

# HOUSE

Journal of the University of Washington  
Housestaff Quality and Safety Committee

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**UW Medicine**

GRADUATE  
MEDICAL EDUCATION

HOUSESTAFF QUALITY  
& SAFETY COMMITTEE

# HOUSE

Journal of the University of Washington  
Housestaff Quality and Safety Committee

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Jay Zhu, MD

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Samuel Mandell, MD, MPH

### GME Contributors

Cindy Hamra, JD, MA

Tammy Ramirez

### Contributing Photographers

Clare McLean/UW Medicine

Jared Bozeman, MD

### Creative Direction & Design

Nancy Forrest Design

## In This Issue of HOUSE

- 3 A Note from the Editors
- 4 Getting Involved in Quality Improvement and Patient Safety
- 5 HQSC Members and Certificate Awardees

### Articles

- 6 Improving Frequency of On-Shift Resident Didactic Education in the Emergency Department
- 10 Engaging an Untapped Resource: Introducing Patient Safety Rounds into Resident Work Flow
- 14 Improving Housestaff Education in Cardiopulmonary Resuscitation in Adults with Mechanical Circulatory Support
- 17 Untethering from Telemetry: A Study of EMR Updates to Promote Appropriate Use of Inpatient Cardiac Monitoring on the HMC Medicine Service
- 17 Building A Better Doctor: Iconoclasts in Standardization
- 24 Reflections



## A Note from the Editors

Dear UW Medicine Reader,

Thank you for reading the fourth edition of HOUSE, the resident publication of the UW Housestaff Quality and Safety Committee (HQSC). It has been an exciting year for HQSC, with membership continuing to increase and over 30 specialties represented! HQSC also collaborated with NURF (Network for Underrepresented Residents and Fellows) for the first annual Health Equity Symposium. This forum explored how healthcare delivery often suffers from inequality and that the principles of Quality Improvement (QI) can be applied to these issues to lead to more just and equitable care.

QI work spans all fields of medicine and this year's HOUSE is no exception. Optimization of resources is a major goal of many quality improvement initiatives and Tanenbaum et al. discuss a project that promotes wise use of cardiac telemetry. Interdisciplinary collaboration is critical in all fields of medicine and Hicks et al. describe how to improve coordination in a resident primary care clinic. We all work at teaching hospitals but there is often no time for teaching! Lebin et al. explore efforts to improve on-service didactics by increasing dedicated teaching time in the Harborview ED. Given that QI is a process, we have also included a proposed project from Leedy et al. related to the proliferation of Mechanical Circulatory Support (MCS) devices and the implication for codes. Dr. Joyner also offers his perspective on QI and the origin of HQSC. We also feature several provocative reflective pieces and poetry that explore humanistic aspects of medicine.

This impressive diversity of topics highlights the ubiquity and importance of QI work. HQSC thrives thanks to housestaff leadership (especially HQSC co-chairs Dr. Kailey Bolles and Dr. Clint Orloski) and our faculty sponsors especially Dr. Byron Joyner and Dr. Nicholas Meo.

We hope that you enjoy HOUSE 2018 and that it not only informs you of the impressive work that University of Washington residents and fellows undertake but inspires you to engage in your own quality improvement efforts.

Sincerely,

Jared Bozeman, MD  
Jay Zhu, MD,  
HQSC Co-editors



# Getting Involved in Quality Improvement and Patient Safety

*There are many ways for University of Washington residents and fellows to become involved in quality improvement (QI) and patient safety projects.*

## Housestaff Quality and Safety Committee

Founded in 2011, the UW Housestaff Quality & Safety Committee (HQSC) is a trainee-led organization with members from a range of academic divisions. HQSC functions in partnership with the UW Patient Safety and Quality Coordinating Committee and the Graduate Medical Education Committee, with the goal of engaging members in the quality and safety work pursued throughout UW training sites. PGY-1 residents are welcome to this group. Members attend monthly meetings throughout the year to learn the skills needed to become future leaders in QI and patient safety. Because of impressive growth, HQSC has debuted a new leadership team to better serve our members in areas of publication, technology, development, and outreach.

**Certificate Program:** Motivated HQSC members can earn a certificate in quality improvement and patient safety by consistently attending monthly meetings, completing an IHI Open School online training course, and undertaking a longitudinal project.

## UW Medicine Transformation of Care

UW Medicine is the recipient of a \$30 million, four-year award from the Center for Medicare and Medicaid Innovation to serve as a Practice Transformation Network for the WWAMI region (Washington, Wyoming, Alaska, Montana, and Idaho). Oversight for this grant is through the office of the Chief Medical Officer, who is identifying projects in need of resident input before making these opportunities available on QI Match.

<https://depts.washington.edu/uwmedptn/>

## Leaf Data Retrieval System

*Leaf* is a self-service clinical data analytical tool that allows clinicians to independently run analyses on various patient populations in the UW system based on multiple different specified criteria. Please see

<https://www.iths.org/investigators/services/bmi/leaf/>

## Access to Excellence

Access to Excellence is a frequently updated, electronic quality dashboard of key metrics. All metrics are protected and require AMC login to view. Access to Excellence provides detailed quality data on numerous metrics and allows users to search performance information for specific units, services, or departments. There are also dashboards for key departments/centers of emphasis, accessible by clicking on the department/center's initials in the upper righthand corner. Access to

Excellence is a great reference for current QI and Patient Safety efforts underway at UWMC and HMC. Each metric has a champion, and his or her contact information is displayed if you would like to reach out. Click on the Access to Excellence banner on the HMC or UWMC intranet webpage to access.

## Quality Improvement Reporting Systems

Given that housestaff are on the frontlines of healthcare, it is important for residents and fellows to be able to report safety and quality issues. All the major hospitals in the UW system have an error reporting system. UWMC and HMC use the Patient Safety Network (PSN), the VA recently adopted a system called JPSR, and Seattle Children's uses eFeedback. Taking a few minutes to report quality and safety issues can add data to existing QI efforts as well as reveal unknown safety concerns.

## HQSC Scholarships

Do you have a QI project you want to present at a conference? Or is there a QI project you are interested in starting but need \$250 to \$500 to get started? Consider applying for a grant from HQSC.

<http://www.uwhqsc.org/scholarships.html>



# HQSC Members and Certificate Awardees 2017-2018

## HOUSE CHAIRS

**Kailey Bolles MD–VA** Chief  
Resident Quality and Safety

**Clinton Orloski MD**, Fellow  
Critical Care Medicine

## HQSC MEMBERS

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**Alexa Rodin** (Internal Medicine)

**Allison Ikeda** (Otolaryngology)

**Amy Cheney** (Cardiology)

**Amy Thomas** (Geriatric Medicine)

**Andrew Ludwig** (General Surgery)

**Becca Simon** (Maternal Fetal Medicine)

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**Jay Zhu** (General Surgery)

**Jenny Yu** (Plastic Surgery)

**Jessica Huang** (Anesthesiology)

**Jonathan Del Toro** (Anesthesiology)

**Justin Granstein** (Neurology)

**Kaitlyn McQuistion** (Pediatrics)

**Kate Perez** (Internal Medicine)

**Kathryn (Kailey) Bolles** (Internal Medicine)

**Kavita Pandit** (General Surgery)

**Kayli Gimarc**  
(Physical Medicine & Rehabilitation)

**Kevin Labadie** (General Surgery)

**Kevin Saiki** (Obstetrics & Gynecology)

**Kevin Seitz** (Internal Medicine)

**Kira Newman** (Internal Medicine)

**Kyle Sears** (Internal Medicine)

**Lars Margolis** (Internal Medicine)

**Laura Samples** (Internal Medicine)

**Mariam Shehata** (Radiology)

**Marie Sears** (Internal Medicine)

**Mary Kate Thayer** (Orthopaedics)

**Matt Greer** (Radiation Oncology)

**Matt Mesias** (Geriatric Medicine)

**Matthew Kelberg** (Anesthesiology)

**Medhavi Bole** (Infectious Disease)

**Meg Curtis** (Internal Medicine)

**Meghna Shah** (Internal Medicine)

**Michelle Wiese** (Psychiatry)

**Nabil Zeineh** (Cardiology-EP)

**Natalie Moriarty** (Dermatology)

**Nicole Sharp Cottrell** (Pediatric Surgery)

**Nikita Baclig** (Internal Medicine)

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## UW GME GRADUATE QUALITY & SAFETY CERTIFICATE AWARDEES

**Clinton Orloski** –Critical Care Medicine

**Douglas Leedy** –Internal Medicine

**Emily Bartlett** –Emergency Medicine

**Grace Wu** –Geriatric Medicine

**Katy Bowman** –Internal Medicine

**Katy Hicks** –Geriatric Medicine

**Kevin Seitz** –Internal Medicine

**Sonali Sheth** –Family Medicine

**Stephanie Carr** –Internal Medicine

## GENE PETERSON AWARD 2018



**Dr. Anneliese Schleyer**  
General Internal Medicine

*This section features exceptional work conducted by the residents and fellows of UW Medicine in the field of quality improvement.*

## Improving Frequency of On-Shift Resident Didactic Education in the Emergency Department

**Authors:** Jacob A. Lebin MD<sup>1</sup>, David L. Murphy MD<sup>1</sup>, Benjamin T. Friedman MD<sup>1</sup>

**Affiliations:** 1. Department of Emergency Medicine, University of Washington, Seattle, WA

### ABSTRACT

Structured on-shift didactic sessions in the emergency department are an important educational modality, but occur infrequently due to multiple competing demands. To improve the frequency of on-shift didactic sessions, we implemented an easily reproducible intervention that targeted faculty and senior resident teaching assignment and accountability. While we found improved didactic frequency following the intervention, further study is needed to determine if this effort is sustainable.

### BACKGROUND

On-shift didactic resident education is an important educational experience for residents rotating in the Emergency Department (ED). However, structured on-shift didactic sessions can be difficult to organize in the setting of multiple competing demands, including rapid patient turnover, concurrent high acuity patient arrivals, and continuous interruptions.<sup>1</sup> These inherent barriers result in inconsistent delivery of on-shift didactics, which negatively impacts resident education and detracts from their experience in the ED. We sought to increase the frequency of our structured on-shift didactic sessions at an academic medical center by improving faculty and senior resident teaching assignment and accountability.

### METHODS

Prior to the intervention, on-shift didactic sessions were held every morning following the morning sign-out. On-shift didactics were led by an on-shift faculty member or senior resident (PGY-4) and consisted of an untimed, unscripted presentation on a topic of interest. Assignments for teaching on-shift didactics were distributed amongst faculty via email but were not posted in the ED or made available to residents.

We sought to increase the frequency of on-shift didactic sessions via a two-pronged intervention. First, a schedule of the assigned on-shift educators in the ED was posted in the provider work area and updated weekly. Second, we transferred the responsibility of organizing the on-shift didactics from the teaching faculty or senior resident to junior emergency medicine residents (PGY-2 or 3). These residents were not responsible for delivering didactic content, but rather served as the accountable party for notifying the assigned educator of their teaching

responsibility, organizing residents to the designated teaching location, and alerting the charge nurse that on-shift teaching was to occur.

Occurrence of on-shift didactic education was measured by surveying junior residents immediately following their shift each day for one month before and one month after the intervention. T-test of percentages evaluated the magnitude of effect.

### RESULTS

Pre-intervention on-shift didactics occurred 16/30 days (52%). Increased clinical demands and “forgetting” were frequently cited reasons for missed didactics sessions, as identified by a pre-intervention survey. Post-intervention on-shift didactics occurred 25/30 days (83%), reflecting an absolute increase of 31% (95%CI, 5.1-52.9,  $p=0.01$ ).

### DISCUSSION

Our work suggests that on-shift didactics occur more frequently when the responsibility for their delivery is transitioned to the beneficiaries (i.e. the residents). We postulate that this intervention empowers residents to advocate for their own learning and thereby facilitates the prioritization of didactic sessions. Efforts to organize motivated junior residents and publicize assigned educators likely bolster the expectation that on-shift didactic sessions will occur, and in turn promote a larger culture of favoring formal education. Posting the teaching schedule in the ED facilitates transparency and accountability amongst educators. Partnership with key ED stakeholders, such as the charge nurse, further increased department awareness and accommodation of didactic sessions.

A limitation of this work is that we cannot discern the individual contribution of each of this two-part intervention, yet we speculate that they work synergistically. Additionally, the intervention was reviewed for one month and the positive result may be confounded by the likely enthusiasm that comes with initial implementation any educational intervention. Sustainability of this effort warrants further study. Further, we did not assess for increased learning or whether the residents found this to be educationally valuable or disruptive to the general workflow.

We observed how this relatively small, targeted intervention amidst an unpredictable ED environment tipped the balance to overcome the challenges of organizing on-shift didactics sessions.

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## Engaging an Untapped Resource: Introducing Patient Safety Rounds into Resident Work Flow

**Authors:** Katherine G. Hicks, MD<sup>1,2</sup>; Jared W. Klein, MD, MPH<sup>1,2</sup>; Anneliese M. Schleyer, MD, MHA, SFHM

**Affiliations:** 1. Harborview Medical Center, Seattle, WA  
2. University of Washington Internal Medicine Residency, Seattle, WA

### ABSTRACT

A culture of safety is essential for the delivery of high-quality patient care and to encourage event reporting by all team members. Executive safety rounds are a recognized method to connect leadership with frontline staff with the goal of identifying patient safety concerns. Applying a similar model to the residency environment engages trainees in safety culture and lowers barriers for reporting while also satisfying objectives in the Accreditation Council for Graduate Medical Education (ACGME) Clinical Learning Environment Review (CLER) initiative. Patient safety rounds were implemented on the Internal Medicine teaching service at Harborview Medical Center. A quality and safety chief resident (CR) visited the team room at a pre-determined time during an admitting day once per team per month. The CR asked trainees about concerns with specific prompts as needed and recorded field notes. After rounds, themes were compiled and event reports filed. The CR sent follow-up emails for loop closure within one week. Residents were surveyed about their experience. Of 86 residents, 41% completed the follow-up survey. The majority (84%) felt safety rounds increased awareness of patient safety events and made it easier to report (91%). Most residents (87%) felt that rounds did not disrupt patient care. Common themes discussed were communication and care coordination (30% and 31% of comments, respectively). Twenty event reports were filed with 80% not otherwise documented in the formal reporting system. Introducing patient safety rounds to residents increased awareness of patient safety and lowered barriers to reporting with minimal workflow disruptions.

### INTRODUCTION

To improve quality of care and increase awareness of patient safety events, hospitals must foster a climate in which people will speak up without fear of retribution or blame.<sup>1</sup> One tool shown to improve culture among hospital staff is executive patient safety rounds, a structured approach that brings together leadership and frontline staff endorsed by the Institute for Healthcare Improvement and the Agency for Healthcare Research and Quality.<sup>2,3</sup> The program has been widely implemented and gives staff an opportunity to share safety concerns directly with leaders, building trust and understanding and therefore promoting a culture of safety. However, for many institutions these sessions are unit based and do not necessarily include the voice of providers, in particular resident physicians.

In the residency environment, the Accreditation Council for Graduate Medical Education (ACGME) through their Clinical Learning Environment Review (CLER) has identified patient safety as one of six focus areas.<sup>4</sup> Importantly these requirements are mandated for training sites and not residency programs. As training environments are modified to align with CLER goals, emphasis has been on improving event reporting among trainees; however many interventions overlook the important step of building culture and connection with leadership. In contrast, patient safety rounds represent an opportunity to improve both the learning environment and the culture of safety in teaching hospitals.

The objective of this study was to establish the feasibility of implementing a patient safety rounds program with residents on the acute care medicine service at a large academic medical center.

### METHODS

We conducted a descriptive study at Harborview Medical Center. Out of 174 residents, fifteen trainees per month rotate on the inpatient Internal Medicine service.

The intervention consisted of a quality and safety chief resident (CR) visiting the team workroom at an agreed upon time during an admitting day. All levels of learner on the team were asked to attend. The CR introduced the conversation as an opportunity to reflect on ways to improve care and report concerns. If needed, the CR provided prompts on possible topics such as unexpected deaths or ICU transfers, hospital acquired infections, or communication/professionalism concerns. Team members were asked to provide their perspectives on the event and indicate patient-specific identifiers as appropriate. The CR recorded field notes. After the session, the CR filed event reports as indicated and categorized topics using a predetermined list of theme. Teams received a follow-up email for loop closure from the CR or hospital patient safety office.

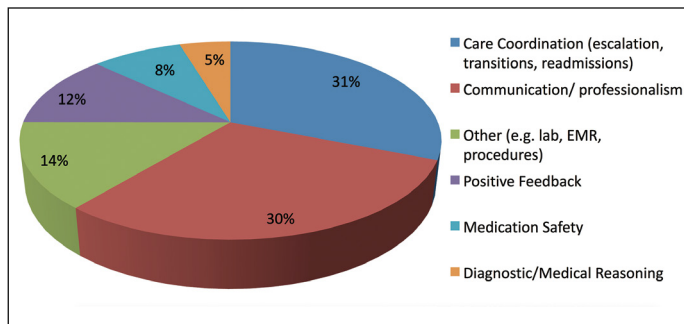
Residents received a voluntary and anonymous electronic survey at the end of the clinical rotation regarding their experiences with safety rounds. Additional qualitative data were collected from comments provided in the survey. The existing hospital event report database was used to determine whether specific patient events described in safety rounds were otherwise reported. Analyses were descriptive in nature. As a quality improvement project with data collected for non-research purposes this project was deemed exempt from IRB review.

### RESULTS

**Session Content/Themes:** Over the 6 month pilot, 86 residents participated in 32 sessions of patient safety rounds with an average of 5 events or themes per session. The most common themes (Figure 1) were care coordination (31%), such as concerns with the discharge process and escalations of care, and communication (30%), including difficult conversations between physicians or with other staff members.

**Resident-reported Experience with Safety Rounds:** Thirty-six residents (41%) completed the survey (Figure 2). The majority of respondents felt safety rounds increased awareness of patient safety events (84%) and made it easier to report concerns (91%). Most

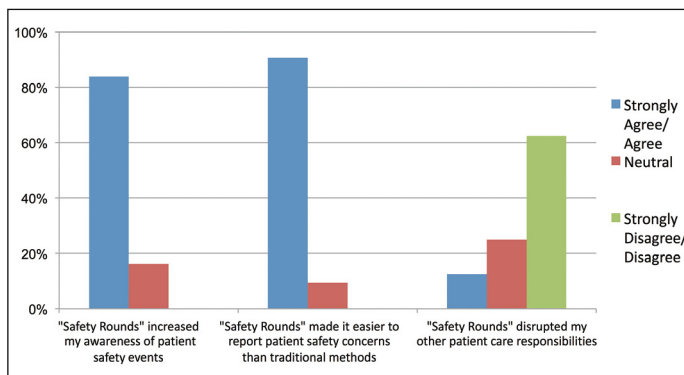
**Figure 1. Distribution of Themes**



residents felt that rounds did not disrupt patient care (87%). One trainee stated that rounds provide a “safe space to debrief on how to do better for our patients.” Another wrote that the rounds, “helped report events that would have otherwise been forgotten.”

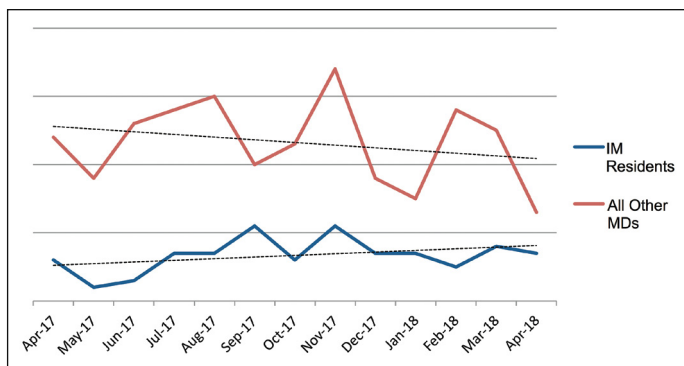
**Event Reports:** Twenty electronic event reports were submitted,

**Figure 2. Resident Experience Survey**



representing 13% of all topics discussed. Of event reports submitted, 80% were not otherwise captured in the reporting system. The median number of event reports filed by medicine residents per month increased from 6.0 before the start of safety rounds at this site to 7.0

**Figure 3. Monthly Patient Safety Event Reports (PSNs) Submitted by Medicine Residents vs All Other Physicians**



after safety rounds were implemented. In contrast the number for all other physicians decreased over the same period from 24.0 to 21.5 per month (Figure 3).

## DISCUSSION

Implementing structured, scheduled conversations about patient safety concerns between a CR and trainees resulted in a self-reported increased awareness of safety events and lower barriers to reporting without disrupting workflows. This has several important implications for training sites. First, the high-degree of resident satisfaction supports safety rounds as a valuable intervention and fulfills a previously unmet need in the training environment. The engagement of trainees may stem from scheduling the sessions such that they can be easily incorporated into the residents’ workflow. It also is a conversation between a trusted peer leader and a preexisting clinical team that fosters a culture of safety development in a safe environment. A structured loop closure process is essential to ensure meaningful culture change as demonstrated at centers with executive safety rounds.<sup>5</sup>

Second, the themes that were most commonly discussed, including communication and professionalism, indicate that concerns most important to trainees are not well captured in other reporting venues. Prior work has shown that trainees rarely speak up about these concerns in traditional reporting structures.<sup>6</sup>

In addition to the evidence that safety rounds promote a culture of safety among trainees, review of event reporting data indicates a trend towards increased reporting in the target group. The majority of events that led to formal reporting were not otherwise captured in existing systems, a finding consistent with studies of executive safety rounds.<sup>7</sup> The recent ACGME report on national CLER findings highlighted a common knowledge gap among trainees regarding what defines a patient safety event, a gap that may be narrowed with these direct conversations about resident concerns.<sup>8</sup>

This study has a number of important limitations. It is a descriptive design and involves self-reported survey data. It also took place at a single site with a dedicated CR in quality and safety, a resource that is not available at all institutions. However, this initiative successfully engaged residents in quality and safety, capturing the important and previously unheard perspectives of trainees in the clinical learning environment.

In conclusion, chief resident-facilitated patient safety rounds on inpatient clinical services are a promising approach to engage residents in quality and safety work. Implementing this process at an academic medical center empowered residents to report safety concerns in a timely fashion with minimal interruption to workflow and enabled the institution to better achieve CLER objectives.

## Acknowledgements:

The authors would like to thank Tonya Martino, RN, Vija Merrill, MD, and J. Richard Goss, MD, MPH, whose support made this project possible.



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## Improving Housestaff Education in Cardiopulmonary Resuscitation in Adults with Mechanical Circulatory Support

**Authors:** Douglas Leedy, MD<sup>1</sup>; Ryan C. Martin, MD<sup>2</sup>

**Affiliations:** 1. Department of Medicine, Division of General Internal Medicine, University of Washington, Seattle, WA  
2. Department of Medicine, Division of Cardiology, University of Washington, Seattle, WA

### ABSTRACT

Cardiopulmonary resuscitation in patients with mechanical circulatory support (MCS) devices deviates from standard advanced cardiac life support (ACLS) protocols. Expertise is needed to proficiently respond to cardiac arrest in this patient population. Through a bundled intervention targeting internal medicine residents' education on MCS devices, we aim to increase residents' confidence in responding to and leading a cardiac arrest in MCS patients. In this article, we describe the ongoing design and implementation of a project aimed to improve the training, and ultimately resuscitation outcomes, of internal medicine residents responding to cardiac arrest in mechanically supported patients at Harborview Medical Center (HMC).

### INTRODUCTION

Mechanical circulatory support devices (MCS) have evolved from a rarely used intervention to an increasingly used therapy in critically-ill hospitalized patients, specifically in advanced heart failure.<sup>1</sup> In the 6 years from 2006-2012, there was a greater than 30-fold increase in the use of peripheral ventricular assist devices alone.<sup>2</sup> With this accelerating adoption of MCS devices, in-hospital cardiopulmonary arrest in this subset of patients is becoming a common occurrence.<sup>3</sup> Resuscitation measures are highly variable depending on the specific device and institutional practices. In certain clinical scenarios, patients may have no discernible pulse or blood pressure, and in others, an appreciation of the device mechanics is critical to troubleshooting during a cardiac arrest.<sup>4</sup> Additionally, cross-cover residents may not be aware that a patient has an MCS device when the primary team is off duty. Due to these complexities, as well as deviation from standard Advanced Cardiac Life Support (ACLS) protocols, providers require specific education when responding to a cardiopulmonary arrest in MCS patients.

At Harborview Medical Center (HMC), internal medicine residents are often responsible for leading and performing cardiopulmonary resuscitation. While the current American Heart Association ACLS course provides education in standard resuscitative protocols, medical residents at HMC do not currently receive specific training for cardiopulmonary arrest in MCS patients. It is widely accepted that ACLS training for physicians improves cardiac arrest outcomes.<sup>5</sup> Simulation training along with longitudinal education has been shown to improve performance during cardiac arrest when compared to traditional train-

ing methods.<sup>6,8</sup> Our goal with this article is to describe the continuing planning and application of ACLS specific to MCS at HMC. We also plan to evaluate the resuscitation outcomes of resuscitations at HMC during codes with MCS patients.

### PLANNED INTERVENTIONS

Internal medicine residents at the University of Washington Affiliated Hospitals will attend a formalized lecture on cardiac assist devices as part of their Academic Half Day lecture series. The lecture will consist of education on the basics of frequently used devices at HMC, troubleshooting common issues with these devices, and responding to cardiac arrest. At the end of the lecture, residents will be given the opportunity to practice cardiac arrest simulations with percutaneous ventricular assist devices. At the end of the lecture they will be provided with a portable tri-fold with information on how to respond to cardiac arrest in patients with assist devices. A similar, more detailed document will be present in the provider team rooms and in respective patient rooms. To aid in the identification of MCS devices when responding to a cardiac arrest, a placard identifying the name of the device (e.g. Impella, a type of ventricular assist device) will be displayed overhead for all patients with an MCS device at HMC.

**Measures:** To evaluate the impact of this curriculum, Internal Medicine Residents at the University of Washington Affiliated Hospitals will be administered a survey before and after the proposed intervention. Anonymous surveys will consist of questions answered on a 5-point Likert scale evaluating the residents' confidence responding to and leading a cardiac arrest in MCS patients.

**Work completed thus far:** In conjunction with the Code Blue Committee at HMC, revised MCS protocols are being developed and translated into an algorithm on highly portable tri-fold cards and on a more detailed document for provider team rooms. The goal is for these educational tools to be easy to follow. Placards have been created to be displayed above patient beds to assist in more visible identification of MCS devices. For the code-simulation and lecture for residents, an advanced heart failure attending at HMC will assist in overseeing the MCS cardiac arrest simulation.

### CONCLUSION

Through a bundled intervention targeting internal medicine residents' education on MCS devices, we aim to increase residents' confidence by 10% in leading a cardiac arrest in MCS patients. We hope this planned intervention will ultimately improve patient outcomes in MCS patients during cardiac arrest at HMC. Potential pitfalls of the proposed intervention include the need for longitudinal didactic and simulation training to maintain the proficiency of housestaff as well as the challenge to adequately assess significant outcomes in cardiac arrest due to a relative low incidence at HMC.

### Acknowledgements:

The authors would like to recognize Guy Maddison RN, Brendan Riordan PA-C, Jennifer Hamilton RN, Katy Hicks, MD and everyone on the Harborview Code Blue Committee for their contributions and continued support to make this project possible.

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## IMPELLA Cardiac Arrest Protocol

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### Essentials

**Initiate standard ACLS protocol immediately if indicated**

- Examples may include: loss of Mean Arterial Pressure (<50mmHg) signs of malperfusion, continuous suction events
- During defibrillation, do NOT touch the pump, cables, or Impella® Console

**Reduce the P-level (speed) to P2**

- This is standard across all Impella devices

**Contact Cardiology Cath Lab or Interventional attending and/or fellow**

- Call the Operator

**Contact Impella Representative for device specific questions**

- 1-(800)-422-8666

**Following ROSC, a portable CXR and TTE should be rapidly obtained to ensure proper position of Impella**

- To be interpreted/repositioned by Cardiology Cath Lab attending and/or Interventional fellow or attending

Cardiac Arrest

↓

Perform Standard ACLS Protocol

↓

Reduce Impella performance level to P2

↓

Contact Cardiology Cath Lab attending and/or Interventional fellow/attending

↓

Contact Impella Representative for device specific questions

↓

Following ROSC, obtain urgent TTE and portable CXR to assess device positioning

# Untethering from Telemetry: A Study of EMR Updates to Promote Appropriate Use of Inpatient Cardiac Monitoring on the HMC Medicine Service

**Authors:** Eric Tanenbaum, MD<sup>1</sup> and Pranoti Hiremath, MD<sup>1</sup>; Ellen Robinson, PT<sup>2</sup>; Zachary Goldberger, MD, MS<sup>3</sup>; Paul Sutton, MD, PhD<sup>1</sup>; Astrid Schreuder, PhD<sup>4</sup>; Anneliese Schleyer, MD, MHA, SFHM<sup>1</sup>

**Affiliations:** 1. Department of Medicine, University of Washington, Seattle, WA 2. Harborview Physical Therapy, Harborview Medical Center, Seattle, WA 3. Division of Cardiology, University of Washington, Seattle, WA 4. Department of Quality Improvement, Harborview Medical Center, Seattle, WA

## ABSTRACT

Cardiac telemetry monitoring (telemetry) is a useful tool to detect dangerous arrhythmias, but its use may be associated with increased cost, patient inconvenience, and alarm fatigue. At Harborview Medical Center (HMC) and the University of Washington Medical Center (UWMC) the electronic medical record and electronic ordering system (EMR) were modified to aid providers in appropriate acute care telemetry use. The changes included 1) a new ordering system, with indications for use and recommended durations of use that align with the current American Heart Association guidelines, 2) a reminder page, sent to care providers recommending discontinuation of telemetry when the guideline-recommended duration has been exceeded, and 3) the inclusion of documentation by telemetry technicians in the notes section of the EMR (HMC only). Acute care telemetry use on the Medicine Services at HMC was examined during the 12-month period preceding these EMR modifications and compared to the 12-month

period following the modifications. Following the EMR updates, on the acute care medicine services there were fewer telemetry orders placed per patient-days, fewer patient-days spent on telemetry per total patient-days of hospitalization, the average duration of telemetry monitoring decreased, and patients were significantly more likely to have telemetry discontinued prior to hospital discharge. These findings suggest that changes to the EMR can be effective in promoting appropriate use of telemetry thereby avoiding costs associated with telemetry overuse.

## BACKGROUND

The American Heart Association (AHA) has published guidelines on appropriate telemetry use<sup>1</sup>, however many providers are unaware of these recommendations. On an internal survey of 87 internal medicine physicians (including both attendings and medical residents) within our hospital system in 2016, only 33% indicated that they were aware of such guidelines. In addition, providers often receive little to no formal education on appropriate telemetry use. Telemetry has received attention from the Choosing Wisely initiative, and currently the Society of Hospital Medicine recommends against the use of telemetry outside of the ICU without a protocol that governs its continuation.<sup>2</sup> Other groups have been able to demonstrate a decrease in telemetry use by modifying their electronic ordering systems.<sup>3,5</sup> At Harborview Medical Center (HMC) and the University of Washington Medical Center (UWMC), we attempted to promote appropriate use of telemetry on acute care medicine floors using modifications to our electronic medical record and electronic ordering system (EMR).

## METHODS

Three major changes were made to the EMR across sites. We compared data on acute care telemetry use on the Medicine Service at HMC for the 12 months preceding and the 12 months following update implementation. The first update was a new telemetry order set that reflected the recommendations of the AHA. Using the new order

Figure 1. New telemetry order set

**Telemetry - Acute Care (Planned Pending)**  
Pt Care / Nursing

**Please see the UW Medicine Guidelines for Telemetry on Acute Care units**

- The need for telemetry in the acute care setting is generally transient.
- Telemetry is inconvenient and uncomfortable for patients.
- Telemetry beds are a limited resource that constrains access to care.
- Telemetry monitoring demands considerable patient care resources.

**Discontinue telemetry when it is no longer indicated (Right-click and Cancel/DC the Telemetry order).**

**Reassess need for Telemetry after 24 hours for the indications listed below:**

- Telemetry\_PS\_NEW Indication: Chest Pain, R/O MI, USUAL DURATION-ACUTE: 24 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Post PCI, Ablation, Device, USUAL DURATION-ACUTE: 24 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Procedural Sedation, USUAL DURATION-ACUTE: 24 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Signif Electrolyte Abnormalities, USUAL DURATION-ACUTE: 24 hours, DO NOT REMOVE MONITOR  
i.e., K+ >6 or < 2.5; Mg+ <1.2; Corrected Ca+ >12 or < 6; pH <7.2
- Telemetry\_PS\_NEW Indication: Other-Specify in Special Instructions, USUAL DURATION-ACUTE: 24 hours, DO NOT REMOVE MONITOR

**Reassess need for Telemetry after 48 hours for the indications listed below:**

- Telemetry\_PS\_NEW Indication: Unstable Brady/Tachyarrhythmias, USUAL DURATION-ACUTE: 48 hours, DO NOT REMOVE MONITOR  
i.e., uncontrolled atrial fibrillation / a-flutter, ventricular tachycardia, paroxysmal supraventricular tachycardia, symptomatic bradycardix
- Telemetry\_PS\_NEW Indication: Syncope, USUAL DURATION-ACUTE: 48 hours, DO NOT REMOVE MONITOR

**Reassess need for Telemetry after 72 hours for the indications listed below:**

- Telemetry\_PS\_NEW Indication: ACS, Acute MI, USUAL DURATION-ACUTE: 72 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: CVA, TIA, USUAL DURATION-ACUTE: 72 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Post ICD Shock, USUAL DURATION-ACUTE: 72 hours, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: QTc >500 ms or QT Prolonging Drug, USUAL DURATION-ACUTE: 72 hours, DO NOT REMOVE MONITOR

**Continue telemetry as long as necessary for the indications listed below:**

- Telemetry\_PS\_NEW Indication: Decompensated Heart Failure, USUAL DURATION-ACUTE: Continuous, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Post Cardiac Surgery, USUAL DURATION-ACUTE: Continuous, DO NOT REMOVE MONITOR
- Telemetry\_PS\_NEW Indication: Post Cardiac Arrest, USUAL DURATION-ACUTE: Continuous, DO NOT REMOVE MONITOR

**FYI: The following are NOT indications for telemetry by themselves:**

- Chronic atrial fibrillation, rate controlled
- Pulmonary Embolism that is hemodynamically stable and on anticoagulation
- Acute COPD Exacerbation
- Alcohol Withdrawal
- Sepsis that is sufficiently stable for the acute care setting
- GI Hemorrhage
- Anemia, Acute or Chronic
- Altered Mental Status

**Table 1. HMC Medicine Acute Care Telemetry Use Data**

	Number of telemetry orders	Mean duration of telemetry use	SD	P-value	% orders discontinued prior to discharge	P-value	Total patient days	Total telemetry days	Telemetry days per 100 patient days	Telemetry orders per 100 patient days
<b>HMC Hospitalist Service</b>										
12 mo. pre-intervention	181	47.3	44.1		56		8519	356	4.2	2.1
12 mo. post-intervention	176	42.9	38.3	0.31	69	0.01	10328	315	3.0	1.7
<b>HMC Medicine Resident services</b>										
12 mo. pre-intervention	800	66.1	89.8		64		24070	2211	9.2	3.3
12 mo. post-intervention	664	42.9	38.3	< 0.01	79	< 0.01	25508	1380	5.4	2.6
<b>All HMC Medicine Services</b>										
12 mo. pre-intervention	981	62.6	83.6		62		32589	2568	7.9	3.0
12 mo. post-intervention	840	48.4	52.3	< 0.01	77	< 0.01	35836	1695	4.7	2.3

set providers choose among conditions that the AHA recommends using telemetry and the appropriate duration of use for each condition. The order set also includes a list of conditions for which telemetry is frequently ordered, but per current guidelines is not recommended.

The second update was a paging system set up through the EMR that sends a reminder to the providers caring for patients on telemetry whose usage has exceeded the guideline-recommended duration. The page recommends discontinuation of telemetry unless there is a new indication.

The third update, implemented at HMC only, was the requirement for telemetry technicians to document their findings in the EMR each shift. The hope was that this would provide both better communication between telemetry technicians, physicians and nurses and increase physician awareness of which of their patients are receiving telemetry monitoring.

Data collected at HMC included the total number of acute care telemetry orders placed on Medicine services, time/days spent on telemetry, and whether patients' telemetry monitoring was actively discontinued prior to hospital discharge. These data were examined in aggregate and separately for the resident services and hospitalist-only services. Data analysis was done in Microsoft Excel 2016. The Student's T-test was used to compare the difference between means and the Chi-squared test was used for comparison of percentages

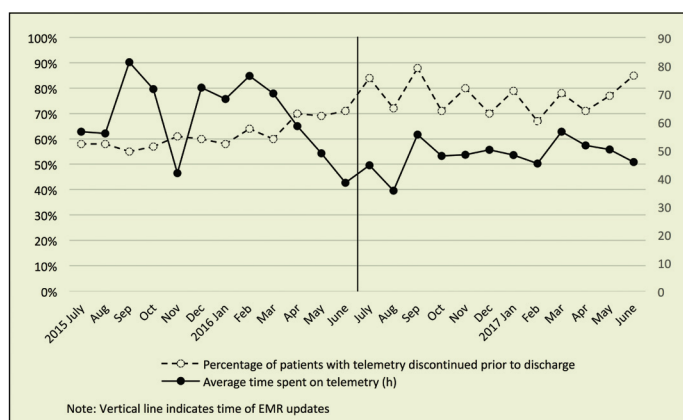
**RESULTS**

Comparing the 12-month time period immediately preceding the updates to the EMR with the 12-month time period immediately following it, there was a 22% decrease in the total number of new telemetry orders per 100 patient-days (3.0 vs 2.3, respectively), a 23% decrease in the average number of hours patients on telemetry spent being monitored (63 hours vs 48 hours, respectively,  $p < 0.01$ ), a 24% increase in the percentage of patients who had their telemetry monitoring discontinued prior to discharge (62% vs 77%, respectively  $p < 0.01$ ), and a 40% decrease in the percentage of patient-days in which telemetry was used (7.9% vs 4.7%, respectively  $p < 0.01$  – Table 1, Figure 2, Figure 3).

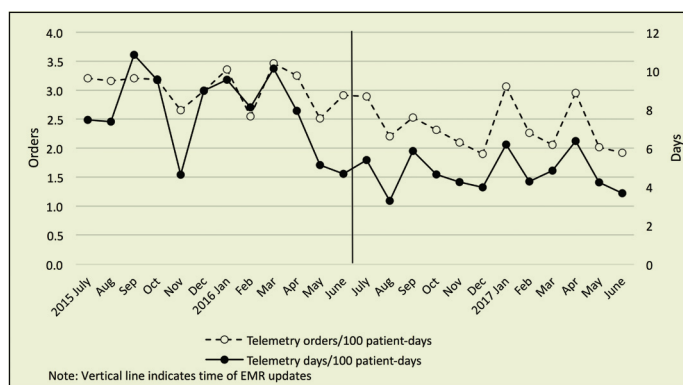
The effect was greatest for patients on teaching services.

Using the EMR updates described above, we were able reduce telemetry usage and encourage providers to adhere to the AHA guidelines on appropriate telemetry use on the HMC Medicine Service, largely

**Figure 2. Percentage of patients with telemetry discontinued prior to discharge and average duration of telemetry monitoring for all acute care medicine services at HMC, by month.**



**Figure 3. Number of telemetry orders and number of patient telemetry-days per 100 patient-days for all acute care medicine services at HMC, by month.**



with earlier discontinuation. Other effective strategies to accomplish this goal described in the literature include a guideline-based nursing-driven telemetry discontinuation protocol<sup>3</sup> and the use of pop-ups within the EMR to guide providers on appropriate telemetry use.<sup>5</sup> We achieved a modest but significant reduction in telemetry use. The use of a nursing-driven telemetry discontinuation protocol may be an even more effective way to minimize inappropriate telemetry usage; one study performed at a large tertiary care hospital system demonstrated a dramatic reduction in number of telemetry orders and mean telemetry duration (43% and 47% reductions, respectively).<sup>3</sup>

The effect of our intervention was greater on teaching services than services run by hospitalists only. This may reflect a lower level of baseline knowledge of appropriate telemetry use among learners and increased reliance on the order set recommendations and reminder pages.

### CONCLUSION

Changes in the EMR are one effective way to reduce unnecessary telemetry usage and help providers adhere to current usage guidelines. We demonstrated that a combination of interventions including a telemetry order set that reflects the guidelines, pages to providers recommending discontinuation at appropriate times, and telemetry technician notes in the EMR can reduce total telemetry usage on the acute care medical unit.

### Acknowledgements:

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## Building a Better Doctor: Iconoclasts in Standardization

**Author:** Byron Joyner, MD, MPA

**Affiliations:** Seattle Children's Hospital and University of Washington School of Medicine

In 2001, the Accreditation Council for Graduate Medical Education (ACGME) established the Outcome Project which introduced the six *core* Competencies. Ten years later, the Next Accreditation System (NAS) was developed as the new multiyear process of restructuring the accreditation system. There were many mandates in the NAS, one of which involved a long-term quality & patient safety initiative. At that time, I thought that this would be an initiative that UW Medicine could really embrace – a stretch goal that we would need to start early. But I wasn't exactly sure how to turn this ACGME mandate into reality at our institution.

Later that same year, I spoke with the UW Medicine leadership about inviting 30 trainees to participate in a dinner at which plans to implement quality and patient safety (QPS) initiatives could be discussed. If I've learned anything about trainees, it's that you should try to connect them to messages that have meaning. Over time, this group grew into the Housestaff Quality and Safety Committee (HQSC) and those 30 residents now number over 150, all of whom are involved in innumerable projects to promote better care for our patients.

In the traditional business model, standardization leads to greater efficiency and better quality. We know this from the iconoclastic work by Deming which led to the Toyota methodology. Standards, like those that Deming developed, are *critical to business*. In education, standards are important, too, but the coin of the realm in educating doctors in our business is experience. And, this is what the HQSC has done. Its members learn the theory of quality and experience applying it to their own patients.

For example, the HQSC members work in collaborative teams to standardize patient transitions of care between units in the hospital. They understand Meaningful Use and experience the challenges of applying IT standards to the Patient Problem List in the electronic medical record. Members experience successes and failures in their quality improvement journeys and learn more about themselves in the process.

Another iconoclast, Abraham Flexner, instituted the standards for residency training in the beginning of the 20th Century. Before that time, doctors did not have a standard curriculum. There were no standards for licensing of physicians to practice medicine. Flexner's famous report changed all of that. He guaranteed that the ordinary American citizen could be confident in the standard of medical care delivered by a licensed practitioner in the US. For over 100 years, the Flexner standards have been sufficient. But, times have changed, forcing us to review how we do business and educate our residents.

In 1940, Joseph Shumpter, the third iconoclast, introduced an economic theory called "Creative Destruction," which posits that

economies *reward* winners (those who develop or adapt to technological advances) and *destroy* losers (those who don't or are unable to adapt to technological changes). One of the direct effects of Shumpeter's economic theory was highlighted in *To Err Is Human*, published in 2001 by the Institute of Medicine (IOM). This report outraged the American public which learned that medical errors lead to over 98,000 deaths per year in hospitals in the US. This revelation forced the medical community to consider not only *what* we are teaching but *how* we are teaching residents.

The Next Accreditation System is attempting to answer both of these questions with the Clinical Learning Environment Review (CLER). CLER is an ambitious process that holds hospitals accountable for the clinical learning environment in six focus areas.

**Table 1. QI Match facts & figures at-a-glance**



The final iconoclast is the ACGME. It developed the CLER Site Visits to help hospitals and programs cooperate to activate these six focus areas. These are the areas in which trainees work in teams with other health professionals, hospital leadership and patients to create safe and user-friendly learning environments.

We should embrace CLER and all that it stands for because it forces us to think about *what* we are teaching and *how* we are teaching both faculty and residents about standards in our unique clinical learning environment to better care for our patients.

The HQSC has demonstrated its dedication to quality and patient safety by working in inter-professional and multidisciplinary teams around our hospitals. HQSC has not only inspired the UW Medicine leadership but other resident quality improvement groups around the Pacific Northwest, like Oregon Health Science University's and Madigan

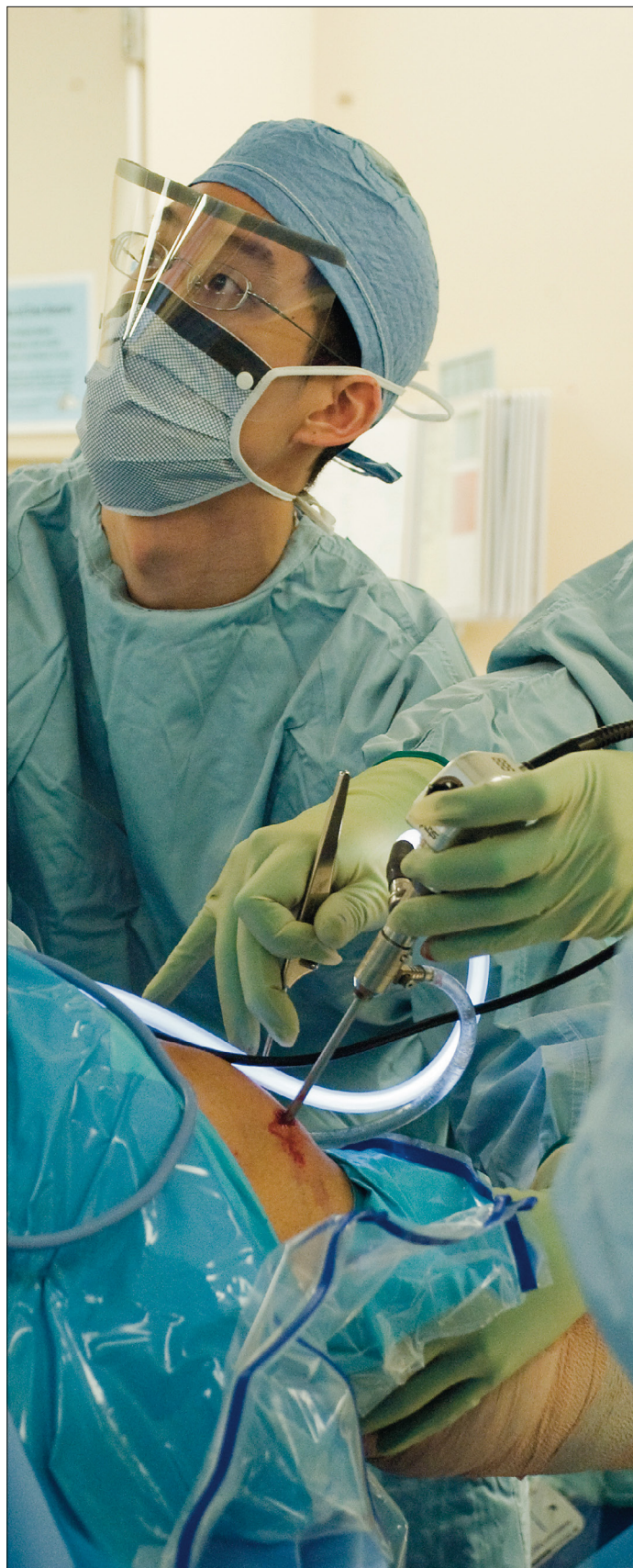
Army Medical Center's version of resident quality and safety groups.

The voluntary work that the HQSC has done has inspired me and made me reflect on the definition of *doctoring* in the 21st Century. How do we build a better doctor, one who is knowledgeable, kind, and considerate? One who has good judgment and a better bedside manner? One who has skills to operate and to listen? How do we create a doctor who makes a difference? Isn't it the doctor who makes improvements and measures the success of patient care?

HQSC is celebrating its 8th year. Since its inception, this resident-run group has been learning how to improve patient care and, then, applying better standards of care throughout our healthcare system. This is an ambitious goal for a group that began as a small idea.

*Dr. Joyner is a professor in the Department of Urology and Vice Dean of Graduate Medical Education at the University of Washington School of Medicine. He is a member of the Division of Pediatric Urology at the Seattle Children's Hospital where he sees patients. With generous support from UW Medicine he founded HQSC in 2011. He has been a faculty sponsor for HQSC since that time.*





### Hope Springs Eternal

Christine Limonte, MD, Nephrology Fellow, PGY-4

There was a lot that was cold and still, and as her skin became translucent I could see the blue blood underneath settle. Ugly, her upper lip rested snarled and her pupils fixed, dilated.

I touched her and she took my warmth (by no agency of her own but by that of physical laws that govern nature) and immediately I found myself envying the eternal.

Check it out, this perpetual motion machine, like its hardware we erode but can be replaced, and so as imperfect manifestations of the driving form of life we exist.

But to honor me, may I ask – have me as an ideal, evoke my image when you think “Man,” and I in turn will make you my “Death.”

---

### Training

Katie Martin, MD-MPH, Chief Medical Resident VA Puget Sound Healthcare System

Now I can check the boxes and speak the words and walk detached from room to room with the best of you.

And when I leave here I will start forgetting what you taught me and mend with what I knew before I came.

### Heroin

Katie Martin, MD-MPH, Chief Medical Resident VA Puget Sound Healthcare System

Last night or early morning I saw you sitting with your arm stretched out still, like a stone figure absently present, I imagined your other hand grasping the needle.

As I walked in the dark to the ward I thought the sidewalk seemed covered in glitter or maybe it was just broken glass.





## A Last Transmission

Michael Charles “Mitch” C. Tan, Internal Medicine, PGY-3

When we first met, I introduced myself as your doctor.  
In hindsight, I would have rather said your guide.  
And while my garb would suggest myself a seasoned traveler,  
My cloak obscured from view the roadmaps and manuals I still clutched.  
It was clear that, for you, the journey into illness was unfamiliar territory.  
Trudging onward, I wondered if you realized it was for me as well.  
And that each time you looked to me for guidance,  
I too saw the fork in our road with new eyes.  
While it was my hand that directed the way,  
It was your compass that steered our steps.  
When our paths finally untwined  
Oh, how the furrows of your skin had grown deeper.  
And as your gaze increased its distance,  
So too did the tension in the hands of those around you.  
Your wife and young children drew closer, circling their wagons round your gurney  
As if to ward away the IV poles and monitors that loomed in your periphery.  
Amidst quiet incantations, the heads and shoulders of your children slumped  
Pulled towards the earth by the gravity of your impending departure.  
And as their eyes followed suit, hovering just above the sterile tile,  
Those of your wife looked imploringly through the eggshell white ceiling.  
As if begging her message to persist through the layers of cold concrete  
To the satellites above.  
I bowed my head apologetically:  
A contribution of condolences.  
An offering, an antenna  
For your last transmission.  
That wherever you were carried to now,  
You would arrive at your desired location.  
To soon be met by the oscillations sent skyward,  
From those gathered at your bedside.  
And with that, I continued down the hallway  
To meet those venturing forward on separate paths.

## Reflections:

### On Being "Too Young"

Theresa Pham MD, Medicine Resident Prelim

"Oh my, you're way too young to be my doctor! I can't believe it!"

It was close to 6:00 AM and the room was dark save for the small crack of light from the door I had just opened. My patient looked at me with bewildered eyes as she watched me check the numbers and bags hanging off her IV pole. *Too young*. The constant, ear-splitting cry from the IV reverberated throughout the room in the quiet of the much too early morning. After straightening out some lines, the machine finally ceased its relentless assault and my eardrums sent a silent prayer of thanks.

"There," I said, "that should quiet things around here." Turning around to face my patient, she still had eyes as wide as saucers.

"So... I guess you really are going to be the one taking care of me." she simply stated.

"That's right," I replied. "I'm glad to see you doing better since I last saw you in the emergency room."

"Wow, you really look like you just graduated from high school!"

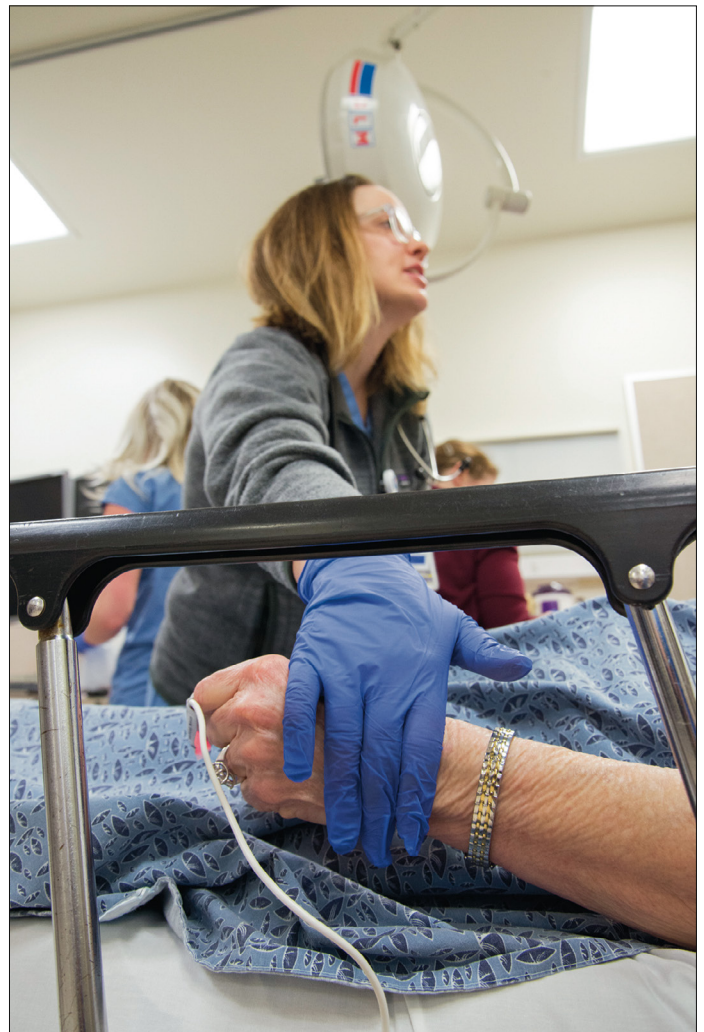
It wasn't the first time I had patients telling me I looked too young to be taking care of them. I had never considered myself having a youthful appearance until I entered medicine. At first I was flattered, but that quickly turned into annoyance as it seemed like everything I did was questioned or required a second opinion. Maybe my reasoning was being rightly challenged since I was still new. Or perhaps my patients had their reservations due to my gender or ethnicity, as this seems to be a hot topic in American media these days.

I recall being paired with a male colleague during a rotation. We would take turns interviewing the patient while the other scribed. Without fail, each patient eagerly soaked in *his* explanations and recommendations as if they had been wandering in the desert for days without water. When my turn came, I often had to spend extra time justifying my rationale or having him or my attending back me up. One kindly, elderly male said to me at the end of a particularly long day, "Ma'am, thank you for everything, but it feels odd listening to someone who looks too young to be a doc."

*Too young*. There was that phrase again. What was too young was this patient of mine laying in the small sliver of light at 6:00 AM in front of me. In her early thirties, she had already been sent to the emergency department several times for recurrent pancreatitis due

to dangerously high cholesterol levels. Additionally, she suffered from morbid obesity and had severely uncontrolled diabetes as she had been noncompliant with her treatment plans prior to admission. When I initially saw her in the ED, she was so overcome with pain she was barely coherent. My team and I quickly got her into aggressive treatment as her glucose and cholesterol levels were sky high.

Now that she was stable and comfortable, I could easily see how young she was. She and I were so similar in age and yet one was bedridden while the other was able to stand and walk. We both had our lives ahead but she had so many things counting against her. I pulled up a chair and sat down next to her. She sat up and suddenly smiled, "You know, I think we're going to get along just great! Tell me what I need to do to get out. I'm so tired of people telling me I'm too young to be here." Her grin was so infectious I couldn't help but smile back. *You and me both*.





## D. G.

Jean Liew, MD, Rheumatology, PGY-5

You were  
my first patient.  
The laying of hands  
When those hands could not heal.  
We talked  
but I had no news  
and I was the last to know.  
For example,  
I did not know  
that the infection in your blood  
would likely preclude you  
from transplant  
and a new life.  
I did not know  
that your slumped stature  
was the consequence  
of your body dying  
little by little.  
Each day  
I dutifully saw you  
for the duration of the rotation  
but only that long  
and we never met again.  
I carried your name  
for years  
but never knew  
what became of you.  
If I looked for you  
I knew  
I would read your obituary.  
But then  
after years of training,  
after many lives waned away,  
after family meetings,  
and utterances of "I'm sorry"  
I found your name again.  
You had lived  
and were living still  
with a gifted organ.  
You were my first patient  
but you were not my first loss.  
I am reminded,  
Vive ut vivas.



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