

Analysis of the Interprofessional Clinical Learning Environment for Quality Improvement and Patient Safety From Perspectives of Interprofessional Teams

Mike K.W. Cheng, MD

Sally Collins, MA, MSc

Robert B. Baron, MD, MS

Christy K. Boscardin, PhD

ABSTRACT

Background In 2018 the Clinical Learning Environment Review (CLER) Program reported that quality improvement and patient safety (QIPS) programs in graduate medical education (GME) were largely unsuccessful in their efforts to transfer QI knowledge and substantive interprofessional QIPS experiences to residents, and CLER 2.0 called for improvement. However, little is known about how to improve the interprofessional clinical learning environment (IP-CLE) for QIPS in GME.

Objective To determine the current state of the IP-CLE for QIPS at our institution with a focus on factors affecting the IP-CLE and resident integration into interprofessional QIPS teams.

Methods We interviewed an interprofessional group of residents, faculty, and staff of key units engaged in IP QIPS activities. We performed thematic analysis through general inductive approach using template analysis methods on transcripts.

Results Twenty individuals from 6 units participated. Participants defined learning on interprofessional QIPS teams as learning from and about each other's roles through collaboration for improvement, which occurs naturally when patients are the focus, or experiential teamwork within QIPS projects. Resident integration into these teams had various benefits (learning about other professions, effective project dissemination), barriers (difficult rotations or program structure, inappropriate assumptions), and facilitators (institutional support structures, promotion of QIPS culture, patient adverse events). There were various benefits (strengthened relationships, lowered bar for further collaboration), barriers (limited time, poor communication), and facilitators (structured meetings, educational culture) to a positive IP-CLE for QIPS.

Conclusions Cultural factors prominently affected the IP-CLE and patient unforeseen events were valuable triggers for IP QIPS learning opportunities.

Introduction

In 2018 the Clinical Learning Environment Review (CLER) Program, which reviews graduate medical education (GME) engagement in 6 focus areas, reported that despite many programs' efforts to advance quality improvement (QI) training, transfer of QI knowledge and a substantive QI experience to residents has not been successful, and that resident participation in interprofessional (IP) QI and patient safety (QIPS) efforts in particular were lacking.¹ The CLER report described that, while most residents report some participation in QIPS activities, many lack understanding in QI principles and have fragmented exposure to systems improvement and safety activities.¹ As a result, the CLER Pathways to Excellence 2.0 highlighted IP QIPS work as an area

for GME improvement nationally and introduced a new CLER focus area related to teamwork for patient care called Teaming.²

However, not much is known about the interprofessional clinical learning environment (IP-CLE) for QIPS work within teaching health systems. Much has been written about improvement of the CLE for residents and IP team members within the context of routine clinical care^{3–5} and around factors that promote or inhibit teamwork for patient care.^{6–11} Yet, there is little understanding about the CLE in relation to IP teamwork for QIPS activity and what factors affect resident integration into these teams.

The distinction between IP teams performing routine clinical care and those working on QIPS activity is important because the teams may not always be the same, and this subset of IP teams may have its own culture and milieu. Gaining knowledge about these topics could inform health systems regarding how to promote CLEs that encourage IP

DOI: <http://dx.doi.org/10.4300/JGME-D-20-01555.1>

Editor's Note: The online version of this article contains the interview script used in the study.

teamwork for QIPS and effectively incorporate residents.

We derived our understanding of the CLE through the work of Gruppen et al,⁴ which builds on the analysis of the learning environment from Genn¹² to describe the CLE as a complex psycho-social-physical construct that is co-created by individuals, social groups, and organizations in a particular setting and shaped by contextual climate and culture. Genn details how, within medical education, the learning environment is the “most significant manifestation” of a curriculum and to understand or change a curriculum one must consider the learning environment as the 2 are inextricably linked.¹² Genn details the many elements that comprise the CLE and Gruppen et al further group them into 4 components: personal, social, organizational, and physical and virtual spaces.^{4,12}

In this study, we seek to determine the current state of the interprofessional QIPS learning environment by drawing on perspectives of interprofessional residents, faculty, and staff. We focus on factors that affect resident integration into these IP teams for QIPS and factors that promote or detract from a rich IP-CLE.

Methods

This qualitative study used thematic analysis of scripted interviews with IP teams involved in QIPS efforts in patient care units throughout the University of California, San Francisco (UCSF) Health System, a large academic tertiary health system.

Interview Guide

We developed our interview guide through modification of an existing interview script currently being piloted by the Accreditation Council for Graduate Medical Education (ACGME) Pursuing Excellence Pathway Leaders Patient Safety Collaborative to assess the IP-CLE for QIPS at 8 GME program sites.¹³ The Pursuing Excellence Collaborative developed this script after careful review of the National Collaborative for Improving the Clinical Learning Environment 2017 report¹⁴ as well as the Institute of Medicine’s Conceptual Framework for Measuring the Impact of Interprofessional Education.¹⁵ We added questions to ensure assessment of all domains of the CLE from Gruppen et al⁴ and added questions related to resident involvement in QIPS efforts (provided as online supplementary data). This interview guide and source script was tested with one interprofessional team including 3 members from the adult ICU unit for clarity of the questions as well as the logical flow to

Objectives

To determine the current state of the interprofessional clinical learning environment (IP-CLE) for quality improvement and patient safety (QIPS) at our institution with a focus on factors affecting the IP-CLE and resident integration into interprofessional QIPS teams.

Findings

Participants defined what learning on interprofessional QIPS teams meant and detailed the benefits, barriers, and facilitators to resident integration into these teams as well as the benefits, barriers, and facilitators of a positive IP-CLE for QIPS.

Limitations

Our study is limited by its observation of the CLE within a single health system.

Bottom Line

Cultural issues can act as prominent facilitators or barriers to the IP-CLE for QIPS, and patient unforeseen events can act as a valuable trigger for interprofessional interest in QIPS among residents, faculty, and staff.

the interview protocol prior to administration with our study group.

Scripted interviews allowed us to thoroughly assess the different facets of the CLE and to standardize the questions posed to individuals of different professions for means of comparison.

Participants and Logistics

To represent a diverse and representative sample, we asked the health system and GME leadership to identify key adult and pediatric inpatient and outpatient patient care units engaged in IP QIPS activities. We approached unit medical directors to request at least 3 participants from different professions for 15- to 20-minute individual interviews. We purposefully interviewed participants from different professions to account for varied perspectives and continued interviews until we reached informational redundancy. We recorded, transcribed, and anonymized all interviews.

Analysis

We analyzed interview transcripts using template analysis.¹⁶ We chose this approach as it aligns with critical realist epistemology, which postulates that the social world is real, but can be perceived subjectively and is driven by various mechanisms within specific contexts that produce outcomes.¹⁷ Through analysis of these mechanisms, one can inquire about how phenomena work and can determine how to manipulate such phenomena. Three authors (M.K.C., C.B., S.C.) engaged in an iterative consensus-building approach to develop an initial coding template and, subsequently, a code book with definitions. Transcripts were then coded independently by each author

TABLE 1

Interview Participant Reported Demographics and Assigned Identifier Codes

Unit	Role	Years at Institution	Gender	Code
Adult Emergency Department	Pharmacist	2	F	ED/PharmD1
	Nurse	4	F	ED/RN1
	Attending physician	8	M	ED/MD1
Pediatric ICU	Pharmacist	5	F	PICU/PharmD1
	Pharmacist	9.5	F	PICU/PharmD2
	Nurse	8	F	PICU/RN1
	Resident physician	1.5	M	PICU/Res1
Pediatric Transitional Care Unit	Resident physician	1.5	F	TCU/Res1
	Nurse	9	F	TCU/RN1
	Nurse case manager	2.5	F	TCU/RN2
	Pharmacist	1	M	TCU/PharmD1
Adult Neurosurgery	Nurse	12	F	NSY/RN1
	Attending physician	8	F	NSY/MD1
	QI specialist	1.5	F	NSY/QIS1
Adult Hospital Medicine	Attending physician	7	F	HMED/MD1
	Nurse case manager	4	F	HMED/RN1
	Nurse	17	F	HMED/RN2
General Internal Medicine	Attending physician	2	M	GIM/MD1
	Administrative assistant	3	F	GIM/Admin1
	Medical assistant	8	F	GIM/MA1

Abbreviations: F, female; M, male; QI, quality improvement

and then reconciled together. Dedoose analytic software (SocioCultural Research Consultants LLC, Manhattan Beach, CA) was used to organize coded transcripts. Using template analysis and a general inductive approach,¹⁸ the authors reviewed coded excerpts to identify cohesive themes. These themes were refined through consensus, and one representative quote for each theme was chosen and compiled into tables (key quotes are highlighted within this article). The authors also compared inpatient and outpatient interviews as well as those from different fields of medicine to assess for thematic variance.

Reflexivity

The first author (M.K.C.) practices primary care in the division of general internal medicine and participated in IP QIPS initiatives as a resident and currently coaches QIPS initiatives. Another author (R.B.) also practices primary care in general internal medicine, has participated in and coached IP QIPS initiatives, and as Associate Dean for Graduate Medical Education and a Designated Institutional Official has led the ACGME's Pursuing Excellence in Clinical Learning Environments initiative at UCSF. The other authors (S.C., C.B.) are education researchers. Senior author (C.B.) has participated in and coached IP QIPS initiatives and has been an active

member of the Pursuing Excellence Collaborative and is a professor in general internal medicine. While analyzing transcripts, authors took reflexivity notes to account for individual perspectives and discussed notes with other authors to facilitate richer data analysis and interpretation. Throughout the coding process, the authors engaged in discussion to ensure that codes arose from and were supported by the data and were not imposed by the authors' existing knowledge and experiences.

The UCSF Institutional Review Board granted our project education exemption status. We obtained verbal or written consent before all interviews.

Results

We interviewed 20 participants from November 2019 to July 2020, including 4 attending physicians (MD), 2 postgraduate year 2 pediatric residents (Res), 4 pharmacists (PharmD), 7 registered nurses (RN), 1 QI specialist (QIS), 1 administrative staff (Admin), and 1 medical assistant (MA; TABLE 1). Participants belonged to 3 inpatient adult units: emergency department (ED), neurological surgery (NSY), hospital medicine (HMED); 2 pediatric inpatient units: pediatric intensive care unit (PICU) and transitional care unit (TCU); and 1 outpatient adult unit: division of general internal medicine (GIM). Interviews averaged

TABLE 2

Subthemes and Interview Quotes Regarding Theme of Definition of IP Learning for QIPS

Theme: Definition of IP Learning for QIPS	
Subthemes	Representative Quotes
Learning about other professions' roles in collaboration to improve patient care	"Interprofessional learning to me is that collaboration and the ability to understand how patient care is affected by all of those different services or different disciplines and how we can work together." (NSY/MD1)
Occurred naturally when patients were the center focus Allowed different professions to bring their expertise to complement one another to improve patient care	"If you put the patient at the center, I see interprofessional education as us all doing our best for the patient and then learning from one another's roles... everyone is bringing their expertise and we respect everyone's expertise and then try and complement one another. And in that process, I feel like there's a lot of education that actually happens naturally." (ED/MD1)
Produced individual growth	"Each member has something to contribute, and we can all learn from each other. So... we learn from other professions and that really helps us to grow in our own professional field too." (PICU/PharmD1)
Occurred through collaboration for QIPS triggered by patient cases or through specific projects	"[It] is people from multiple professions within health care who are getting case-based learning together or experiential learning like through quality improvement in the same space and in a sort of discussion-based format." (HMED/MD1)
It is important to have an environment that promotes sharing and mutual respect	"Interprofessional learning means being able to create an environment where staff from all disciplines can share... in any space that's been created for that to happen where there's mutual respect." (PICU/RN1)

Abbreviations: IP, interprofessional; QIPS, quality improvement and patient safety.

16 minutes and 50 seconds. The first author (M.K.C.) interviewed all participants except for ED/PharmD1 (C.B. interviewed); a second author (either C.B. or S.C.) observed the first 17 interviews to supervise interviewing technique. Three broad themes emerged: definition of IP QIPS learning, resident integration into QIPS teams, and factors influencing the IP-CLE for QIPS.

Definition of Interprofessional QIPS Learning

Participants described what IP learning for QIPS means to them, how it occurs, and where it occurs (TABLE 2). For many, it meant not only learning from and with those from other professions, but also learning more about each other's roles to understand how patient care is affected by different disciplines working together. Learning occurred when QIPS collaboration was triggered by specific patient cases, and some described this as a natural byproduct of patient-centeredness. It also occurred through experiential learning, such as through QI projects. IP learning led to personal growth in one's own field, and an environment of sharing and mutual respect was important to promote this learning.

Resident Integration Into Interprofessional QIPS Teams

Participants delineated the benefits that residents and teams gain from resident integration into IP QIPS

teams, as well as barriers and facilitators to integration (TABLE 3).

Benefits to Resident Integration: Residents gained new perspectives important for patient care via integration into IP QIPS teams. IP QIPS activities also allowed residents to connect to members from other professions, which augmented daily clinical practice. "[These activities] enhance our relationships...it's a good mechanism through which to learn from each other and work together...it adds to what we do on a day-to-day basis" (TCU/Res1).

QIPS teams reported benefits from having a resident champion who could disseminate information around QIPS activities to peers more effectively than non-residents.

Barriers to Resident Integration: Participants recognized many barriers to resident integration, which can be categorized as cognitive, structural, and cultural. Several participants alluded to the high cognitive load of some rotations, namely the intensive care unit rotations, that prevented resident participation in activities beyond basic expectations of clinical care because they were mentally taxed and occasionally too overwhelmed by the demanding rotations to meaningfully contribute to QIPS activities.

While rotations of lower acuity of care may be better suited for the addition to the resident workload, the general rotational structure of training

programs can be a barrier as well, especially in our large academic hospital where residents frequently switch rotations and training sites. Each rotation is “such a small amount of time to be able to routinely engage with interprofessional colleagues and to see quality evolve over usually what takes years” (HMED/MD1).

Participants also reported cultural barriers to resident participation in QIPS teams. Participants alluded to a hidden curriculum suggesting that QIPS work is not considered a core element of clinical care. As one resident within the pediatric ICU explained, “There’s a huddle at the whiteboard every morning that I think they go over things like that [QIPS activities] at. But the residents are told to just keep pre-rounding” (PICU/Res1). This resident was instructed to focus on the expected typical clinical care of “pre-rounding” on patients instead of being encouraged to join QIPS presentations.

Another cultural barrier was the culture of inappropriate assumptions. Residents may hold an inappropriate assumption of self-sufficiency such that they try to take on all patient-related tasks, even those better suited to other professions, because of lack of awareness of others’ roles or lack of trust in others. Non-residents may hold an inappropriate assumption that residents lack interest in QIPS and would not want to be offered opportunities to join QIPS efforts.

Facilitators to Resident Integration: Participants identified institutional support structures as facilitators of resident involvement. In particular, several mentioned the unit-based leadership teams (UBLT), interdisciplinary leadership teams, developed by the health system, which meet regularly to promote IP QIPS activities that purposefully incorporate residents. Another example is the yearlong UCSF Residents and Fellows Leading Interprofessional Continuous Improvement Teams (REFLECT) program, through which residents and fellows can develop and lead QIPS proposals and can receive monetary incentives for goals achieved.¹⁹ This program prioritizes IP projects.

A second facilitator was patient adverse events, which participants mentioned as motivators for residents to engage in QIPS efforts alongside others also involved in the case. One participant described a central line-associated bloodstream infection that prompted the interprofessional care team to perform a root cause analysis and develop steps to prevent future occurrences.

Another facilitator was frequent communication through structured avenues to residents about existing QIPS projects that they were expected to engage in, which participants mentioned resulted in improved

dissemination among the resident cohort. Lastly, one emerging facilitator may be the promotion of QIPS principles within undergraduate medical education (UME) and GME. One participant felt that a value for QI is “ingrained in the education and training of going through medical school and residency,” which may translate into residents internalizing and gaining familiarity with this value (ED/MD1).

Factors Affecting the IP-CLE for QIPS

Participants spoke about benefits of a positive CLE as well as barriers and facilitators to achieving a positive IP-CLE (TABLE 4).

Benefits to a Positive IP-CLE for QIPS: Many participants were extremely positive about the improved IP relationships after working on QIPS projects. As relationships grew stronger and “silos [were] broken down” (ED/MD1), team members started to “rely on each other a lot. Not just for work, I feel a lot of us are allowed to deliver moral support too” (HMED/RN1). Strengthened relationships lowered the bar to seek help for other clinic issues and to initiate further collaboration.

Barriers to a Positive IP-CLE for QIPS: In terms of barriers to achieving a positive IP-CLE for QIPS, participants considered lack of quantity of time an important factor. Participants also felt that lack of protected time was a barrier as they struggled to find others to cover their clinical duties during QIPS meetings. These time-related factors can be substantial issues for IP teams as each profession brings a unique set of scheduling challenges.

Another barrier was infrequent and fragmented communication about QIPS project dissemination and updates. As one participant mentioned, “To really get everyone together to see ...[QIPS projects] through when you have so many people who are on rotating shifts, to make sure the message comes across to everyone...is a little challenging” (ED/PharmD1). Without purposeful emphasis on communication, it can be difficult to disseminate QIPS efforts and maintain forward momentum of such efforts. The consequences of poor communication can be magnified on IP teams, where each profession brings different expectations and communication styles.

Facilitators to a Positive IP-CLE for QIPS: Participants mentioned numerous facilitators of a positive IP-CLE for QIPS. One important facilitator was a culture of respect. Several participants, particularly nurses, mentioned that “mutual respect and... a dismantling of the power hierarchy” (PICU/RN1) is

TABLE 3

Subthemes and Interview Quotes Regarding Theme of Resident Integration Into IP QIPS Teams

Theme: Resident Integration Into IP QIPS Teams	
Subthemes	Representative Quotes
Benefits of Integration	
Allowed residents to gain new perspectives important for improvement of patient care	"I learn so much from the other people on our [QIPS] team and learn to think about things differently, whether that be our social workers providing important context or the nursing staff knowing, having a better sense of day-to-day realities for families." (TCU/Res1)
Enhanced resident relationships with other professions which augmented daily clinical practice	"[These QIPS activities] enhance our relationships... it's a good mechanism through which to learn from each other and work together... it adds to what we do on a day-to-day basis." (TCU/Res1)
Facilitated dissemination of QIPS efforts	"So we actually have a neurosurgery resident that's assigned to our unit-based leadership team [QIPS team]... he is our spokesperson and actually disseminates information to the residents. I think it's better coming from your peer than someone that doesn't even know how to do your job telling them how to do something." (NSY/RN1)
Barriers to Integration	
Rotations with high cognitive load	"Our unit is hard, too, for residents in general... the ICU is tough and our patients are tough and our nurses are tough... it can be a tough place to kind of get your bearings and then to think, "Oh, and now I have to do other things outside of just my normal workflow" can be a little bit intimidating." (PICU/RN1)
Rotational structure of GME training programs	"But residents rotate only 1 month at a time on an inpatient service and they rotate through 3 different hospitals. So, someone may rotate at Moffitt [Hospital at UCSF] 1 month of the year or maybe 2... that's such a small amount of time to actually be able to routinely engage with interprofessional colleagues and to see quality evolve over usually what takes years." (HME/MD1)
Perception that QIPS is separate from core clinical care	"...there's a huddle at the whiteboard every morning that I think they go over things like that [QIPS topics] at. The residents are told to just keep pre-rounding." (PICU/Res1)
Assumption of self-sufficiency	"...sometimes they [residents] come with this one size fits all mentality, where it's like I am a blunt instrument and I'm just going to do what I've been taught to do. I think part of my job is to teach them how you delegate, what you delegate, what are the interprofessional resources you can draw upon, how someone can do something way better than you can. And so not only is it easier for you, but it's better for the patient." (ED/MD1)
Assumption of residents' lack of interest	"...I know the time is already very limited so I don't want to bring them into something if they (a) don't have an interest in it and (b) don't really find it impactful or useful for their work." (PICU/RN1)
Facilitators of Integration	
Unit-based leadership team structure Clear communication	"...we have a resident representative on the UBLT. There's a neurosurgery resident who comes every week... I think that actually is a really fantastic way to get input in because what happens is, we meet for our UBLT on Wednesdays, we'll talk about issues and things that come up. And then they actually, the residents have a meeting every week on Thursdays. So this resident will go back and bring back a lot of what we are talking about to the residents." (NSY/MD1)
REFLECT program structure	"I think one of the missions of the GME is that the QI projects that the residents do, the REFLECT program, it has some interprofessional nature." (HME/MD1)
Adverse patient events	"...we had...[a central line-associated bloodstream infection] recently on one of my patients. And in order to debrief it, we had a huddle with a lot of different staff, which is something that's a formal mechanism through which to review why it happened and or at least think about why it happened, how we could prevent it next time." (TCU/Res1)
Promotion of QIPS principles in UME and GME	"I mean I think it's built into your medical school training that you're always interested in QI and getting better and you're raised on this notion of an M&M and what that means. So I think that that part is ingrained in the education and training of going through medical school and residency." (ED/MD1)

TABLE 3

Subthemes and Interview Quotes Regarding Theme of Resident Integration Into IP QIPS Teams (continued)

Theme: Resident Integration on IP QIPS Teams	
Subthemes	Representative Quotes
Facilitators of Integration	
Rotations with opportunities for continuity such as ambulatory rotations	"...another place where that interprofessional collaboration is intended to happen then is like quality improvement projects that take place in the ambulatory setting. But... right now, the mentorship and education infrastructure is not very good for those." (HMED/MD1)

Abbreviations: IP, interprofessional; QIPS, quality improvement and patient safety; UCSF, University of California, San Francisco; GME, graduate medical education; UBLT, unit-based leadership team; REFLECT, UCSF Residents and the Fellows Leading Interprofessional Continuous Improvement Teams program; UME, undergraduate medical education; M&M, morbidity and mortality conference.

a key facilitator of IP teamwork and a positive learning environment. Mutual respect encourages team members to value each other's opinions and cultivates a value for feedback.

A commitment to learning and sharing was also vital. Participants mentioned structured learning opportunities that the health system offered, such as QI boot camps and workshops, but also that individuals would display commitment through ad hoc interactions where attending physicians reviewed a patient case to discuss future areas for improvement.

Another facilitating activity was regular team meetings. Many echoed the idea that these were "a very great mechanism for us to interact with other disciplines and conduct improvement work...The idea of having all stakeholders...present is extremely powerful" (NSY/MD1). Meetings not only provided opportunities for IP QIPS teams to brainstorm and work with stakeholders, but also were an avenue for education, project dissemination, and escalation of QIPS topics.

Lastly, participants mentioned triggers that motivated them to pursue IP QIPS teamwork. Many mentioned having an intrinsic interest in QIPS. Another trigger was awareness of deficits in patient care quality through review of quality metrics.

Variance of Responses

We did not find significant differences in the responses of those from different fields of medicine. Additionally, after analysis of 3 outpatient interview transcripts, we did not notice substantial thematic variance compared to inpatient transcriptions, and thus do not believe there to be a meaningful difference between the 2 settings.

Discussion

We found that there are several facilitators and barriers to successful integration of residents into IP QIPS activities. One notable finding of our study is

that cultural issues can act as prominent facilitators or barriers to the IP-CLE for QIPS. A second is that patient unforeseen events can act as a valuable trigger for interprofessional interest in QIPS among residents, faculty, and staff.

Cultural Issues Influence the Interprofessional CLE

The efforts of the Association of American Medical Colleges, the ACGME, and the Health Resources and Services Administration have spurred a national shift in institutional culture that places increased emphasis on the importance of QIPS within UME and GME.^{20–22} Institutional initiatives with increased emphasis on QI as a core educational activity in UCSF UME include incorporating QIPS principles early and requiring medical students to engage in novel QI projects; within GME there is the aforementioned REFLECT program as well as creation of UBLTs. These efforts contribute to significant cultural shifts in institutional support for QI work and training and facilitate participants' involvement in IP QIPS teamwork. Existing studies show mixed attitudes toward and mixed impact of this increased emphasis within UME and GME, with more successful efforts requiring special attention to the mode of QIPS education and the educators selected.^{23–27} However, through carefully designed curricula that emphasize QIPS in UME and GME and value the contributions of residents in these efforts, institutional initiatives can help change the perception of QI work from being a peripheral component of medical training to a more central component.

Conversely, participants mentioned a cultural practice that inhibits IP QIPS—that of making inappropriate assumptions of others or of one's own professional identity in relation to others. More broadly, several studies show that many residents and medical students can have preconceived assumptions or stereotypes of other professions, particularly in contrast to their own professional identity, which inhibits teamwork as well as the IP-CLE.^{28–30} The literature supports the effectiveness of interprofessional education efforts to

TABLE 4

Subthemes and Interview Quotes Regarding Theme of Factors Affecting a Positive IP-CLE for QIPS

Theme: Factors Affecting a Positive IP CLE for QIPS	
Subthemes	Representative Quotes
Benefits of a Positive IP-CLE	
Promotes IP relationship development	"I think [the QIPS efforts are] really good for team building and communication. And I think people here... genuinely care about everyone's opinion on the matter since we all come at it from different views." (ED/RN1)
Relationship development in turn leads to IP teammates becoming sources of moral support and clinical support outside of QIPS activities	"I feel like, we just rely on each other a lot. Not just for work... to deliver moral support too." (HMED/RN1) "...you've worked with someone in this other capacity where you weren't stressed and the patient wasn't acutely decompensating and so you've built rapport and respect and trust... [so] even if they're not my assigned case manager or pharmacist, I'll just pop into their office and be like, 'Hey, I got a question, I need you to help me with it.'" (HMED/MD1)
Relationship development in turn lowers bar for future collaboration with IP teammates	"...some of those silos are broken down and we have personal relationships that I had most often with other MDs or my residents. Now I have the same personal relationships with the nurses and the APPs and everybody else. And so that familiarity I think just lowers that bar even further for the next time you want to do a project." (ED/MD1)
Barriers to a Positive IP-CLE	
Lack of quantity of time	"...everyone has clinical work they're doing, and other administrative work, or research work on the side and it's just tough to carve out other time." (HMED/RN2)
Lack of protected time	"...sometimes it's really hard to leave the unit [to go to the QIPS meetings]. It's tough to arrange coverage to go to the meeting for 2 hours." (ED/PharmD1)
Poor communication	"To really get everyone together to see... [the QIPS projects] through and make sure it's consistent when you have so many numbers of people who are on rotating shifts, to make sure the message comes across to everyone and to reinforce that is a little bit challenging." (ED/PharmD1)
Facilitators of a Positive IP-CLE	
A culture of mutual respect and dismantled hierarchy	"Interprofessional learning means being able to create an environment where staff from all disciplines can share in a learning opportunity, really in any space... where there's mutual respect and kind of a dismantling of the power hierarchy." (PICU/RN1)
A commitment to a culture of education	"For this unit I've done little teachings even at our UBLT, what certain things mean and just small trainings." (NSY/QIS1) "...depending on the supervising physician, sometimes they'll initiate a debriefing just to make sure everybody's sort of on the same page about what happened [to a patient], what could have gone better, areas for improvement." (PICU/PharmD1)
Regular team meetings	"And so this is a group that... meets every week. It has representation from neurology, neurosurgery, physicians, and then also nurse leadership... Case management and social work is sometimes present. We have a neurosurgery program manager who's there, a neurosurgery resident, and the program manager is an improvement specialist and so she helps drive the meetings as well. I think that's been a very great mechanism for us to interact with other disciplines and conduct improvement work... The idea of having all stakeholders involved in a unit present is extremely powerful." (NSY/MD1)
Intrinsic interest in QIPS	"So yes, there's interests [in QIPS work], everyone really wants to do it." (ED/PharmD1)
Awareness of quality metric deficits	"...being a Magnet facility, it is very important to look at those quality indicators, nursing sensitive indicators... being compared across the country... [for] nursing quality improvement... it's very important looking at the quality outcomes based on those and what the metrics are for those." (NSY/RN1)

Abbreviations: IP, interprofessional; CLE, clinical learning environment; QIPS, quality improvement and patient safety; MD, medical doctor; APP, advanced practice provider; UBLT, unit-based leadership team; Magnet facility, facility recognized by the American Nurses Credentialing Center's Magnet Recognition Program.

moderate these inappropriate assumptions^{28,29} and, in particular, supports a focus on deeper understanding of each other's roles as a stimulus for interprofessional collaboration,^{31,32} which are similarly important facilitators of successful IP QIPS. Within our institution there is an attempt to increase IP education through purposeful selection of interprofessional speakers at GME grand rounds, dedicated interprofessional curriculum opportunities open to all residents, and the emphasis on QIPS teams within

the aforementioned REFLECT program to be interprofessional. Other institutions wishing to overcome barriers to IP QIPS may consider that an increased emphasis on IP education may be integral to QIPS training.

Patient Unforeseen Events Stimulate IP Interest in QIPS

Patient unforeseen events can act as a strong and natural trigger for interprofessional interest in QIPS. If reviewed through a format such as morbidity and mortality (M&M) conferences, these adverse events could inspire interprofessional QIPS projects if discussed among interprofessional teams. The conferences could become impromptu IP QI meetings where members share improvement ideas from their unique perspective. While, historically, M&M conferences focused on improvement on the individual technical level as opposed to the systems level,³³ several studies show the potential for interprofessional review of patient adverse events to be an effective springboard for systems-focused improvement and QIPS initiatives.^{34–37} Thus, similar health systems may consider reevaluating M&M conferences with these concerns in mind. Moreover, through embedding continuing medical education within QI initiatives, one can further optimize the triggered events as educational opportunities.³⁸ This can be achieved, for example, through connecting triggered events to clinical areas with known quality problems and highlighting evidence-based best practices or requiring post-event deliverables as part of experiential components of the embedded curriculum.³⁸

Limitations

Our study is limited by its observation of the CLE within a single health system, potentially limiting generalizability. A second limitation was our more prominent focus on teams within inpatient units as compared to outpatient units. Lastly, the small number of resident interviews was a limitation as only 2 pediatric residents participated; our method of recruitment of participants through medical directors of key units may have led to this limited recruitment of residents. Many non-resident participants work extensively with residents and were able to relay their perception of the resident experience but not give a firsthand account.

Additional research is needed to capture a wider breadth of firsthand resident perspectives of the IP-CLE to inform areas for improvement within GME programs and to examine variance between different specialty programs.

Conclusions

We defined IP learning and teamwork for QIPS and identified barriers, facilitators, and benefits to a positive IP clinical learning environment for QIPS and resident integration within these environments from resident, faculty, and staff perspectives. Two main findings were the importance of cultural factors affecting the IP-CLE and the strength of patient adverse events to trigger IP QIPS activity.

References

1. Weiss KB, Co JPT, Bagian JP. Challenges and opportunities in the 6 focus areas: CLER National Report of Findings 2018. *J Grad Med Educ.* 2018;10(suppl 4):25–48. doi:10.4300/1949-8349.10.4s.25
2. Accreditation Council for Graduate Medical Education. CLER Pathways to Excellence: Expectations for an Optimal Clinical Learning Environment to Achieve Safe and High-Quality Patient Care, Version 2.0. <https://www.acgme.org/Portals/0/PDFs/CLER/1079ACGME-CLER2019PTE-BrochDigital.pdf>. Accessed August 23, 2021.
3. Gruppen L, Irby DM, Durning SJ, Maggio LA. Interventions designed to improve the learning environment in the health professions: a scoping review. *MedEdPublish.* 2018;7. doi:10.15694/mep.2018.0000211.1
4. Gruppen LD, Irby DM, Durning SJ, Maggio LA. Conceptualizing learning environments in the health professions. *Acad Med.* 2019;94(7):969–974. doi:10.1097/ACM.0000000000002702
5. Brandt BF, Kitto S, Cervero RM. Untying the interprofessional Gordian knot: the National Collaborative for Improving the Clinical Learning Environment. *Acad Med.* 2018;93(10):1437–1440. doi:10.1097/ACM.0000000000002313
6. Reeves S, Pelone F, Harrison R, Goldman J, Zwarenstein M. Interprofessional collaboration to improve professional practice and healthcare outcomes. *Cochrane Database Syst Rev.* 2017;6(6):CD000072. doi:10.1002/14651858.CD000072.pub3
7. Luthfiya MN, Chang LE, McGrath C, Dana C, Lipsky MS. The state of the science of interprofessional collaborative practice: a scoping review of the patient health-related outcomes based literature published between 2010 and 2018. *PLoS One.* 2019;14(6):e0218578. doi:10.1371/journal.pone.0218578
8. O'Carroll V, McSwiggan L, Campbell M. Health and social care professionals' attitudes to interprofessional working and interprofessional education: a literature review. *J Interprof Care.* 2016;30(1):42–49. doi:10.3109/13561820.2015.1051614

9. Bollen A, Harrison R, Aslani P, van Haastregt JCM. Factors influencing interprofessional collaboration between community pharmacists and general practitioners—a systematic review. *Health Soc Care Community*. 2019;27(4):e189–e212. doi:10.1111/hsc.12705
10. Mulvale G, Embrett M, Razavi SD. “Gearing up” to improve interprofessional collaboration in primary care: a systematic review and conceptual framework. *BMC Fam Pract*. 2016;17:83. doi:10.1186/s12875-016-0492-1
11. Bentley M, Freeman T, Baum F, Javanparast S. Interprofessional teamwork in comprehensive primary healthcare services: findings from a mixed methods study. *J Interprof Care*. 2018;32(3):274–283. doi:10.1080/13561820.2017.1401986
12. Genn JM. AMEE Medical Education Guide No. 23 (Part 1): curriculum, environment, climate, quality and change in medical education—a unifying perspective. *Med Teach*. 2001;23(4):337–344. doi:10.1080/01421590120063330
13. Passiment M, Zaveri P, Traboulsi EI, et al. CLER Pursuing Excellence: designing a collaborative for innovation. *J Grad Med Educ*. 2020;12(4):512–517. doi:10.4300/JGME-D-20-00712
14. National Collaborative for Improving the Clinical Learning Environment. Envisioning the optimal interprofessional clinical learning environment: Initial findings from an October 2017 NCICLE symposium. https://storage.googleapis.com/wzukusers/user-27661272/documents/5a5e3933a1c1cKVwrfGy/NCICLE%20IP-CLE%20Symposium%20Findings_011218%20update.pdf. Accessed August 23, 2021.
15. Committee on Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes; Board on Global Health; Institute of Medicine. *Measuring the Impact of Interprofessional Education on Collaborative Practice and Patient Outcomes*. Washington, DC: National Academies Press (US); 2015.
16. Brooks J, McCluskey S, Turley E, King N. The utility of template analysis in qualitative psychology research. *Qual Res Psychol*. 2015;12(2):202–222. doi:10.1080/14780887.2014.955224
17. Ellaway RH, Kehoe A, Illing J. Critical realism and realist inquiry in medical education. *Acad Med*. 2020;95(7):984–988. doi:10.1097/ACM.0000000000003232
18. Kahlke RM. Generic qualitative approaches: pitfalls and benefits of methodological mixology. *Int J Qual Methods*. 2014;13(1):37–52. doi:10.1177/160940691401300119
19. Vidyarthi AR, Green AL, Rosenbluth G, Baron RB. Engaging residents and fellows to improve institutional wide quality: the first six years of a novel financial incentive program. *Acad Med*. 2014;89(3):460–468. doi:10.1097/ACM.0000000000000159
20. Myers JS, Nash DB. Graduate medical education’s new focus on resident engagement in quality and safety: will it transform the culture of teaching hospitals? *Acad Med*. 2014;89(10):1328–1330. doi:10.1097/ACM.0000000000000435
21. Wong BM, Levinson W, Shojania KG. Quality improvement in medical education: current state and future directions. *Med Educ*. 2012;46(1):107–119. doi:10.1111/j.1365-2923.2011.04154.x
22. Gould BE, O’Connell MT, Russell MT, Pipas CF, McCurdy FA. Teaching quality measurement and improvement, cost-effectiveness, and patient satisfaction in undergraduate medical education: the UME-21 experience. *Fam Med*. 2004;36(suppl):57–62.
23. Bartlett T, Hewertson E, Vassallo M. Culture change and mandating quality improvement. *Clin Teach*. 2019;16(1):30–35. doi:10.1111/tct.12758
24. McGeorge E, Coughlan C, Fawcett M, Klaber RE. Quality improvement education for medical students: a near-peer pilot study. *BMC Med Educ*. 2020;20(1):128. doi:10.1186/s12909-020-02020-9
25. Levitt DS, Hauer KE, Poncelet A, Mookherjee S. An innovative quality improvement curriculum for third-year medical students. *Med Educ Online*. 2012;17. doi:10.3402/meo.v17i0.18391
26. Duong DB, Sullivan EE, Minter-Jordan M, Giesen L, Ellner AL. A model for training medical student innovators: the Harvard Medical School Center for Primary Care Abundance Agents of Change program. *Med Educ Online*. 2016;21. doi:10.3402/meo.v21.30662
27. Durstenfeld MS, Statman S, Carney K, et al. Swimming with sharks: teaching residents value-based medicine and quality improvement through resident-pitched projects. *J Grad Med Educ*. 2020;12(3):320–326. doi:10.4300/JGME-D-19-00421.1
28. Foster R, Clark JM. Moderating the stereotypical views of health and social care students: the role of interprofessional education. *J Interprof Care*. 2015;29(1):34–40. doi:10.3109/13561820.2014.936059
29. El-Awaisi A, Awaisu A, Jaam M, Hajj MSE, Verjee MA. Does the delivery of interprofessional education have an effect on stereotypical views of healthcare students in Qatar? *J Interprof Care*. 2020;34(1):44–49. doi:10.1080/13561820.2019.1612863
30. Smith CS, Gerrish WG, Nash M, et al. Professional equipoise: getting beyond dominant discourses in an interprofessional team. *J Interprof Care*. 2015;29(6):603–609. doi:10.3109/13561820.2015.1051216
31. Wang J, Guo J, Wang Y, et al. Use of profession-role exchange in an interprofessional student team-based

- community health service-learning experience. *BMC Med Educ.* 2020;20(1):212. doi:10.1186/s12909-020-02127-z
32. Suter E, Arndt J, Arthur N, Parboosingh J, Taylor E, Deuschlander S. Role understanding and effective communication as core competencies for collaborative practice. *J Interprof Care.* 2009;23(1):41–51. doi:10.1080/13561820802338579
 33. George J. Medical morbidity and mortality conferences: past, present and future. *Postgrad Med J.* 2017;93(1097):148–152. doi:10.1136/postgradmedj-2016-134103
 34. Weingarten N, Issa N, Poslusny J. Fellow-led SICU morbidity and mortality conferences address patient safety, quality improvement, interprofessional cooperation and ACGME Milestones. *Am J Surg.* 2020;219(2):309–315. doi:10.1016/j.amjsurg.2019.01.026
 35. Tad-y DB, Pierce RG, Pell JM, Stephan L, Kneeland PP, Wald HL. Leveraging a redesigned morbidity and mortality conference that incorporates the clinical and educational missions of improving quality and patient safety. *Acad Med.* 2016;91(9):1239–1243. doi:10.1097/ACM.0000000000001150
 36. Frey B, Doell C, Klauwer D, et al. The Morbidity and Mortality Conference in pediatric intensive care as a means for improving patient safety. *Pediatr Crit Care Med.* 2016;17(1):67–72. doi:10.1097/PCC.0000000000000550
 37. Churchill KP, Murphy J, Smith N. Quality improvement focused morbidity and mortality rounds: an integrative review. *Cureus.* 2020;12(12):e12146. doi:10.7759/cureus.12146
 38. Shojania KG, Silver I, Levinson W. Continuing medical education and quality improvement: a match made in heaven? *Ann Intern Med.* 2012;156(4):305–308. doi:10.7326/0003-4819-156-4-201202210-00008



All authors are with the University of California, San Francisco. **Mike K.W. Cheng, MD**, is Clinician Educator Fellow (PGY-6), Division of General Internal Medicine, Department of Medicine; **Sally Collins, MA, MSc**, is Research Data Analyst, Center for Faculty Educators; **Robert B. Baron, MD, MS**, is Professor of Medicine, Division of General Internal Medicine, Department of Medicine, and Associate Dean; and **Christy K. Boscardin, PhD**, is Professor, Department of Medicine and Department of Anesthesia and Perioperative Care.

Funding: The authors report no external funding source for this study.

Conflict of interest: The authors declare they have no competing interests.

The authors would like to thank ACGME's Pursuing Excellence Pathway Innovators Collaborative for their partnership in permitting us use of their interview script; the ACGME's Pursuing Excellence in Clinical Learning Environments initiative team at UCSF as well as UCSF Health leadership for their feedback and guidance; and Emily Ko for her administrative efforts for interview scheduling and transcription.

Corresponding author: Mike K.W. Cheng, MD, University of California, San Francisco, mike.cheng@ucsf.edu, Twitter @mikekwcheng

Received December 22, 2020; revisions received June 20, 2021, and August 11, 2021; accepted August 16, 2021.