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# Agenda

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Keynote Speaker

Terry Platchek, MD is a Clinical Assistant Professor of Pediatrics and Internal Medicine at the Stanford University School of Medicine and serves as the Fellowship Director of the Clinical Excellence Research Center. He is also the Medical Director for Performance Improvement at Stanford Children’s Health. His career focuses on using Lean operations engineering to improve quality, safety, cost, appropriateness and service in healthcare delivery. Dr. Platchek is co-author of the book *Advanced Lean in Healthcare* and he is specifically interested in the education and engagement of physicians in improving healthcare delivery systems and the development of innovative models for delivering higher value healthcare.

Dr. Platchek has been active nationally and internationally in promoting physician engagement in Lean healthcare management. He has advised healthcare systems across the United States and Australia on performance improvement, including the Departments of Health in Victoria and Western Australia which have adopted junior doctor healthcare redesign programs using a continuous improvement model.

Dr. Platchek was educated at Georgetown University (BS – Biology, Government) and the University of Michigan (MD). He completed his residency training in the combined Internal Medicine and Pediatrics program at the University of Michigan, followed by a Chief Residency in the Department of Pediatrics and Communicable Diseases. Currently, he practices medicine as a Pediatric Hospitalist at Lucile Packard Children’s Hospital Stanford.
**Poster Map**

**When:** Monday, June 8, 2015 at 3:30 PM – 6:30PM  
**Where:** Li Ka Shing Center (LKSC), Berg Hall, LK 230A
Abstracts

1. Survival and Neurological Outcomes of Cardiac Arrests at a University-Affiliated Veterans Affairs Health Care System
Felipe D. Perez, MD*; Steven K. Howard, MD2,3; Robert E. King, MS2; Edward R. Mariano, MD, MAS (Clinical Research)2,3; Geoffrey Lighthall, MD, PhD2,3; T. Kyle Harrison, MD2,3
1 Resident, Santa Clara Valley Medical Center Transitional Program; 2 Anesthesiology and Perioperative Care Service, Veterans Affairs Palo Alto Health Care System; 3 Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Purpose: To assess efficacy of a patient informational flyer in triggering referrals to palliative care from the emergency department.
Methods: A one-page informational flyer about palliative care was designed with input from thought leaders in the Division of Palliative Care (PC). Patients presenting to Stanford Emergency Department (ED) who screened in for PC benefit by validated criteria were provided this informational flyer. If patients subsequently expressed interest, referrals were placed to either inpatient or outpatient PC service depending on disposition. Research protocol and just-in-time training engaged leadership among ED physicians, advanced practice providers, nurses, social work, and case management. EPIC generated orders were counted from the ED, which includes the Clinical Decision Unit.
Results: In the six months prior to pilot launch (03/2014-08/2014), a total of 30 inpatient PC and 5 outpatient PC referrals were placed from the ED. In the six months following pilot launch (09/2014-02/2015), 87 inpatient PC referrals and 8 outpatient PC referrals were placed. Referrals were evenly distributed across the months. In total, the number of referrals more than doubled.
Conclusion: In an increasingly resource-restrained healthcare system, EDs have an opportunity to lead in providing better care at lower costs. Early integration into palliative care has been shown to increase both quality and quantity of life while simultaneously reducing admissions and lengths of stay. A simple PC informational flyer effectively increases palliative care interest directly from the ED. Further research will explore the nuanced demographics of this captured population – underlying disease type, symptom burden, as well as satisfaction and outcomes with early referral.

3. Resident Physician Knowledge of the Discharge Medication Process and the Impact of Pharmacy Rounding
Thomas Lew, MD* Department of Internal Medicine
Purpose: To reduce delays in discharge due to medication issues by utilizing Transition of Care (TOC) pharmacists, as well as to assess resident knowledge of the discharge medication process.
Methods: A survey sent to residents assessed the frequency of delays to discharge related to medications and knowledge of formulary information. The pharmacy rounding intervention was performed concurrently. Two Medicine wards teams were chosen for the intervention with three control teams. The intervention teams met with a TOC pharmacist daily to review medication lists of upcoming discharges. They identified medications that would need prior insurance authorization and alerted the teams. Control teams met with a resident to review the same information, but were not alerted to potential costly medications.
Results: 155 residents were surveyed. 93% had experienced delays in discharge due to medications, many of which were due to late recognition of the necessity for prior authorizations. A significant majority of residents do not understand the Stanford insurance formulary or MediCal prescribing rules. In the TOC pharmacy intervention, there were four unnecessary days of hospitalization due to medications needing prior authorization, compared to zero for the intervention group.
Conclusion: Delays to discharge due to medications is a common occurrence. There is a gap in knowledge among residents concerning medication coverage. Bringing in TOC pharmacists early into the discharge process, while not leading to a decrease in overall length of stay, reduced unnecessary days of hospitalization. Further utilization of TOC pharmacists would be cost-effective in reducing such delays in discharge.

4. Examining the Athlete Experience of Medical Care
Calvin E Hwang, MD*; Jennifer G Baine, MD Department of Orthopedic Surgery
Purpose: The medical team in the sports medicine clinic can be quite large, comprised of multiple physicians, physical therapists, athletic trainers, interns and rotating students. We hypothesized that the presence of such a large team might proclude the athletes from relaying personal information which may be crucial to patient care.
Methods: We developed an IRB approved survey to better understand the athlete experience of care at the sports medicine clinic. All student-athletes presenting to sports medicine clinic over a period of two months had the
opportunity to complete the survey. We asked questions on the level of athlete comfort in expressing concerns about their care, bringing up potentially sensitive topics, and confiding with their providers. We also collected data on the number of medical personnel in the room during the visit and demographic data.

**Results:** Fifty surveys were collected during the study period. There did not appear to be an association between the number of providers in the clinic room and an athlete’s comfort in discussing his or her medical care or other sensitive topics. Student-athletes were comfortable asking questions during the appointment, were not afraid to express concerns, were comfortable bringing up potentially sensitive topics and asking people to leave the exam room if necessary, and did not have concerns regarding privacy.

**Conclusions:** Although student-athletes are often seen and examined with multiple providers in a clinic exam room, they did not have any significant concerns regarding their medical care or possible violations of privacy.

5. Improving Diabetes Care and Population Health Training in an Internal Medicine Resident Clinic
Anuradha Phadke MD*, Nazima Allaudeen MD, Nicole Grant MD, and Steven M. Asch MD MPH
Department of Internal Medicine

**Purpose:** Our goals were 1) improve rates of diabetic patients with optimally controlled blood pressure and annual diabetes labs and 2) improve resident exposure to population health via increased engagement with a diabetic registry.

**Methods:** The project took place at the Palo Alto VA Internal medicine teaching clinics. Initial steps included registry aggregation to determine the current state of diabetes care and review of ACGME program survey data to understand educational gaps. Subsequent steps included meetings with residents and clinic leadership, chart review, and discussion with patients to understand root causes for identified clinical gaps and to develop planned-study-act interventions. We then used a quasi-experimental design, with one resident clinic serving as intervention and the other comparison, to test a series of interventions.

**Results:** We tested educational, checklist, and audit feedback/academic detailing interventions. Over a 6 month period, the percent of patients with annual hemoglobin A1c did not change in the intervention group but decreased by 5% in the comparison group. A sustained increase in patients with annual microalbumin of 2% was seen in the intervention group as compared to a decrease of 3% in the comparison group. Semi-structured interviews demonstrated increase in knowledge and behaviors surrounding population health and registry management in the intervention group.

**Conclusions:** Audit feedback and academic detailing can increase trainee engagement with population health management. Addressing challenges of limited frequency of feedback, team protected time for registry management, and leadership prioritization, as well as focusing on patient follow-up, should further clinical improvement.

6. Decreasing Rates of Inappropriate Echo Ordering Using Report-Embedded Follow-up Recommendations
Anuradha Phadke MD* and Paul Heidenreich MD, MS
Department of Internal Medicine

**Purpose:** To study if including follow-up recommendation in an echocardiography report improves appropriate use of follow-up echocardiograms.

**Methods:** We randomized 1705 echoes, for which an echo attending chose to give a follow-up recommendation, to either include or not include the recommendation in the echo report. There were 298 recommendations to perform a follow-up study within a time frame (POS) and 1407 recommendations that a follow-up was not indicated (NEG). We conducted chart review to determine the reason for follow-up study for the 1407 in the NEG group. We defined appropriate follow-up as an echo in the recommended time frame for positive recommendations or avoidance of an echo for the same indication following a negative recommendation. Results: 805 reports were randomized to include a recommendation in the echo report (703 NEG, 102 POS) and 826 randomized to not include a recommendation (705 NEG, 121 POS). The mean age of patients undergoing echocardiography was 68 +/- 12 years. Requests for echocardiography were from general medicine outpatient (33%), cardiology outpatient (27%), other outpatient (14%), and inpatient (26%). Appropriate follow-up echocardiography following a POS recommendation occurred in 57% in the recommendation-included group and 51% for the control group. Inappropriate follow-up echocardiography (NEG recommendation) occurred in 4.1% randomized to the recommendation-included group and 5.5% for the control group. Overall inappropriate follow-up decisions occurred in 8.9% of those randomized to the recommendation-included group compared to 11.9% of those randomized to control (p=0.05).

**Conclusion:** Placing recommendations within echo reports decreased rates of inappropriate follow-up.

7. Barriers to Effective RN-MD Communication at Stanford
Adam Sang* MD, Ian Chong MD, Minjoung Go MD, Ryan Perumpail MD, Arghavan Salles MD, Michael Shaheen MD, Barbara Mayer RN PhD, Ruth Fanning MD
Resident Safety Council

**Purpose:** Effective communication between nurses and physicians is essential to ensure optimal patient care, foster a culture of safety, and improve job satisfaction. Yet, both qualitative and quantitative data, including work experience, National Database of Nursing Quality Indicators (NDNQI) survey data, and literature review, suggest that RN-MD communication is suboptimal across many major academic centers. Our goal as a multi-specialty committee of residents is to start the process of improving RN-MD communication at our institution by gathering data on specific barriers to effective communication from both professions.

**Methods:** Communication barriers were explored by focus groups comprised of physicians and nurses across many disciplines. Nursing NDNQI data from our institution was reviewed from the past academic year.

**Result:** Resident physicians considered the following as barriers to effective communication with RNs: 1) lack of understanding of each other’s roles, 2) technological limitations, 3) conflicting personalities, and 4) the intrinsic stressful and fast-paced nature of health care. From the nurses’ perspective, the barriers include 1) lack of face time between RNs and MDs, 2) lack of understanding of each other’s roles, 3) poor closed-loop communication, 4) cultural and professionalism conflicts, and 5) lack of good feedback mechanisms.

**Conclusions:** Institutionally, there is much interest from both RNs and MDs to improve the effectiveness of communication between both professions. A number of common barriers were identified by both physicians and nurses, including a lack of understanding of each other’s roles, and culture/personal conflicts. The overall goal of this project is to tailor interventions which address these specific barriers to communication, such
as education pieces, multi-disciplinary training, and institutional support to increase face time.

Anand Veeravagu*, Christian Swinney, Amy Li, Adrienne Moraff, John Ratliff
Department of Neurosurgery

**Purpose:** The ability to predict risk of perioperative complications based on patient and procedure specific factors would benefit surgeons and patients. Current methods of risk assessment for spine surgery are limited. This study assesses an iPad application that predicts the risk of perioperative complications based on patient and procedure specific unique factors.

**Methods:** We developed a smooth data entry process using an iPad device that provided appropriate inputs into a previously developed computational model of adverse event occurrence in spine surgery. The model was previously generated using longitudinal prospective data, consisting of 279,145 records. The present study applied this model to a group of 200 patients. Patient factors were entered into the application’s interface. Predicted complications were then compared to the actual complications for the 30 day postoperative period.

**Results:** The median predicted probability of experiencing a complication was .4494 for patients experiencing 1+ complications and .3714 for patients experiencing 0 complications (p=.0436), according to the iPad application. In the current study a group of 70 patients (35%) experienced postoperative complications. The most common comorbidity in patients experiencing complications was hypertension (49%, compared to 36% in patients with no complications).

**Conclusion:** The iPad application and the statistical model that it utilizes can provide the surgeon with a straightforward and timely means of assessing the risk of perioperative complications based on known patient factors and comorbidities. This device has the potential to improve both patient safety and the quality of medical care.

Dimitar Zlatev MD*, Simon Conti MD, Remy Lamberts MD, Phil Harter MD, Harcharan Gill MD, Eila Skinner MD
Department of Urologic Surgery

**Purpose:** Pain from urolithiasis is a common presentation to the emergency department (ED) in the United States. Abdominal non-contrast computed tomography (NCCT) has been the standard initial imaging method for these patients. The use of abdominal ultrasonography (US) remains an area of ongoing research, with lower cumulative radiation exposure but lack of definitive localization and sizing of stones necessary for surgical intervention. We sought to create guidelines for evaluation and urologic referral of patients presenting with suspected urolithiasis to Stanford Hospital & Clinics ED.

**Methods:** A comprehensive literature review was performed, including MEDLINE searches and the most recent guidelines from the American Urological Association and European Association of Urology. This analysis formed the evidentiary basis of the recommended guidelines, with additional attention dedicated to streamlined ED workflow and optimized department-specific urologic management.

**Results:** Initial evaluation should include a BMP, CBC, urinalysis, urine culture, and plain abdominal radiography. Abdominal US is optional. Medical expulsion therapy with outpatient referral to Urology is appropriate for afibrile patients with unilateral urolithiasis, satisfactory pain control, and no evidence of sepsis or renal failure. NCCT (low-dose if BMI < 30) should be obtained for all patients with evidence of sepsis, renal failure, uncontrolled pain, or non-diagnostic initial imaging. Inpatient consultation to Urology is required for all patients with evidence of sepsis, renal failure, solitary kidney, bilateral obstructing urolithiasis, or uncontrolled pain. Management should otherwise include medical expulsion therapy and outpatient referral to Urology.

**Conclusions:** The proposed urologic guidelines have the potential for streamlining initial patient evaluation of suspected urolithiasis, with the goal of enhanced emergency department workflow and optimized urologic management.

10. Standardization of Hospital Discharge Instructions Templates following Admission to Urologic Surgery Service
Dimitar Zlatev*, Kerri Stevenson, Remy Lamberts, David Guo, Harcharan Gill, Eila Skinner
Department of Urologic Surgery

**Purpose:** The transition of care from hospital to home is a vulnerable time for patients. Discharge instructions that are accurate, clear, and complete can reduce complications and readmissions, while ineffective instructions can adversely affect patient care. There remains significant variability in the content of discharge instructions across providers in our department. We sought to create standardized, diagnosis-specific electronic templates to be used for patients discharged from the Adult Urologic Surgery service at Stanford Hospital & Clinics.

**Methods:** Electronic discharge instructions were created as diagnosis-specific SmartPhrases for use within the Discharge Navigator in EPIC. Each template included the following standard components: name of procedure or reason for admission, diet, activity, wound care, drain care, medications, follow-up, warning signs, medical contact information during normal working hours (including clinic telephone numbers), and medical contact information after normal working hours. EPIC wildcard placeholders (denoted as ** *) were utilized to allow incorporation of patient-specific details. Standardized templates were created for the most common urologic operations and personalized for each of the 9 attending physicians within the Urologic Surgery department.

**Results:** A total of 79 diagnosis-specific discharge instructions were created. The average number of discharge instructions was 9 (range 3 to 16) per attending physician. All discharge instructions templates were shared in EPIC with urology residents and nurse practitioners for clinical use. Ownership was limited to select users to maintain template integrity.

**Conclusions:** Standardized diagnosis- and attending-specific discharge instructions templates have the potential of easing the transition of care following hospital discharge, with the goal of improved patient satisfaction and reduced outpatient complications and readmissions.

11. Design of emergency cognitive aids impacts performance on information retrieval and use: A simulation-based study in physicians
Janak Chandrasoma, MD, Educational Informatics Fellow, Stanford AIM Lab
Anna Clemenson, RN, Stanford AIM Lab
Reuben Eng, MD, Educational Informatics Fellow, Stanford AIM Lab
Kyle Harrison, MD, Core Faculty in Simulation, Stanford AIM Lab
Larry Chu
Stanford AIM Lab, Anesthesiology, Perioperative and Pain Medicine

**Purpose:** To determine the effect of pictographic design elements on human factors performance of ACLS crisis management, compared to text-based aids.
Methods: The methods used in this study were approved on October 10th, 2012 by the Stanford University Institutional Review Board (#25138). Twenty-one participants completed the study with various levels of medical training (interns, residents, and attending physicians) and specialty (anesthesia, internal medicine, surgery, emergency medicine, and dermatology). Each participant took part in two experiments involving text-based and pictographic cognitive aids. In the timed task procedure, subjects were given modified cognitive aids of either text-based or pictographic design with their eyes closed. Subjects were informed dosing information had been changed and were asked to retrieve correct dosing information from the aid upon opening their eyes. In the narrative simulation task procedure, subjects underwent a screen-based ACLS scenario simulation while simultaneously performing a distractor test.

Performance was graded using text-based or pictographic aids.

Results: Subjects using the pictographic cognitive aids had faster information retrieval times compared to text-based aids in finding the correct dose of atropine to treat bradycardia (5.6 seconds vs. 3.0 seconds, p=0.01). Performance in finding the correct dose of current to treat SVT was also faster (0.02 vs. 5.04, p=0.002). 71% of subjects preferred using some form of cognitive aid, compared to none at all. When comparing the text-based aid vs. the pictographic aid, 57% of users felt their performance had improved when using the pictographic aid compared to the text-based aid. 76% reported preferring pocket-based paper aid, while only 24% preferred digital aids. There was no significant difference between groups on performance in the narrative simulation task.

Conclusion: We have shown, for the first time, that design of emergency cognitive aids impacts performance on informational retrieval and use in a laboratory-based simulation experiment. Overall, physicians performed better in time-task for retrieving critical treatment information from aids incorporating pictographic design elements. This effect is thought to be significant because subjects stated repeatedly that “If you pick something up and it just confuses you or you can’t find the information you need right away it’s going to make the average user just set it right down and not use it again.” Additional work is need to determine evidence-based best practices for cognitive aid design.

12. Analysis of diagnostic and management approaches to bone and joint infections at LPCH before and after implementation of an algorithm
Megumi Itoh MD, Nivedita Srinivas MD, Jeffrey Young MD, Kathleen Gutierrez MD
Department of Pediatric Infectious Diseases

Background: With a multidisciplinary team of hospitalists, orthopedic surgeons and infectious disease specialists, we implemented a treatment algorithm for bone and joint infections (BJI) at LPCH to streamline and unify our diagnostic and management strategies.

Methods: The algorithm was disseminated among clinicians at LPCH in Jan. 2015. We have obtained pre-intervention data on patients (age range: 3 months to 19 years) admitted for osteomyelitis (ICD-9 730.x) or septic joint (ICD-9 711.x) between Jan 1 2012 to Dec 31, 2015. Exclusion criteria included patients who are immunocompromised, incompletely immunized, experiencing post-operative infection or those who required ICU-level of care. We also excluded atypical locations of infection such as axial skeleton and small bones of hands and feet, which potentially require longer duration of IV antibiotics therapy.

Results: There were 57 patients (19F, 28M) admitted for osteomyelitis (40%), septic joint (47%) or both (12%). Average length of admission was 8.1 days and the number of patients requiring re-admission was 5 (9%). Percentage of patients who had a blood culture obtained prior to antibiotics was 89.5%, of which 51% were positive. Forty-five (82%) patients underwent a diagnostic or therapeutic procedure to have joint fluid or tissue sent for culture, and of these 46.7% were positive. Overall, 73.7% of patients admitted for BJI had identification of a causative organism. Majority (71%) were due to MSSA, while only 7% were due to MRSA. Other organisms included Group A Streptococcus (10%), Group B Streptococcus (2%), Kingella Kingae (2%), Haemophilus influenza type A (2%), Neisseria meningitidis (2%), and Pseudomonas aeruginosa (2%). Thirty-six (63.2%) patients had a MRI to diagnose osteomyelitis, and the average time to MRI from admission was 1.92 days. In terms of antibiotic therapy, there were 11 different empiric antibiotic combinations used as first-line therapy. The most common monotherapy used were cefazolin (21%), clindamycin (19%), vancomycin (16%) and nafcillin (4%), while the common combinations used were vancomycin and ceftriaxone (11%), vancomycin and cefazolin (9%), and clindamycin with cefazolin or ceftriaxone (5% each). Judging by the variability of empiric antibiotics used, there is a clear need for consensus and guidance among clinicians for management of BJI. We plan to continue collecting data after implementation of the BJI algorithm and our ultimate goal is to improve outcomes as measured by diagnostic yield, time to obtaining MRI, use of appropriate first-line antibiotics to minimize number of antibiotic changes, and reduction in length of stay and rate of readmission.

13. Reducing Unnecessary Labs: The Human BPA Project
Jessie Kittle MD*
Department of Internal Medicine

Purpose: The United States is responsible for 43% of lab expenditures worldwide, and up to thirty percent of lab tests may be unnecessary1. Best practice alerts (BPAs) have been shown to decrease lab ordering by physicians2. This project aims to determine if an electronic medical record (EMR) based BPA could decrease the number of unnecessary labs ordered by physicians at Stanford.

Methods: Three internal medicine ward teams were randomized to the intervention, and two to the control group. Standing daily labs ordered for 3 or more days were recorded for every patient. A QI resident visited intervention teams on four occasions, and asked if standing labs ordered 3 or more days could be decreased in frequency or discontinued. If a lab was not changed, the reason was recorded.

Results: Across both groups, 45% of patients had standing labs ordered for at least 3 days. In the intervention group, 32% of standing CBCs and 14% of BMPs were decreased in frequency and 28% and 20%, respectively, were discontinued. 7 to 47% of other chemistry tests were decreased or discontinued. Main reasons for not stopping labs include patient condition and consult request.

Conclusions: Internal Medicine residents at Stanford decrease their daily lab ordering when prompted by another physician, offering evidence that an EMR-based BPA may be effective at reducing unnecessary lab tests. Next steps include developing an automated BPA and randomizing its use to test the efficacy.

14. Safety Culture at Stanford: Improving physician utilization of an adverse event reporting system
Sara Bakhatary MD1, David Guo MD2, Jessie Kittle MD1, Ryan Ribeira MD3, Michael Tchou MD1, Lisa Sheih MD1
Resident Safety Council, Department of Medicine1, Department of Surgery2, Department of Pediatrics3, Department of Pathology4
Purpose: Medical errors in the hospital setting are widespread and devastating. The Stanford adverse event reporting system, SAFE, helps drive quality initiatives around the hospital, but is underutilized by physicians. The Safety Culture committee was established to determine the barriers to, and improve, physician utilization of the SAFE reporting system.
Methods: Data from the current SAFE system were analyzed to determine the current level of physician engagement. Barriers to physician utilization of the SAFE system were elucidated using an anonymous survey. A new online SAFE interface was built that addresses some common barriers to use, with an educational campaign to introduce the new system. A physician committee is being assembled to triage reports to the correct department. Finally, data will be collected regarding the physician utilization of the new SAFE reporting system.
Results: Physician reports account for about 15% of all adverse events reported through the current SAFE system. Based on survey data from 90 physicians, fewer than 1/3 had ever filed a SAFE report but >90% believed they had witnessed a medical error. Common barriers to reporting include paperwork burden, uncertainty regarding the handling of reports once they are filed, and difficulty finding the link.
Conclusions: Our interventions on the SAFE report system include building a new, user-friendly online interface, advertising the new program extensively to raise awareness, and creating a physician panel to review the reports. Our hope is to double physician reporting of adverse events, but the ultimate impact is yet to be seen.

15. Improving consultations: a pilot study of a brief consult note to standardize emergency room and consultant communication
Danielle Goodrich, MD*, Kristin Brandt, MD, Maria Ortega, MD, Andrea Smeraglio, MD, Sanaa Suharwardy, MD, Greg Wallingford, MD, Linda W Xu, MD, Sam Shen, MD
Residency Safety Council, Division of Emergency Medicine, Department of Internal Medicine, Department of Obstetrics and Gynecology, Department of Neurosurgery
Purpose: Consultations are prevalent but variations in the emergency department and consulting services leads to unmet expectations, frustrations and delays in patient care. We hypothesized that standardizing the emergency department consult process through “quick note” templates could improve communication between services and increase satisfaction in the consult process.
Methods: The consult team developed an emergency room “quick consult note” template in Epic to facilitate preliminary recommendations by the consulting service. This note was piloted with the Neurology service, the most consulted team in the emergency department. A designated computer on wheels was placed in the emergency department to allow real time placement of quick consult notes. Charts were reviewed to monitor percent usage of the note by the Neurology. Qualitative surveys were also conducted with residents from Neurology and from other services to review the consult process as a whole.
Results: Quick consult notes were piloted for four months with the Neurology team. Based on interviews and surveys, consultants responded well to the improved computer access in the emergency department but felt the “quick note” did not replace verbal communication to emergency department staff and added extra work on the consultant. Based on these results, trial of the note was stopped in April 2015.
Conclusions: The brief consult note was not able to replace verbal communication regarding recommendations and was not greatly utilized. Our next steps are to expand our initial data collection to produce a summary of each service’s consult load to reward efficiency and highlight any areas that need improvement.

16. Implementing a Quality Improvement Program for Residents in an Anesthesiology Department
Clair Secomb* MD, Lena Scotto MD, Ruth Fanning MD
Department of Anesthesia, Perioperative, and Pain Medicine
Purpose: ACGME requirements include resident participation in quality improvement (QI) as part of the core competencies. In addition, the ACGME’s Clinical Learning Environment Review Program examines six areas of an institution’s educational environment, including Patient Safety and Quality Improvement. In the Stanford Anesthesia residency program, all residents indirectly participate in broad QI initiatives. However, not all residents are directly involved in QI projects. We set out to develop a program to involve all PGY-3 anesthesia residents in interdisciplinary QI projects in accordance with ACGME milestones.
Methods: Beginning in November, the department designated monthly one-hour meetings to the PGY-3 class QI Program. The initial meetings focused on choosing projects using the Delphi Method, splitting into groups, and designating leaders. Subsequent meetings focused on A3 form completion, project implementation and impact evaluation with guidance from faculty with a background in QI. Emphasis was placed on involving hospital-wide stakeholders to drive the projects forward and developing communication and leadership skills.
Results: Four PGY-3 QI projects are currently underway and in various stages of development, including background gathering under IRB exclusion, data evaluation, and discussion with key stakeholders.
Discussion: The PGY-3 anesthesia cohort developed four QI projects, facilitated by experienced faculty. By allowing residents to design their own projects, topics reflect the concerns of those on the front line of patient care. Residents are getting hands-on training in writing A3 forms and implementing change. Challenges faced include incomplete buy-in from stakeholders, need for more protected time, and difficulty coordinating with other disciplines.
dataset was narrowed to the core rotations during intern year of one residency class.

**Results:** A total of 20,280 notes and 112,214 orders were written by 26 pediatric interns between June 2012 and June 2013. The average number of notes written was 780 (range 595 to 945) with a standard deviation of 80. The average number of orders was 4,316 (range 1,776 to 6,004) with a standard deviation of 1,057.

On average, the black cloud residents – defined as those with number of notes and orders in the top quartile – wrote 19% more notes and 91% more orders than the “white cloud” residents in the bottom quartile.

**Conclusions:** There exist significant variations in workload between pediatric residents at Stanford Children’s Health. Disproportionate resident workload may contribute to heterogeneous opportunities for resident education, physician wellness, and quality of patient care.

18. **Assessment of Anti-Infective Utilization at Stanford Hospital**
Maria Birukova, Elena Mancini, Sam Roosz, Stefanie Seisenberger Glenn, Aslıhan Selimbeyoglu, Brannon Weeks, Elizabeth Zambricki**
Division of Infectious Diseases, Department of Medicine

**Objective:** In 2014, Stanford General Medicine ranked 78th of 98 University Health Care (UHC) hospitals in antimicrobial costs per patient, with costs almost 3x the mean cost per patient for UHC hospitals. Our objective was to analyze UHC data to identify areas and anti-infectives that represent opportunities for savings and compare Stanford antifungal utilization to that of peer hospitals with equivalent outcomes and lower costs.

**Study Design:** Quantitative Data analysis comparing Stanford Antibiotic use to other peer UHC health systems

**Methods:** Top spending Stanford Diagnosis Related Groups (DRGs) were identified and selected based on the total potential cost savings. Total cost savings was calculated by estimating the Stanford mean cost per case minus the UHC mean cost/case times the number cases at Stanford. After uncovering the top 12 DRGs, physicians within that diagnosis group were interviewed to get a better understanding of the practices in high-spending groups.

**Results:** The 12 DRGs prioritized for analysis collectively represent an opportunity for $1.6M in annual cost savings compared to the UHC mean. Top DRGs included acute leukemia, ECMO, heart transplant, otitis media and URI, infectious and parasitic disease, liver transplant, ventilator support, allogeneic BMT, liver disorders, autologous BMT, pancreas/liver procedures and upper GI procedures. Anti-infectives that represented the most high cost divergence from other UHC systems were caspofungin, ribavirin, amphotericin B.

**Conclusion:** Utilization of anti-fungals and ribavirin are significant outliers at Stanford relative to peer hospitals. Additionally, Stanford prescribes each prioritized agent in a significantly greater proportion of cases than does its peers.

19. **Improving the Quality of Mammographic Positioning to Detect Breast Cancer**
Christina Chen*, Audrey Strain, Jake Mickelsen, David Larson, Robert Jesinger, Daniele Botelho, Sandra Fromholz, Chrysalis Obi, Alexis Crawley, Jafi Lipson, Debra Ikeda, Claudia Cooper, Sunita Pal
Breast Imaging and Mammography at Stanford Hospital

**Purpose:** High quality screening mammograms are essential for radiologists to detect breast cancer. The American College of Radiology (ACR) outlines 13 criteria of breast positioning to optimize mammograms. Our goal is to increase the percentage of Stanford screening mammograms achieving the ACR criteria from a mean of 65% in 2013 to 90% by June 2015.

**Methods:** The Radiology Improvement Team Education course sponsored this project. Team members identified causes that barred achieving the ACR criteria, such as disagreement on what met ACR criteria, not having a standard work to acquire and read mammograms, and lack of communication between technologists and radiologists. From the time period of July 2014 to March 2015, over 1,700 mammograms were audited.

**Results:** Developments to address the causes included: teaching modules on what meets ACR criteria, standard work for radiologists to recall mammograms that did not meet ACR criteria, system for the technologist to document why criteria were missed, auditing system to track performance, and feedback sessions between technologists and radiologists. By March 2015, 10 of the 13 ACR criteria were being met by the target goal of 90% of mammograms.

**Conclusion:** The most recent quality improvement publication on breast positioning dates to 1993. To our knowledge, Stanford is the first breast imaging department to proceed in a structured way to meet the ACR positioning criteria. Sustainment plans include hiring a mentor to provide real-time feedback, scheduling sessions of radiologists and technologists to review ACR criteria, and automating feedback to technologists.

20. **The Impact of Health Outcomes Information Registries on Future Graduate Medical Education**
Neil Ray MD*, Jordan Newmark, MD, Ming-Chih Kao, MD, Sean Mackey, MD
Division of Pain Medicine, Department of Anesthesiology

**Purpose:** The improvement of graduate medical education and patient quality of care remains a constant and continual goal. As large health data registries develop, one new method of advancing both goals involves using patient outcomes information. Our goals are to describe the development and design of our collaborative health outcomes information registry (CHOIR) and determine whether it allows for trainees to meet high-level 4 and 5 ACGME patient safety and quality improvement competencies.

**Methods:** We anonymously surveyed existing trainees on whether they feel the use CHOIR, allows them to meet high-level 4 and 5 ACGME patient safety and quality improvement competency goals. Level 4 and 5 milestones being that trainees identify opportunities in the care of patients to improve patient outcomes and define outcome measures leading to quality improvement projects.

**Results:** CHOIR is a robust computer adaptive testing survey system that is used to electronically survey and track patients on valuable clinically relevant pain-related outcomes such as depression, anxiety, anger, etc. The system also assesses and computes scores to standardize the biopsychosocial data collected. In addition, aggregate data is used to study overall trends and associations. We found, trainees agreed or strongly agreed that CHOIR increases patient quality of care, decision-making, and supports aggregate research efforts.

**Conclusion:** Simply using CHOIR enables trainees to meet high-level 4 and 5 ACGME patient safety and quality improvement competency goals. Increased use of health registries, like ours, will play an integral role in improving both future graduate medical education and patient quality of care.

21. **Obtaining complete, pertinent clinical histories for radiographic examinations, a pilot project.**
Benjamin Johnson*, Angela Fast, Anita Angelotti, Jake Mickelsen, Geoffrey Riley, David Larson
Department of Radiology
**Purpose:** To improve the completeness and quality of the clinical histories which provide the context in which radiologists interpret radiographic studies.

**Methods:** From November 2014 through March 2015, this project was piloted at the Blake Wilbur outpatient site. Prior to implementation, a team of radiologists and technologists defined what constituted an adequate and appropriate clinical history. This definition includes “what” an order provider is looking for, “when” the symptoms began, and “where” specifically are the symptoms located. Prior to implementation, technologists at this site were educated about appropriate clinical histories and briefly trained on how to obtain them prior to completing an examination. In the months prior to and following implementation, radiology residents audited both the ordering provider clinical history and technologist obtained clinical history for each examination performed at the Blake Wilbur site.

**Results:** At the Blake Wilbur outpatient radiography site, complete clinical histories were only present for 5-15% of studies audited in the month immediately preceding implementation of the quality improvement project described above. Upon implementation of technologist acquired clinical histories during examinations, this improved gradually over time, and for the last 4 weeks of the project ranged from 92-98%.

**Conclusions:** Appropriate and complete clinical histories provide key context for radiologic interpretation of radiographic studies. Unfortunately, due to multiple factors, more often than not radiologists are not provided with adequate clinical histories from ordering providers. As a department, we are able to significantly improve the quality and consistency of clinical histories by obtaining them directly from patients at the time of examination.

**22. Root Cause Analysis of Internal Medicine Hospital Readmissions within 30 Days**

Andrea Smeraglio, MD1*, Gomathi Krishnan PhD2; Jonathan Chen, MD1, Daniel Croyman3, Trisha Narula4, Lisa Sheih, MD1

1 Department of Internal Medicine, Stanford University School of Medicine, Stanford, California, USA

2 Clinical and Translational Research Department of Internal Medicine

**Purpose:** This project focused on determining the underlying systems issues that lead to hospital readmissions from the internal medicine service at Stanford Hospital. We compiled information from chart reviews and patient based interviews to fully elucidate the reasons behind hospital readmissions.

**Methods:** We used STRIDE data in combination with manual chart reviews to evaluate risk factors and predictors for hospital readmission within 30 days after discharge from the Stanford Internal Medicine service. Accuracy of STRIDE data was confirmed using random chart biopsy. Patient interviews were conducted over the phone by medical students within 3 months of hospital discharge.

**Results:** Preliminary results based on the initial 15 manual chart biopsies and patient interviews indicate that risk factors for hospital readmission included multiple medical comorbidities, complex social situations, lack of RN education at time of discharge, lack of discharge follow-up call by RN, lack of consult to discharge pharmacy.

**Conclusions:** Multiple avenues can be addressed to decrease hospital readmissions on the internal medicine service. Further data collection is planned to obtain a larger sample with the addition of STRIDE data for a larger sample size.

**23. Building a Clinical Effectiveness Program at LPCH: Establishing a Prototype Clinical Pathway**

Claudia A. Algaze*, Catherine D. Krawczeski, Andrew Y. Shin, Chelsea Nather, Chandra Ramamoorthy, Komal Kamra, Alaina Kipps, Vamsi Yarlagadda, Marcy Lamonica, Monica Mafra, Kriisa Elgin, Juanita Hickman, Tanushree Vashist, Paul Sharek

Department: Pediatrics, Division: Cardiology and the Center for Quality and Clinical Effectiveness at LPCH

**Purpose:** Clinical pathways, by reducing unnecessary variation, can improve patient outcomes and efficiency. We lack a reliable method to develop, implement, monitor, and improve clinical pathways. Without this methodology, our impact and sustainability is limited. By implementing and testing a prototype clinical pathway, we are identifying factors associated with a successful Clinical Effectiveness (CE) program and using these lessons to deploy a hospital-wide CE program at LPCH Stanford.

**Methods:** The model includes selection of a prototype population, building of a multidisciplinary team, clinical pathway build and deployment, development of analytic support and scalability. The postoperative management of tetralogy of Fallot was selected as the area of clinical focus. An evidence-based clinical pathway was developed from rigorous review of current literature and best practices. We widely socialized the pathway to practitioners, nurses, and other allied health workers. As we conduct a paper-based pilot, we are concurrently developing implementation tools (order sets, electronic medical record-based decision support tools, and monitoring tools for real-time data extraction and analysis to evaluate our improvement through process and outcomes metrics. Primary outcome measures include postoperative length of stay (LOS), cardiovascular intensive care unit (CVICU) LOS, duration of mechanical ventilation and resource utilization. Secondary outcome measures include patient/family and provider satisfaction. Process measures include compliance to pathway enrollment and completion. Balancing measures include incidence of reintubation, readmission to CVICU and related readmission to hospital.

**Results:** There has been a reduction in LOS, CVICU and duration of mechanical ventilation after implementation of the TOF clinical pathway.

**24. Pediatric Anesthesia Critical Incident Reporting: Understanding Motivators and Barriers to Anesthesiologists’ Use of an Intra-Operative Self-Reporting System**

*Matthew Muffy, Tom Caruso, Jumbo Williams

Department of Anesthesia, Perioperative and Pain Medicine; Division of Pediatric Anesthesia

**Background:** Obtaining reliable data related to critical incidents is important in identifying and planning quality and safety initiatives. A critical incident reporting tool is embedded in our intraoperative charting system; however, attending physician frequency of reporting by percentage of cases varies (0-12%). To understand this variation, we characterized the motivators and barriers to reporting anesthesia-related critical incidents.

**Methods:** We conducted interviews with pediatric anesthesiology faculty to describe motivators and barriers to self-reporting. We then tested respondents’ knowledge of reporting definitions and assessed variation in reporting thresholds with three clinical vignettes.

**Results:** Twenty-eight (76%) faculty participated, the majority (74%) of whom agreed that reporting was useful, yet most (59%) agreed that more training was needed to clarify reporting definitions. Only 28% correctly identified all three clinical vignettes as reportable in accordance with established definitions; of those, only three (11%) would actually report all three incidents within the current system.
Motivators to reporting included: the ability to identify systems issues, improve patient safety, increase faculty education, and duty. Barriers included: lack of sufficient feedback, concern about punitive repercussions, forgetfulness, and variation in individual reporting thresholds.

**Conclusion:** These semi-structured interviews allowed us to identify motivators and barriers to anesthesiologist critical-incident self-reporting. While the majority of anesthesiologists agree that the system is useful, barriers to reporting critical incidents exist and may account for reporting variation. We plan to address these barriers through a combination of educational initiatives, improved feedback and increased transparency related to the critical incident reporting process.

### 25. Alendronate as treatment for Osteonecrosis of the Femoral Head in Sickle Cell Disease
Oyebimpe Adesina*, Michael Jeng, Carolyn Hoppe and Jason Gotlib
Divisions of Hematology and Oncology, Department of Medicine

**Purpose:** Sickle cell disease (SCD) is the most common disorder of hemoglobin in the world, affecting up to 100,000 people in the United States, and millions more in developing countries. SCD is the most common cause of osteonecrosis of the femoral head (ONFH) in childhood, and affects up to 50% of adults with homozygous SCD. There is no standard of care for the treatment of SCD-related ONFH. Bisphosphonates have shown efficacy in the management of steroid-induced and idiopathic ONFH, but have never been studied in SCD patients with ONFH.

**Methods:** We propose a randomized, double-blinded, placebo-controlled prospective clinical trial of alendronate in SCD patients, ages ≥ 12 years, with radiographic evidence of early stage ONFH. We will also measure levels of plasma microparticles (MP), membrane-bound vesicles, which have been implicated in the pathogenesis of SCD-related ONFH.

**Results:** The primary endpoint is a ≥15-point improvement on the Children’s Hospital Oakland Hip Evaluation Scale (CHOHES) score, a validated tool that measures hip pain and function in SCD patients with ONFH. Preliminary studies from Children’s Hospital in Oakland showed statistically significantly higher total MP levels in a cohort of SCD patients with ONFH, compared to age-matched SCD controls. We hypothesize that MP levels can predict early onset ONFH in SCD patients, and can be used to monitor response to bisphosphonate therapy.

**Conclusion:** Advances in early diagnosis and effective non-surgical treatment of ONFH in SCD will address significant unmet clinical needs in this vulnerable patient population, and help to improve their quality of life.

### 26. Improving Goals of Care Documentation for DNR patients
Molly Kantor*, Lance Downing, David Wang, Daniel Fang, Robert Fairchild, Yi-Ren Chen, Teng Lu, Sara Stern-Nezar, Stephanie Harman, Stephanie Bowen, Paul Maggio
Resident Safety Council: Internal medicine, Neurosurgery, Emergency Medicine, Neurology, General surgery

**Purpose:** We aimed to improve communication of goals of care for inpatients. Only 41% of inpatients with do-not-resuscitate (DNR) code status, including all patients with code status orders of “do-not-resuscitate/do-not-intubate,” “do-not-resuscitate/comfort measures only,” “do-not-resuscitate/do-not-escalate,” and “partial code,” had goals of care documented in designated “Goals of Care” (GOC) notes. We sought to improve rates of use of GOC notes for patients with DNR code statuses to 80%.

**Methods/Results:** To better understand the problem, we performed standard interviews of residents in internal medicine, neurology, neurosurgery, hematology, oncology, and medical, surgical, and cardiac intensive care. From this, we created a root cause analysis and identified a that a key root cause was lack of standard work, including lack of clarity about responsibility for writing a note, forgetting to write the note, and finding the GOC note template too cumbersome. We then developed standard work that identified the team resident as responsible for ensuring a GOC note was written for all patients with DNR code statuses, with the attending physician responsible for co-signing these notes. We simplified the GOC note template. We are in the process of disseminating these changes in standard work via an educational campaign to residents. Finally, we plan to use the electronic medical record to help residents remember to place goals of care notes through a Best Practice Alert. This will be a non-interruptive reminder that appears if a patient has a DNR code status but no GOC note for the current inpatient encounter; this is still being finalized. After this is in place, we will monitor whether rates of GOC notes for DNR patients improve to our set goal.

**Conclusions:** As frontline workers, residents are a key resource for identifying quality improvement problems and their underlying causes. Many patients with DNR code statuses lack GOC notes, and we aim to improve this via setting standard work.

### 27. Improving Pathology Curriculum for Nephrology Fellows
Enrica Fung, MD, MPH*; Orlando Camacho, MD; Michelle O’Shaughnnessy, MB Bch MRCP; Ade A. Taiwo, MD; M. Gabriela Velez, MD, PhD., Timothy W. Meyer, MD, Neeraja Kambham, MD.
Division of Nephrology, Department of Medicine

**Purpose:** Fellows were previously exposed to renal pathology through attendance at monthly hour-long “biopsy conferences” where faculty and fellows discussed difficult cases; and informal quarterly “fellows-only conferences” where fellows asked pathologists questions on core topics. Our project sought to improve fellows’ education in renal pathology.

**Methods:** Two renal pathologists led an orderly review on the following topics, dedicated to fellows only: 1. Common renal pathology; 2. Primary glomerulonephritis; 3. Secondary glomerulonephritis; 4. Plasma cell dyscrasia-related renal disease; 5. Renal transplant pathology. Second year fellows helped in preparation of teaching material and fellows were encouraged to ask questions.

Participants completed a survey measuring their level of satisfaction with renal pathology teaching and their confidence in interpreting renal biopsy findings before and after completion of this teaching series. Five 10-question pre-sessional quizzes and a comprehensive 50-question post-session final measured knowledge acquisition.

**Results:** Eleven of twelve 1st–3rd year fellows responded to the pre-course survey. Five fellows felt “somewhat dissatisfied” with the current training, while six felt “somewhat satisfied” or “satisfied” with the current training. Ten respondents reported being “not confident at all” or “somewhat lacking in confidence” in their abilities to interpret biopsy findings, while one reported being “somewhat confident”, prior to our project. To date, fellows answered 63% questions correctly on the knowledge-based pre-sessional quizzes.

**Conclusions:** Survey of nephrology fellows suggested poor confidence in interpreting renal pathology despite perceived importance of the topic. Survey and testing to be completed May 2015 would reveal whether our project improved confidence and knowledge.

### 28. Covert Observations, Auditing, and Videos: A Multi-faceted Approach to Improving Hand Hygiene Adherence at LPCH.
Kaitlyn Phuong Le, MD*, Lauren Destino, MD, Dianne Laumann, RN, MBA, PMP, Terry Platcok, MD, and Amit Singh, MD.
Department of Pediatrics, Division of Pediatric Hospital Medicine; Center for Quality & Clinical Effectiveness

**Purpose:** Improvement of hand hygiene (HH) adherence has been associated with a decrease in healthcare associated infections (HAI). At LPCH, prior to April 2013, the state of HH adherence was not well known. Our aim was to improve and sustain HH adherence from 84% to >90% by December 2014 on the acute care wards.

**Methods:** We addressed HH adherence using Lean improvement tools from April 2013–December 2014. In April 2013, we improved our understanding of HH adherence through paper audits of patient-care roles. In August 2013, we incorporated HH audits into standard work in all acute care units. In March 2014, medical students covertly observed physician adherence. Additionally, audit cards were redesigned to track barriers. Starting in July 2014, we focused on education using screen savers, resident teaching, videos, and promotion of Infection Prevention Week.

**Results:** From April-August 2013, baseline HH audits revealed 85% HH adherence across all staff and 67% across physicians. Following an increase in HH audits in the second PDSA, adherence improved to 94% and 85%, respectively. The top three barriers were forgetting, lack of knowledge, and hands being full. The education campaign resulted in sustaining HH adherence. During the period of active PDSA cycles targeted at HH, LPCH had no decreases in CLABSiSs.

**Conclusions:** An increase in HH audits was associated with improved HH adherence, which was sustained with continued education. Despite an improvement in HH adherence, the rate of CLABSiS did not decrease. Current efforts are now targeted at “just-in-time” education and reminders.

31. A Quality Improvement Project to Reduce Continuous Pulse Oximetry Use in Pediatric Inpatients with Bronchiolitis

Nivedita Srinivas, MD*; Jody Lin, MD; Yvette Keers-Moraga, RN; Jennifer Everhart, MD

Department of Pediatrics

**Purpose:** The 2014 AAP bronchiolitis guidelines recommend against routine continuous pulse oximetry (CPO) use in children admitted with bronchiolitis. Unnecessary CPO use is associated with alarm fatigue, prolonged hospitalization, and increased healthcare costs. We sought to reduce overall CPO use in children with bronchiolitis admitted to Packard El Camino (PEC) during the 2014-2015 respiratory virus season by 30% compared to the previous season.

**Methods:** We utilized an A3 problem-solving methodology. We first sent confidential surveys to PEC MDs and RNs to identify barriers to reducing CPO use. Identified barriers included a lack of awareness of the implications of overusing CPO as well as poor consensus about which patients with bronchiolitis require CPO upon admission. Next, an educational campaign aimed at PEC MDs and RNs reinforced the appropriate use of CPO and the consequences of overuse. Lastly, we changed the existing workflow of providers at PEC to include: 1) admission and progress note templates for MDs incorporating a daily prompt to check whether CPO use was warranted for a given patient and 2) nursing audits to ensure concordance between the level of monitoring ordered and the level actually received.

**Results:** Based on preliminary data analysis, overall CPO use decreased from 87% (n = 57) to 61% (n = 18) between the 2013-2014 and 2014-2015 respiratory virus seasons, respectively. Appropriate CPO use increased from 45% to 83% during the same time period.

**Conclusions:** Unnecessary continuous pulse oximetry use in patients with bronchiolitis can be reduced effectively using clinical quality improvement methodologies.
Conclusions: Pending May 13 meeting a consensus statement will be and disseminated among physicians and trainees involved in SCVMC endocrinology clinics.

33. Prevention of Perioperative Hypothermia in Patients Undergoing Total Hip Arthroplasty Surgery
Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine
Background: Perioperative hypothermia (defined as temperature less than 36 degrees Celsius) is associated with an increased incidence of bleeding, sepsis, myocardial infarction, and mortality. The World Health Organization sets a standard for maintaining a patient’s temperature >36 degrees in the perioperative period. Quality indicators created by the Centers for Medicare and Medicaid Services, the Joint Commission, and the Agency for Healthcare Research and Quality measure our success in maintaining normothermia, through the Surgical Care Improvement Program (SCIP). Perioperative normothermia is maintained in the majority of patients in the Stanford OR suite, however, certain patient subgroups have a higher incidence of post-operative hypothermia.

Preliminary survey: Data on first post-operative Post Anesthesia Care Unit (PACU) temperature was compiled from a de-identified Epic database. Our review showed that over 25% of patients undergoing total hip arthroplasty were hypothermic upon arrival to the PACU as compared to less than 10% hypothermia in other surgical populations.

Intervention: We propose placement of a Bair hugger prior to induction, standardization of temperature measurements intraoperatively with a bladder temperature probe, and warming the OR if temperature of 36 Celsius is not reached.

Measures: Our hypothesis is that there will be a statistically significant decrease in the incidence of hypothermia post-intervention. Using the known incidence of postoperative hypothermia - 21-30% - and our goal of reducing to 5%, a power of 80%, and a confidence level of 95%, we will need a sample size of 47 to demonstrate a statistically significant decrease in hypothermia.

34. Improved Cycle Times in a Resident Continuity Clinic: A Resident Led Process Improvement Project
Taylor Louden MD*, Lauren Destino MD, Elizabeth Stuart MD, Lahia Yemane MD
Department of Pediatrics
Background: At Gardner Packard Children’s Health Center, a resident continuity clinic, patients were experiencing very long clinic visits for acute and well child care leading to patient and provider dissatisfaction. Average clinic visit time was 1 hour and 33 minutes across all visits and 1 hour and 42 minutes for scheduled well child visits in November of 2013.

Purpose: Decrease cycle times and overall appointment times by 30 minutes using a standardized patient flow model to limit variability.

Methods: A multidisciplinary team led by a pediatric resident using an A3 Quality Improvement tool of Lean Methodology identified specific barriers to improved clinic flow. The wide variability of clinic attending and resident providers, which led to great variability of clinic flow, was chosen as the target for improving. Using an innovative tool of patient passports, staff members recorded start and end times at each stage of a clinic visit. This process allowed for the tracking of times through each stage of the clinic visit as well as wait times between stages. Initial data was collected in November of 2013. After analyzing different clinic flows at multiple sites within the Lucile Packard Children’s Hospital Stanford system a standardized process was chosen. Posters displaying the new flow and team huddles before the start of clinic were implemented to train staff and providers. Timers were also implemented on patient rooms to prompt residents of time. The first PDSA cycle was delayed until February of 2015 due to unexpected clinic management change. Post implementation data was collected over 1 week using patient passport method.

Results: After the intervention, total visit time was 65 minutes and time from vitals to end of visit was 53 minutes. This was a 37 minutes or a 36% decrease in total visit time and a 23 minutes or 30% reduction in time from vitals to end of visit. This was a statistically significant difference using a p-value of less than 0.0001.

Conclusion: There was a significant decrease in overall visit time and cycle times after implementation of standardized flow. In a multi-provider clinic, standardized clinic flow is important to improve cycle times. Provider and clinic staff participation were key to implementation of the standardized flow.

35. Training primary care providers in rural Guatemala on employing evidence-based methods in alcohol screening and intervention
Yedida Rissman*, Shani Isaac*, Alejandro Paiz, Christina Khan Stanford Hospital and Clinics Psychiatry Residency Training Program; ALAS Pro Salud Mental

Purpose: To collect baseline data regarding the prevalence of harmful alcohol use amongst patients at a busy primary care clinic in rural Guatemala. To provide training on screening and brief intervention according to evidence-based practices to primary care physicians (PCPs) at this clinic.

Methods: The Centro de Atencion Permanente is the main federally funded primary care clinic in Santiago Atitlan, a town of 48,419 in the Western Highlands of Guatemala. This clinic is staffed by six PCPs and serves approximately 1,400 patients per month. To better understand physicians’ beliefs and practices concerning harmful alcohol use, we asked them to complete an anonymous survey that assessed current screening practices, whether physicians feel adequately trained to screen and treat harmful alcohol use, perceived barriers to screening and treatment, and whether there is a perceived need for a more structured way of addressing alcohol use.

We then held a training session using the Screening, Brief Intervention and Referral to Treatment (SBIRT) model. SBIRT is an evidence-based method for addressing alcohol use in the primary care setting that is recommended by WHO for use internationally.

Two weeks after the training a second survey was issued to assess the efficacy of this QI project. Efficacy will be evaluated in terms of changes in physicians’ perceptions and practices concerning alcohol screening and intervention.

Results/Conclusions: In Progress. 6/6 CAP physicians filled out a pre-training questionnaire. In general, practitioners tend to screen informally and only screen some patients (typically those who are already showing signs and symptoms of risky use). Limited time, limited resources for treatment and other health problems taking priority were common barriers to screening.

36. The Golden Ticket Project: A Pilot Program in Resident Peer Recognition
Valerie Gribben, MD*, Laura Bachrach, MD, Alyssa Bogetz, MSW, Rebecca Blankenburg, MD, MPH
Department of Pediatrics
Stanford Quality Improvement/Patient Safety Symposium 2015

**Purpose:** A supportive working environment has been shown to be a protective factor against the corrosive effects of residency. However, there are few published interventions on how to foster this supportive environment. The Golden Ticket Project (GTP) is a novel wellness pilot program that encourages peer recognition within a pediatric residency program.

The purpose of this pilot was two-fold: (1) To evaluate the feasibility of the GTP and (2) To characterize the qualities residents appreciate about each other across all levels of residency training, as revealed through participation in the GTP.

**Methods:** All residents were eligible to participate in the GTP. Participating residents nominate a co-resident for any behavior they perceived as going “above and beyond”. Nominations could be made through an online form during the pilot period (October 2013-July 2014). Golden ticket recipients were offered a token prize every month, and the reasons for the nominations were posted near the residency lounge. As part of an IRB-exempt study, two reviewers independently analyzed each nomination to code for emerging themes; a consensus on core themes was reached. In August 2014, an anonymous Likert survey was distributed to all residents to assess their attitudes about the GTP.

**Results:** A total of 50/83 (60%) residents gave or received golden tickets. 56 tickets were given representing 63 codes) during the 10-month pilot period. Golden ticket nominations represented five major themes: Positive Attitude, Teamwork, Patient Care, Resident-Resident Support, and Strong Supervisory Skills. Across all classes, the most recognized theme was Teamwork, noted in 44% of awarded tickets. PGY2 and PGY3s gave golden tickets proportionately more for Patient Care than PGY1s. According to the residents who participated in the post-pilot survey, residents on average agreed that because of the GTP, they were “more aware of acts of kindness in the residency program.” 76% of survey participants indicated they wanted the program to continue.

**Conclusion:** The GTP is a feasible wellness program, valued by participating residents. The GTP offers a needed venue for residents to recognize teamwork and other positive attributes of their co-residents. The program can be implemented at other institutions and may serve as a framework for robust wellness interventions.

**37. Utility of Focused Re-screening of Liquid-based Papanicolaou Tests Diagnosed as Negative for Intraepithelial Lesion/Malignancy with Positive High-Risk HPV in an Academic Tertiary Care Center:**

**Comparison with Follow-up Cytology/Biopsy**

Adam J. Gomez*, MD, Thuy Penedo, MD, Tala Lo-Guyamatayo, CT, Harumi Lim, CT, Steven R. Long, MD, Christina S. Kong, MD

**Division of Cytopathology, Department of Pathology**

**Purpose:** Recent studies have supported focused re-screening of Pap tests that are interpreted as negative for intraepithelial lesion or malignancy (NILM) but positive for high-risk HPV DNA by co-testing. While the percentage of women who fall into this category is reported to range from 3.6% to 5.4%, the increased risk of squamous dysplasia in these patients may impact screening guidelines and triage to colposcopy. In this study, we examine the impact of focused re-screening for this population at our institution.

**Methods:** A search for Pap tests with HPV co-testing from January to March 2013 yielded 753 cases, and 45 (5.97%) were NILM/HPV+. 44/45 of these cases were available for re-screening by two cytotechnologists, with further review by two board certified cytopathologists. Follow-up Pap test and biopsy findings were obtained from the pathology information system.

**Results:** 37/44 (84.1%) cases were interpreted as NILM on re-screen, and 1 of these had evidence of dysplasia (HSIL) on follow-up biopsy. 7/44 (15.9%) cases were upgraded to atypical (ASCUS or ASC-H) on re-screen, and 3 of these had evidence of dysplasia (2 LSIL, 1 HSIL) on follow-up Pap or biopsy.

**Conclusions:** HPV screening is more sensitive than Pap, resulting in the detection of HSIL in a patient with a confirmed negative Pap test (1/44). Re-screening of NILM/HPV+ Pap tests could have led to earlier detection of HSIL in 2.3% (1/44) of cases. Inherent bias from re-screening HPV+ negative Pap tests may lead to overcalls of atypical squamous cells (ASCUS or ASC-H).

**38. Stress Ulcer Prophylaxis: Clinical Guideline Implementation in the Intensive Care Unit**

Cody A. Parsons, PharmD*, Critical Care Resident; Hangyul Chung-Esaki, MD, Critical Care Fellow; Nicholas Berte, RN, BSN, Critical Care Nurse Department of Pharmacy

**Purpose:** Stress ulcer prophylaxis (SUP) decreases the incidence of gastrointestinal bleeding (GIB) in patients receiving mechanical ventilation or those with coagulopathy. However, its widespread use is associated with increased rates of Clostridium difficile colitis infections and nosocomial pneumonia without decreased GIB rates in low risk patients. 2,3,4,5 A survey of the intensive care units (ICUs) at Stanford in 2012 by Wong et al revealed that approximately 28% of patients inappropriately received SUP. By establishing an evidence-based clinical practice guideline with real-time feedback to clinicians, we seek to reduce the rate of inappropriate SUP in ICU patients, and consequently reduce the risk of C. difficile infection and nosocomial pneumonia.

**Methods:** We conducted a review of the literature to establish an evidence-based clinical practice guideline in conjunction with the ASHP national guidelines, and created a Pharmacy-driven protocol to monitor and regulate the use of SUP in the ICU. Per the protocol, Pharmacy staff will prospectively evaluate active orders on every Monday, Wednesday, and Friday and discontinue inappropriate SUP orders. The protocol was approved by the ICU CQI committee, and implemented on April 1, 2015 after initial education and dissemination of the guidelines to clinicians. Cumulative rates of inappropriate SUP, as well as secondary outcomes such as rates of GIB, C. difficile infection, and nosocomial pneumonia will be monitored from April through June 2015 and compared with baseline data from April through June 2014.

**Results and Conclusions:** This project is currently active with pending data.

**References:**

39. Development of a Standardized Pre-anesthesia Pregnancy Screening Protocol

Erin Crawford*, Chris Clave, Lindsay Borg, Jessie Ansari, Lindsey Bergman, Victoria Fahrenbach, Tyler King, Thomas Caruso
Department of Anesthesiology, Perioperative and Pain Medicine

**Purpose:**
Through the development of a standardized pregnancy screening protocol, we aim to eliminate administration of anesthesia to patients with an undetected pregnancy.

**Methods:**

- Education and Implementation (June 1 – July 15, 2015): Gap analysis followed by education of staff on new process to optimize pregnancy screening.
- Post Intervention audit (July 15 – September 1, 2015): Review intervention compliance and examine percentage of patients who receive appropriate screening.

**Study Population**
Randomly selected medical records of 210 females ages 11-55 having surgery in the Stanford Main Operating Rooms or Ambulatory Surgery Center were searched for a serum or urine pregnancy test on day of surgery or within one week prior. Patients were exempt from testing if the patient was offered and declined a pregnancy test, last menstrual period occurred within 21 days prior to surgery, or the patient had a history of hysterectomy, bilateral oophorectomy, or bilateral tubal ligation.

**Data Analysis:** Two sample t-tests will be used to examine the differences in the percentage of women who receive pregnancy screening after the intervention.

**Results:** Data collection and analysis is ongoing. Preliminary data reveals a significant proportion of female patients of childbearing age not receiving a pregnancy test prior to surgery, without a documented exemption.

**Conclusions:** This task force will work to develop a standardized approach to pregnancy testing to improve compliance with nationally accepted standards of care.

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40. Reducing functional MRI scan times by optimizing workflow

Wilson B. Chwang*, Michael Iv, Darryl Costales, Jason Smith, Teresa Nelson, Aleksandr Kalnins, Jake Mickelsen, Roland Bammer, Dominik Fleischmann, David B. Larson, Max Wintermark, and Michael Zeineh Department of Radiology

**Purpose:** Functional MRI (fMRI) is a specialized examination requiring coordinated efforts of the entire health care team. We observed that in our practice, fMRI scan times were lengthy. Our purpose was to reduce fMRI scan times by increasing workflow efficiency.

**Methods:** We reviewed all fMRI exams performed from January 2013 to April 2015. We plotted the scan times on a run chart, and performed root-cause analysis. We identified key drivers, and specific interventions which were 1) eliminating intravenous contrast, 2) reducing repeated language paradigms, 3) updating technologist checklists for patient monitoring, 4) updating visual slides and audio, 5) developing a patient training video, and 6) developing multilingual paradigms.

**Results:** We performed 89 fMRI exams from January 2013 to April 2015. One exam was excluded since the patient was unable to complete the study. For the remaining 88 exams, the mean scan time was 73 minutes, median was 70 minutes, and range was 27 to 148 minutes. We implemented four specific interventions. The outcomes data met criteria to indicate a shift in the process median on November 28, 2014. Prior to this date, there were 72 fMRI exams with a median scan time of 74 minutes. After this date, there were 16 fMRI exams with a median scan time of 59 minutes.

**Conclusion:** By implementing specific interventions to improve our workflow, we successfully reduced our median fMRI scan times from 74 to 59 minutes. We believe that our process of workflow optimization can be applied broadly to any functional MRI practice.

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41. Improving Face-to-Face Handoff in Pediatric Intensive Care to Acute Care Transfer

Michael Tchou*, Mihaela Damian, Lauren Destino
Department of Pediatrics

**Purpose:** Residents identified that verbal handoff from pediatric intensive care unit (PICU) to acute care ward (ACW) providers was often incomplete or delayed. Providers were unable to evaluate patient for appropriateness of transfer. Our project aim was to implement a face-to-face handoff process within one hour of PICU to ACW transfer.

**Methods:** Residents worked with key stakeholders to map the current process and develop a new process. The new process used unit clerks, EHR orders, and nurse-to-MD notification of the transfer. This process begun on June 2014 and a self-reported audit of PICU to ACW transfers was used to track outcomes.

**Results:** After the first transfer process improvement, only 24% of handoffs were face-to-face. After implementation of the second process, within 3 months, face-to-face handoffs increased to >80% and >60% of the time residents were paged prior to patient arrival on the floor and patients arrived within one hour of handoff.

**Conclusions:** With resident engagement, education and a simple transfer process, rapid improvement was seen over 3 months. Maintaining this process proved difficult with declining participation in self-report surveys, which may have skewed results towards reporting only transfers with non-adherence to standard process. Declines in patient arrival within one hour appear to be related to a true change in adherence to the process requiring future rounds of improvement. The aim of 100% face to face communication continues to be improved with the help of residents and attending leads.

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42. Outcomes from an Advanced Course in Quality Improvement and Performance Improvement

Michael Tchou, MD*; Nivedita Srinivas, MD; Terry Platchek, MD; Alyssa Bogetz, MSW; Rebecca Blankenburg, MD; Lauren Destino, MD
Department of Pediatrics

**Goals and Objectives:** The Quality Improvement and Performance Improvement (QI/PI) foundations course is part of a longitudinal track during residency which was developed to provide advanced training above ACGME required QI/PI education and activities for residents considering careers in these fields.

The goals of the course were to provide residents: 1) advanced leadership training in Lean operations management and improvement science; 2) hands on experience in QI/PI methodology; 3) practical experience with organizational alignment; 4) exploration of careers in QI/PI; and 5) time to plan and implement their own QI projects.

**Educational Activities:** The course curriculum consisted of 4 weeks addressing advanced topics in QI/PI. Residents participated in over 80
hours of didactic and interactive activities including a 3-day QI/PI leadership seminar, lectures on core concepts, journal clubs, and a 3-day rapid process improvement workshop. In addition to faculty and peer mentorship on projects, active participation in hospital-prioritized improvement projects was a core feature of the curriculum.

Assessment and Evaluation: Four residents participated. Confidence in QI/PI methodology was self-assessed pre and post course on a 5-point Likert scale (1=not at all confident, 5=extremely confident), and revealed improvements in the following: 1) responding to medical errors (2.25 vs 4.25), 2) writing a clear problem statement (1.75 vs 4.25), 3) determining appropriate QI/PI methodology (1.75 vs 3.75), 4) evaluating the effectiveness of a given methodological approach (2.00 versus 4.00), and 5) using the PDSA cycle (2.23 vs 4.25). All residents “strongly agreed” that they were “able to develop and implement a continuous quality improvement project” post-course (vs 25% pre-course), and 100% rated the overall course quality “outstanding.” Open response questions revealed hands-on QI/PI participation was the most beneficial to residents’ learning.

43. Timeout Compliance During Regional Anesthesia Training
Jason Johns, MD; Luke McCage, MD*; Jean-Louis Horn, MD
Department of Anesthesiology, Perioperative and Pain Medicine, Stanford University School of Medicine

Introduction: The American Society of Regional Anesthesia and Pain Medicine (ASRA) recently published a pre-block safety checklist designed to be incorporated into the “timeout”. We evaluated the compliance to the standardized pre-block timeout by the individual trainees placing the block.

Methods: One hundred surveys were filled out by the attending anesthesiologist supervising a resident or fellow performing a peripheral nerve block in the preoperative area. The primary question was whether or not the trainee performing the block initiated the mandated pre-block timeout. The trainees experience level was noted and the duration of the timeout pause was recorded. We calculated the percentage representing timeout compliance, analyzed compliance according to training level, and tabulated both the distribution and the duration of the timeout itself.

Results: A total of 100 surveys were performed. On average trainees initiated a timeout 56% of the time. The amount of time spent to perform the timeout (80/100 surveys) was 71.2% taking less than 1 minute and 28.8% taking between 1-5 minutes. Resident timeout initiation during the rotation improved from an average of 41.5% during the first 2 weeks, to 66% the last 2 weeks while regional fellows averaged 75% throughout the 4 week period.

Discussion: There is clear value in utilizing a safety checklist prior to block placement. In this case, the timeout was not initiated by the trainee 44% of the time, despite the quick nature of it. Overall, more emphasis needs to be placed on training providers to adhere to this valuable safety protocol.

44. Hydroxychloroquine (Plaquenil) and Retinal Toxicity; Yearly Eye Exam for Patients on Plaquenil
Hooman Dehghan, MD, Neera Narang, MD
Department of Rheumatology

Purpose:
• To ensure that all patients seen in the Division of Rheumatology and are on Plaquenil receive eye examinations at least yearly.
• Also to ensure that all patients receive the recommended dose of Plaquenil (less than 6.5 mg/kg/day).

Methods:
• The Rheumatology division has reached a consensus regarding the importance of receiving an annual eye exam for patients who are using Plaquenil.
• Reminded faculty/fellows regarding the importance of receiving an annual eye exam by routine discussion during clinics, reminder posters, pocket cards and re-evaluation of Plaquenil dose for each patient.
• Data was collected by reviewing electronic medical records.
• Data was recorded and trended in the Rheumatology QI Dashboard.
• Monthly confidential individual feedback was provided to each clinician via emails, EPIC messages and personal meetings regarding their performance as compared to that of the entire division.

Results: Ongoing project. Results will be available at the end of May.

Conclusions: Ongoing project. Results will be available at the end of May.

45. Non-mydriatic fundus camera screening for referral-warranted diabetic retinopathy in a Northern California safety-net setting
Brian Toy*, James Egbert, Tyler Aguinaldo, Joseph Eliason, Darius Moshfeghi
Department of Ophthalmology

Purpose: Tele-ophthalmology fundus photography has shown promise in diabetic retinopathy screening. This study assessed the prevalence of diabetic retinopathy (DR) in a safety-net population in Santa Clara County, CA, based on non-mydriatic fundus photography screening, compared this method of screening with clinical dilated fundus examination, and evaluated patient and health systems factors associated with more severe DR.

Methods: A retrospective chart review was conducted on 6,911 adult patients with diabetes, who presented to Santa Clara Valley Medical Center (SCVMC) for non-mydriatic fundus photography screening for DR between 2008 and 2012. Patient photos were graded for the presence of referral-warranted DR. A subset of 709 patients was referred to the SCVMC Eye Clinic for dilated fundus exam, and the clinical grade of diabetic retinopathy was compared with the non-mydriatic photo grade of DR.

Results: Based on non-mydriatic screening, the prevalence of any DR was 17%, with moderate nonproliferative diabetic retinopathy (NPDR) or worse present in 5% of patients. 13% of photos were unreadable. When compared with clinical grading, the sensitivity and specificity of non-mydriatic grading to detect moderate NPDR or worse were 78% and 65%, respectively.

Conclusions: Our study found that 17% of patients with diabetes in a large safety-net population screened with non-mydriatic fundus photography needed referral for further ophthalmic care. These results demonstrate a use-case of telemedicine to screen a large number of patients in a safety-net setting, but they also highlight the need for adequate specialty resources to care for patients referred for ophthalmic care.

46. A Quality Improvement Project to Reduce Continuous Pulse Oximetry Use in Pediatric Inpatients with Bronchiolitis
Jody Lin, MD*; Yvette Keers-Moraga, RN; Jennifer Everhart, MD, Nivedita Srinivas, MD
Department of Pediatrics

Purpose: The 2014 AAP bronchiolitis guidelines recommend against routine continuous pulse oximetry (CPO) use in children admitted with bronchiolitis. Unnecessary CPO use is associated with alarm fatigue, prolonged hospitalization, and increased healthcare costs. We sought to
reduce overall CPO use in children with bronchiolitis admitted to Packard El Camino (PEC) during the 2014-2015 respiratory virus season by 30% compared to the previous season.

**Methods:** We utilized an A3 problem-solving methodology. We first sent confidential surveys to PEC MDs and RNs to identify barriers to reducing CPO use. Identified barriers included a lack of awareness of the implications of overusing CPO as well as poor consensus about which patients with bronchiolitis require CPO upon admission. Next, an educational campaign aimed at PEC MDs and RNs reinforced the appropriate use of CPO and the consequences of overuse. Lastly, we changed the existing workflow of providers at PEC to include: 1) admission and progress note templates for MDs incorporating a daily prompt to check whether CPO use was warranted for a given patient and 2) nursing audits to ensure concordance between the level of monitoring ordered and the level actually received.

**Results:** Based on preliminary data analysis, overall CPO use decreased from 87% (n = 57) to 61% (n = 18) between the 2013-2014 and 2014-2015 respiratory virus seasons, respectively. Appropriate CPO use increased from 45% to 83% during the same time period.

**Conclusions:** Routine continuous pulse oximetry use in patients with bronchiolitis can be reduced effectively using clinical quality improvement methodologies.

### 47. Putting the Continuity back in Continuity Clinic: A Resident-Driven, Longitudinal QI Pilot Project

Kirsten F. Brandt, MD
Department of Internal Medicine

**Purpose:** Residents have limited opportunities to design and implement QI projects that impact their practice environments, especially in the ambulatory setting. We piloted a shared, longitudinal practice-improvement project during a two-week continuity clinic rotation.

**Methods:** We reviewed resident evaluations of continuity clinic for the last two years for common themes. Residents ranked the themes in order of their interest. The project was implemented in a longitudinal manner, with each resident advancing the project and then handing it off to the next resident. Mentors include three on-site attending physicians, two institutional QI experts, and one resident “QI champion”.

Residents receive a structured sign-out from the prior resident and then meet with the mentors to determine next steps of the project. At the completion of the rotation, he or she does the evaluation and gives sign-out. The evaluation was adopted from one used for an existing QI rotation.

**Results:** Ten (of eighteen) residents completed the initial survey. To date, eight residents participated in the project. Participation is high among the mentors. The residents were engaged and made significant advancements in the project. A visibility board was created so all residents are aware of the project and can contribute ideas.

**Conclusions:** We initiated a new project to allow experiential learning of QI in the ambulatory setting. The project has led to several process changes and has given residents a chance to contribute meaningfully to improving their practice environment.

### 48. Use of A3 Thinking to Evaluate Patient Discharge Paperwork

Kimberly Slonaker, MD*, Hannah Bassett, MD, Whitney Chadwick, MD, Sarah Hendrickson, MD, Julie Pantaleoni, MD, Sean Bomber, BS, Amit Singh, MD, Nivedita Srinivas, MD, Terry Platchek, MD
Lucile Packard Children’s Hospital at Stanford, Department of Pediatrics, 725 Welch Road, Stanford, CA 94304

**Purpose:** In April 2014, Lucile Packard Children’s Hospital transitioned to a new Electronic Health Record (EHR). This EHR utilized a new process for discharging patients and created a discharge document for patients known as the After Visit Summary (AVS). The AVS is an important document intended to provide the patient with a summary of their hospitalization and instructions for post-hospital care. However, providers appeared frustrated with the AVS creation process, and it was unclear if the document proved useful to patients. The purpose of this project was to understand the workflow involved in the creation of the AVS and to evaluate the layout and content of document itself.

**Methods:** This project was approached with A3 thinking, a problem-solving process commonly utilized by Lean organizations. The current state of the problem was examined by conducting a “Go to Gemba” exercise where physicians directly observed the creation and communication of multiple AVS documents. The information from this exercise was prepared for review at a Rapid Process Improvement (RPI) workshop where a broader group of providers and stakeholders further assessed areas of improvement and potential countermeasures.

**Results:** A preliminary “ideal AVS” document was formulated. Improvements included: removal of extraneous material, use of standard language, and clear prioritization of information. The LPCH Information Technology team began working with EHR programmers to design a more streamlined process to help providers create the AVS. Additionally, a high-impact/low-effort change was identified and implemented in the medication translation process.

**Conclusion:** The utilization of Lean principles and A3 thinking provided a useful framework for understanding the current processes involved in AVS creation, identifying potential opportunities for improvements in provider processes and patient satisfaction, and facilitating collaboration across disciplines to address an issue that has a broad impact on both employees and patients.

### 49. A Quality Improvement Project to Improve the Proportion of Appropriate Patients Offered Peripheral Nerve Blocks for Total Knee or Shoulder Replacement Surgery

Quentin Baca, MD, Kevin Chang, MD, Gavin Hartman, MD, Lauren Steffel, MD, Anna Swenson Schalkwyk, MD, Adam Was, MD, Ruth Fanning, MD, Jean-Louis Horn, MD, Kristen Telischak, MD
Department of Anesthesiology, Pain and Perioperative Medicine, Stanford School of Medicine

**Introduction:** The indications for regional anesthesia are expanding, as peripheral nerve blocks have been shown to reduce pain, decrease hospital length of stay, and improve patient satisfaction following major orthopedic surgery. Despite the potential benefits, currently all appropriate patients are not offered blocks. We evaluated the barriers to use of peripheral nerve blocks in patients undergoing primary knee and shoulder replacement in order to target and evaluate interventions.

**Project:** In our quality improvement project, we constructed a workflow process map for providing preoperative peripheral nerve blocks. This process identified several etiologies of delays and subsequent decreased regional anesthesia utilization, including late patient arrival, patient check-in, education, language barriers, difficult IV, limited equipment, and multiple surgical areas. Our team of CA-2 residents met with stakeholders and discussed potential interventions. However, a recently-collected 6-week, 150 case sample demonstrates that only 3 of 15 delays were attributable to regional anesthesia delays. Other causes, including lack of surgical consent, were more common.
To address the inaccurate perception of delays being due to regional anesthesia, we are now planning to make this data available to our surgical colleagues, along with research discussing the benefits and drawbacks of regional anesthesia. Pre-presentation and post-presentation surveys may measure a change in perception of regional anesthesia. Through these phases of our quality improvement project, we have learned that it is important to thoroughly characterize the problem to be addressed, preferably with the relevant data to be improved, before beginning to brainstorm solutions.

References:

50. Improving Inbound Communication from Clinicians to Radiologists
Michael Muelly, MD. Chris Denucci, MD. Curtis Langlotz, MD. David Larson, MD.
Department of Radiology
Purpose: Computerized report and image distribution systems have reduced the need for clinicians to visit the reading room. Radiologists often do not receive adequate clinical history or clinical follow up on patients whose exams they interpret. Part of the reluctance of clinicians to communicate with radiologists is the difficulty in knowing what number to call due to the physical separation of reading rooms in our subspecialized practice.
Methods: We introduced a centralized phone number for routing of incoming phone calls from clinicians. A reading room assistant program was established for this purpose, providing call routing services from 7am to 11pm on weekdays. Phone calls are answered by a centralized reading room assistant, relevant information obtained, and the call routed to the reading room and radiologist most likely able to assist the caller based on information gleaned from RIS/PACS. Internal marketing of the program was performed to all outpatient clinics and trainees within Stanford Healthcare informing them of this new option. The weekly incoming call volume was measured as a surrogate measure for popularity of the program, with the assumption that callers prefer the simplicity of a central phone number. 120 incoming calls/week were targeted for implementation.
Results: Initial survey results demonstrated a need for radiation safety education and improved access to lead aprons. Results from a final survey show that residents felt that access to lead aprons (percentage who found MOR lead apron availability to be inadequate dropped from 93% to 21%) and their radiation safety knowledge have significantly improved.
Conclusions: This QI project improved radiation safety knowledge as well as access to personal protective equipment amongst Stanford anesthesiologists.

51. Integrating NIMH PROMIS Measures on Stanford’s Primary Care Clinics
Steven Sust MD*, Shashank Joshi MD, Kyle Hinman MD, Antonio Hardan MD Child and Adolescent Psychiatry Chief Fellow
Purpose: Efficiently improve pre-visit detection and aid diagnosis of major mental health problems in Primary Care clinics using pre-existing Stanford IT infrastructure and widely available consumer technology.
Methods: In collaboration with Stanford’s EPIC IT/IS staff, we will activate EPIC’s Patient Reported Outcomes application and program the DSM-5 adult and child psychiatric symptom measures. They will initially be sent out to all active patients at Stanford Primary Care practices who have already enrolled in EPIC’s web-accessible MyHealth functionality and can subsequently complete the symptom measures from home or in the waiting area prior to their PCP appointment using any internet-capable device such as a tablet or smartphone. Patient results that reach the measures’ pre-determined threshold of significance for DSM-5 diagnoses will appear as an EPIC best-practice advisory during the clinician’s charting and provide a convenient link to psychiatric consultation referral order.
Innovation: This is a novel integration of newly validated DSMS symptom measures into EPIC’s intrinsic patient portal that can collect Patient Reported Outcomes data and will dramatically affect daily Primary Care practice efficiency in regards to mental health.

52. Radiation Safety for Anesthesiologists
Rachel R. Wang, Pedro P. Tanaka
Department of Anesthesiology, Perioperative and Pain Medicine
Purpose: There is an increasing number and variety of radiological procedures performed for diagnostic and therapeutic purposes, and many of these require the presence of anesthesiology staff. An understanding of the physical principles and methods of minimizing radiation exposure as well as access to personal protective equipment is essential for anesthesiologists.
This quality improvement project served a dual-purpose: developing a radiation safety curriculum and improving access to lead aprons for Stanford anesthesiologists.
Methods: Two surveys of Stanford Anesthesia residents were conducted to determine the underlying level of radiation safety knowledge and access to personal protective equipment and areas for improvement. Results were presented to OR management. With the support of a multidisciplinary team, many of the previously locked aprons were made available, and additional sets of lead aprons were purchased for anesthesiologists. A review article and Powerpoint presentation on radiation safety were produced and distributed to residents. A final survey was conducted to assess progress.
Results: Initial survey results demonstrated a need for radiation safety education and improved access to lead aprons. Results from a final survey show that residents felt that access to lead aprons (percentage who found MOR lead apron availability to be inadequate dropped from 93% to 21%) and their radiation safety knowledge have significantly improved.
Conclusions: This QI project improved radiation safety knowledge as well as access to personal protective equipment amongst Stanford anesthesiologists.

53. A web-based solution to reduce NPO violations
Andrew J. Giustini, MD, PhD*; Paul Sharek, MD, MPH; Ling Min Loh, MPH; Joh Olson, RN, BSN, MBA; Kevin Chen, BS; Thomas J. Caruso, MD Lucile Packard Children’s Hospital Stanford
Purpose: NPO violations account for 4% of same-day procedure cancellations at LPCH. Numerous NPO policy revisions have made it challenging to update information across clinics and patients. Accurately disseminating information to patients is important for safe anesthesia and to minimize avoidable cancellations.
Methods: A multidisciplinary group partnered with the Marketing and Analytic department to devise a strategy to provide patients with a central information source. Previously, paper copies of NPO policies were distributed by clinics to patients. We developed a Perioperative Guidelines webpage with NPO guidelines. This webpage was then presented to the surgical clinics for dissemination to patients. By centralizing the source of information, we hypothesize that we can further reduce the incidence of NPO violations.
Analysis/Results: Perioperative nurses record NPO violations in Epic and the Perioperative Analytics Team reports the incidence of violations. We assess the rate of NPO violations before and after the launch of the website to determine if these interventions decrease the rate of NPO violations. We are tracking the number of public visits to the NPO guideline page and will report correlation between webpage visits and incidence of NPO violations, assessing for significance.

Conclusions: Our method involves a coordinated team approach between the Perioperative Analytics Team, Marketing, anesthesiologists, and proceduralists. This method of cross-specialty collaboration to decrease NPO violation will become increasingly important as the public’s desire for electronic information increases. Future interventions include the development of an app to send push email and text alerts to patients to further prepare patients for surgery.

54. Behavioral Analysis of Electronic Medical Record Use by Internal Medicine Residents on the General Medicine Service
David Ouyang*, Jonathan Chen, Jason Hom, Jeffery Chi
Department of Medicine
Purpose: To understand the workflow and time constraints of internal medicine residents working on the general inpatient medicine wards at Stanford University Hospital.
Methods: Retrospective analysis of resident usage of electronic medical record system use at Stanford University Hospital between June 26, 2013 and May 30, 2014.
Results: We identified 4,327,708 unique actions performed by 87 residents during their days of service on the general medicine wards. During this time, residents saw a median of 13 patients and worked 12.78 hours per day. Compared to supervising residents, interns looked at the chart of fewer patients (11.9 vs 25.8 patients, p < 0.001) and worked fewer hours (11.5 vs. 12.8 hrs, p < 0.001). We identify temporal patterns in computer use which correlate with known patterns in resident schedule including morning report, grand rounds, and noontime conferences. Housestaff frequently switch between tasks involving multiple patients suggesting a high degree of multiple tasking and possibly frequent interruptions.
Conclusions: While researchers have sought to characterize resident work hours and workflows in this era of modern medicine, we introduce the analysis of electronic medical record system utilization as the most granular and objective way to characterize resident behavior. In the future, we plan to use the data to assess whether team census affects resident workhours as well as patient outcomes.

55. Improving Care Coordination and Communication with Primary Care Providers in Single Ventricle Patients in the Interstage period
Holly Bauser-Heaton, MD*, Bambi Alexander-Bays, PNP; Renee M. Rodriguez, MD; Bronwyn Harris, MD; Charles Nguyen, MD; Gail Wright, MD
Division of Cardiology, Department of Pediatrics
Purpose: Single ventricle patients in the interstage period (between their initial surgical palliation and second stage) are amongst the highest risk patients. Our home monitoring program (HMP) team, consisting of physicians and nurse practitioners, closely monitors these patients but effective care coordination with primary care providers (PCPs) remains important. In collaboration with our Single Ventricle Family Advisory Council (FAC), we aimed to improve communication between the HMP team and PCPs.
Methods: Based on results from a telephone survey of PCPs of recently discharged single ventricle patients, we developed an improved educational packet to be mailed prior to hospital discharge. The packet addressed identified gaps in communication. We continued to perform our pre-discharge phone call with PCPs. PCPs who received the new education packet then underwent the same telephone survey.
Results: Post-surveys showed improvement in all areas identified during the pre-evaluation phase, including handoff accuracy (83% baseline, 100% post), receipt of the packet (50% baseline, 100% post), receipt of information about cardiac physiology (0% baseline, 83% post), and receipt of information about single ventricle care (0% baseline, 83% post). When PCPs were asked if the information was useful, the answer “Very/Somewhat” increased from 66% to 100%.
Conclusions: Effective care coordination is especially challenging, yet imperative, in caring for complex patients. Continued evaluation and adjustment to communication practices, particularly at the time of hospital discharge, can improve PCP knowledge and provider relationships which is likely to result in improved patient outcomes.

56. Intraoperative medication safety - Exploring strategies to minimize medication waste and improve safety
Shara Cohn, Amanda Kumar, Jed Cohn, Brita Mittal, Christina Stachur, Louise Wen, Clair Sbecomb, Ruth Fanning
Department of Anesthesiology, Perioperative and Pain Medicine; Stanford School of Medicine
Purpose: Anesthesiologists rely upon rapid access to essential drugs for emergent cases or unexpected intraoperative complications. Currently, anesthesia providers draw these drugs from vials into syringes to facilitate rapid administration if needed; however many are unused and discarded at the end of the day. Other workarounds include administering medications that have exceeded their shelf-life, storing medications in unauthorized locations, or passing medications to later shifts, promulgating expired medication use and possibly multiplying effects of a single medication error. Provider-based dilutions can increase risk of medication error, resulting in both patient safety and drug waste issues with potential economic consequences. The Anesthesia Patient Safety Foundation recommends that high alert drugs should be available in standardized concentrations in a ready-to-use form. We are exploring the option of compounded, sealed, pre-filled syringes as a safety and cost-saving measure.
Methods: We performed a resident survey to evaluate which medications are routinely drawn up for anesthetic care, assess of amount of waste, and gauge resident concern regarding medication waste.
Results: We surveyed Stanford CA-2 residents, and 100% of responders were concerned about drug waste in the OR. 90% reported >3 drawn but unused clean syringes wasted at the end of the day. 100% noted passing medications to other providers at the end of the day.
Conclusions: Residents have a high level of concern for excessive drug waste. Further analysis is pending a planned trial in collaboration with Stanford OR pharmacy of pre-filled syringes of selected emergency drugs to compare cost savings and drug waste.

57. Nighttime Communication at Stanford University Hospital: Perceptions and Reality
Andrew Sun MD, Minjoung Go MD, Gloria Sue MD, Erin Palm MD, Graeme Rosenberg MD, Raymond Deng, MSPH, Lisa Shieh MD*, Paul Maggio MD*
Purpose: To improve physician, nursing, and care team communication.
Methods: 236 pages to general surgery night float residents between 10/19/2014 and 10/25/14 and 11/2/14 and 11/5/14 were reviewed (9 night shifts total). Pages were categories by sender, urgency, and subject matter. Urgent pages were those pages that required an assessment or
intervention by the night float resident. Non-urgent pages were those pages that did not require timely intervention and could be better addressed by the primary service. A paper survey for the nursing staff, and an electronic survey for the medicine and surgery residents were conducted to evaluate provider perception of nighttime communication.

**Results:** On average, 26.2 pages were received each night by the night float resident. Of the 236 pages reviewed, 89% were sent by nursing staff. 12% were specified as “FYIs,” 39% requested an order, and 6% requested an MD evaluation. Categorization of the pages by urgency revealed 59% were urgent and 34% were non-urgent. 7% of pages could not be categorized. Of the urgent pages, 56% required a medication/procedure/order from the night float and 13% were related to abnormal vital signs. Of the non-urgent pages, 35% were non-urgent patient status updates and 21% were for low-priority medications/orders/procedures.

Of 187 residents, 54 responded to the survey. 15% reported that they are satisfied or very satisfied with the current paging system. 22% reported that they are placed on hold for greater than 3 minutes. Resident perception, on average, is that 52% of nighttime pages are non-urgent or better addressed by the primary team. 154 of 200 distributed nursing surveys were completed. 54% stated that they are satisfied or very satisfied with the current paging system. 74 % stated that they wait at least 10 minutes to receive a response and that on average, 24% of pages are non-urgent.

**Conclusions:** While the majority of pages sent to general surgery night floats are urgent (59%), a very significant proportion (34%) did not require an immediate response. This was supported by our survey and underscores the current lack of a non-urgent modality for communication.