dental models are created from computed tomography and intraoral surface scans of real human dentitions.

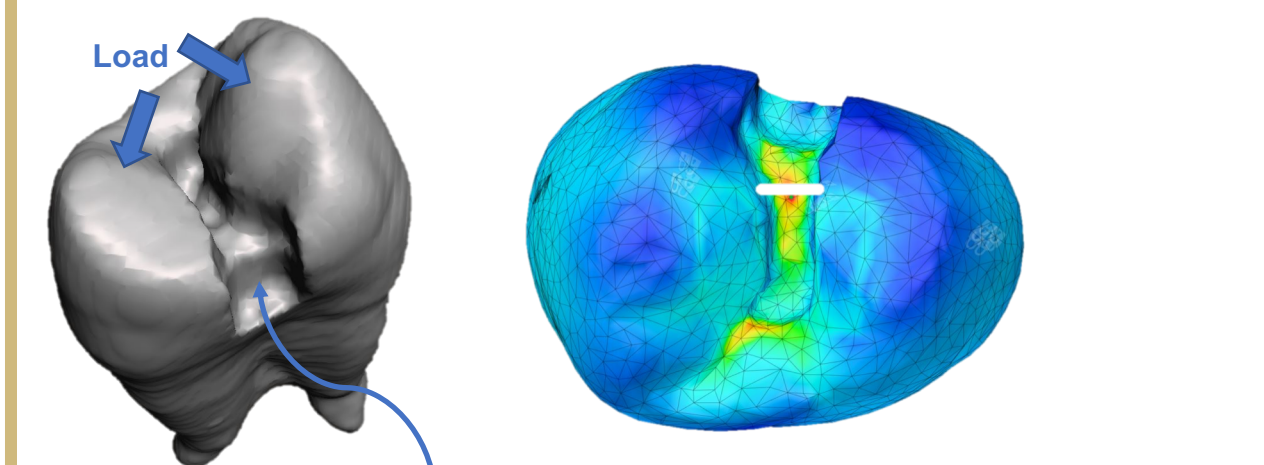
The resulting 3D renderings are imported to Simodont, where the hand forces and movements needed to prepare teeth accurately can be simulated while the operator views the work piece in a mouth-sized portal through stereoscopic glasses. Because the operator can see part of their hand holding a physical handpiece, and the other end of the handpiece in the virtual environment ("mixed reality"), the brain interprets the experience as though it really happened. As importantly, the models that are created can be exported for a variety of uses. In this novel project, prepared teeth are exported to 3D image files (.STL) to create load simulation models for stress analysis.

Objectives

- Novel use of haptic dental trainers
- Quantifiable, objective, consistent grading
- Understand biomechanical behavior of teeth
- Quantify load bearing potential of damaged teeth
- Create an artificial intelligence model
- Validate and/or modify current preparation designs

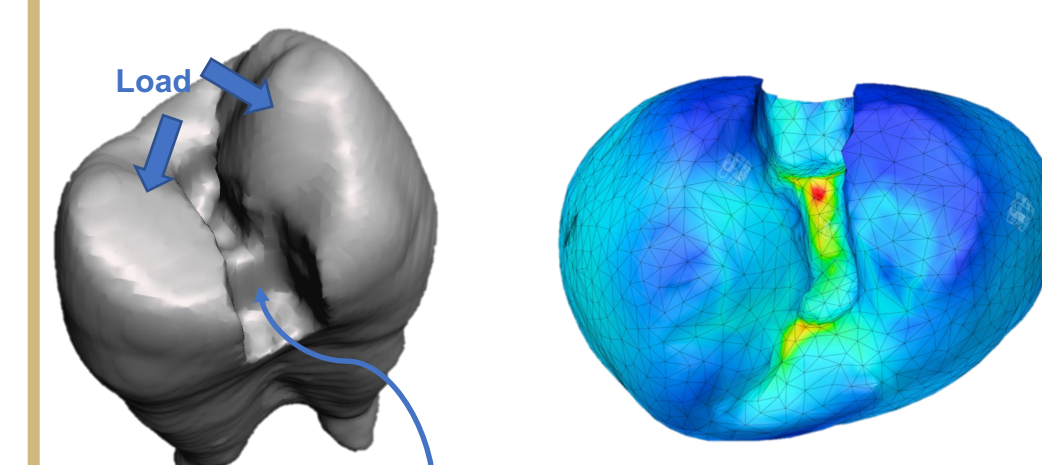
Methods and Early Results

1. CT scanned tooth is loaded into haptics unit



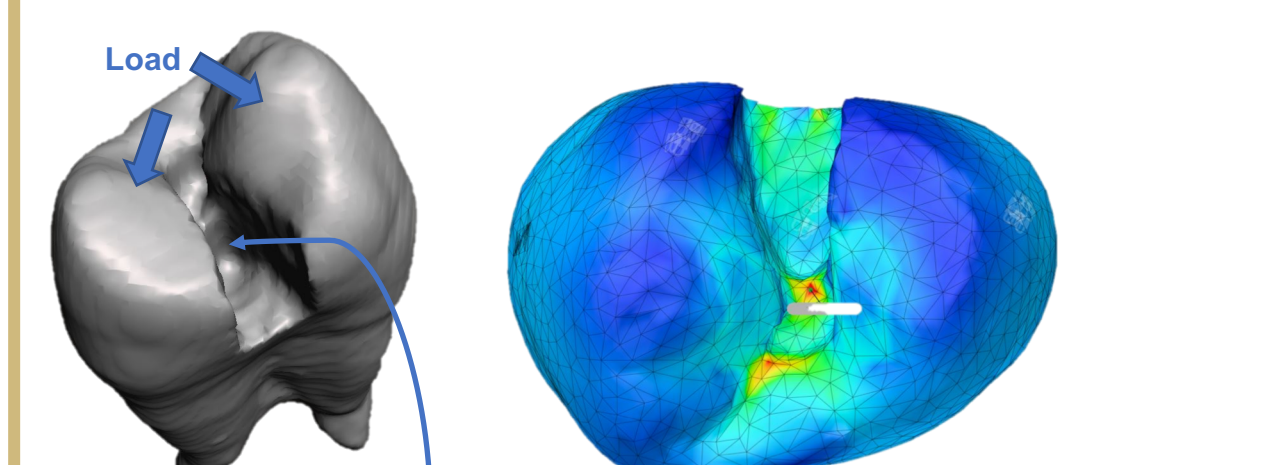
Axial wall depth 0.9 mm. Coronal yield occurs ~ 450N

2. Tooth is reduced by successively greater amounts

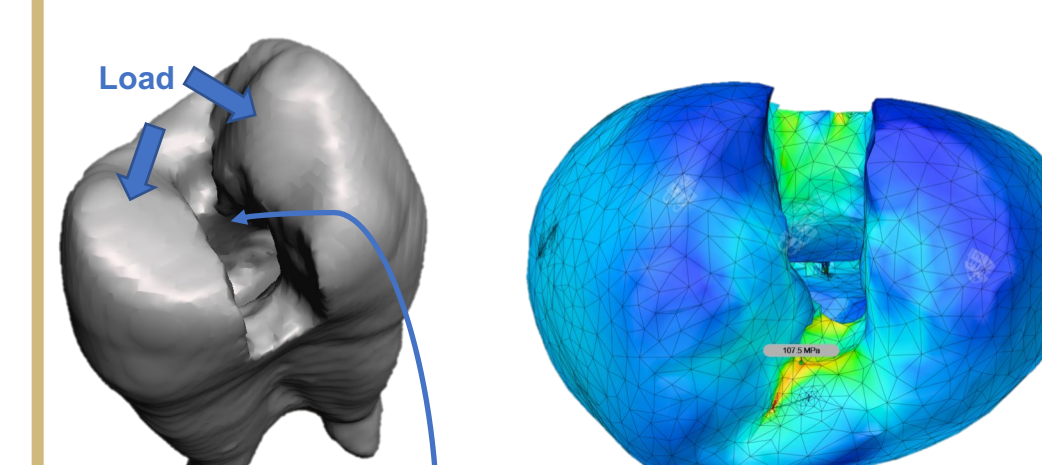


Axial wall depth 1.2 mm. Coronal yield occurs ~ 344N

3. Prepared tooth models are imported into load simulation (FEA) software

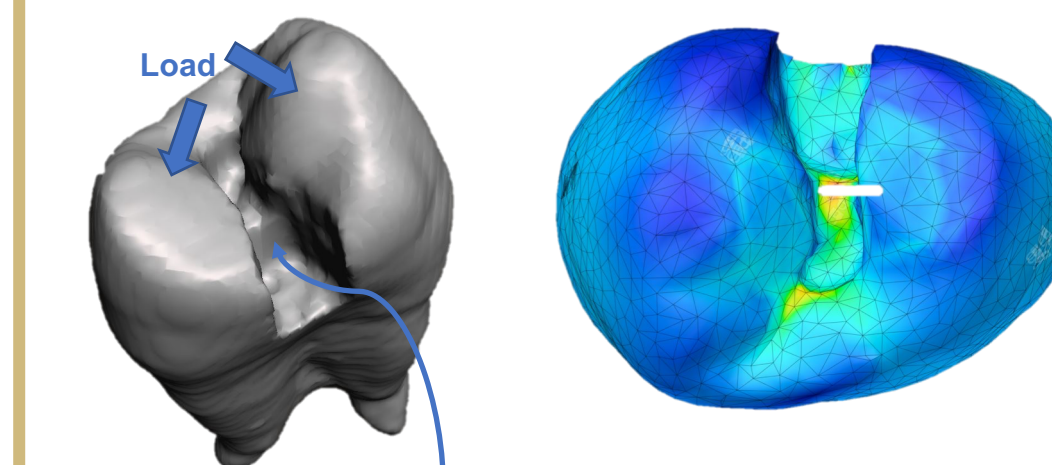


Axial wall depth 3.2 mm. Coronal yield occurs ~ 242N

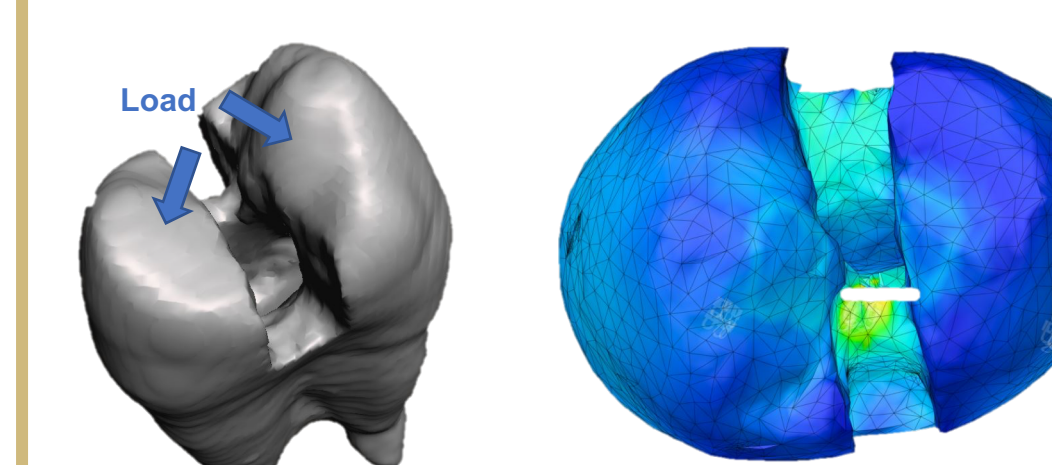


Axial wall depth 3.3 mm. Coronal yield occurs ~ 240N

4. Non-linear static load simulations are designed and executed



Axial wall depth 2.1 mm. Coronal yield occurs ~ 280N



Total axial reduction 4.4mm. Coronal yield occurs ~ 216N

5. Failure modes and loads are evaluated

6. Steps 1-5 are repeated for additional teeth & preps

7. Failure data by tooth & prep design is used to build a database

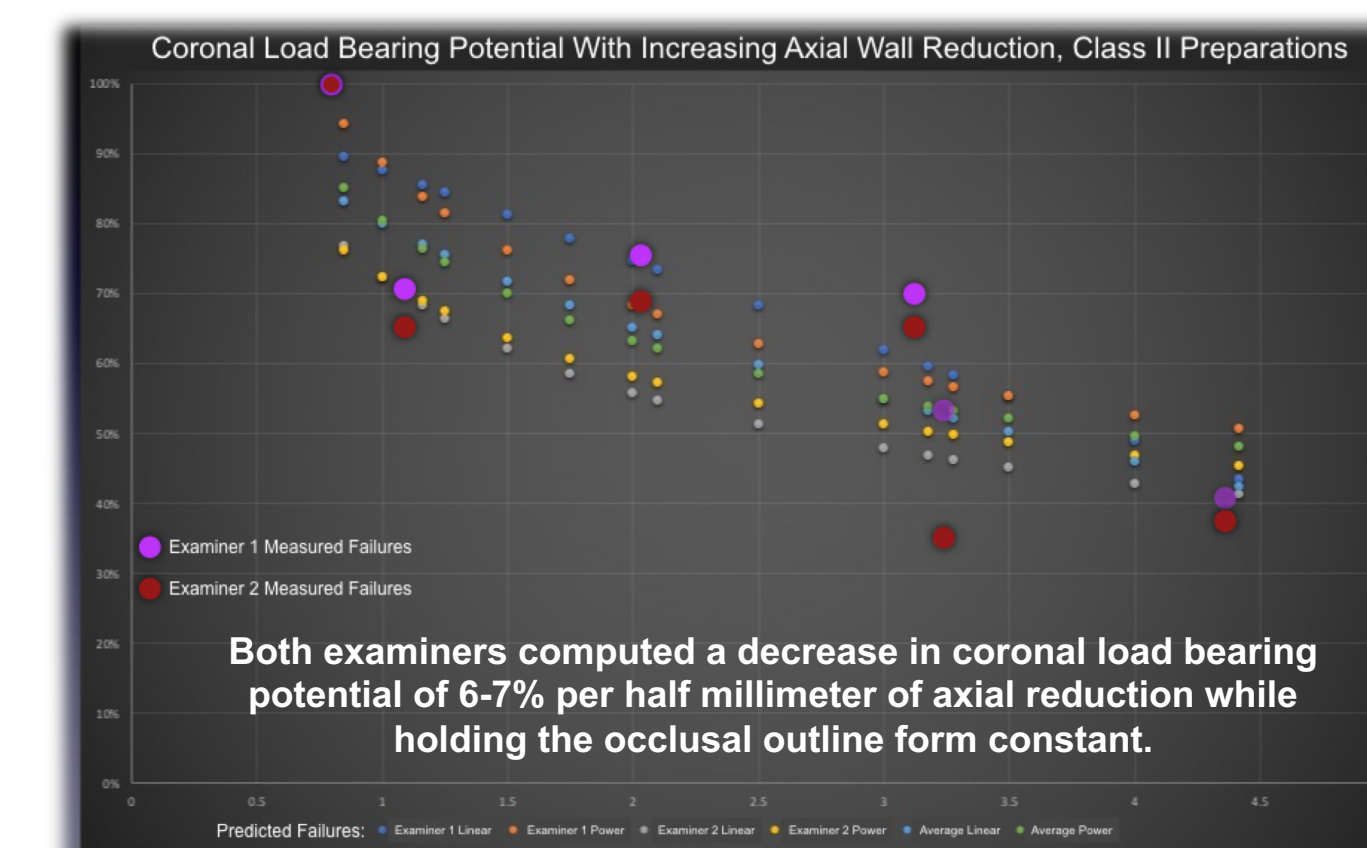
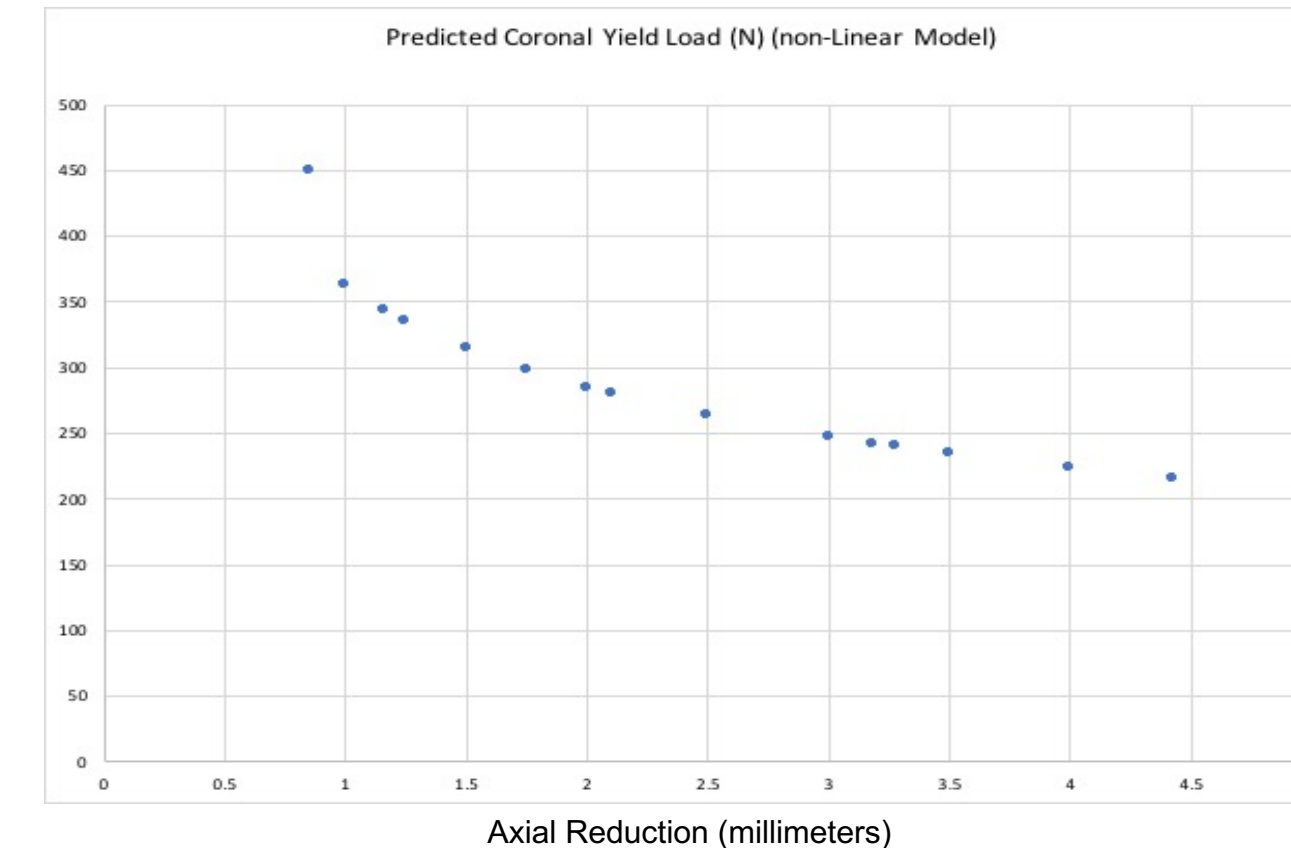
8. A prediction model is created

9. Grading of student work becomes objective and standardized

10. Prediction of tooth restorability can be quantified

In vivo dentin properties reported by Kinney, et al. (2003) were used to model mechanical performance of prepared teeth under a range of different load scenarios.² Four pre-doctoral dental students performed Class II cavity preparations ranging from conservative to aggressive. 3-D image files of the prepared teeth were exported for evaluation using non-linear load simulation (Finite Element Analysis).

Von Mises stress, strain and safety factor were computed and used to identify failure modes for each tooth preparation across a range of loads. All prepared teeth were compared to conservatively prepared versions of the identical teeth to assess load bearing potential. Failure modes and percent load bearing potential relative to the conservatively prepared teeth were used to determine the acceptability of axial wall reduction in each cavity preparation and to quantitatively assess load bearing potential as a measure of restorability.



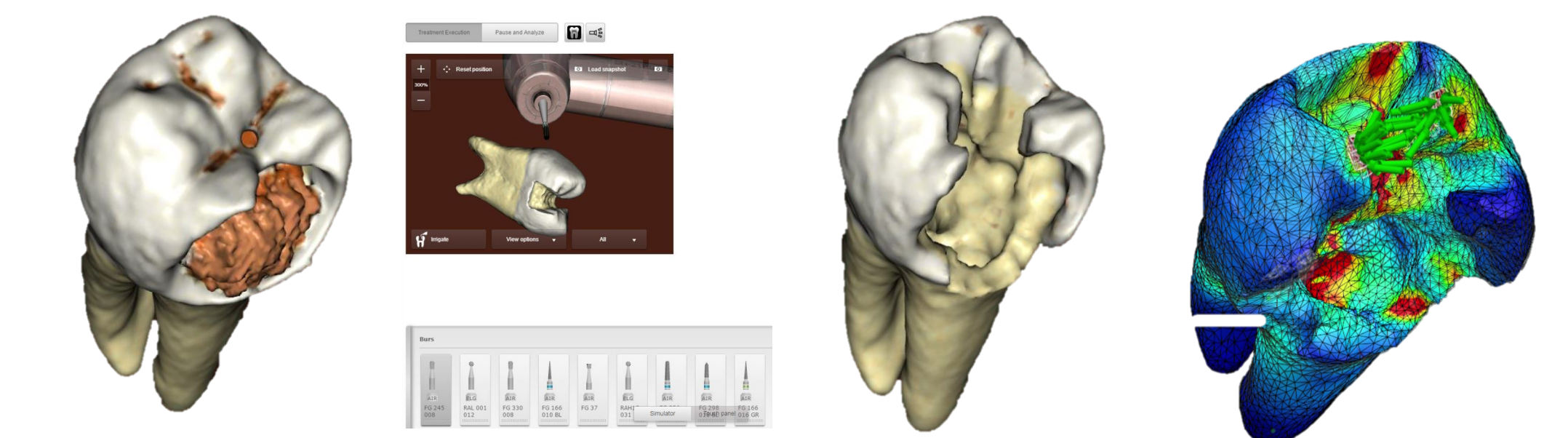
Conclusions

This project demonstrates the feasibility of numerically assessing dental student work with greater objectivity, using load bearing potential as a measure of the biomechanical stability of prepared teeth. The algorithm is also useful for predicting the load bearing potential of actual human teeth in vivo that are badly decayed or damaged, to help dentists assist their patients in making better informed decisions about when to save such teeth and when to have them removed and replaced.

A convergence of five recent technological advances has enabled this type of digital assessment of teeth to be performed accurately: 1) resonant ultrasound, to establish in vivo mechanical properties of human dentin; 2) narrow-field CT, to produce accurate layered models of human teeth with reasonable ionizing radiation exposure; 3) haptic dental trainers to create a library of realistic three-dimensional models of human teeth; 4) cloud computing to perform the complex calculations necessary to solve non-linear load simulations; and 5) machine learning to develop artificial intelligence models. Human capital is the other essential asset needed to advance these studies.

Future work on this project will involve preparation, load simulation, and analysis of virtual teeth with varying outline forms; and construction and maintenance of a human tooth model database to build an artificial intelligence application. Goals will be objective assessment of *all* student work in the field of restorative dentistry; and quantification of the load bearing potential of human teeth in clinical practice. Cross disciplinary collaboration will be essential.

An extensively decayed tooth, accurately rendered from a CT Scan is virtually debrided, exported to a 3-D image file and analyzed with FEA to measure its strength and failure modes:



References and Acknowledgements

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*Special thanks to Mr. Nicholas Evans, MS (CU SDM DS2) for his early assistance with NEI NASTRAN modeling; Mr. Kyle Duffee (CU SDM DS2); Mr. K. Chase Lewis, MS (CU SDM DS2); Mr. Kory Carpenter (CU SDM DS2) for their early assistance with haptic preparations; and to the Free Open Source Software (FOSS) vendors who supply essential software and cloud computing resources needed to accomplish this work free of charge to those in the .edu world.

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None of the authors have any conflicts of interest to declare.

Ultrasound Curriculum for Family Medicine Residency



Department of Family Medicine
UNIVERSITY OF COLORADO **ANSCHUTZ MEDICAL CAMPUS**

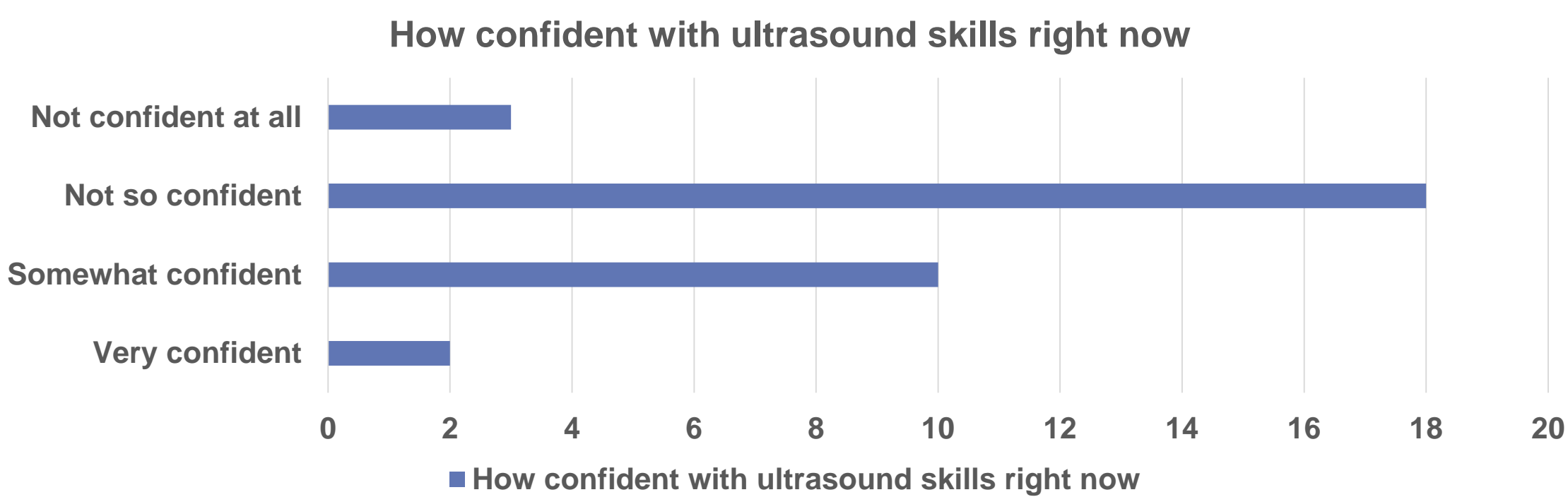
Molly Hoss, MD; University of Colorado Family Medicine Residency, Denver, CO

Background

Point of care ultrasound (POCUS) is one of the biggest advancements in bedside diagnosis since the stethoscope was brought into medicine around 200 years ago. POCUS refers to limited ultrasound protocols that are performed at the patient's bedside to assess for conditions and to guide treatment therapy. It is different from formal or comprehensive ultrasound in that these procedures are performed by trained sonographers and interpreted by radiologists. POCUS is becoming an important tool in family medicine practice which has shown to improve clinical outcomes, reduce failure and complication rates, rapidly narrow differential diagnosis, lower cost and reduce ionizing radiation exposure.¹ In 2016, the American Academy of Family Physicians passed a resolution encouraging all family medicine residency programs to include POCUS as part of their training.² As of the beginning of 2019, there was no ultrasound curriculum at the University of Colorado Family Medicine Residency.

Needs Assessment

- No current ultrasound curriculum
- PD requested development of new curriculum
- Scattered ultrasound exposure throughout residency training
- Residents sent survey for needs assessment (N=41; response rate=82%).
- 100% residents that responded want more ultrasound training
- Respondents desired longitudinal curriculum as opposed to one-off workshops



Goals and Objectives

Goal: To develop knowledge, skills and confidence of family medicine residents when using ultrasound in the clinical setting

Objectives:

1. Demonstrate basic knowledge of the ultrasound machine
2. Understand the indications, benefits, and limitations of ultrasound
3. Distinguish between anatomy, physiology, and pathology with ultrasound as demonstrated through workshops and real time with patients
4. Communicate results of ultrasound with patients, team, and via medical record which will be observed by an attending
5. Apply ultrasound to practice to guide clinical decision making which will be observed by the attending.

Intervention

Once monthly didactics for 1 hour

Residents given tutorial videos for flipped classroom 1 week before didactics

During didactics:

Short 20-minute refresher lecture

40 minutes hands-on training

Content: 1st trimester transabdominal and transvaginal ultrasound, OB limited ultrasound, OB biometry, Biophysical profile, Pelvic ultrasound, Cardiac, Lung, Fast/E-fast, Aorta, Biliary/abdominal ultrasound, DVT, Soft tissue, MSK

First lecture contains more physics and basic principles. Each additional lecture contains principles that correlate directly with that exam.

Bedside ultrasound rounds on Family Medicine Inpatient Service

Short chalk talks

Bedside ultrasound teaching

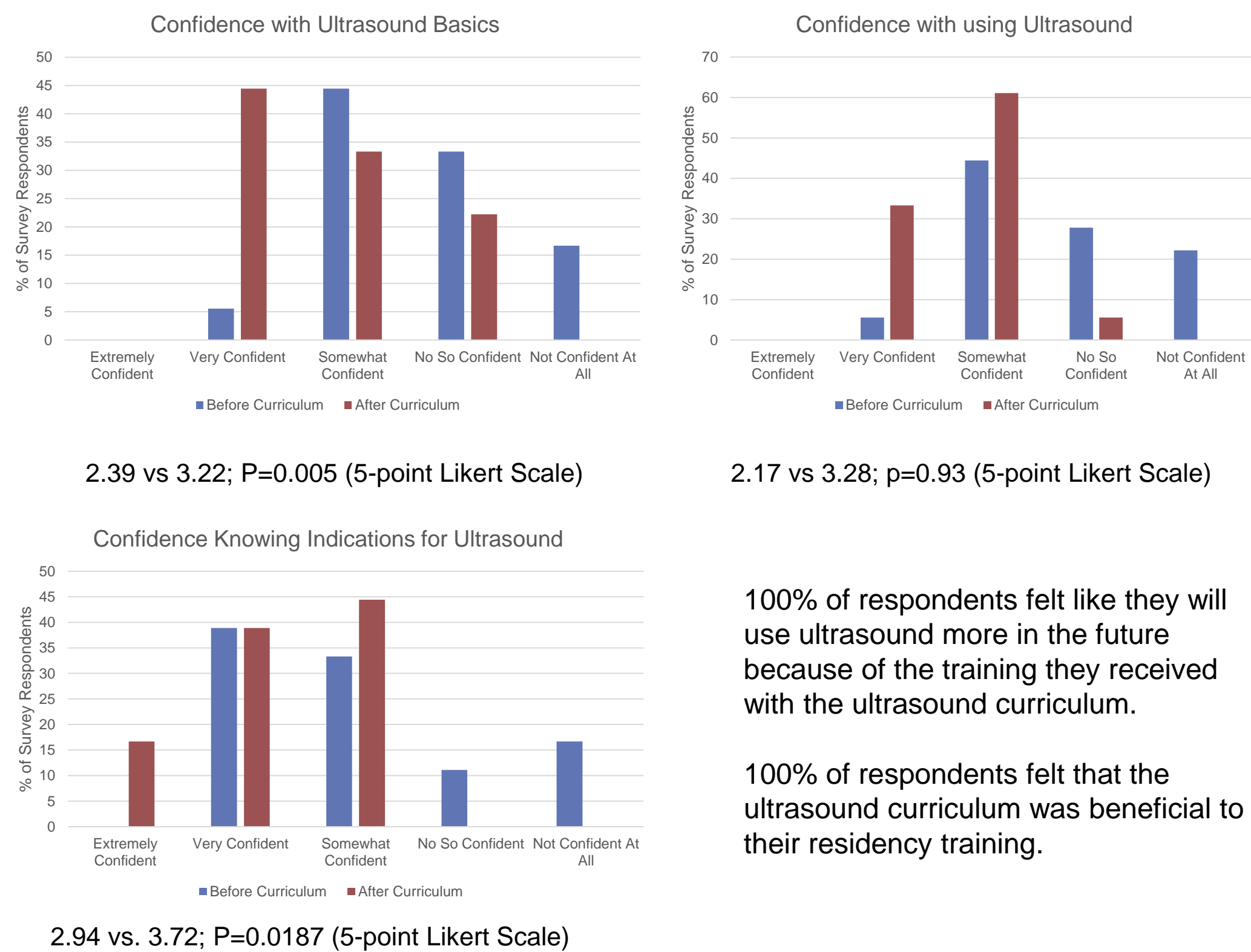
Available when trained faculty on service

References

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2. Bornemann, Paul, and Tyler Barreto. "Point-of-Care Ultrasonography in Family Medicine." American Family Physician, vol. 98, no. 4, 15 Aug. 2018, pp. 200–202.

Post-Intervention Results

Pre/Post Resident Survey Results (18/41 responses)



Next Steps

- Having hands-on workshops during didactics requires multiple instructors if we want small enough groups that will facilitate learning. Finding family medicine physicians to teach ultrasound is difficult due to limited training amongst the faculty. The next step would be to train the faculty in POCUS and utilize residents that already are competent in ultrasound.
- Now that we have introduced basic concepts of ultrasound to residents and increased confidence, I now want to work on strategies to develop competence in ultrasound.
- We have learners with variable ultrasound experience. I would like to create an ultrasound elective for those that would like more intense training.
- Incorporate ultrasound into objectives for EM, IM, MSK, ICU, and OB rotations.

Acknowledgements:

Thank you to the University of Colorado Family Medicine Residency and Program Director, Linda Montgomery, MD who allowed me to make this project possible. Special thanks to Mark Deutchman, MD and Corey Lyon, DO for their mentorship and resources to help implement this project. Finally, thanks to the residents for participating and the faculty and outside physicians that helped teach.

Student Perspectives on Interprofessional Professional Assessment & Feedback: Lessons Learned from the School of Medicine Implementation Pilot Site

Mike Levy, BA; Jonathan Layne, BS; Suzanne Brandenburg, MD; Eric Gilliam, PharmD

Background

Interprofessional Feedback in Medical Education:

- Medical School curricula may not collect formal feedback from non-physicians regarding student performance
- Interprofessional teamwork is key to modern healthcare delivery and a required competency for physician training
- Interprofessional feedback during clinical clerkships is not currently required in the CU SOM curriculum

The Modified Interprofessional Professional Assessment (IPA) Tool:

- A validated and reliable assessment of interprofessional behavior within the following domains: *Communication, respect, altruism and caring, excellence, ethics, accountability*
- Integrated into the third year Hospitalized Adult Care (HAC) rotation at Presbyterian - St. Luke's (PSL) Hospital
- Each rotating student was asked to solicit feedback from a non-physician team member via the modified IPA tool
- Results were collected electronically and returned to the student upon completion of the rotation

Objective:

- The goal of this qualitative study is to elicit student feedback about the modified IPA tool and to gain better understanding of how students value interprofessional feedback in clinical practice

Methods

Thematic Analysis of Semi-Structured Debrief Interviews:

- Students who received IPA feedback were invited to complete a deidentified semi-structured debrief interview about the following predefined thematic foci:
 - Interprofessional trust
 - The value of the interprofessional feedback received
 - The IPA evaluation and feedback process
- **Recording:** Investigator A used Zoom videoconferencing to conduct and record the interviews
- **Coding:** Investigator B coded the interviews using Dedoose (www.dedoose.com) qualitative research platform
- **Analysis:** Coded interview excerpts underwent thematic analysis allowing for emergence of themes and sub-themes
 - Investigators created consensus on the theme grouping

Results and Themes

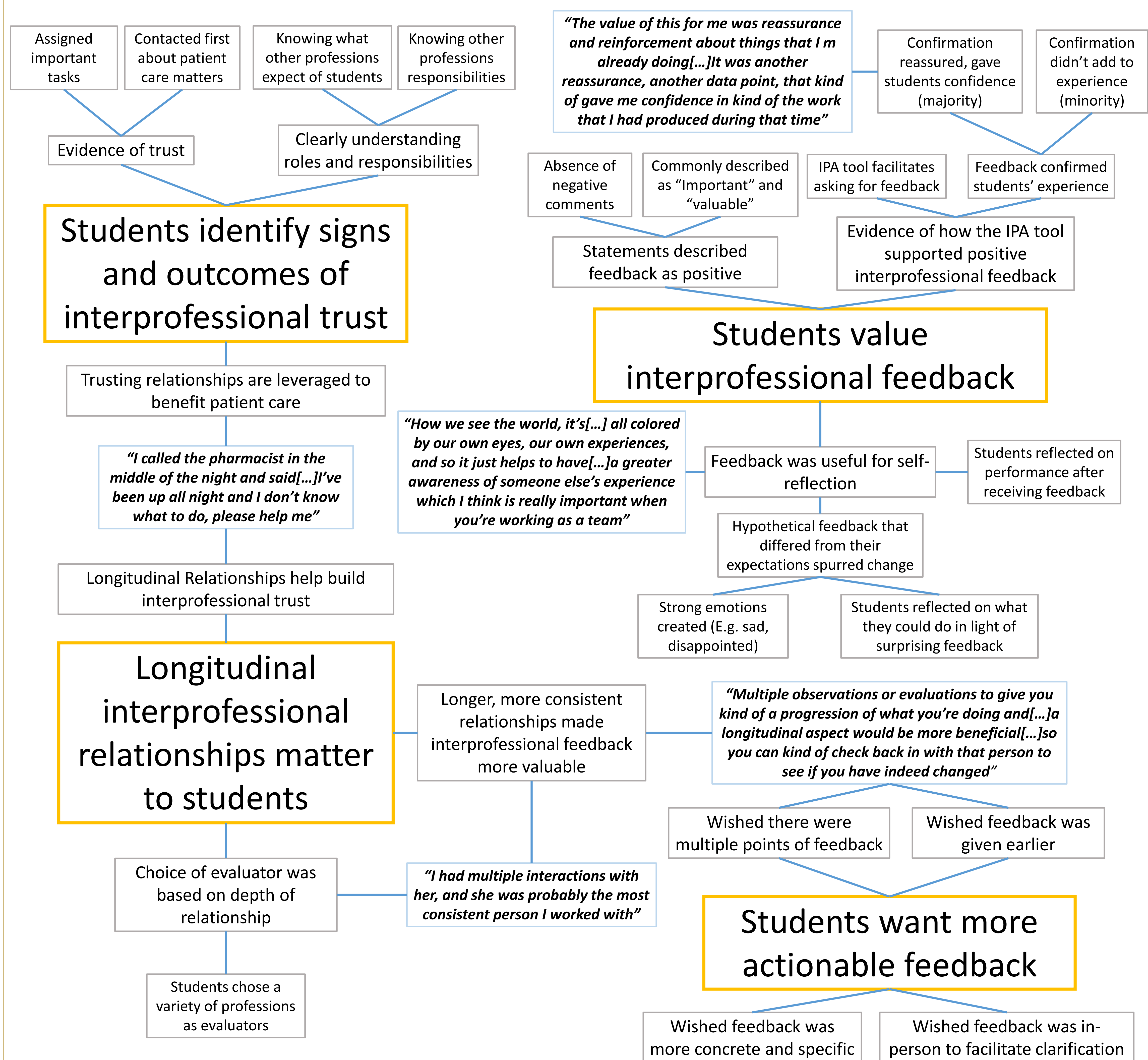
Participation:

- 9/55 students participated in the debrief study (16.3%). Participants participated in the pilot from 2017-2019.
- This included 194 minutes of interview, with 86 excerpts and 160 codes chosen

Results:

- Four primary themes emerged clarified by several supporting themes

Primary and Supporting Themes



Implications and Limitations

Implications:

- Students strongly value the role of interprofessional feedback during their clinical training
- Students appreciated many aspects of our implementation and provided new ideas to improve the process
- Students appear to have a good sense of their performance within interprofessional teams and can recognize evidence of being trusted by team members
- Students use the IPA feedback to reinforce their professional behavior, reflect on their performance, and improve in future rotations

Limitations:

- Data source limited to single site, medical students, with small sample size; Findings may not be generalizable to other contexts or professions
- Only one independent coder, with others confirming codes
- Students who opted not to participate may have had different opinions

Next Steps:

- Expanding to different locations and contexts (outpatient clinics, other hospital systems, etc.)
- Consider process improvements identified by students
- Further integration of interprofessional feedback in the new SOM curriculum using lessons learned from student feedback gathered

Acknowledgements

- CU Center for Interprofessional Practice & Education
- Dr. Chris King, Director and Angie Duet, Coordinator, HAC Block
- Dr. Lela Mansoori, Presbyterian - St. Lukes Hospital
- Janice Hanson, PhD, EdS, MH, Washington University in St. Louis

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1. The Interprofessional Education Collaborative (IPEC). Core competencies for interprofessional collaborative practice: 2016 update. Washington DC 2016
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Development and Implementation of Psychiatry Research and Scholarship Methods (PReMS) Curriculum into Residency Training

Susan K. Mikulich; Emmaly L. Perks; Kimberly S. Slavsky; C. Neill Epperson; Julie H. Wolfe; Joseph T. Sakai; Robert D. Davies

Department of Psychiatry, University of Colorado School of Medicine



COLOR-CODED KEY

There are 3 components to this study that are identifiable in each section (Objectives, Methods, Results, Conclusions) with a color: **Red, Brown, Green**. For example, **Curriculum Development/Implementation** is indicated in **Brown**.

BACKGROUND

- US Accreditation Council for Graduate Medical Education’s practice based learning and improvement competency requires residents demonstrate ability in: “...*locating, appraising, and assimilating evidence from scientific studies related to their patients’ problems and apply knowledge of study designs and statistical methods to the appraisal of clinical studies.*”
- Incomplete biostatistics knowledge among clinicians has been widely described for years [e.g. Swift et al (2009); McCullough et al (2018)]
- Windish et al. (2007) developed and validated assessment to reflect statistical methods and results most commonly represented in contemporary research studies that were published in 2005
 - Surveyed 277 medicine residents across 11 residency programs in 2006
 - Results showed poor understanding of biostatistics concepts and study interpretation, with most lacking necessary comprehension to interpret results in published clinical research
- Statistical methods used in clinical research have rapidly increased in complexity [e.g. Arnold et al (2013); McCullough et al., (2018)]
- CU Department of Psychiatry has invested considerable resources to expand research components of residency program

OBJECTIVES

1. **Assess attitudes, confidence, and knowledge of biostatistics in current CU Psychiatry residents and compare with prior study of Medicine residents**
2. **Describe process for development and implementation of the Psychiatry Research Methods and Scholarship (PReMS) curriculum**
3. **Evaluate changes in knowledge of research methods during PReMS curriculum in the inaugural CU PGY2 2019-2020 class**

METHODS

1. Methods: Assess Attitudes, Confidence, Knowledge

- Obtained IRB approval for volunteers from CU Psychiatry residency program in January 2020 to complete:
 - ❖ Windish et al (2007) assessment
 - 7 questions Attitude and Confidence interpreting and assessing statistics
 - 20 questions knowledge: multiple-choice; no calculations, vignettes
 - ❖ Developed 10-item multiple choice survey on additional current methods
 - e.g. mediation, intent-to-treat, moderating variables, study designs, biases
- Compared Psychiatry resident responses with those from medicine residents surveyed in 2006 using Chi-square and Fisher’s Exact Tests

2. Methods: Development and Implementation of PReMS

- Department leadership requested faculty member (Professor/Biostatistician) expand research didactics for PGY2x to 12 sessions (75% in 1st half of year)
 - Each given month for scholarly projects during 2nd half of year
- Course director worked with pedagogy and residency program experts to develop PReMS curriculum:
 - Backwards Design model (Wiggins et al, 2011)
 - Kern et al (2010) Six-Step approach to curriculum development
- Implementation began September 2019; Finishes June 2020
 - Modified requirements early on after PGY2s initial feedback

3. Methods: Evaluating Knowledge Acquired during PReMS

- Change in knowledge survey scores at midpoint of course in volunteer PReMS recipients was evaluated with Wilcoxon Signed Rank Test

RESULTS

- 22 of 32 CU Psychiatry resident volunteers completed assessment:
8 / 13 PGY2s 9 / 12 PGY3s 5 / 6 PGY4s

1. Results: Attitudes and Confidence

Table 1. Attitudes in Medicine Residents Surveyed in 2006 and CU Psychiatry Residents Surveyed in 2020
**Values of percent correct < 50% in red

Attitude Questions Regarding Statistics* Endorse = Agree or Strongly Agree *Windish et. al. (2007)	N=277 PGY1-PGY4 Medicine Residents Percent Endorsed	N=22 PGY2-PGY4 Psychiatry Residents Percent Endorsed	Chi-Square or *Fisher’s Exact Significance
Would like to learn more about statistics	77%	36%	p < 0.0001
Understand almost all statistical terms in literature	25%	18%	p = 0.4795
Do not trust statistics because is easy to lie	15%	9%	p = 0.4391
Often use statistics in forming decisions/deciding about care	58%	68%	p = 0.3561
To read literature, knowledge of statistics is necessary	95%	96%	p = 1.0*

Table 2. Confidence in Medicine Residents Surveyed in 2006 and CU Psychiatry Residents Surveyed in 2020
**Values of percent correct < 50% in red

Confidence Questions Regarding Statistics* Endorse = Fair to High Confidence *Windish et. al. (2007)	N=277 PGY1-PGY4 Medicine Residents Percent Endorsed	N=22 PGY2-PGY4 Psychiatry Residents Percent Endorsed	Chi-Square or *Fisher’s Exact Significance
Confidence interpreting a p value	88%	100%	p = 0.15*
Confidence interpreting statistics results	68%	91%	p = 0.024
Confidence assessing if correct statistics were used	38%	36%	p = 0.8858
Confidence identifying factors of power	55%	59%	p = 0.7018
Additional Question (Q): Confidence evaluating medical literature		91%	
Additional Q: Confidence formulating a testable hypothesis		86%	
Additional Q: Confidence minimizing bias in study design		77%	

1. Results: Knowledge of Biostatistics and Methods

Table 3. Knowledge in Medicine Residents Surveyed in 2006 and in CU Psychiatry Residents Surveyed in 2020
**Values of percent correct < 50% in red

Item Number from the Biostatistical Knowledge Test Survey* and Targeted Objective *Windish et. al. (2007)	N=277 PGY1-PGY4 Medicine Residents Percent Correct	N=22 PGY2-PGY4 Psychiatry Residents Percent Correct	Chi-Square or *Fisher’s Exact Significance
1a. Identify continuous variable	43.7%	27.3%	p = 0.1339
1b. Identify ordinal variable	41.5%	50.0%	p = 0.4380
1c. Identify nominal variable	32.9%	27.3%	p = 0.5906
2. Identify case-control study	39.4%	36.4%	p = 0.7823
3. Recognize purpose of double-blind in study	87.4%	86.4%	p = 0.7493*
4a. Identify Analysis of Variance (ANOVA)	47.3%	45.5%	p = 0.8680
4b. Identify chi-square test	25.6%	40.9%	p = 0.1192
4c. Identify independent t test	58.1%	81.8%	p = 0.0294
5. Recognize definition of bias	46.6%	72.7%	p = 0.0181
6. Interpret the meaning of p value > 0.05	58.8%	77.3%	p = 0.0892
7. Identify Cox proportional hazard regression	13.0%	22.7%	p = 0.2012*
8. Interpret standard deviation	50.2%	68.2%	p = 0.1039
9. Interpret 95% Confidence Interval and significance	11.9%	0%	p = 0.1485*
10. Relationship among power, sample size, and significance	30.3%	54.6%	p = 0.0192
11. Evaluate specificity of test	56.7%	68.2%	p = 0.2934
12. Interpret unadjusted odds ratio	39.0%	77.3%	p = 0.0005
13. Interpret odds ratio from multiple regression	37.4%	36.4%	p = 0.9122
14. Interpret relative risk	81.6%	100%	p = 0.0190*
15. Determine strength of evidence for risk factors	17.0%	9.1%	p = 0.5486*
16. Interpret results from Kaplan Meier analysis	10.5%	0%	p = 0.1459*
Mean (Standard Deviation SD) Cumulative Percent Correct	41.1% (SD=15.2%) Range 10%-90%	49.1% (SD=13.7%) Range 10%-70%	

2. Results: PReMS Curriculum Development

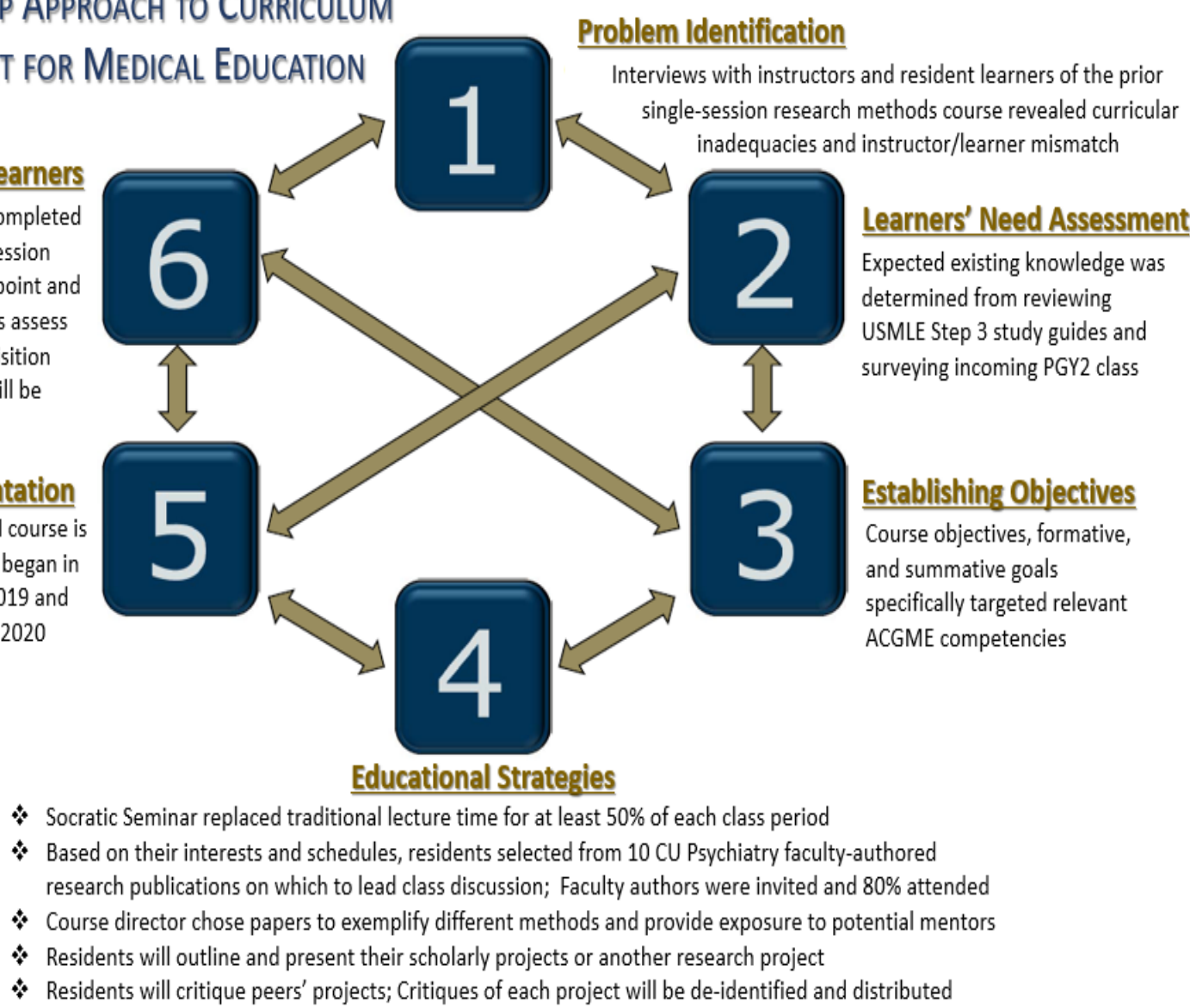
KERN’S 6 STEP APPROACH TO CURRICULUM DEVELOPMENT FOR MEDICAL EDUCATION

Evaluation of Learners

- ❖ Exit tickets are completed following each session
- ❖ Pre-PReMS, midpoint and Post-PReMS tests assess knowledge acquisition
- ❖ Course ratings will be obtained

Implementation

The inaugural course is underway. It began in September 2019 and finishes June 2020



3. Results: Knowledge Midway during PReMS

Table 4. Knowledge of Research Methods in PGY2 Residents Before and Midway during PReMS
**Values of percent correct < 50% in green

10-Item Multiple-Choice Survey We Developed Querying Additional Statistical and Research Methods Common in Current Literature	Before PReMS 09/2019; N=13 Percent Correct	Midway PReMS 01/2020; N=8 Percent Correct
1. De-identifying test is to prevent which types(s) of bias	38.5%	62.5%
2. In ANOVA, test for evaluating relationships between outcome and confounder, covariate, predictor, and moderating variable	7.7%	50.0%
3. Causes of erroneous results for associations among outcomes	84.6%	87.5%
4. Study design where exposure and outcome measured at same time	69.2%	87.5%
5. Identify types of paired study designs of educational intervention	23.1%	37.5%
6. Identifying selection bias, measurement bias, and confounding as biases that could impact a research study	84.6%	50.0%
7. Binomial regression better than logistic regression for estimating risk of predictors of an outcome with prevalence > 10%	15.4%	75.0%
8. The principle of intent to treat (ITT) and corresponding ITT analysis	15.4%	12.5%
9. In describing results from a study that compares two groups, identify condition(s) when reporting power is important	7.7%	12.5%
10. Conditions under which a variable may be mediator	23.1%	25.0%
Mean (Standard Deviation SD) Cumulative Percent Correct	36.9% (SD=14.9%) Range 10%-60%	50.0% (SD=9.3%) Range 30%-60%

Wilcoxon Signed Rank Test of change in scores for N=8 with both: **p = 0.0078** indicates significant increase in knowledge from baseline to midway through PReMS

CONCLUSIONS

Attitudes: (Table 1)

- Similar to Medicine residents surveyed 15 years ago, 95% of our Psychiatry residents believe knowledge of statistics is necessary to read the literature
- But significantly fewer our current CU Psychiatry residents (36%) want to learn more about statistics compared to those Medicine residents (77%)

Confidence: (Table 2)

- Like Medicine residents, the majority of Psychiatry residents (> 62%) lack confidence assessing if correct statistics were used
- However, significantly more Psychiatry residents (91%) report confidence interpreting statistical results than Medicine residents (68%)

Knowledge: (Table 3)

- Correct responses were significantly greater in our Psychiatry residents compared to Medicine residents surveyed 15 years early for 20% of questions
- However, as with Medicine residents, percent of our Psychiatry residents with correct responses remained below 50% (red) for half of the test items and so did the average cumulative score

Changes in Knowledge during PReMS for PGY2s (Table 4)

- Correct responses increased for 9/10 questions midway through PReMS and improvement in average cumulative knowledge score is modest but significant
- Limitation: Only 8 of 13 residents in PReMS were assessed at midpoint
- Implementation still ongoing**
 - Course evaluations and re-assessment of knowledge once residents complete PReMS will be important to assess final impact and potential modifications



Understanding the Gaps: A Qualitative Study Ascertaining the Educational Value of Geriatric Care Transitions Conference Calls for Internal Medicine Residents

Roxana Naderi, MD, Tyson Oberndorfer, MD, MS, Sarah Jordan, MA, Blythe Dollar, MPH, Ethan Cumbler, MD, Christine D. Jones, MD, MS
University of Colorado School of Medicine



KEY POINT

✓Residents gain valuable insights in the spectrum of care for their patients by participating in multidisciplinary conference calls

BACKGROUND

- Limited literature on resident curricula for geriatric transitions of care

PURPOSE

- Understand resident perceptions of the educational value of joint discussions between inpatient and outpatient teams caring for elderly patients across transitions.
- Determine if these experiences changed their practice or attitudes pertaining to transitions of care.

METHODS

- Acute Care of the Elder (ACE) unit implemented weekly multidisciplinary video-conference calls with Geriatrics Clinic to discuss mutual patients
- Residents participated in these calls to summarize hospital course, follow up needs, and answer questions for clinic
- Semi-structured interviews with residents rotating on the ACE unit were recorded, transcribed, and analyzed inductively using thematic analysis, managed with ATLAS.ti software.
- Team based iterative approach was used for coding and analysis.

PARTICIPANT CHARACTERISTICS

9 Senior Residents, 2 Interns



RESULTS

Overarching Theme: Dawning Awareness of Educational Blind Spots

- Residents discovered new educational insights through this transitions of care experience.**
“There’s not good education about recognizing how to combine a medical judgment with social considerations of when a patient is ready to leave the hospital. Melding those two was something that I learned a lot more about through the calls...” Second Year Resident

Theme 1: Increased awareness of social complexities

- Residents recognized how barriers to care influenced patients’ readmission risk, including affordability of medications, home life stability, and access to care.**
“Your job isn’t just to get them out of the hospital, but to make sure that when they are discharged, they have the correct follow up, they can afford the prescriptions in the plan that you’re discharging with, the medications can be afforded and continued...” First Year Resident

RESULTS, CONTINUED

Theme 2: Deconstructing siloes across care settings

- Residents gained a stronger sense of their role within the larger scheme of a patient’s overall care transition.**
“It’s just a reminder that my role is part of a continuum of care and I need to be thinking about what ways I can contribute to that continuum and how I’m setting my colleagues up for success on the outpatient setting.” Second Year Resident

Theme 3: Recognizing the value of different disciplines during transitions

- Residents cited pharmacy and case management/ social work as teams that provide unique, individualized care.**
“The discussion went as far as addressing the medication check from the pharmacist’s standpoint, follow up services from the social worker’s case management standpoint... the care of the patient as an individual from a multidisciplinary perspective. It involves a huge team that I never knew existed.” Second Year Resident

CONCLUSIONS AND NEXT STEPS

- Multi-disciplinary transitional care conferences between inpatient and outpatient providers provides a unique experiential curriculum offering insight and feedback not traditionally found in usual clinical care or classroom didactic transition education.
- Residents initially perceived these calls through the lens of a clinical obligation but ultimately derived educational insights from the experience.
- Residency programs can more explicitly highlight the educational value of multidisciplinary transitions of care programs to solidify clinical learning experiences.



Talking Hospitalist – Improving Provider Resilience Through Communication Skills Practice

Lisa Fosnot, MD; Roxana Naderi, MD; Jessica Camacho MD; Patrick P. Kneeland MD
University of Colorado School of Medicine



Division of Hospital Medicine
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

LEARNING OBJECTIVE

✓ Evaluate the efficacy of a model for low-cost, high-yield, work-integrated approach to communication skills development to improve provider experience.

BACKGROUND

- Burnout impacts patient safety and experience, and provider turnover and well-being.
- Enhanced communication skills can foster personal resilience, improve efficiency of practice, and bolster professional fulfillment



HYPOTHESIS

A low-cost, high-yield professional development program for providers focusing on enhancing communication skills could positively impact hospitalist well-being

CURRICULUM DEVELOPMENT

- Electronic survey to identify the most common communication challenges (n = 43/71, 60% response rate).

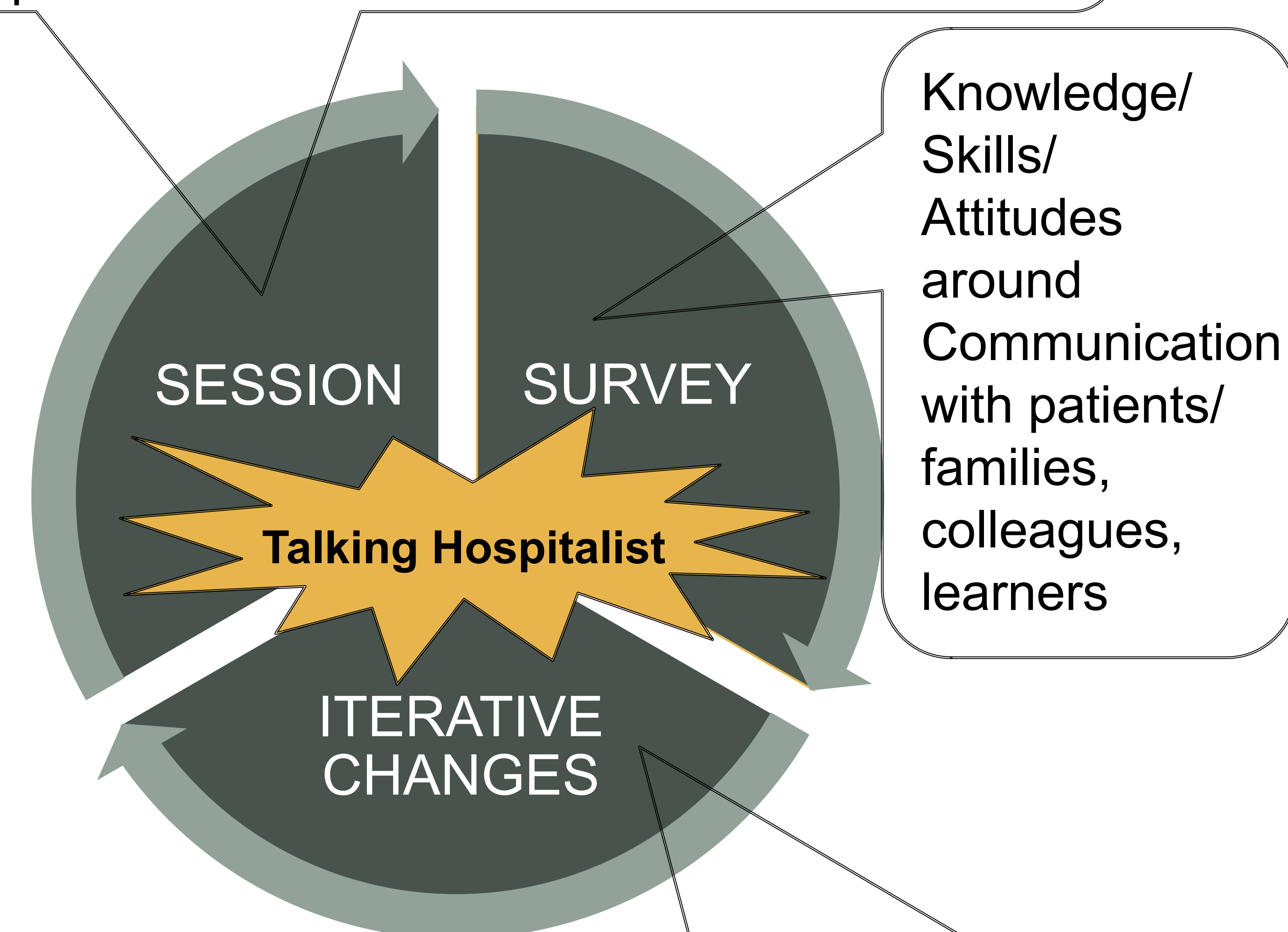
89% of our clinicians identified that communication challenges negatively impact job satisfaction

- Developed a four-part, hour-long, peer-led communication skills workshop to practice evidence-based communication skills
- Piloted a series of 3 cycles with iterative changes
- Certification Pathway for providers who completed 3 or 4 sessions

INNOVATION

Talking Hospitalist Communication Series

- Develop ground rules and learning objectives
- Review communication framework
- Observed skills practice using real-life scenarios with peer feedback



- Timing of session during work-week, lunch provided
- Multiple session options to accommodate hospitalist schedules
- Increased number of scenarios

Topics Discussed (2 sessions each):

Transitions in Care	Pain Management
Interactions with Learners	Challenging Patients/ Families

RESULTS

Certification Pathway (N=6)



Increased confidence managing challenging conversations with patients



Challenging patient conversations negatively impact job satisfaction-but this improved with the Talking Hospitalist series

Increased use of Reflective Listening, Joint Agenda Setting, PEARLS communication tool

Total Participants (N=39)

How likely are you to recommend this session? (1-10)	9.1
Good use of your time? (1-5)	4.5

CONCLUSIONS

- Hospitalists who chose to participate in communication skills training may experience improved job satisfaction and enhanced well-being.
- While participation one time in voluntary communication skill-building was high and deemed valuable by hospitalists, a certification pathway of 3+ sessions proved difficult logistically for participants.

ACKNOWLEDGMENTS

Statistical support from Monica McNulty

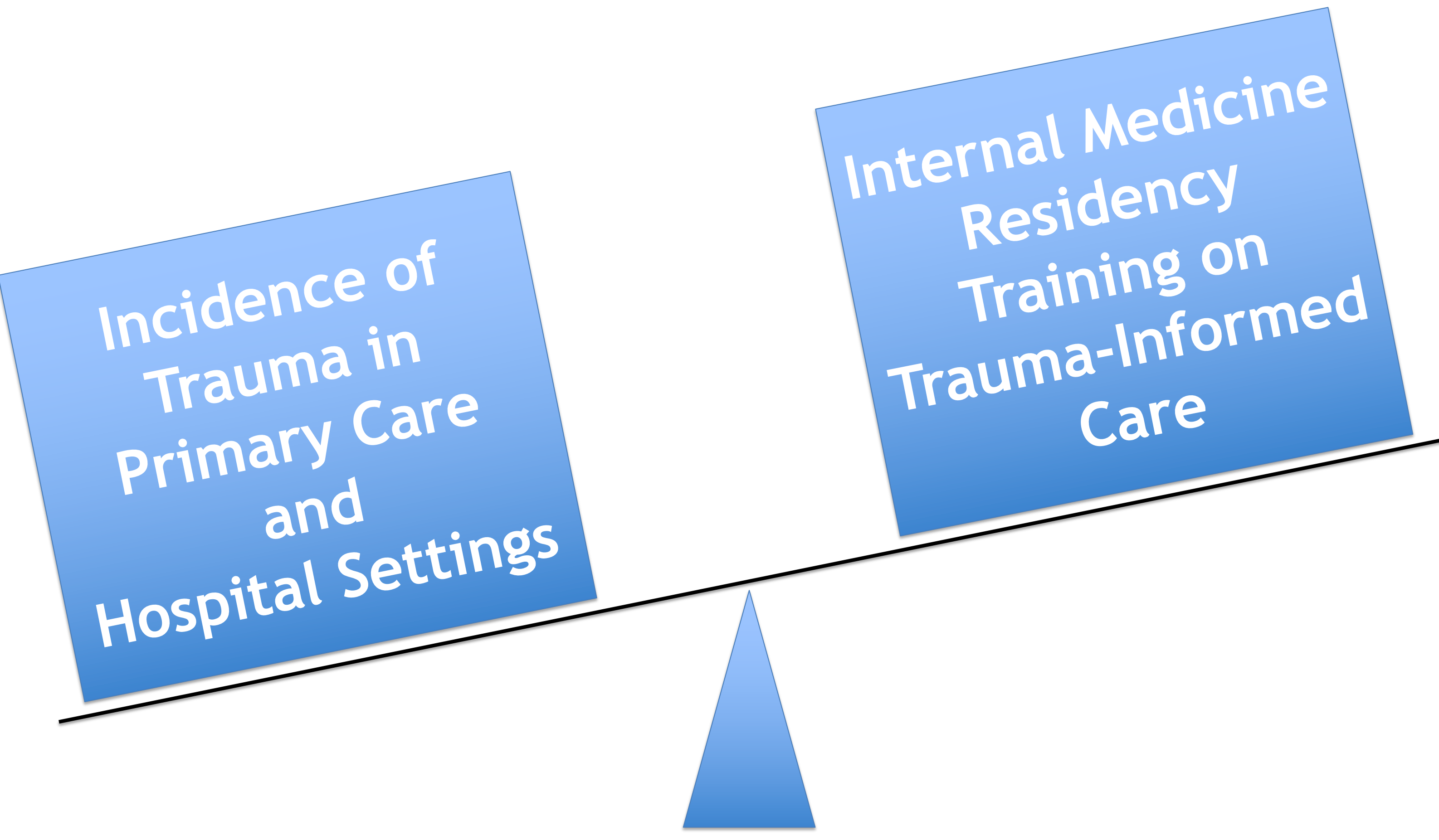
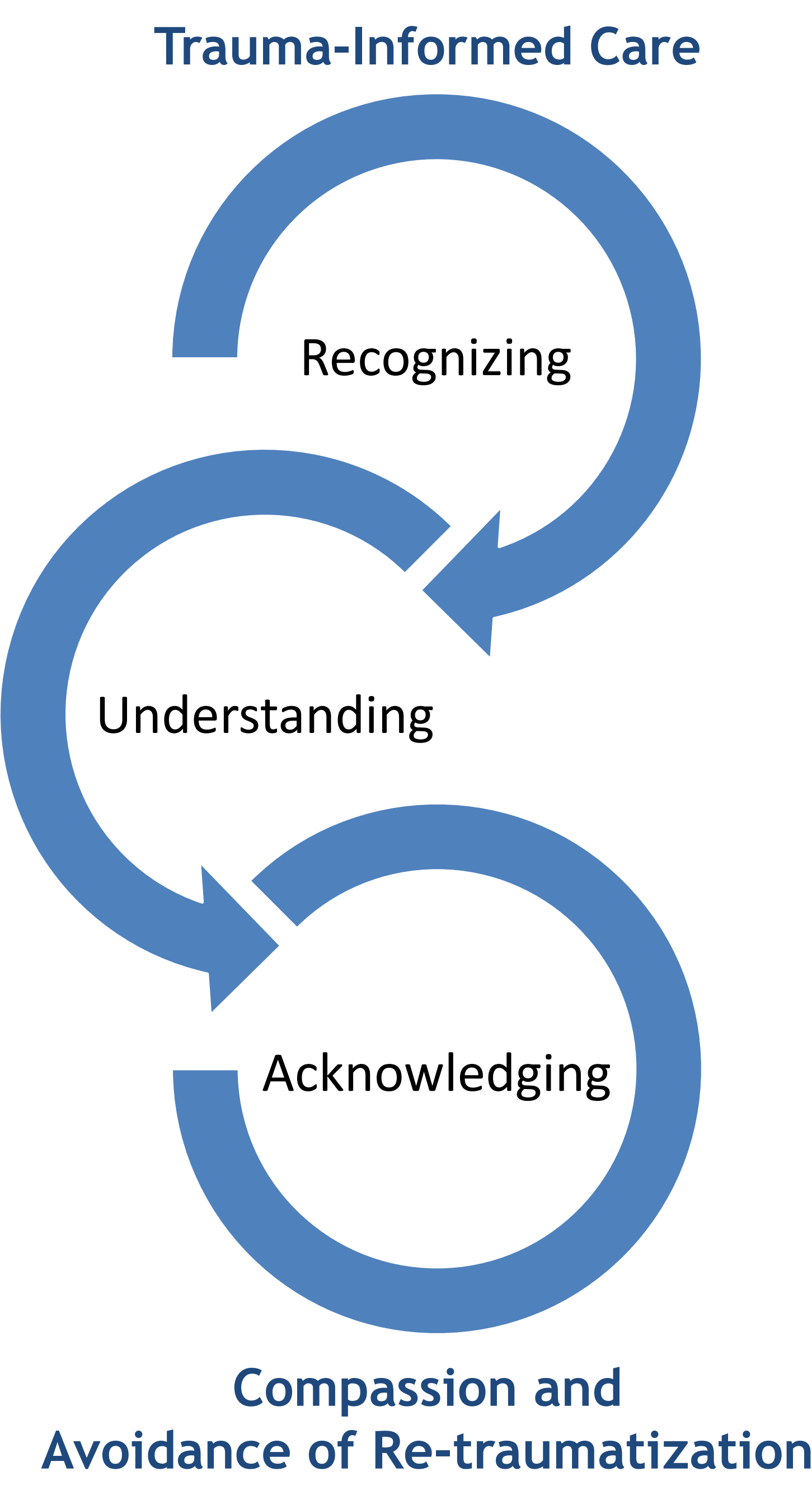
Impact of a Trauma-Informed Care Workshop on Internal Medicine Residents' Knowledge, Attitudes, and Behaviors Regarding Trauma and Trauma-Informed Care

Deepa Ramadurai, MD^{1,2}; Julie Knoeckel, MD^{2,3}; Ellen E. Sarcone, MD^{2,3}; Roger J. Stace, MComm⁴; Jennifer Perlman, PsyD⁵; Sarah A. Stella, MD^{2,3}

¹Internal Medicine Residency Program, Aurora, CO, USA ²Department of Medicine, University of Colorado School of Medicine, Aurora, CO ³Department of Medicine, Denver Health Hospital Authority, Denver, CO, USA ⁴University of Colorado School of Business School, Denver, CO, USA ⁵Colorado Coalition for the Homeless, Denver, CO, USA

Learning Objectives

1. Define trauma and differentiate between different types: developmental, single event trauma, cultural and intergenerational.
2. Describe the impact of trauma on patients seeking medical care.
3. Understand and apply information from the Adverse Childhood Experience (ACE) Study in interviewing and examining a patient with a history of trauma.
4. Learn practical tools to aid in fostering connection, empowerment, hope and sensitivity for patients who have experienced trauma.
5. Understand the impacts of vicarious trauma and compassion fatigue on healthcare providers, and tips for addressing this.



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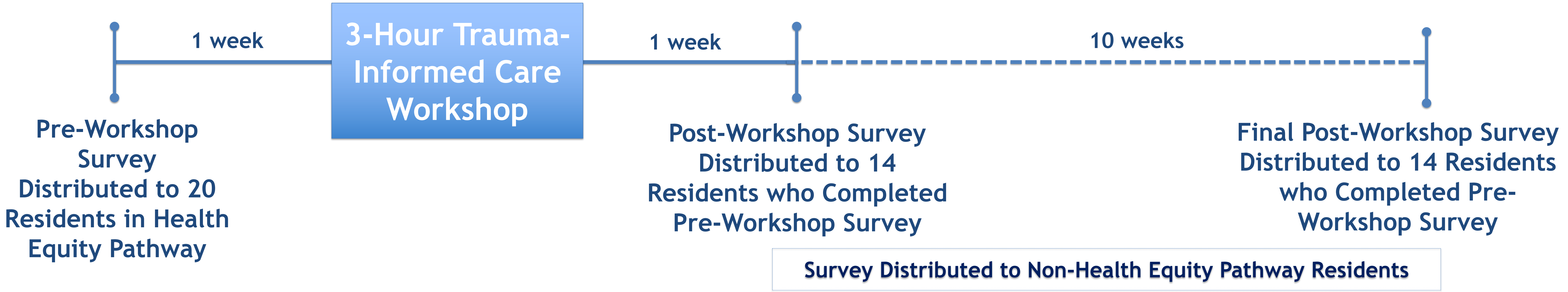
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Methods



Conclusions

TIC training is an important **gap** in IM residency with residents **desiring** this training.

An innovative TIC workshop influenced residents' self-reported **knowledge** and **attitudes**, and **skills** related to this topic.

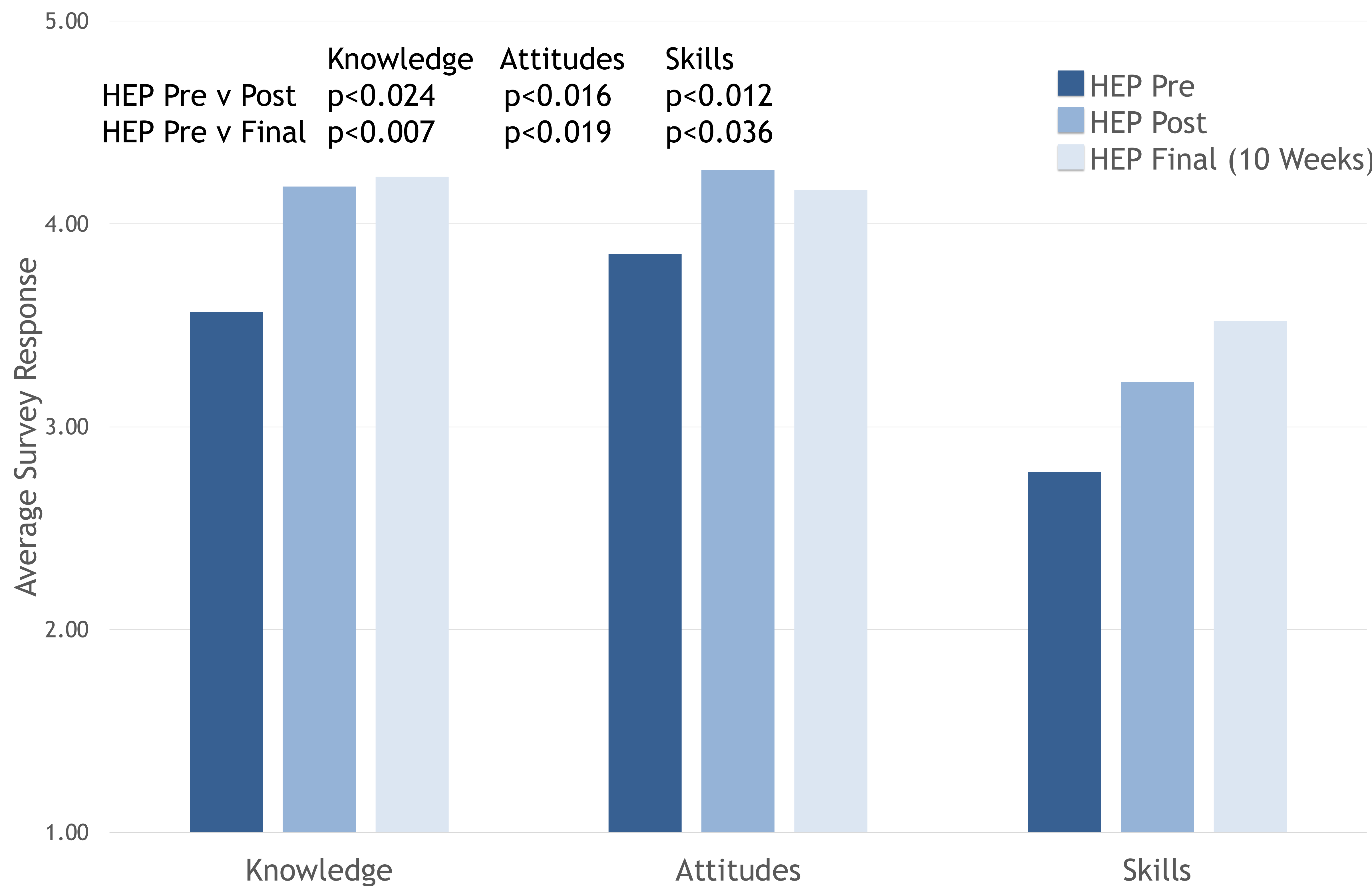
Additional **practical** training may be beneficial.

Results

Table 1. Survey Responses

Pathway	Survey Completed	Total (%)	PGY-2 (%)	PGY-3 (%)	Gender, male (%)
HEP	Pre-Workshop	14 (70)	5 (35.7)	9 (64.3)	9 (64.3)
HEP	Post-Workshop	11 (71)	5 (50)	5 (50)	7 (70)
HEP	Final (10 Weeks)	7 (50)	2 (28.6)	5 (71.4)	5 (71.4)
Non-HEP	N/A	23 (27.7)	14 (60.9)	9 (39.1)	13 (56.5)

Figure 1. Effect of Trauma Informed Care Training on Medical Residents



What was the most important thing you learned from the Trauma-Informed Care Workshop?

- “How to recognize past trauma in patient's even when it is not something they directly report”
- “Learning about the ACE study, which I had never heard of.”
- “[Learning] new ways to ask for permission”
- “Trauma informed care could be an orientation like patient-centered care”
- “How to talk to patients in order to make them feel more comfortable in medical settings”

Acknowledgements

University of Colorado Internal Medicine Residency Training Program
Program Director: Dr. Geoffrey Connors

Health Equity Pathway Leadership:
Dr. Sarah Stella, Dr. Ellen Sarcone, and Dr. Julie Knoeckel

Jennifer Perlman, PsyD
Colorado Coalition for the Homeless

A Case-Based Critical Care Curriculum to Address Social Determinants of Health Creates a Valuable Reflective Space for Internal Medicine Residents

¹University of Colorado Internal Medicine Residency Training Program, Aurora, CO ²Denver Health and Hospital Authority, Division of Hospital Medicine, Denver, CO ³Denver Health and Hospital Authority, Division of Pulmonary Sciences and Critical Care Medicine, Denver, CO ⁴University of Colorado, Division of Pulmonary Sciences and Critical Care Medicine, Aurora, CO

Needs Assessment

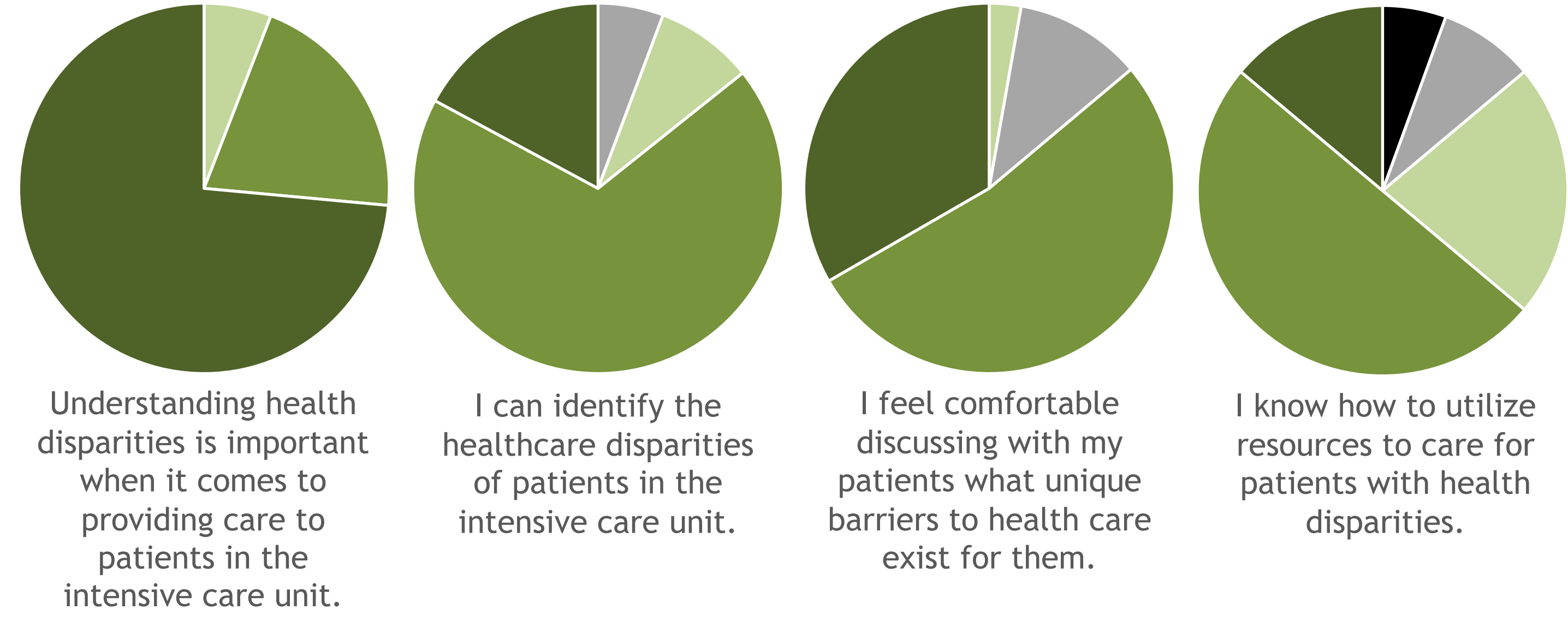
38/120 Internal Medicine Residents

28% PGY-1

34% PGY-2

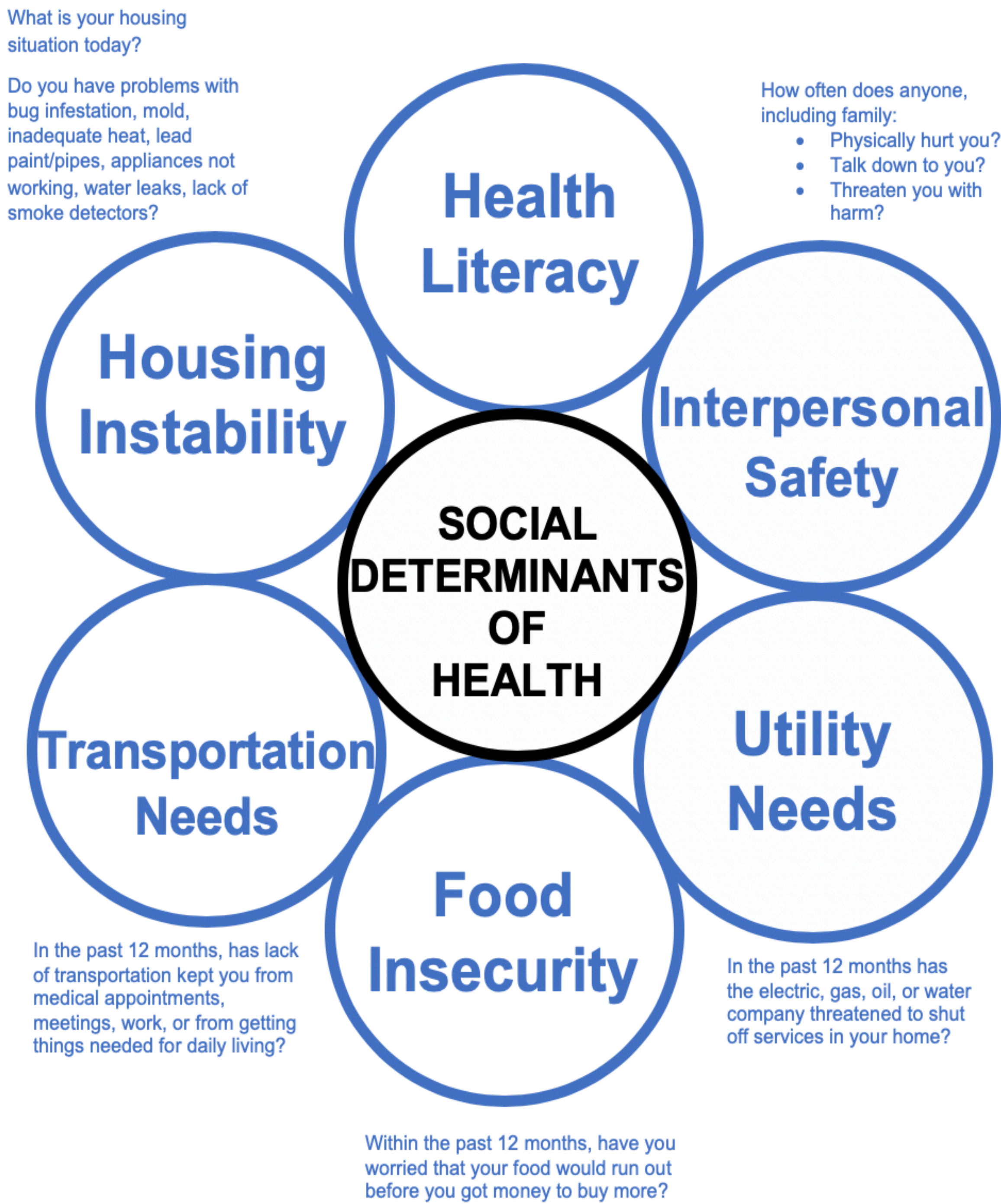
36% PGY-3

Strongly Agree
Somewhat Agree
Neither Agree nor Disagree
Somewhat Disagree
Strongly Disagree



Sample Schedule Based on a 4-Week MICU Rotation

Week	Case	Critical Care Topic(s)	Social Determinants Topic(s)
1	Sepsis secondary to pneumonia	Shock & Vasopressors Sepsis Mechanical Ventilation	Screening for Social Risk
2	Cardiac arrest with intentional overdose	Cardiac Arrest Toxidromes Acute Liver Failure	Identifying a surrogate decision-maker Advanced Care Planning
3	Alcohol withdrawal seizure and upper GI bleed	Alcohol Withdrawal Upper GI Bleed Delirium and Sedation Hyponatremia	Substance Use Disorders and Inpatient Treatment Protocols
4	Life-threatening hyperkalemia	Acid-Base Disorders Renal Replacement	Insurance Subsidy Programs Food Insecurity



Curriculum

Learning Objectives

1. Define **social determinants of health** and identify its role in health care.
2. Reflect on **personal experiences** with patients whose access to health care is limited due to social determinants.
3. **Screen** patients for social determinants and **apply** this knowledge to assessment of their critical illness.
4. Gain confidence in **discussing unique barriers** to health care with patients.
5. **Collaborate** with a team of health care providers to determine appropriate resources for patients whose health is affected by social determinants.

Implementation (3 Cycles)

32 PRE

Pre- and Post-Surveys

5 POST

7

Care Team

ICU Resident
360° Evaluation

Attending

0

Adaptation

Patient Cases

Glycemic Emergencies

Non-Invasive Ventilation

Hypertensive Emergency

Cerebrovascular Accidents

Resident Needs

End of Life Care

Brain Death Evaluation

Refugee Populations

Reflection and Restructuring

What component of this curriculum did you find most valuable?

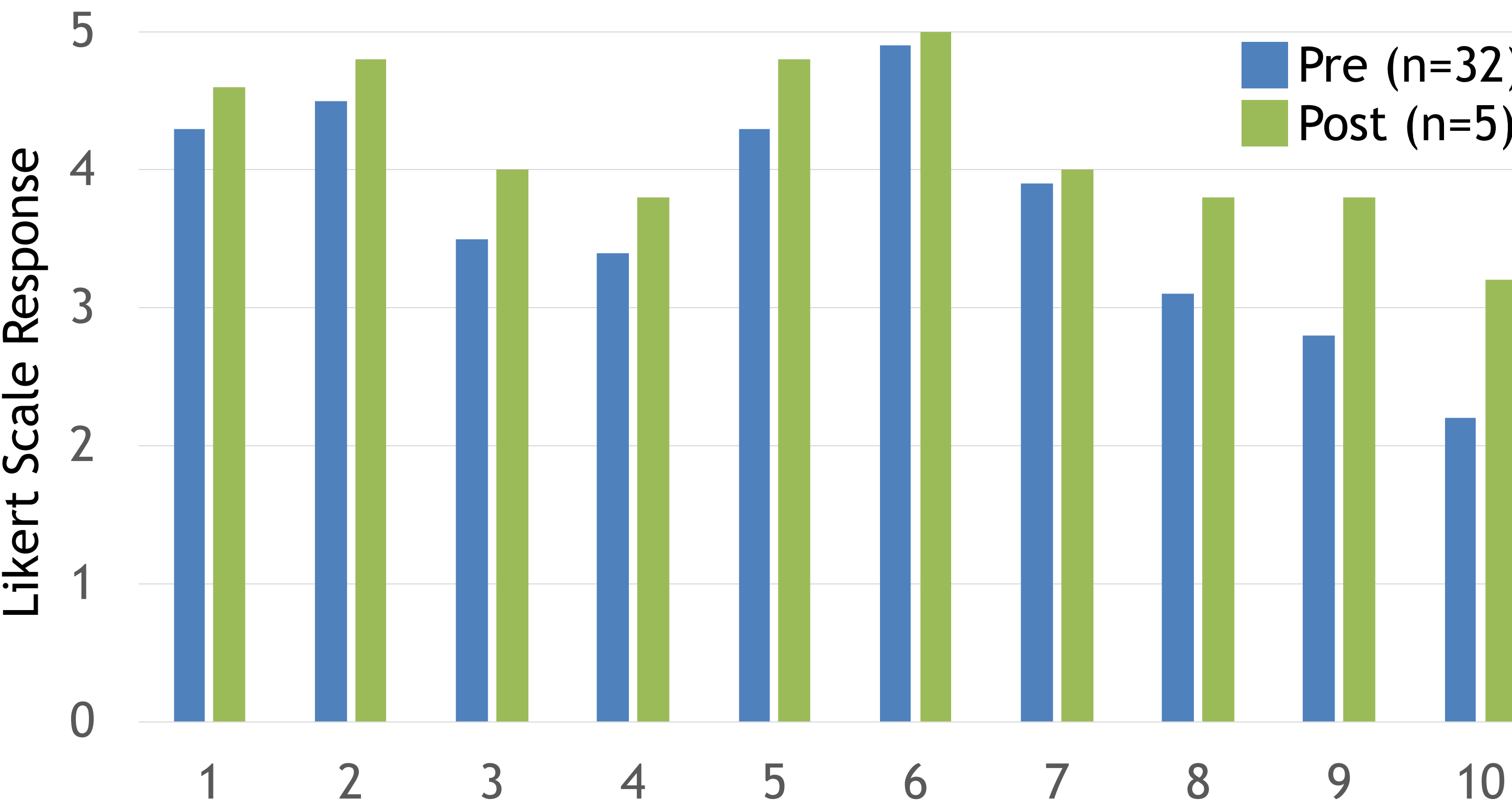
“I loved the open dialogue”

“Discussion on insurance and how that effects patient care in the hospital”

“Information about resources available to our patients”

“debriefs on specific patient encounters and discussing SDOH and how it brought [patients] to the ICU”

Results/Program Evaluation



Pre- and Post- Questions

1. I can identify and describe how social determinants of health affect quality of care for patients experiencing disparities in health care quality.
2. I can recognize more than one social domain that may contribute to a patient's social risk.
3. I can name specific resources that may be valuable for patients who experience health disparities related to substance abuse.
4. I can name specific resources that may be valuable for patients who experience health disparities related to financial constraints.
5. As healthcare providers, we have an obligation to screen patients for social risk and provide resources for patients who experience disparities in health care quality when appropriate.
6. The interdisciplinary team is valuable in the assessment and management of social risk in our intensive care unit patients.
7. I routinely include my understanding of a patient's social risk in the medical plan while the patient is hospitalized.
8. I receive formal training to assess social risk.
9. I receive formal feedback on my ability to assess social risk.
10. I receive evaluations from individuals outside of my discipline of practice.

Resident Preference for Critical Care Education > Social Determinants

Faculty Buy-In

Small Sample Size

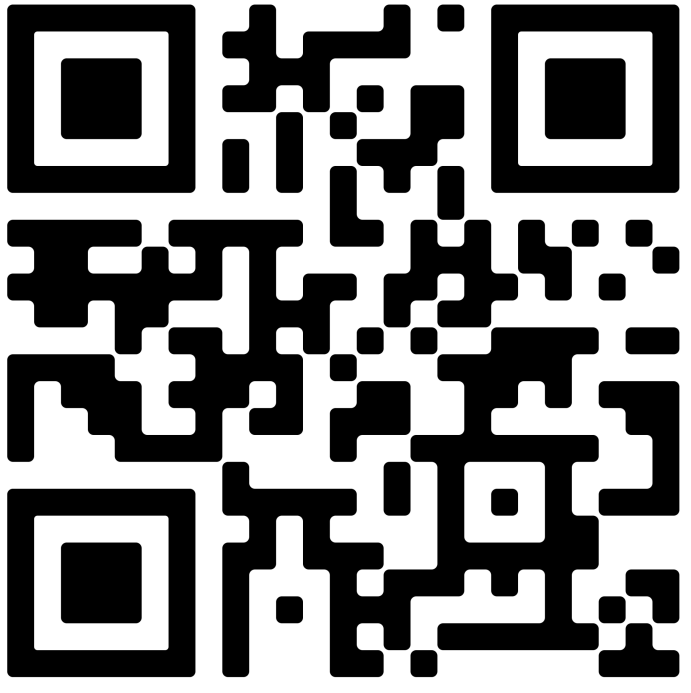
Time and Workflow in the ICU

Major Limitations

Limited Expert Personnel

Creating a **space** and **time** for *reflection* on the effects of social determinants of health on critical illness can be **valuable** for internal medicine trainees.

References, Additional Information and Acknowledgments



University of Colorado Internal Medicine Residency Training Program
Program Director: Dr. Geoffrey Connors
Health Equity Pathway Leadership
Denver Health and Hospital Authority
Medical Intensive Care Faculty and Leadership
Patients of the Denver Health Medical ICU

Evaluation of an Experiential Interprofessional Program Pilot for Physical Therapy and Dental Students

Lindsey Yates, DDS, Amy Nordon-Craft, PT, DSc



Background

- Interprofessional Education (IPE) emphasizes teamwork and collaboration and is critical for safe and effective patient care.
- School of Dental Medicine (SDM) faculty recognized a curriculum gap regarding safe patient management for individuals who experience significant limitations with mobility, specifically transfers.
- Therefore, SDM and Doctor of Physical Therapy (DPT) Program faculty designed a hands-on learning activity to reinforce safe patient mobility.

Objective

The purpose was to enable students to apply classroom-based IPE communication and safety concepts in the simulated clinical setting to improve delivery of patient care.

Methods

- This pilot program ran in January 2018 and December 2018 with distinct student cohorts in the dental student clinic.
- Learning activities consisted of:
 - one-hour lecture by DPT faculty
 - one-hour small group sessions with 1st/2nd year DPT students guiding 3rd year SDM students on wheelchair to dental chair patient transfers.
 - patient case scenarios included neurological diagnoses.
- At the conclusion of the workshop, all participants (N= 135) were surveyed.

Results

99% of respondents reported:

- increased confidence in assisting a patient from a wheelchair to a dental chair.
- increased confidence in seeking collaboration from other professions to improve the patient experience and patient care.
- the collaboration between the DPT program and SDM contributed to their ability to provide patient-centered care related to transfers and mobility.



Thematic Analysis

DPT and SDM students desired more practice time dedicated to this workshop.

Discussion

This pilot addressed a gap in the SDM curriculum.

Due to clinical rotations, 25% of the dental class was unable to attend.

Next Steps:
To address this gap in knowledge and skill, the experiential learning activity will be integrated into an existing SDM course on special-care patients in Fall 2020.



GLUCOSE EDUCATION TEAM “PEARLS”: IMPROVING RESIDENT KNOWLEDGE AND MANAGEMENT OF INPATIENT GLYCEMIC CONTROL

ADNIN ZAMAN, MD; ELIZABETH A. THOMAS, MD; CINDY K. BROWN, RN, MSN, CDE; LAYLA A. ABUSHAMAT, MD, MPH; JANET CORRAL, PHD; ALEXIS C. BOUFFARD, RN, MA, CDE; MARGARET WIERMAN, MD; AND JANE E. REUSCH, MD
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS, AURORA, CO



Endocrinology, Metabolism
and Diabetes
SCHOOL OF MEDICINE
UNIVERSITY OF COLORADO ANSCHUTZ MEDICAL CAMPUS

BACKGROUND

- Nearly 10% of all adults in the U.S. have type 2 diabetes and this prevalence continues to rise.
- Hyperglycemia in hospitalized patients is unequivocally associated with adverse outcomes and mortality.
- Glucose management is a key skill for all general medicine physicians, but in the acute inpatient setting, it is often an overlooked area of development.
- Within the University of Colorado Internal Medicine (IM) Residency Program, specialized teams or consultants oversee inpatient glucose management at most training sites.
- Residents and medical students are given more autonomy in glucose management at the Rocky Mountain Regional Veterans Affairs Medical Center (RMR VAMC).
- The Glucose Education Team (GET) was created as an educational program to provide guidance to IM trainees in inpatient diabetes management at the RMR VAMC.
- GET Pearls were implemented to improve the consistency in delivery of core educational principles and to optimize the breadth and depth of inpatient diabetes-related topics.

CURRICULUM DESCRIPTION

- IM residents completed their inpatient month at the RMR VAMC in 4-week blocks only once per year.
- A certified diabetes educator (CDE) reviewed all blood glucoses on patients admitted to the internal medicine service and entered Glucose Oversight Notes with general strategies on how to improve glycemic control in patients with abnormal blood glucoses four times per week.
- The Endocrine service sought out the four general medicine teams to discuss their patients being followed by GET to discuss the suggested strategies.
- At the end of the interactions with each team, Endocrinology imparted 16 pre-determined educational “pearls” in sequence throughout each month (see handout) between August 5, 2019 – January 31, 2020.
- The “pearls” were e-mailed out to the IM residents and medical students at the end of each week.
- A pre- and post-test with the same questions testing knowledge and attitudes about inpatient glycemic management was administered in person by an Endocrine fellow in the first and last weeks, respectively.
- Percent correct in knowledge questions was computed and compared between pre- and post- periods using a Student’s t-test. Attitude questions were asked on a Likert Scale, averaged, and similarly analyzed.

RESULTS AND CONCLUSIONS

Figures 1-2. Flowchart detailing the expected number of trainees to have participated in GET (including surveys) between August 2019 and January 2020 (Figure 1). Figure 2 shows number of GET Oversight Notes written versus number of new Endocrine consults between October-December 2018 when GET Pearls were not in effect versus same time period in 2019 when GET Pearls were administered.

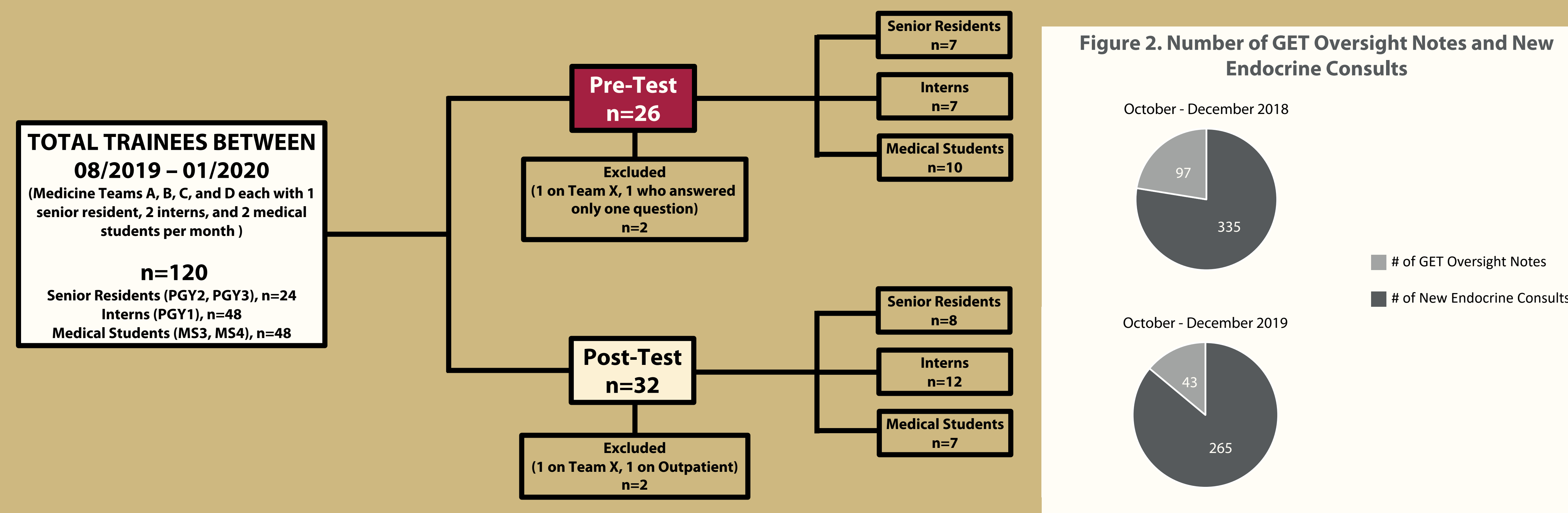
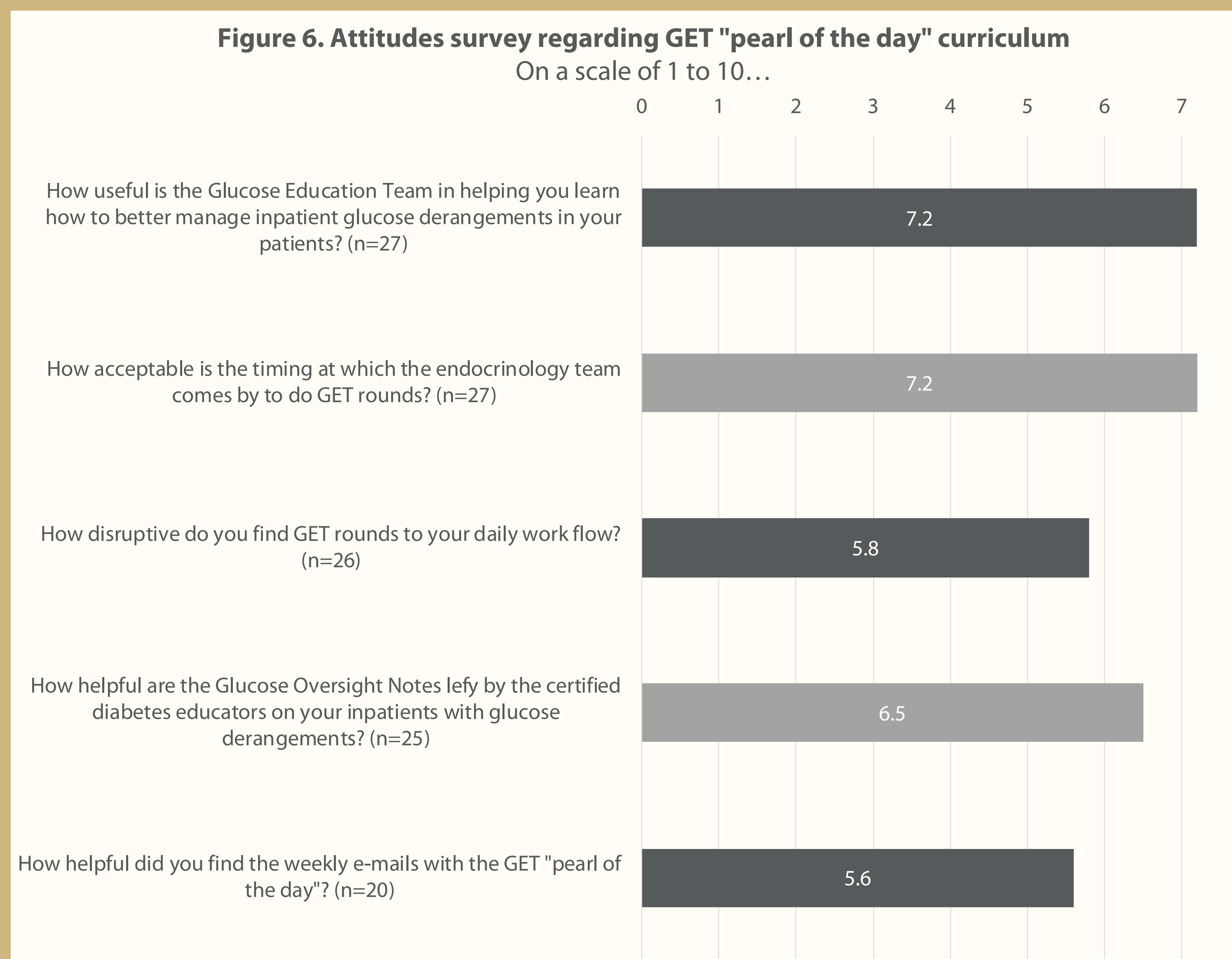
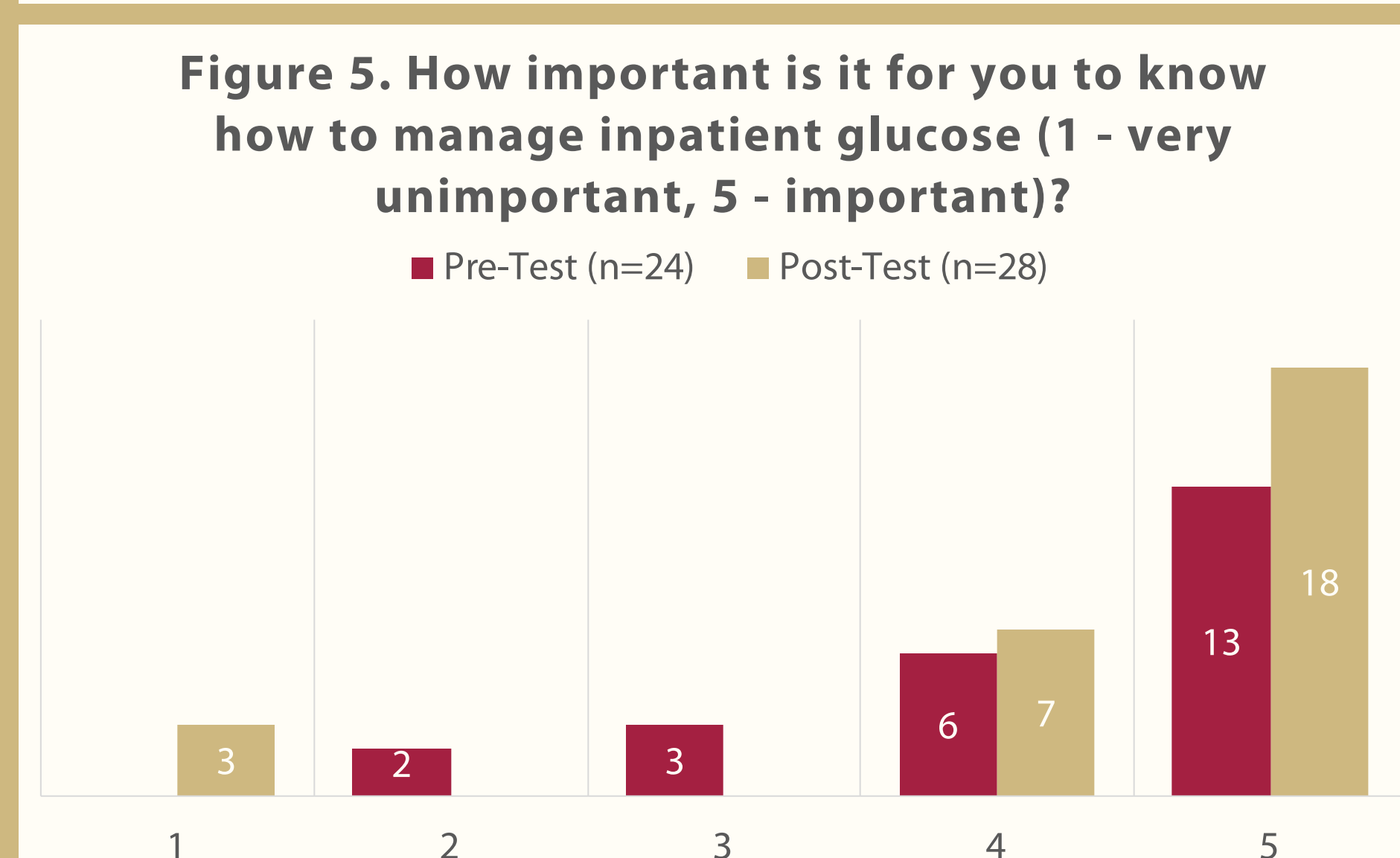
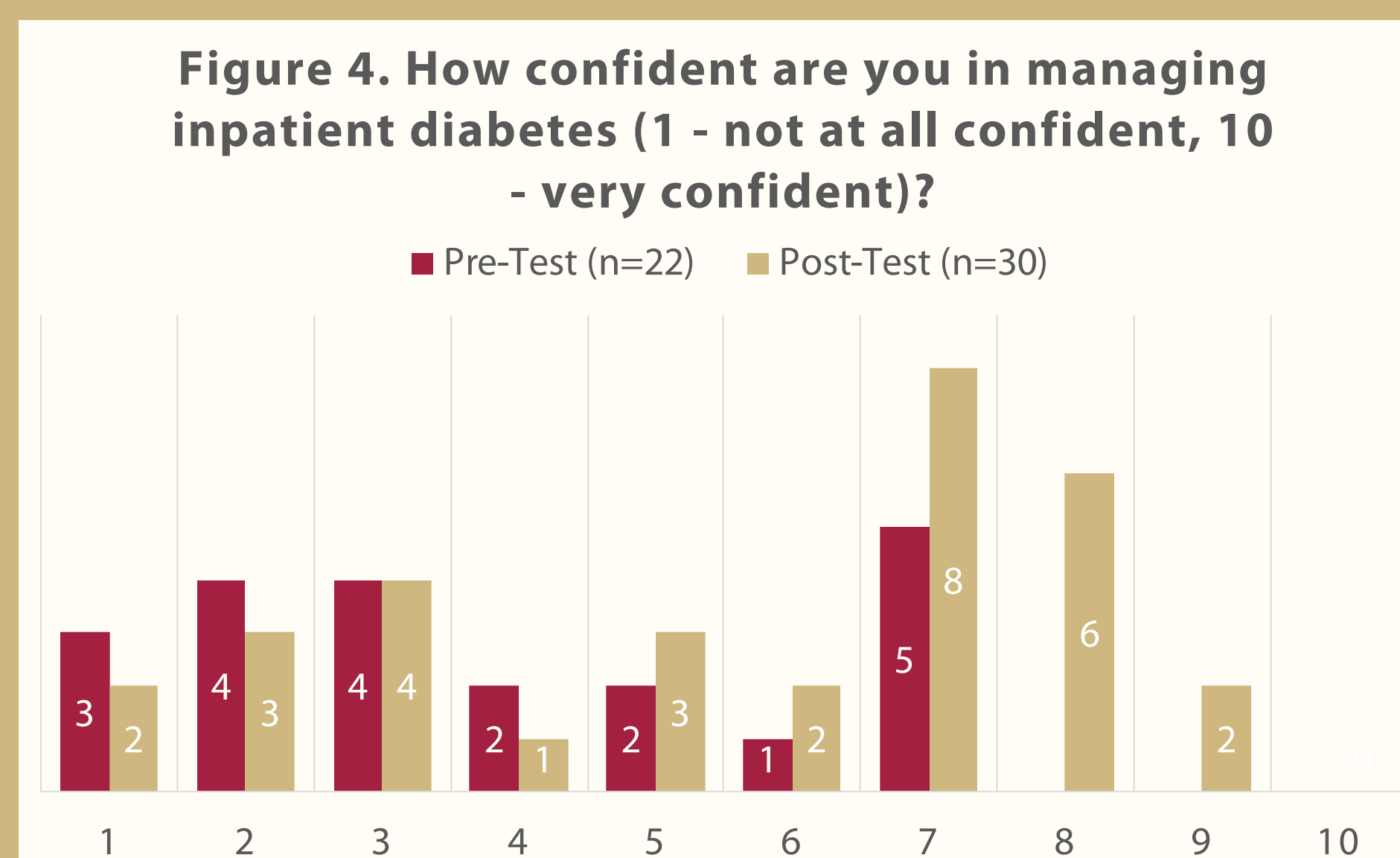
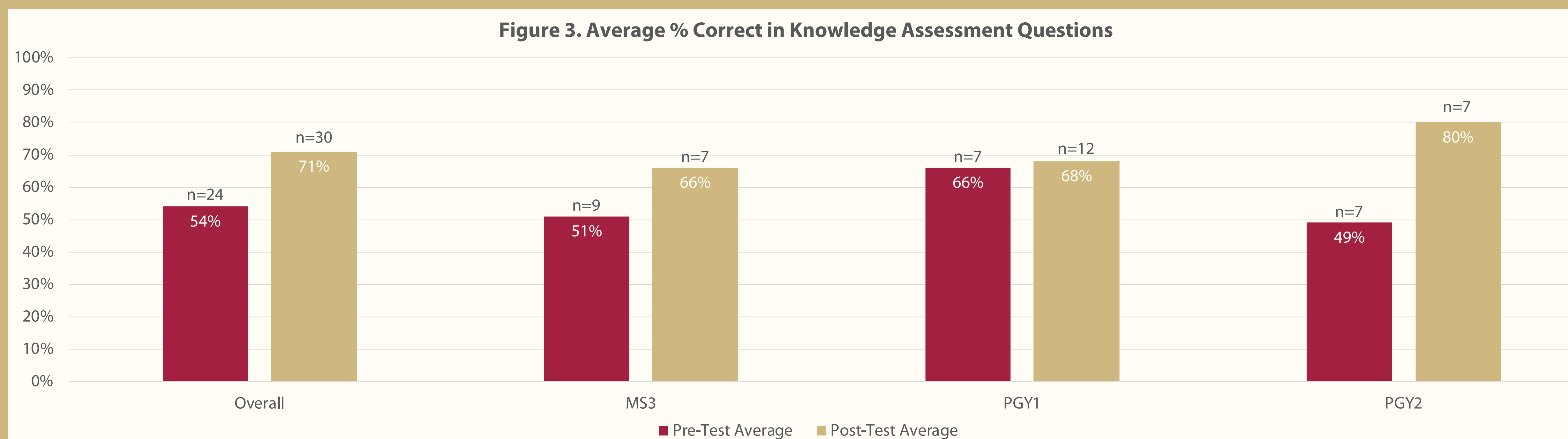


Figure 3. Graph depicting average number of questions correct on pre- versus post-test knowledge assessment questions. The same 5 questions were asked on the pre- and post-tests. Three people did not list their training year on post-tests. Only 6 people (2 MS3s and 4 PGY2s) completed both tests.



Figures 4-6. Likert scales to assess attitudes of trainees regarding confidence in managing inpatient diabetes (Figure 3), importance in knowing how to manage inpatient diabetes (Figure 4), and opinions about the GET “pearl of the day” curriculum.

- Between August 2019 and January 2020, there were 6 inpatient blocks with approximately 120 trainees (four medicine teams each with 1 senior resident, 2 interns, and 2 medical students) exposed to GET (Figure 1).
- Twenty-six trainees completed the pre-test survey, but 2 were excluded from the analysis (1 on a team that did not receive GET, 1 who answered only one question). Thirty-two trainees completed the post-test survey, but 2 were excluded from the analysis (both on teams that did not receive GET, Figure 1).
- Only 6 trainees (2 MS3s and 4 PGY2s) filled out both the pre- and post-tests during their VA inpatient block.
- Given the low number of respondents (<25% of all trainees), we were not powered to detect statistical differences in changes in knowledge or attitudes.
- Between October – December 2019, there were 265 patients admitted to the medicine service with diabetes requiring 43 GET oversight notes (16.2%). In the prior academic year (October – December 2018), there were 335 patients admitted to medicine with diabetes requiring 97 GET oversight notes (29.0%) in comparison (Figure 2).
- In general, trainees did improve in their knowledge of inpatient glucose management over their month-long rotation with exposure to GET (Figure 3).
- Trainee confidence in managing inpatient glucoses also improved (average 3.8/10 to 5.6/10, Figure 4), though attitudes regarding the importance of knowing how to manage inpatient glucoses did not change (average 4.2/5 to 4.3/5, Figure 5).
- Trainees felt that the GET helped them learn inpatient glucose management (average 7.2/10, Figure 6).
- Though GET rounds were perceived as being moderately disruptive to trainees’ daily work-flow (average 5.8/10), the timing at which GET rounds occurred was acceptable (average 7.2/10, Figure 6).
- Glucose oversight notes left by CDEs were rated to be moderately helpful (average 6.5/10) but weekly e-mails were perceived to be less helpful (average 5.6/10, Figure 6).

FUTURE DIRECTIONS

- Perform a chart review to assess for changes in accuracy and quality of trainee documentation/ordering practices.
- Meet with IM leadership (hospitalists, chief residents) and residents, potentially through focus groups, to design a more effective and efficient curriculum on inpatient glucose management.