Stanford Health Care & Stanford Children’s Hospital Presents

Annual Resident/Fellow Quality Improvement & Patient Safety Symposium

Monday, May 9, 2016, 1:45PM - 5:00PM
2nd Floor, Li Ka Shing Center
Welcome to the Symposium!

Welcome to our 2nd annual Resident/Fellow Quality Improvement and Patient Safety Symposium for Stanford and Packard Hospitals!

Our primary goal of the symposium is to engage the hospital community by showing the breadth of quality improvement projects that are spearheaded by residents and fellows. Another goal is to create a forum where residents and fellows from different programs can meet and learn from each other. Therefore, I encourage you to view all posters, introduce yourself to new colleagues, and gain an appreciation for the work performed at Stanford. We hope that residents, faculty and staff can gain ideas from this event that will help grow their own projects as well as form collaborations for more research. This is all with the goal of enhancing the safety culture at Stanford Medicine.

Enjoy the symposium!

Laurence Katznelson, MD
Associate Dean, Graduate Medical Education
Professor, Neurosurgery and Medicine (Endocrinology and Metabolism)

QUESTIONS?
Contact Thi Dinh La at tdinhla@stanford.edu
MONDAY, MAY 9, 2016

Poster Session 1  
Poster #17 moved to Session 2  
1:45PM - 2:30PM

Poster Session 2  
2:30PM - 3:15PM

BREAK  
To Poster Participants: Please take down your posters. LKSC Management will close off Conference Room B and C at 4:00PM or 5:00PM to prepare for another event later tonight. They will move all tack boards to the lobby.  
3:15PM - 3:30PM

Keynote Presentation  
Overview of Resident Safety Council Projects  
Ryan Ribeira, MD  
3:30PM - 4:00PM

Oral Presentation 1:  
Improving Patient Discharge Workflow and Discharge Documentation for Families Using continous Improvement  
Whitney Chadwick, MD  
Poster #26  
4:00PM - 4:15PM

Oral Presentation 2:  
Achieving “Lean” at the Stanford Healthcare Transfusion Service and Blood Center by Streamlining Platelet Inventory Management.  
Rebecca Sonu, MD  
Poster #21  
4:15PM - 4:30PM

Oral Presentation 3:  
Evaluating the effectiveness of problem based charting in utilizing the problem list to structure clinical data in the intensive care unit  
Ron Li, MD  
Poster #22  
4:30PM - 4:45PM

Awards for Top 10 Posters & Symposium Survey  
4:45PM - 5:00PM
Poster Map

Poster Session 1: 1:45PM - 2:30PM - Odd posters except #17
Poster Session 2: 2:30PM - 3:15PM - Even posters and #17

Podium

Poster #38 - 39
Poster #36 - 37
Poster #30 - 31
Poster #28 - 29
Poster #22 - 23
Poster #20 - 21
Poster #14 - 15
Poster #12 - 13
Poster #6 - 7
Poster #4 - 5
Poster #1
Poster #40
Poster #34 - 35
Poster #32 - 33
Poster #26 - 27
Poster #24 - 25
Poster #18 - 19
Poster #16 - 17
Poster #10 - 11
Poster #8 - 9
Poster #2 - 3
HOSPITAL CULTURE/OPERATIONS

1. Improving MD-RN facetime during morning rounds using an automated visual-cue intervention
   Adam X Kang MD* 1 Julia E Noel MD2 Silvia Loica-Mersa MD3 Travis Miller MD4 Ian Chong MD5 Blake N Read MD1 Lisa Shish MD PhD FHMI6
   1. Department of Surgery
   2. Department of Otolaryngology, Head & Neck Surgery
   3. Department of Internal Medicine
   4. Division of Plastic Surgery
   5. Department of Emergency Medicine
   6. Medical Director for Quality, Department of Internal Medicine

   Purpose: Having MDs and RNs round together at bedside has many benefits, including clearer communication, reduced guesswork and errors, fewer pages, improved sense of teamwork, and higher patient satisfaction. However, traditionally, RNs do not know when MDs are coming by for rounds, and MDs often do not take the extra time to find RNs during rounds. This project investigates whether a novel visual-cue system can increase the percentage of morning rounds that have both an MD and an RN together at bedside.

   Methods: Three medical/surgical wards at an academic teaching hospital participated in the study. MD teams who routinely have patients in these three wards were given small locator devices to wear during morning rounds. All RNs at this teaching hospital wear locators as well. These locators report exact times when an MD or RN enter or leave a patient room. MDs and RNs were classified as rounding together if their locator data shows a temporal overlap in the same patient room; conversely, MDs were classified as rounding alone if no RNs overlapped with them while they were in a patient room. One month of baseline “pre-intervention” rounding data was collected for these three wards. Afterwards, a green overhead light located outside each patient room was programmed to turn on automatically whenever a locator worn by an MD entered the patient room. Two months of “intermediary” data was collected. Finally, ward-based staff and nurses were given formal teaching on this intervention in two of the three wards, with the third ward being a control. Afterwards, two months of “post-intervention” rounding data was collected and compared to the “pre-intervention” data using a student’s T-test.

   Results: Analysis of one month of “pre-intervention” data identified 160 distinct MD rounding events. Of these events, 85 overlapped with an RN (present in the room at the same time), resulting in a baseline of 53% of morning rounds involving both an MD and a RN together at bedside. The average overlap time of these combined rounds was 3.49 minutes. Preliminary analysis of “intermediary data” showed no increase in the percentage of morning rounds involving MDs and RNs together.

   Conclusions: Using wearable locators is an effective method to study MD and RN rounding habits, specifically how often they round together. At baseline, 53% of rounds are team-based. We hypothesize that the combination of a visual cue (a green overhead light) and formal teaching to staff will improve this percentage in the upcoming months.

2. Containing oral pathogen contamination of the anesthesia work environment: post-intervention footage - a video observation and novel design initiative
   Clayton Crawford BA, Jordan Ruby MD, Dean Bowker MD, Erin Conner MD, Anna Harter MD, Elizabeth Koch MD, Larry Chu MD, MPh, and Cynthia Khoo MD PhD*
   § Stanford Department of Anesthesiology Perioperative and Pain Medicine • Stanford Anesthesia Informatics and Media (AIM) Lab

   Purpose: In the operating room (OR) laryngoscope handles contribute to bacterial transmission and risk of infection. This study aims to reduce contamination of the anesthesia workstation by iteratively designing a device for used laryngoscope handles.

   Methods: Direct observation and surveys of anesthesia residents and attendings were performed as a preliminary needs assessment. An intraoperative video study will observe 20 general endotracheal anesthetic cases to map the transmission of oral bacteria from the laryngoscope to surfaces in the anesthesia work environment. We will then design a device to contain the laryngoscope and associated pathogens after intubation. The efficacy of the used airway receptacle will be evaluated in simulated and real OR environments to determine if the intervention reduces contamination and improves patient care practices.

   Results: A survey of anesthesia providers showed that of 16 surgeries the contaminated laryngoscope was placed in a kidney basin on the workstation most often (38%) followed by the current designated airway receptacle (25%) bed or workstation then the receptacle (25%) and directly on the workstation (13%). Emergency medications that if contaminated may risk transmitting bacteria to the bloodstream were placed on the same workstation surface 63% of the time.

   Conclusions: Our survey demonstrates the current variability in practices and risk of contamination from bacteria on the laryngoscope. Although this quality improvement study is focused on limiting the spread of airway pathogens from the laryngoscope handle the techniques employed have broader implications for monitoring infectious risks and optimizing the workflow of specialized tasks to encourage best practices.

5. Potential Contributors to Improved Patient Satisfaction with Housestaff: Patient Familiarity with Daily Care Plans and Inpatient Care Teams Results of a Patient Satisfaction Focus Group and Housestaff Needs Assessment
   *David K. Werho MD; (1) Jessica A. Gold MD MS; (2) Anuj Aggarwal MD; (3) Ruth Hou MD; (2) Lucas Campos MD PhD; (4) David Ouyang MD; (5) Bikram Sharma MD; (6) Ann Weinacker MD; (6) (1) Dept of Pediatrics Div of Pediatric Critical Care Medicine (2) Dept of Psychiatry (3) Dept of Anesthesiology (4) Dept of Pain Medicine (5) Dept of Medicine (6) Dept of Medicine Div of Pulmonary & Critical Care Medicine

   Purpose: Patient satisfaction is an important metric of perceived healthcare quality. At academic medical centers interaction with housestaff and the quality of interactions may contribute to patients’ satisfaction with their healthcare. We aimed to identify targets for improving patient satisfaction with housestaff at Stanford using mixed methods.

   Methods: Stanford Patient and Family Advisory Council members were invited to participate in a focus group. An independent moderator conducted the focus group with a convenience sample of nine participants. Using major themes generated from the focus group a needs assessment was developed and conducted using an electronic survey instrument distributed to Stanford housestaff.

   Results: The focus group valued interactions with their care team and understanding their daily plan; they expressed frustration with the converse. Housestaff strongly agreed that patient knowledge of their names and roles were important for clinical care (49.2%) but only 16.9% felt patients understood their roles. Only 8.5% felt confident that patients understood their care plans.

   Conclusions: Improved familiarity with the care team and their plan of care was important to patients. Residents agreed there is a need for improvement in these domains. Primary limitations include small sample size and low response rates. Next steps include implementing bedside tools aimed at increasing patients’ familiarity with their care team and daily plan. The impact of these tools on patient satisfaction will be measured.

7. Implementation of a Standardized Referral Order for Outpatient Cardiac Rehabilitation
   Jacqueline Baras Shreibati MD* Randall Vagelos MD
   Department of Cardiovascular Medicine

   Purpose: Cardiac rehabilitation (CR) reduces mortality and hospital readmissions and improves quality of life for patients with a variety of cardiovascular conditions. However CR remains underutilized in the United States. The purpose of this study was to improve referral rates to outpatient CR centers in California. The primary hypothesis was that implementation of a standardized electronic referral process could result in improvement in CR referrals.

   Methods: Before initiation of the study health care providers referred patients by downloading and then faxing site-specific referral forms. To ascertain the information needed for a universal referral order several CR managers from the California Society for Cardiac Rehabilitation were interviewed. A CR referral order was then developed in Epic for outpatient and inpatient use and was released in April 2015. Education was provided for Cardiovascular Medicine and Surgery physicians, nurses and physician assistants to increase awareness. Charts were reviewed to monitor use of the order.

   Results: Between April 2015 and February 2016 356 CR referrals were submitted. Approximately 27.5% were from Cardiovascular Surgery 24.7% were from Cardiovascular Medicine 6.4% were from Internal Medicine/Family Medicine and 37.0% were from the affiliated Cardiovascular Consultants Medical Group. On average 32.3 referrals were submitted per month (median 36 interquartile range 26-38.75). CR participation rates were not available.

   Conclusions: Implementation of an electronic universal CR referral order was well received across divisions. However many eligible patients have yet to be referred. Further work should investigate those patients who qualify for CR but are not referred as well as CR participation rates.

9. Utilizing Emergency Department Clerks to Test a New Paging Template
   Danielle Goodrich MD Katie Doering MD* Andrew Sun MD Sanaa Suhrwardy MD Monica Sinha-Evenson MD Andrea Ament MD Linda Xu MD Ashrit Multani MD
   Emergency Medicine Urology Obstetrics-Gynecology Psychiatry Infectious Disease Neurosurgery
Purpose: Consults play a vital role in the care of complex patients throughout the hospital. Consultants are often reached and information shared via text pages. Routine pages do not always contain the pertinent information to provide a thorough and timely consult. We surveyed residents to learn what information would be valuable in a consult page and using this information we plan on testing a new page format.

Methods: Using a small cohort of the hospital we plan to institute a new paging template for the Emergency Department Clerks who do the majority of the paging in the Emergency Department. After a short trial residents will be re-surveyed to assess the efficacy of the new format.

Results & Conclusions: pending

11. The creation of a notification process to achieve safer OR to ICU patient transfer
Lena Scotto MD1 Clair Secomb MD1 Frank Chen MD2 Allison Kwong MD2 Felipe Perez MD1 Steven Sust MD3 Andrew Phillips MD1
1. Department of Anesthesiology Perioperative and Pain Medicine; 2. Department of Medicine; 3. Department of Psychiatry and Behavioral Sciences; 4. Stanford University Medical Center Stanford CA

Purpose: Safely transferring patients from the Operating Room (OR) to the Intensive Care Unit (ICU) involves notification of impending patient arrival physical patient transfer and appropriate patient information handoff to the receiving team. Currently a standard notification of patient arrival to the Medical ICU team does not exist. We set out to create a notification process to avoid delays in care.

Methods: Based on conversations with charge nurses a diagram was created to illustrate the existing process for obtaining a Medical ICU bed and notifying the nurse and ICU team about the patient. To evaluate the current transfer process and identify whether the notification to the ICU team is necessary we disseminated an online survey to members of the ICU team (Anesthesiology Medicine and Emergency Medicine residents) and conducted in-person interviews with ICU fellows and ICU Charge Nurses. Additionally Anesthesiology residents and attendings filled out online surveys evaluating whether a handoff occurs before patient arrival.

Results: The current notification process involves a “45 form” that is provided to the Charge Nurse and Bedside Nurse only 45 minutes prior to end of surgery. The bedside nurse notifies one of the ICU fellows that the patient has arrived. Analysis of survey results is ongoing.

Conclusions: The receiving ICU team is notified about patient arrival to the ICU when the patient is already in the room. By instituting a notification of OR to ICU patient arrival we hope to delays in communication of patient information and assumption of patient care.

13. Less Than Half Of Inpatient Code Blue Activations Are True Cardiopulmonary Arrests: Appropriate Level Of Caution Or Injudicious Overutilization?
*Majid Shafiq MD MPH; Julian Villar MD MPH; Lijia Xie MD; Terry Platchek MD; Paul Mohabir MD Department of Medicine (Pulmonary & Critical Care Medicine Internal Medicine); Department of Anesthesiology (Critical Care Medicine); Clinical Excellence Research Center

Purpose: “Code blue” (CB) activations are used to summon appropriately skilled multidisciplinary teams for treatment of cardiopulmonary arrest (CPA) and other life-threatening situations. What constitutes appropriate CB activation is still debated. Potential CPA also merits learning resources to the radiology department to enhance pediatric safety. As a result of this project we plan on testing a new page format.

Methods: We retrospectively analyzed all CB and Rapid Response Team (RRT) activations on hospitalized patients at Stanford University Hospital between January 1 2014 and December 31 2015. Primary outcome was the proportion of CB calls made in response to CPA. Secondary outcomes included event mortality for each type of activation stratified by the reason for activation.

Results: Of 1710 activations 542 (32%) were CB. Among CB activations 139 (25%) were CPA whereas 209 (19%) required intubation for isolated airway compromise or respiratory failure. Of 1168 RRTs seven involved CPA whereas 6% required intubation. Among CB activations mortality with CPA was 28% versus 3% among non-CPA cases (p<0.001). Among all non-CPA cases risk ratio of mortality for CB activations versus RRT activations was 2.68 (95% CI 1.27-5.64).

Conclusions: CPA constitutes 25% of CB activations. However CB patients without CPA are more often raised level of activation may address the needs of these sicker patients without activating the entire CB apparatus.

15. Reducing Non-Urgent Pages in the Inpatient Setting
Naomi Seling-Boyd MD Internal Medicine

Purpose: Residents receive and spend time responding to many pages throughout the day and night which can take away time and distract from other patient care activities. On average they receive about 20-30 pages per day and about 30% are non-urgent. Ideally non-urgent pages could be reduced.

Methods: Our aim was to identify and categorize the non-urgent pages and decrease the number of pages by 50%. Possible methods that we are looking into include holding focus groups with nurses to discuss protocols for paging regarding lab values looking into alternative methods of communication and implementing changes to EPIC order sets to anticipate potential orders that will be needed to avoid requiring a page for the orders.

Results: Prior to the intervention non-urgent pages comprised about 32% of total pages. The vast majority of these pages around 60% were requesting a particular order. Other categories included critical lab notification abnormal vitals changes in mental status or request for evaluation. Post intervention data is still pending as the interventions are still underway.

Conclusions: Non-urgent pages can be reduced by a variety of methods. Further interventions are still underway to work with nurses and the IT teams to make changes to help reduce pages in the main categories comprising these pages.

19. Improving Preparedness for Anaphylaxis Management in Pediatric Radiology Suite: A Quality Improvement Collaborative with Anesthesiology
*Pragati Rohargi MD1; Manchula Navaratnam MD1; Shreyas Vasanawala MD(PhD2) 1 Department of Anesthesiology Perioperative and Pain Medicine; 2 Department of Radiology

Purpose: Radiographic contrast media are routinely used for diagnostic procedures like CT and MRI. Life threatening anaphylaxis/ anaphylactoid reactions can occur with these agents. This study was designed to assess the preparedness of radiologists radiology nurses and technologists in managing such emergency situations until the code team arrives. The objective of this study was to improve patient safety with the introduction of simulation training use of crisis management cognitive aids in radiology suite.

Methods: We conducted a survey of pediatric radiologists radiology nurses and technologists at Lucile Packard Children’s Hospital to assess their experience with anaphylaxis and their confidence in managing such reactions. In the survey we also asked about the potential utility of learning resources like simulation training and refresher lectures to improve clinical performance in such a crisis.

Results: 33 people responded to the survey. 45% of the respondents had never encountered anaphylaxis in radiology suite. 40% felt little or no confidence in leading resuscitation. 82% respondents expressed interest in regular simulation sessions to practice anaphylaxis scenario. A few respondents also suggested that an anaphylaxis management protocol be displayed in the radiology suite.

Conclusions: Crisis resource management simulation training and use of cognitive aids are integral parts of anesthesia training and practice. With this ongoing initiative we are taking these resources to the radiology department to enhance pediatric safety. As a result of this project anaphylaxis checklist will be displayed at CT scan and MRI scan locations at LPCH and radiology staff will be undergoing regular simulation training.

21. Achieving “Lean” at the Stanford Healthcare Transfusion Service and Blood Center by Streamlining Platelet Inventory Management
Rebecca Sonu MD Saurabh Gobimar MD-PhD Evelyn Miller David Lancaster Diann Geary Robert Scott Raina Shankar Leslie Buchanan Tho Pham MD Department of Pathology Transfusion Services Stanford Blood Center Stanford Healthcare Components and Distribution

Purpose: To streamline the processes of ordering and managing platelet inventory between the Stanford Blood Center and Stanford Health Care Transfusion Service to meet anticipated clinical demand in platelet products maximize workflow efficiency decrease costs and minimize the wastage of expired platelet products.
Methods: Use Lean principles to (1) determine whether current inventory target levels were sufficient by performing platelet utilization data analysis; (2) evaluate and change the current ordering processes which includes staff education and training; and (3) evaluate the post-implementation effectiveness.

Results: A range of 15 to 72 platelet units are transfused per day throughout the year. The highest average usage occurs on Friday and the weekend average usage is lower than during the week (Figures 1-3). Revision of old platelet order form with staff feedback (Figure 4). Post-implementation analysis (Figure 5 and Table 1) Transfusion Service: Significant decrease in the number of STAT deliveries from an average of 10.78/month to 4.25/month resulted in a decrease in monthly charges from an average of $2500/month to $986/month. The projected 12 months of savings is $20000. Blood Center: Decreased work hours for distribution staff from 21.6 hours/month to 8.3 hours/month.

Conclusions: Streamlining workflow processes for platelet inventory management can lead to a significant decrease in costs improved efficiency among workstaff and an improved inventory of platelets for clinical demand. Blood utilization analysis helps to determine the average usage of blood products and can help to modify ordering practices and methods. Implementation of new methods requires education and training of staff. Future directions are to develop an informatics dashboard for real-time blood product inventory.

23. Effect of a hospital-wide resident and fellow safety group on resident engagement with and understanding of quality improvement projects and principles

Jessica Kittle MD1* Ryan Ribeira MD MPH2 Department of Medicine, Department of Emergency Medicine

Purpose: Since 2010 incorporation of QI/PS principles into residency training has been an ACGME requirement. Stanford University Hospital (SUH) founded a Resident’s Safety Council (RSC) in 2014 with the goal of improving residents’ and fellows’ access to education and clinical experiences in QI/PS. This study sought to evaluate the effect that participation in this council has had on residents’ education skills and enthusiasm for QI/PS.

Methods: We surveyed residents currently engaged in SUH’s RSC (2015-2016). The survey asked participants to evaluate their knowledge and enthusiasm for QI before and after their participation in the RSC. When appropriate questions used a 5 point Likert scale. When applicable survey results were compared using unpaired T tests.

Results: Survey respondents reported a substantial increase in their understanding of hospital administrative structure with an increase in mean Likert rating from 1.69 to 3.08 (p < 0.001) an increase in their understanding of QI principles from mean of 2.36 to 3.72 (p <0.0001) and an increase in their impact on QI/PS at Stanford from a mean of 2.06 to 3.25 (p < 0.0001). Additionally the majority (24/36) felt participation had increased the probability they would make QI part of their future career.

Conclusions: This study has limited generalizability but demonstrates that a resident QI group structured in a manner similar to SUH’s RSC can be an effective means of teaching residents’ QI principles getting them involved in quality improvement projects in the hospital and motivating them to incorporate QI work into their future careers.

25. Improving access to stereotactically ablative radiation therapy for out-of-town patients through a novel remote pre-planning workflow

Titania Juang PhD1; Karl Bush PhD; Billy W. Loo MD PhD; Michael Gensheimer MD Department of Radiation Oncology

Purpose: Access to advanced radiation therapy techniques, such as stereotactic ablative radiotherapy (SABR), can be improved for rural patients by reducing travel to a central treatment facility through a novel remote pre-planning workflow. The proposed workflow: Before an out-of-town patient travels to Stanford Cancer Center, a diagnostic CT remotely acquired at his/her local facility is used to (1) fabricate a custom immobilization device (cradle) to match the patient’s diagnostic positioning, and (2) create an initial treatment plan. When the patient arrives at Stanford, the treatment plan is transferred to a verification CT-sim taken on-site, quickly re-optimized, and checked by a physician. This allows rapid plan turnaround and treatment by completing the majority of treatment planning prior to patient arrival, and eliminates need for patients to make separate trips for planning CT imaging and treatment delivery. Feasibility was evaluated by (1) prototyping a custom polystyrene cradle and comparing performance to conventional immobilization for a lung patient undergoing radiation therapy, and (2) retrospectively investigating the clinical quality of workflow-generated plans for a cohort of 6 lung SABR patients through comparison with treatment plans created through standard processes.

Results: The custom cradle closely replicated patient positioning, conformal to patient anatomy with the conventional device, and provided a high level of comfort. Clinically-acceptable treatment plans were generated through the workflow with sufficient coverage of tumor volumes (minimum GTV dose ≥ prescribed dose, median PTV V95%≥95.2%) and normal tissue sparing comparable to standard plans.

Conclusions: The proposed remote pre-planning workflow is capable of generating both custom immobilization and clinical-quality plans, and has potential to improve treatment access for rural patients by allowing a single trip to Stanford and reducing time between CT-sim and treatment from 1-2 weeks to no more than a day.

27. Documentation Bias in Functional Neurological Symptom Disorder: Comparing the Prevalence and Documentation of Functional Neurological Symptom Disorder with Parkinson’s Disease

Kate Emily Leaver MD; Esther Jin-Ah Yi; Kim Bullock MD; Joanna Dearlove MD MPH Department of Neurology

Objectives: 1) Evaluate the prevalence of patients with functional neurological symptom disorder (FND) presenting to neurology clinic at a tertiary academic center. 2) Investigate whether a documentation bias for FND exists.

Background: Functional neurological symptom disorder refers to neurological symptoms unexplained by disease. Historically a psychiatric diagnosis, DSM diagnostic criteria now rely heavily on the neurological assessment. Research demonstrates that accurate diagnosis improves patients’ symptoms, enables appropriate care, and decreases health care utilization. Documentation of the diagnosis in electronic medical records (EMR) is essential to accurately estimate the frequency of the disorder and to make accurate conclusions regarding patient commonalities and comorbidities. Parkinson’s disease is another diagnosis that hinges on the neurological examination. We would expect documentation of suspected cases of these two diseases to be similar.

Methods: The rate of suspected diagnosis of FND was assessed through retrospective chart review of all unique patients presenting to general neurology clinic between January - July 2015 at Stanford University Hospital. Cases of suspected FND were identified independently by two neurologists using key search words and phrases and referrals to psychiatry for co-management. Cases of documented FND were those associated with the ICD-10 codes for FND. The same process was used to identify the suspected and documented cases of Parkinson’s Disease (PD).

Results: Our data show FND was clinically suspected in 11% of patients, but the diagnosis of FND was documented in only 2% of patients. Comparatively, PD was suspected in 8% of patients and the diagnosis was also documented in 7%.

Conclusions: The diagnosis of FND is frequently suspected, but rarely documented. In comparison, Parkinson’s disease is documented almost every time it is suspected. The under-documentation of this diagnosis suggests inappropriate care for a large patient population and holds significant implications regarding the accuracy of EMR-based clinical research for FND.

PATIENT CARE

29. When Infusion Pumps Fail: A Critical Issue in Patient Safety

Anuj Aggarwal MD1* Derek Atkinson MD1 Kenneth Ike MD1 Luke McCage MD1 Sandra Sacks MD1 Meghan Yajnik MD1 Harvey Fortune BEd2 Diane Alejandro-Harper3 Cer AT Ruth Fanning MBChB1 1Department of Anaesthesiology Perioperative and Pain Medicine 2Clinical Technology Stanford Healthcare 3OR Anesthesia Stanford Healthcare

Purpose: Critically ill surgical patients undergo multiple intra-hospital transfers. Infusion pumps provide essential medications in transit. Frequent failure of infusion pumps prompted Stanford anesthesiologists to address this critical patient safety concern.

Methods: Stanford Anesthesiology residents were surveyed regarding their experience transporting acutely ill patients with Alaris infusion pumps. A direct observational study was also performed as part of the initial needs assessment. A process map will be constructed to identify improvement opportunities as well as a reporting system to track adverse events.

Results: Approximately 90-100 patient transfers from the operating suite to other care areas occur weekly at Stanford Hospital. 87 % of residents surveyed experienced infusion pump failure. More than 15% stated that their patients suffered an adverse outcome as a result. Mitigation measures included bolusing drugs fetching replacement equipment and prolonging transfers. Our process map illustrated inconsistencies in maintenance and variation in battery reliability.
31. Optimizing Length of Stay for Patients Requiring Rehabilitation Consults
Elizabeth Martin MD MPH (1) Eleanor Loomis MD MPH (1) Lynne C. Huffman MD (2) and Kara Flavin MD (1)
(1) Department of Orthopaedic Surgery Division of Physical Medicine & Rehabilitation (2) Department of Pediatrics Division of Neonatology

Purpose: To evaluate length of stay in association with rehabilitation services received in a select population of post-operative patients at Stanford hospital and identify areas for improvement in use of these consult services.

Methods: We used a retrospective study design of existing Epic data from 2008-2016 to evaluate rehabilitation consult services received time to consult hospital length of stay and discharge destination. Using these findings an intervention was designed.

Results: We identified 491 patients receiving PM&R consults 15% received Speech therapy consults 45% received Occupational therapy consults and 37% received Physical therapy consults. Median LOS of those with a PM&R consultation was 10 (3-56) days; Speech therapy consult 4 (2-34) days; Occupational therapy consult 4 (2-40) days; and Physical therapy consult 4 (0-37) days. Median time between procedure and PM&R consultation was 8 (3-67) days; Speech therapy 3(0-16) days; Occupational therapy (9-92) days; Physical therapy 2(0-58) days . Consult type was significantly associated with discharge destination (p=0.01); for those receiving PM&R consults the majority of patients were discharged to home (45%) followed by IRF (38%) and other locations such as home health (9%) and SNF (9%).

Conclusions: Longer procedure to consult time was identified for patients receiving PM&R consults. This may be due to disease severity but earlier identification of consult need and request may reduce overall length of stay for these patients. Rehabilitation staff were educated on assisting earlier identification of these patients and future evaluation is planned.

33. Assessing Impact of Obstetric Anesthesia Educational Video on Patient Understanding
Jessica Vaughn MD; Austin Schwab MD; Kristen Telischak MD; Ruth Fanning MD; Tiffany Cheng MD; Quynh Nguyen MD; Ahla Kattan MD
Department of Anesthesiology

Purpose: The labor and delivery experience can be a stressful time for pregnant patients. Contributing to this stress is the decision for pain management during labor and delivery. It has been our experience that often patients are not adequately educated about the various options until they reach the extremes of pain – making the informed consent discussion difficult. The aim of this study is to provide information to pregnant patients at an earlier time in labor and delivery and to assess patient understanding after the video intervention.

Methods: After obtaining IRB approval and permission to use an informational PowerPoint, a patient educational presentation will be tailored to focus on the most common concerns and questions of parturients. We will include a discussion about risks and benefits of anesthetic options including labor epidural, nitrous oxide, and intravenous narcotic pain medications. This presentation will not replace the informed consent process by the anesthesiologist but will provide improved, earlier education and hopefully prompt inquiries that the can be addressed in an optimal setting. The nurse will direct the patient to watch this presentation upon arrival the their L&D room.

Conclusion: We will measure our results via surveys to anesthesia residents and patients in the postpartum period. The resident survey will address patients’ understanding of the various labor pain management techniques and proper positioning during epidural placement. The patient survey will address whether the video presentation helped with their understanding of the pain management options.

35. A Cloud-Based Monte Carlo Dose Calculation Algorithm for Dose Verification of Electron Beam Treatments of Superficial Tumors
Timothy Mitchell PhD* Karl Bush PhD
Radiation Oncology

Purpose: Electron cutouts are useful for shaping electron beams to achieve conformity with the treated tumor thereby reducing normal tissue toxicity while ensuring that the tumor receives the prescribed dose of radiation. For electron cutouts of smaller sizes however it is necessary to verify the dose delivered due to perturbations in electron scattering. Often this requires a physical measurement using an ion chamber and film which is time-consuming and subject to human error. The purpose of this study is to develop a fast Monte Carlo based dose calculation algorithm that requires only a smart phone photograph of the cutout to verify the accuracy of the dose delivered.

Methods: The algorithm uses a pattern recognition technique to identify the corners of the cutout in the photograph. It then corrects for variations in perspective scaling and translation of the photograph. Blob detection is used to identify the portions of the cutout which comprise the aperture and the portions which are cutout material. This information is then used define physical densities of the voxels used in the Monte Carlo dose calculation.

Results: The algorithm successfully identifies all necessary features of the electron cutout to perform the calculation. Subsequent testing will be performed to compare the Monte Carlo results with a physical measurement.

Conclusion: A cloud-based method of calculating electron dose could eliminate the need for physical measurements and substantially reduce the time required to properly assure accurate dose delivery.

RESIDENT EDUCATION

37. Outcomes of Patients Taken Care of By Housestaff Working More than 80 Hours per Week
David Ouyang MD* Jonathan H. Chen MD PhD2 Gomathi Krishnan PhD3 Jason Hom MD Ronald Witteles MD1 Jeffrey Chi MD1
1Department of Internal Medicine Stanford University School of Medicine Stanford CA USA 2Center for Innovation to Implementation (Ci2I) Veterans MHauls Palo Alto Health Care System Palo Alto CA USA 3Stanford Center for Clinical Informatics Stanford School of Medicine Stanford CA USA

Background: Duty hour restrictions seeks to balance patient care and resident education by limiting residents to working no more than 80 hours per week. It has been posited that high workload and long work hours for trainees could affect the quality and efficiency of patient care.

Methods: We conducted a retrospective cohort study of all patients admitted to the inpatient general medicine service of a large academic medical center and identified by whether they were admitted by an intern or resident working more than eighty hours a week during their hospitalization. Housestaff computer activity and duty hours were calculated by institutional electronic health record (EHR) audit. Primary outcome was a composite outcome of patient death readmission or ICU transfer. We used student’s T-test and generalized linear models to compare outcomes between patient groups.

Results: We included 4767 hospitalizations by 3450 patients in this study; during which 40.9% were treated by housestaff who have worked more than 80 hours a week during their hospitalization. There was a significantly higher rate of the composite outcome (19.2% vs. 16.7% p = 0.03) for patients taken care of by housestaff working more than eight hours a week during their hospitalization. We found a statistically significant higher length of stay (5.12 vs. 4.66 days p = 0.048) and rate of ICU transfer (3.18% vs. 2.38% p = 0.029). There was no statistically significant difference in 30-day readmission rate (13.7% vs. 12.8% p = 0.395) or in-hospital mortality rate (3.18% vs. 2.4% p = 0.115).There was no correlation with team census on admission and patient outcomes.

Conclusions: Patients taken care of by housestaff working more than 80 hours a week had increased length of stay and number of ICU transfers. There was no association between resident work-hours and patient in-hospital mortality or 30-day readmission rate.

39. Incorporating Quality Improvement Into Residents’ Daily Clinical Practice: Obstetric Anesthesiology Rotation
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Purpose: The Accreditation Council for Graduate Medical Education (ACGME) Board of Directors requires residency programs to incorporate clinical quality improvement and patient safety competencies into resident training. Some residency training programs have added additional rotations or project requirements for residents to accomplish the competencies. We demonstrate how quality improvement can be incorporated into the daily clinical practice of anesthesiology.
Methods: Anesthesiology residents at Stanford University Hospital and Clinics are required to complete two month long rotations in obstetric (OB) anesthesiology. On a daily basis the residents are asked to assess and document patients’ well being after receiving anesthesia (i.e. nitrous oxide neuraxial or general anesthesia). If any complications non-routine anesthetic changes near misses or sentinel events occur the resident is asked to trigger a Quality Improvement (QI) event.

Results: Every week on Labor & Delivery the QI event notes for the previous seven days are collected and given to an anesthesia resident on the rotation. The resident is then responsible for doing a root cause analysis for each QI event. This analysis is presented to the anesthesia residents fellows and faculty on the rotation during protected teaching time on Friday afternoons. Specific crisis management algorithms and patient follow up guidelines have resulted from these reports.

Conclusions: Anesthesiology residents learn to incorporate quality improvement into daily clinical practice. By discussing each QI event they are achieving their quality improvement and patient safety competencies. Patients will benefit from improvements in the care they receive.
2. Radiation Exposure of Anesthesia Residents

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Purpose: Fluoroscopic guided procedures are increasingly used in medicine and are commonly place both in and out of the operating room. Anesthesiologists may be exposed to unsafe doses and should have an understanding of radiation safe practices to minimize risk. There is growing concern that some radiation induced hazards such as cataract formation or DNA injury may due to stochastic effects rather than deterministic ones, meaning that the effect may be independent of dose. The International Commission on Radiological Protection (ICRP) recommends an occupational effective dose limit of 20 millisieverts (mSv) per year. Anesthesiologists who frequently work in the cardiac catheterization lab may reach equivalent doses of 1.3-1.8 mSv per month.4

Reflected scatter is another key clinical factor in occupational exposure. The radiation dose to the anesthesiologist can be three-fold greater than that of the radiologist during interventional procedures.4 Another study showed that aggregate radiation exposure to all members of an anesthesia department doubled after introduction of an electrophysiology laboratory.5 Routine radiation monitoring may be warranted for anesthesiologists who frequently work in areas where fluoroscopy is used3,6,7.

Methods: On July 3, 2015, anesthesia residents (n = 78) at Stanford were invited to complete an electronic survey about radiation exposure and their interest in participating in an opt-in dosimetry program. Residents were given a ring dosimeter for 3 months to measure shallow dose exposure, which was then exchanged for a thermoluminescent (TLD) dosimeter to measure deep, eye, and shallow dose exposure for the subsequent 3 months (Figure 1). Through a Health Physics lecture, residents were instructed to wear the ring dosimeter on their fingers (though many attached these to their identification badge to avoid losing them) and the TLD dosimeter outside their lead aprons. Stanford Health Physics provided exposure data in millirads per State of California regulations; data was converted to mSv to allow comparison to international regulations. The IRB determined this study does not meet the federal regulatory definition of research because this was a QA/QI study.

Results: Sixty (77%) of all residents completed the survey (Figure 2, Table 1). Fifty-one of the 60 residents (85%) completing the survey initially agreed to participate in the dosimeter program, and after dropouts, full exposure data were collected from 41 residents from August 1, 2015 to February 1, 2016 (Table 2). Sixteen residents completed a follow-up survey with 31% stating their level of concern was diminished by use of a dosimeter.

Conclusions: Anesthesia housestaff are concerned about radiation exposure and desire more education about radiation safety. During a six-month study period, residents using dosimeters had low overall measured occupational radiation exposure. The highest deep dose equivalent value recorded equaled 0.47 mSv, approximately 9.6% of the ICRP occupational limit. The highest eye dose equivalent was 0.52 mSv, approximately 4% of the ICRP recommended limit. Note that dose limits may vary with institution; we chose to perform our comparison utilizing ICRP recommendations as these were the most conservative guidelines. This data does not support the need for routine dosimetry monitoring for anesthesia residents. However, there may be a future role for monitoring radiation exposure as the scope of anesthesia practice grows to encompass more complex fluoroscopic procedures. Anesthesia providers should aim to identify radiation sources and utilize protective equipment to minimize exposure.

4. Improving the Consult Process

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Danielle Goodrich MD Katie Doering MD Emergency Medicine Andrew Sun MD* Urology Sanaa Suharwardy MD OB/GYN Monica Sinha-Evenson MD Andrea Ament MD Psychiatry Linda Xu MD Neurosurgery Ashir Multani MD. Infectious Disease

Purpose: Across the hospital consult pages are not structured or uniform which leads to confusion and dissatisfaction with the consult process. It is often difficult to reach the correct person for any given consult service and pages do not always contain sufficient information to triage consults with preexisting duties.

Methods: We devised a survey to understand what issues are important to improving the consult process for residents.

Results: Based on the survey results we created a list of consult pages and on-call schedules to provide residents with a quick and accurate way to find the appropriate consultant to page. We are developing a tool within the Resident Safety Council website to house this information and allow residents to directly and efficiently page the right consultant. Implementation of a consult page template will also be added to ensure pages contain all pertinent information in a uniform manner.

Conclusion: In order to improve the consult process we developed a list of pager numbers and contact information for on-call consultants. This information along with a page template will be accessible on a secure website for all residents fellows and faculty.

6. Implementing an early warning system at LPCH

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Purpose: Many cases of clinical deterioration are preventable with early identification. There was a notable increase in the number of out-of-ICU codes in 2014 at LPCH. We describe here the development and implementation of a pilot study using an objective assessment tool to detect early warning signs of clinical deterioration.

Methods: The feasibility and potential impact of implementing various trigger systems was examined using retrospective data. Prospective data was collected in monthly PDQA cycles after the implementation of the Bedside Pediatric Early Warning System (BPEWS) in July of 2015. The number of out-of-ICU codes the number of ICU transfers and the vital signs 48 hours prior to an event were recorded.

Results: After validation of the BPEWS scores retrospectively the tool was implemented as a pilot study on one hospital inpatient unit. Since the implementation there have been 253 ICU transfers out of 4167 patient encounters. A BPEWS score of 9 resulted in a sensitivity of 11% and specificity of 96% with 28 true positives and 162 false positives. A cut off score of 12 would have resulted in a sensitivity of 3% and specificity of 99%.

Conclusion: We are continuing to optimize the implementation of an early warning system by rolling it out gradually while tracking measures/outcomes through monthly PDQA cycles. Our current data on the pilot study suggest that a BPEWS cutoff score of 9 would require significantly more resources for RRT’s than we currently have at LPCH. Our next PDQA cycle may involve a less resource-intensive RRT.

8. Optimizing the Stanford Internal Medicine Discharge Follow-up Appointment Process

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Introduction: Hospital discharge handover is a primary metric for measuring healthcare quality and patient safety. Effective post-discharge follow-up (FUPD) reduces costly readmissions, adverse medical events, and preventable deaths. Despite the importance of hospital discharge follow-up, the process of scheduling discharge appointments and the effectiveness of the process is often unclear to the medicine team and patients. We systematically analyzed the efficacy of the FUPD appointment creation process within the Stanford Internal Medicine Department’s (SIMD) Inpatient Unit.

Methods: Interviews of nurses, case managers, residents, chief residents, and attendings (N=48) were conducted to clarify the roles and current state of discharge appointment scheduling workflow. It was found that there was lack of communication between the medical teams and case management liaison responsible for scheduling appointments, which led to delay in scheduling and patients being missed, especially with weekend discharges and patients with primary care physicians (PCP) outside of Stanford network. Changes were made to the appointment scheduling workflow to optimize capturing all patients by time of discharge, and with special focus on external PCP follow up. To assess the impact of these interventions, patient charts pre and post changes (N=85, 40 pre, 43 post) were reviewed. Patient perspectives of the FUPD process and awareness were assessed through a 12 question survey.

Results: Data analysis revealed that pre-intervention, 71% of patients had internal PCP appointments scheduled at discharge, while only 18% of patients had external PCP appointments by discharge. 68% of subspecialty referrals were scheduled anywhere from 1-7 weeks after discharge, with high variation across Stanford specialty clinics. GI wait times are 50 days while GYN wait times are less than 10, though the n is small. Post intervention, we found a 36% increase in external PCP appointments created for patients discharged from the SIMD inpatient services, from 18% to 54% (p=0.02). Rates of internal PCP appointment scheduling remained the same. Analysis of patient perspectives suggest 82% have been told “having a follow-up appointment is important” with 68% aware of a PCP appointment being created.

Conclusion: Implementation of our recommendations for a streamlined electronic follow-up appointment
scheduling process resulted in significantly increased numbers of patients discharged with an external PCP follow-up appointment. Chart review also demonstrated disparities in internal specialty follow-up times. Patient perspectives suggest clinicians are conveying follow-up appointment importance and that it is being received well by patients, but that administrative inefficiencies may deter FUPD appointment scheduling. Increased awareness of patient preferences for how appointments are made may increase FCP appointment attendance.

10. Pre-operative SNF planning in Surgical Oncology
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Purpose: To appropriately select patients from surgical oncology clinics who are 70-100% likely to require SNF placement postoperatively in order to begin planning for Skilled Nursing Facility (SNF) placement preoperatively.

Methods: The surgical oncology inpatient care manager was contacted regarding the feasibility of preoperatively offering Skilled Nursing Facility (SNF) options and information to patients with a 70-100% chance of requiring SNF placement postoperatively. The case manager confirmed that this was possible and a working group was created that included two surgical residents and a surgical oncology attending. The patient surgical oncology case manager and the outpatient surgical oncology nurse coordinator notified the patient of the SNF option and the postoperative follow-up appointment.

Results: Pre-intervention data revealed that more commonly discussed care topics were estimated discharge date, test/procedures 45% and discharge barriers 45%. Topics not discussed at all included possible discontinuation of lines/telemetry, IVT prophylaxis, wound care and readmission risk.

Conclusions: Having a standardized checklist readily available at the TCR location increased prophylaxis. Post-intervention data showed an average of 6.1 vs 4.8 topics were discussed among checklist usage.

12. Design and implementation of a multidisciplinary rounds checklist on the inpatient medicine ward
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Purpose: Multidisciplinary care team (MCT) communication is difficult and time-consuming. In our team rounds (TCRs), we identified three improvement areas: 1) important care issues are not consistently addressed; 2) members are not consistently up-to-date; and 3) non-urgent communication often interrupts workflow. We describe the ongoing design, implementation, and effectiveness of a multidisciplinary rounds checklist.

Methods: We created a checklist of ten standardized inpatient care issues divided by roles. The checklist is posted at the TCR location and intended to guide discussion. Three university medicine teams were randomly assigned to the intervention group and the other two as controls.

Results: Pre-intervention data revealed that more commonly discussed care topics were estimated discharge date 62%, test/procedures 45% and discharge barriers 45%. Topics not discussed at all included possible discontinuation of lines/telemetry, IVT prophylaxis, wound care and readmission risk.

Conclusions: Having a standardized checklist readily available at the TCR location increased the number of care topics discussed. We still plan to assess whether embedding an interactive electronic checklist into the EMR influences MCT members’ ability to stay current with the care plan and whether it decreases non-urgent pages.

14. Does the Absence of Outside Medical Records Lead to Unnecessary Testing?
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Purpose: Outside Medical Records are essential to providing continuity of care to patients transferred from one medical center to another. At Stanford Hospital there is no uniform process for obtaining records although the Medicine Department has recently implemented a new workflow showing great promise. The purpose of this study was to better assess the current system in place and its perceived effects on patient care.

Methods: Interns (23) Residents (60) Fellows (4) and Attending (4) across 8 specialties were surveyed about their experience obtaining outside records.

Results: On average outside records were received 5-24 hours after requests were made. Most commonly missing parts of requested records were imaging discs, pathology reports and transfer/discharge summaries. 26% of the time outside records are never received. 56% of the time physicians obtain the records themselves using various processes throughout the hospital. Unit clerks were able to help obtain records only 50% of the time. 85% of respondents had to order blood tests because of inadequate records. 37% had to order CT scans, 51% MRIs, 32% LPs, 28% Biopsies and 4% procedures requiring sedation. On average respondents spent 44 minutes per record to find necessary information.

Conclusion: Although the data is limited of course by recall the current process for obtaining outside medical records is inefficient, haphazard, unreliable and likely dangerous. Residents fellows and attendings spend unnecessary time obtaining records and sifting through incomplete or disorganized records. Patients may be suffering from delays in diagnosis and treatment or worse still unnecessary tests and procedures.

16. Leveraging the Patient Aligned Care Team for Patient-Centered Post-Discharge Follow Up
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Purpose: To compare 30 day ED utilization rates and non-elective re-hospitalization rates of patients scheduled to receive a call from a PACT RN at time of discharge versus those receiving the “standard care” of either a scheduled face-to-face specialist or primary care provider (PCP) visit.

Methods: During multidisciplinary discharge planning rounds the discharge planning coordinator asked inpatient medicine providers if a pre-scheduled PACT RN phone call would be appropriate discharge follow-up for patients receiving primary care at the San Jose clinic instead of “standard care.” During PACT RN phone calls patients were triaged to face-to-face visits if medically indicated.

Results: Chart review of San Jose clinic patients discharged from the hospital between 10/1/2015 and 12/31/2015 showed that scheduled PACT RN phone calls at time of discharge rather than “standard care” did not markedly increase the rates of 30 day ED utilization or 30 day non-elective hospital readmission. Of the 17 patients scheduled for PACT RN follow-up three (17.6%) were triaged to face-to-face visits.

Conclusions: Scheduled PACT RN phone calls at the time of discharge rather than “standard care” do not markedly increase the rates of 30 day ED utilization or 30 day non-elective hospital readmission. Study limits include a single center non-randomized study design and small numbers of patients placed in the intervention arm secondary to provider reluctance. Next steps include exploring physicians’ perceptions of this new model of post-hospitalization follow-up involving additional clinic locations and investigating if larger numbers of patients receive scheduled PACT phone calls impacts clinic availability.

17. Using LEAN and A3 Thinking to Improve Code Blue Multidisciplinary Communication
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Background: Pre-LEAN principles front line staff provide value as defined by the customer (the patient). While the literature cites many examples of Plan-Do-Study-Act (PDSA) cycles that improved the functioning of Code Blue teams A3 thinking is rarely mentioned. Per staff surveys PAVA had suboptimal communication during Code Blue events and a multidisciplinary team formed to address this problem.

Purpose: To create standard work for Code Blue events that reinforces multidisciplinary communication.

Methods: Front line staff participating in focus groups said debriefs were ineffective if team members did not know with whom they should be debriefing (role identification) or if the environment was too chaotic to foster productive debriefs (crowd control). These root causes arose from various voiced criticisms including bedside nurses feeling “excluded” residents struggling to
18. Impact of transitions of care (TOC) pharmacy interventions on pneumonia readmissions
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Purpose: Pneumonia is one of the six disease states measured under Hospital Readmission Reduction Program (HRRP) by Center for Medicare & Medicaid Services (CMS). Hospitals with readmission rates that exceed national average will incur reimbursement penalties. The objective of this study is to determine whether transitions of care pharmacy interventions at discharge to patients admitted for pneumonia will reduce 30-day readmissions for primary and secondary pneumonia.

Methods: A list of patients discharged from Stanford Health Care general medicine teams between October 1, 2015 and March 31, 2016 is generated using the electronic medical record system. Patients are screened for an admission diagnosis of primary or secondary pneumonia and included in the study if they are discharged home with or without home health. Patients discharged to skilled-nursing facilities, long-term care, or hospice are excluded from the study. Baseline characteristics, status of outpatient prescription pick-ups, and appropriateness of discharge antibiotics are compared between the TOC intervention group and control group. 30-day readmission rates of the two groups are compared to determine whether or not there is a difference.

Results: A total of 98 patients were included in the study; 42 in non-TOC group and 56 in TOC intervention group. 30-day readmission rates for non-TOC and TOC groups were 19.0% and 12.5% respectively, p-value = 0.37.

Conclusions: The 30-day readmission rates for pneumonia patients who received TOC pharmacy interventions was lower than non-TOC group; However, the results were not statistically significant.

20. Patient-centered outcomes related to adapted sports participation
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Purpose: In the United States an estimated 2-3 million individuals with mental or physical disabilities participate in organized sports annually yet a consistent means for evaluating outcomes such as severity of illness and risk of mortality.

Methods: Five key outcome categories relevant to individuals who have sustained a major disability were identified: (1) functional independence (2) adjustment to disability (3) community reintegration and safety (4) mental health and (5) pain. We then developed an assessment tool comprised of 10 questions encompassing these outcome domains. In addition we included 2 questions designed to identify the development of new injury or disability including those potentially related to sports participation. The assessment tool will be administered prospectively by recreation therapists at 3-month intervals to all Veterans engaging in formal adapted sports and recreation therapy programs through the VA Palo Alto Health Care System. Each evaluation will be documented in the patient’s electronic medical record under a unique note title for ease of recall and data synthesis.

Results: This project is currently in progress.

Conclusion: A goal of adapted sports programs is to promote functional rehabilitation quality of life and community assimilation. However participation in sport also carries the risk of sports-related injury which can pose confounding obstacles for the disabled athlete. In the present project we propose a standardized mechanism to survey both the benefits and safety of adapted sports participation with the aim to enhance program development both locally and nationally in the future.

22. Evaluating the effectiveness of problem based charting in utilizing the problem list to structure clinical data in the intensive care unit
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Introduction: Accurate problem lists linked to electronic medical record (EMR) clinical data can be useful for chart review by clinicians for patient care, clinical decision support design, and data extraction for clinical research. The EMR at Stanford Hospital allows the problem list to be modified in several ways: adding and deleting problems, and designating problems as active or resolved. Nevertheless, modifying the EMR problem list is disruptive to clinician workflow under traditional charting methods, resulting in incomplete, inaccurate, and outdated, problem lists that do not reliably structure clinical data. In 11/2013, Stanford Hospital’s intensive care unit (ICU) implemented problem based charting (PBC) a system of clinical documentation that uses the problem list as an anchor for physician notes. PBC requires clinicians to document and update assessment and plans, instead of in a single note, under individual problems in the EMR problem list, therefore incorporating problem list management into the clinician’s workflow. We report preliminary findings from our study that aims to evaluate the effectiveness of PBC in improving problem list utilization.

Methods: We conducted a retrospective time series using data from a six consecutive month period prior to PBC implementation in the ICU (pre-PBC) from 5/1/2013 to 11/22/2013 and after PBC implementation (post-PBC) from 11/23/2013 to 5/1/2014. Patient data were queried and extracted from the EMR using SQL. Frequencies of total, active, resolved, and deleted problems on the problem list were ascertained per patient encounter. Statistical comparisons were performed between pre-PBC and post-PBC using chi2, rank sum, and t-tests with Stata software.

Results: A total of 735 and 758 patient encounters were identified in the pre-PBC and post-PBC periods, respectively. There were no significant differences in the age, gender, and lengths of stay between patient encounters in the pre-PBC and post-PBC periods. Both pre-PBC and post-PBC periods shared the same top two most common problems: hypertension and acute respiratory failure, but they were charted in significantly more encounters during the post-PBC period (24% vs 13%, p=0.001 and 16% vs 11%, p=0.001, respectively). Compared to pre-PBC, post-PBC encounters also had a higher total number of problems on the EMR problem list (7 (IQR: 7-12) vs 4 (IQR: 2-8), p<0.001). Post PBC encounter problem list labels had a lower mean proportion of problems labeled as “active” (0.86±0.23 vs 0.91±0.23, p<0.001), but had a slightly higher mean proportion of deleted problems (0.03±0.02 vs 0.02±0.01, p=0.006) and resolved problems (0.12±0.2 vs 0.07±0.2, p=0.001).

Conclusions and next steps: This preliminary analysis of a retrospective time series suggests that problem lists were more often used and updated after the implementation of PBC in the ICU at Stanford Hospital. Additional characterizations of problem list utilization are ongoing. We are also studying whether PBC is effective in generating problem lists that can structure clinical data to more accurately phenotype common ICU hospital conditions, such as sepsis, and ICU clinical outcomes such as severity of illness and risk of mortality.

24. Emergency Radiology Clinical Histories
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Purpose: The evaluation and treatment of a trauma patient brought to the Emergency Department is a complex process that requires communication between Emergency Medicine, Surgery, and Radiology staff. Patients sustain both visible injuries and injuries diagnosed only with the assistance of imaging, including radiographs and CT scans. Clinical histories describing injuries are essential for the radiologist to return accurate and timely reads. The communication of these clinical histories is difficult in the confusion of the trauma resuscitation, leading to delayed reads, suboptimal patient care, and physician frustration. A team of Radiology and Emergency Medicine residents banded together to undergo the “Realizing Improvement Through Team Empower- ment” (RITE) program with the aim of improving the quality of this process.

Methods: The RITE team underwent training on process improvement and systems evaluation. As we gathered information, various interventions were tried and new processes implemented. The most successful was the transfer of the trauma “run sheet” from the charge nurse to the
Radiology reading room assistant.

Results: Over the course of the project, the number of trauma studies with an attached clinical history other than "trauma" rose from 0% to 70%. This rise corresponded to a secondary measurement of increased provider satisfaction on both sides of the project.

Conclusions: The communication of the Emergency Department and the Radiology Department is a crucial yet overlooked aspect of hospital efficiency and error avoidance. The implementation of our process improvement, with continuing adjustment, has led to improved clinical reads, patient care, and provider satisfaction.

26. Improving Patient Discharge Workflow and Discharge Documentation for Families Using continuous Improvement
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Purpose: At LPCH the EMR discharge workflow was identified as a cause of discharge delays and a source of provider dissatisfaction. Furthermore the after visit summary (AVS) produced was noted to be error prone and of uncertain value to families. Our aim was to increase provider and family satisfaction with the AVS and eliminate discharge delays caused by the EMR workflow.

Methods: AVS content and EMR workflow was mapped by a multidisciplinary team and analyzed for errors and failure modes. Using a modified Delphi technique an ideal AVS template and electronic discharge workflow were created. Pediatric residents were surveyed pre and post-implemention. Additionally, detailed chart review of AVS content was performed and nurse reported discharge delays due to the AVS were tracked.

Results: 9% of pediatric residents agreed the AVS was of high quality for families prior to intervention, compared to 67% post intervention (p <0.001, n=44). Following our intervention 90% of pediatric residents reported the EMR discharge navigator was easy to use, up from a baseline of 61% (p = 0.003, n=44). We reduced irrelevant information in the AVS, such as birth details, (35% vs. 0%, p<0.01), and increased pertinent follow up information, such as clinic addresses and telephone numbers (1% vs 100%, p<0.001). Finally we reduced AVS-related discharge delays from 3.4 times/month to 0.3 times/month (p = 0.018) which persisted at 3 months post-intervention.

Conclusion: Electronic discharge navigator workflow, patient progression, and AVS documentation can be improved using continuous improvement process redesign aimed by failure mode effects analysis.

PATIENT CARE

28. Use of an A3 Problem Solving Methodology to Improve Influenza Vaccination Rates in Pediatric Inpatients at LPCH
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Purpose: Prior to 2015, the state of inpatient influenza vaccination (IIV) assessment, documentation and administration were not well known. Our aim is to improve the processes surrounding IIV administration with the end result of improving the IIV screening and vaccination rates for the 2016-2017 influenza season.

Methods: We utilized an A3 problem solving methodology. First, we improved our understanding of the current IIV workflow by: observing the intake and discharge process for patients, and performing audits of recently discharged patients to assess the accuracy of documented IIV status in the EMR. Informal interviews were conducted with MDs and RNs to determine their current knowledge of, and readiness to provide, IIV. A root cause analysis helped identify barriers with our current workflow. From this we proposed countermeasures to improve the IIV screening and vaccination rate.

Results: The IIV screening rate for the 2014-2015 influenza season was 54% (national average, 90%). Barriers/issues contributing to this are: 1) Unclear whose responsibility (MD versus RN) it is to assess and document IIV eligibility 2) Even when assessed, it is not consistently documented in EPIC and there is no clear/centralized location for documentation 3) Best Practice Alerts are triggered in EPIC to remind MDs about IIV; however, they are frequently bypassed.

Conclusion: The current workflow surrounding IIV needs improvement. We propose the following countermeasures to increase IIV screening rate to 75% for the 2016-2017 influenza season: 1) Have RNs lead IIV screening, documentation, and order placement utilizing the EMR and 2) Centralize the location within the EMR where IIV status is stored/displayed. The impact of these changes will be studied in future PDSA cycles.

30. Evaluation of the impact of immobilization devices on the radiotherapy treatment of head and neck cancers
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Purpose: During radiotherapy for head and neck cancer patients must be reproducibly positioned to accurately deliver a high energy X-ray beam to complicated tumor shapes. The degrees of freedom in the cervical spine and shoulders must be managed to avoid prolonged treatment setup times or unnecessary X-ray imaging dose. To this end we examined the characteristics of several commercial and custom upper body immobilization products.

Methods: We examined the level of X-ray beam attenuation and skin dose resulting from (a) 3 couchtop overlays (b) 13 immobilization mask types and (c) 8 head/shoulder cushions. We measured the dosimetric impact of these devices and their tendency to both reduce tumor coverage and increase toxicity to the patient’s skin. Measurements were conducted using film and ionization chamber dosimetry over a range of clinically relevant X-ray beam geometries.

Results: High energy X-ray beam attenuation was measured to range from 0.9% to 1.7% for couchtop overlays 0.1% to 1.4% for masks and 0.7% to 5.5% for the cushions. Skin dose enhancement for thermoplastic masks (50% to 70% of maximum dose) was consistent across several vendors once mask thickness and porosity was taken into account. An effective immobilization system consisted of a custom wrap-around cushion combined with shoulder-retracting hand grips and a thermoplastic mask.

Conclusions: It is unlikely that a single-immobilization device can effectively restrict head and shoulder motion so multiple devices are often necessary. These should be characterized before clinical implementation to understand their combined effect and to minimize the associated skin toxicities.

32. Total Body Irradiation for the 21st Century
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Purpose: Total body irradiation (TBI) with megavoltage photon beams is frequently used to destroy the bone marrow and leukemic cells and to immunosuppress the patient prior to receiving a bone marrow transplant (BMT). Our current clinical method of designing the radiation treatment plan has largely remained unchanged in 30 years and involves basic 2D hand calculation of the prescription radiation dose to fewer than a dozen points within the patient. The result is that portions of the body can receive radiation that is up to 40% different from prescribed. The aim of this project was to design a new TBI technique with better control of radiation delivered to the patient.

Methods: A new computerized treatment planning system was programmed in MATLAB to model radiation delivery to a patient. Incorporating advances in 3D-CT imaging mathematical inverse-optimization algorithms and robotically controlled radiation delivery mechanisms the radiation beam can now be dynamically modulated to paint a uniform dose to the entire 3D patient volume.

Results and Conclusions: A TBI treatment plan was simulated for a patient in the MATLAB platform. Delivered radiation dose to at least 80% of the patient volume was within ±10% of the prescribed dose. Robotic radiation painting allowed for personalized treatment plans with enhanced dosimetric accuracy. The new technique also significantly improves patient comfort by allowing the patient to lie supine on a table rather than stand during the entire treatment thus reducing fall risks for these vulnerable patients. A clinical trial is planned.

34. Is 5 days of empiric treatment pending a negative blood culture warranted?
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Department of Pathology

Purpose: A major challenge of modern medicine is the emergence of microorganisms that are resistant to available antibiotics. Overuse and misuse of antibiotics is thought to be a major driver of antibiotic resistance. A cornerstone of antibiotic stewardship includes discontinuation of empiric therapy when sensitive diagnostics rule out infection. In patients with suspected blood stream infections the standard practice is to incubate blood cultures for five days before reporting them as negative. This algorithm results in up to 5 days of empiric broad-spectrum antibiotic
use while cultures incubate. Our goal was to assess whether a 5-day empiric treatment regimen is reasonable by examining time to positivity in positive blood cultures at Stanford.

**Methods:** We used informatics analysis to evaluate all positive blood cultures at Stanford between 6/12/2014 and 2/20/2015 and assessed time to positivity based on infecting species pre-blood culture antibiotic use and patient immune defect (neutropenia).

**Results:** We examined 1847 positive cultures and determined that the median and 95th percentile time to positivity for all positive cultures to be 17.3 and 68.4 hours respectively. For patients not on antibiotics the median and 95th percentile were 12.1 and 58.0 hours respectively.

**Conclusions:** Our study demonstrates that for the vast majority of true blood stream infections a blood culture will be positive <72 hours after collection. This suggests that a reasonable approach to reducing the proliferation of drug resistant microorganisms is reducing culture incubation time and empiric antibiotic use time to 3 days.

### 36. Audio-Visual Assisted Therapeutic Ambience for Radiotherapy (AVATAR)

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**Purpose:** Radiation therapy for treatment of pediatric cancer requires that a patient remain immobile and alone in the treatment room for up to 45 minutes a day often for 5-6 weeks of treatment. Many patients are unable to cooperate with this and therefore need to be treated with daily sedation or anesthesia that significantly increases the risks to the health of the patient the time and costs associated with treatment and diminishes the patient and family experience of care. Allowing patients to watch streamed video during anxiety-provoking procedures is associated with significantly decreased anxiety on validated measures.

**Methods:** We have developed a novel strategy to allow a patient to watch video segments during daily radiation therapy using a specialized wireless streaming digital media player and pico projector with a thin display screen suspended above the patient.

**Results:** We have pilot tested this system with great success and have been able to prevent the administration of anesthesia in over 200 pediatric treatment sessions.

**Conclusions:** Distraction can be achieved allowing many patients to tolerate lengthy precision radiotherapy without sedation and/or anesthesia greatly reducing the risk to the patient and improving the quality of care.

### 38. Anesthesiologists Must Be Familiar With The Ventilatory Changes of Peroral Endoscopic Myotomy (POEM)

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**Purpose:** Clinically significant potentially life-threatening events can occur during peroral endoscopic myotomy (POEM). The purpose of this abstract is to familiarize anesthesiologists with these complications.

**Methods:** We performed a retrospective analysis of 28 POEM cases performed at Stanford that required needle decompression of a pneumoperitoneum. We documented various physiologic parameters such as peak inspiratory pressure (PIP) and tidal carbon dioxide (ETCO2) and oxygen saturation (SpO2) levels before and after decompression to characterize the physiologic patterns that occur.

**Results:** Almost immediately after initiation of esophageal CO2 insufflation ETCO2 begins rising substantially followed by PIP levels which may quickly reach levels known to cause barotrauma. Shortly after PIP rises SpO2 decreases often into the high 80’s. ETCO2 levels as high as 97 mm Hg were recorded. A Veress needle may be inserted into the patient’s abdomen to decompress the pneumoperitoneum; the primary cause of these ventilatory changes. Marked improvement in SpO2 ETCO2 and PIP typically occurs within minutes of this intervention without changes in ventilator settings.

**Conclusion:** Pneumoperitoneum pneumomediatinum and subcutaneous emphysema commonly occur during POEM. Often the anesthesiologist is not aware that these ventilatory changes are the result of the surgical technique not a more serious physiologic derangement. The most effective intervention is immediate decompression of the pneumoperitoneum. Anesthesiologists must be familiar with POEM and its potential complications since valuable time may be lost if one considers other causes and attempts unsuccessful interventions.

### 40. Comparison of self-reported vs. EPIC generated peripheral nerve block data and its application towards improving resident education.

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**Introduction:** It is well-known that a key aspect of the practice of anesthesia is the ability to safely accurately reproducibly and efficiently perform procedures. The current practice is to self-report these procedures in ACGME case logs which are provided to both program directors and eventually future employers. This reporting method is limited by both the accuracy of self-reported data and the lack of details provided in the broad ACGME procedure categories. By using algorithms created to mine this data from EPIC we can generate reports with a prompt detailed and accurate accounting of procedures: data that could be used in real-time to identify targets for improvement at both an individual and program-wide level. Looking specifically at the category of peripheral nerve blocks—a procedure category that is almost entirely accomplished in a one-month regional anesthesia rotation—we will compare the number of resident-reported procedures to those pulled from EPIC.

**Purpose:**

1. Improve accuracy in ACGME case log reporting.
2. Make it easier for residents to enter in their case logs during their regional rotation.
3. Utilizing EPIC and all its resources to help identify potential targets for improvement both in individual and resident wide education and better insure that residents are obtaining a well rounded educational experience during their regional rotation.
4. Create a report for potential employers to submit when job searching.

**Methods:** First we asked each CA-2 Stanford anesthesia resident to use current ACGME case log reporting system to generate a report of all peripheral nerve blocks performed during their regional rotation. Then we generated an EPIC report of all peripheral nerve blocks performed by each of these residents based on procedure notes. We then compared the number of blocks self reported by each resident to the EPIC generated reports.

**Results:** pending

**NOTE:** These reports are based only on procedures performed at Stanford Hospital and therefore will not include PNBs performed at the VA, SCVMC or LPCH.