

# ***2020 Quality Improvement Research Day Abstracts***

Ascension Providence  
Rochester Hospital

Office of Graduate Medical Education  
Wayne State University  
School of Medicine

June 2020



## *Welcome Message*

The Wayne State University School of Medicine Office of Graduate Medical Education (WSUGME) and the Internal Medicine, Family Medicine, and Transitional Year residencies it sponsors at Ascension Providence Rochester Hospital (APRH) in Rochester, Michigan, have jointly administered 8 previous Quality Improvement Research Days, held in late spring of each year. Attended by residents, faculty, hospital administrators, and WSUGME staff, the QI Research Day was designed to showcase residents' quality improvement and patient safety projects in two formats (posters and oral presentations), both competitively judged by noted faculty and researchers from the Detroit area.

In 2020, the 9<sup>th</sup> Annual QI Research Day would have been held on Tuesday, May 5, in the hospital's atrium and main auditorium. Unfortunately, the incipient COVID pandemic in mid-March rendered a face-to-face event not feasible. Rather than try to organize a virtual event with little notice, WSUGME and APRH staff decided to acknowledge residents' work and dedication across the year by publishing this compendium of abstracts. It includes descriptions of 9 QI projects from residents in the Family Medicine and Transitional Year programs, 12 QI projects from residents in the Internal Medicine Program, and 4 QI projects initiated in the spring of 2020 on the impacts of the COVID-19 pandemic at APRH.

This compendium documents the time and effort residents devoted to these projects and their commitment to the principles of quality improvement in the clinical setting. It is all the more remarkable given that, as their QI projects were moving toward conclusion in the late spring 2020, APRH residents were simultaneously frontline workers in providing critical patient care during the peak of the COVID pandemic.

We would like to thank the following individuals for their stellar work as faculty mentors in the administration of the 2019-2020 QI projects at APRH: Internal Medicine Residency Program Director Sarwan Kumar, MD, IM Associate Program Director Vesna Tegeljita, MD, and IM faculty Mohammad Fityan, MD, and Zain Kulairi, MD; Family Medicine Residency Program Director Pierre Morris, MD, FM Associate Program Director Tess McCready, DO, and FM faculty Eleanor King, MD, and Salieha Zaheer, MD; and Assistant Professor Elizabeth Towner, PhD, of the WSU Department of Family Medicine and Public Health Sciences. Going forward, we anticipate that these faculty members will continue to successfully supervise the QI projects described in the pages that follow, culminating in a 10<sup>th</sup> Annual QI Research Day in 2021 at APRH.

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## **FAMILY MEDICINE/TRANSITIONAL YEAR**

*\*Indicates a faculty mentor*

### ***Improving Resident Wellness Through a Formal Wellness Curriculum***

**Michael Duarte, MD, Ashley Aragona, MD, Brent Stansfield, PhD, Tess McCready, DO,\* Elizabeth Towner, PhD\***

**Background:** Rates of physician suicide, depression, and burnout among are at an all-time high. A Wellness Curriculum, co-developed by residents and clinical faculty, is currently being implemented in the Wayne State Family Medicine and Transitional Year Resident Programs. This evaluation explores implementation of this curriculum and its impact on resident wellness over a 1-year period.

**Methods:** The Wellness Curriculum includes (1) monthly wellness events outside of work, (2) structured wellness breaks (30-45 minutes) during didactic blocks, and (3) a wellness library of books and games. Feasibility and acceptability of curriculum components are measured by (1) attendance and frequency of wellness events and didactic breaks and (2) a log of books and games checked out of the library. At the end of the year, residents used a 0 (low)-10 (high) Likert scale to rate satisfaction with each component of the curriculum. Residents anonymously completed the Wayne State University Resident Wellness Scale at baseline (T1) and every 3 months thereafter for a year (5 total). The Wellness Scale includes 10 items with response choices of 1 (never) to 5 (very often) and produces a total and two sub-scale (Self-Care and Meaningful Work) scores. Total Score < 3.5 suggests wellness deficiency. Changes of +0.4 are considered meaningful. Responses were examined for all residents by sex, cohort, and program.

**Results:** During the 2018-2019 academic year, 10 wellness breaks and 6 wellness events were held. Two wellness breaks were held outside the hospital and 7 during didactics. Wellness breaks that occurred during lectures had 100% of expected resident attendance, whereas the attendance at outside events was less (43% and 70%). On average, wellness events were attended by 57% of the residents, with conflicting rotations noted as the primary attendance barrier. Additional wellness events were not scheduled due to lack of funding and reimbursement challenges. Six residents accessed the Wellness library, checking out a total of 12 books and 15 games. Residents (n = 13; 57%) reported moderately high satisfaction with wellness events (8.85±1.23), breaks (8.38±2.10), and the library (8.62±1.94). The following wellness deficiencies were observed over the course of the academic year: total wellness for males (-0.41) and PGY3 cohort (-0.45) and meaningful work for females (-0.47) and PGY3 cohort (-0.81). Wellness improvements were observed in Self-Care for female (+0.41) and TY (+0.75) residents.

**Discussion:** Our data suggest that while residents were satisfied with the Wellness Curriculum, modifications are necessary to improve attendance at wellness events and use of the wellness library. In response to this data, wellness events and breaks in the 2019-2020 academic year were tailored based upon resident suggestions. We are also conducting interviews to inform next steps for improving meaningful work for female residents. Finally, we continue to survey resident wellness and satisfaction with the wellness survey.



***Assuring Appropriate Documentation of Fluid Status in Hospitalized  
Heart Failure Patients***

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MD,\* Elizabeth Jackson, PA, Elizabeth Towner, PhD,\* Nishit Choksi, MD\***

**Background:** In the US, heart failure (HF) exacerbation is the most common diagnosis among hospitalized patients age 65 and older with an annual cost of over \$21 billion. Heart failure can result in fluid accumulation and retention in patients, thus closely monitoring fluid intake and output (I&O) is critical to tracking the clinical status. Previously, we found interventions providing education (resident-led) to nursing staff and placing reminder signs in patient rooms yielded a cumulative increase of I&O documentation from 23% to 79%. However, improvements were not maintained, as documentation fell to 20% one year later, and was not recorded in a consistent location within the patient's chart. This next phase of our quality improvement initiative examines whether more consistent and detailed nursing education supplemented by the Department of Cardiology, along with a systematic documentation protocol, achieves the rate of I&O documentation of at least 80%.

**Methods:** The hospital chief of cardiology, and the cardiology physician assistant, provided a thirty-minute educational presentation emphasizing the clinical importance of I&O documentation and instruction on accurately collecting and documenting this data to nurses on each hospital ward. An I&O documentation tab was also created in each patient's chart to improve nurse documentation consistency. Each morning, nurse managers disseminated a list of patients with HF to nursing staff on each ward and placed visual aid reminders outside the rooms of these patients. I&O documentation for the week following the intervention was then reviewed and compared to pre-intervention data. Successful documentation was defined as recording of both I's & O's during each 12-hour shift during a one week period. Intake and output fluid documentation was examined separately to better understand the unique barriers to completion of each.

**Results:** Charting of daily fluid intake increased from 28.8% to 93.0% (+64.2%). Charting of fluid output increased from 12.6% and increased to 64.9% (+52.3%). Anecdotally, nurses noted physician prescription as a facilitator of documenting I's and patients already having urinated and forgetting to use urinals as barriers to assessment and documentation of "O's."

**Conclusions:** Accurate I&O documentation is vitally important to proper care for HF patients as it allows prompt identification of fluid overload, treatment with diuretics when appropriate, and possibly lower rates of readmission. Our educational intervention and implementing a systematic documentation protocol with visual reminders in patient rooms and in the EMR improved I&O documentation by over 50%. We thus plan to adopt this intervention. However, the nearly 28% higher documentation of inputs vs. outputs suggests adaptations are necessary to improve output documentation. We also plan to examine the effect of improved I&O documentation on patient clinical outcomes and readmission rates.

***Cervical Cancer Screening Rate Disparities Among Male and Female Residents***  
**Ashley DeCaluwe, DO, Taisia Litvinow, DO, Phillip Riley, MD, Elizabeth Towner, PhD,\***  
**Salieha Zaheer, MD\***

**Background:** Cervical cancer is the second most common cancer among women worldwide. Disparities exist between male and female physicians in cervical cancer screening rates, with female physicians completing more screenings than males. Discomfort of male physicians with completing pap testing is one hypothesized source for this disparity. Residency is an ideal time to address discomfort with pap testing. Through medical chart review, we found that in 1 month, female residents at Rochester Academic Family Medicine Center (RAFM) completed nearly 4 times as many cervical cancer screenings as male residents. The purpose of this quality improvement initiative was to examine (1) whether an interactive educational intervention increased comfort level with pap testing among male residents and (2) changes in rates of cervical cancer screenings completed by residents following the intervention.

**Methods:** The educational intervention included review of the USPSTF pap screening guidelines, online video with step-by-step instructions, and demonstration via pelvic mannequin. Residents then practiced pap techniques on the model. Fifteen residents (8 males) completed the intervention. Changes in resident comfort and confidence with completing pap smears was assessed pre/post intervention. The knowledge of screening guidelines was assessed with a 4-item post-intervention quiz. Also, a survey was given with a rating scale asking the likelihood of NOT referring female patients out for cervical cancer screening using a 0 (strongly disagree) to 9 (strongly agree) scale. Responses to quiz and the scale were examined by resident sex. 11 residents completed pre-intervention survey and quiz (6 males), 11 residents completed post-intervention survey (7 males) and 10 completed quiz (7 males). A review of electronic medical record was completed to reassess disparity in cervical cancer screening.

**Results:** Prior to intervention, mean likelihood of not referring out of the office was 5 out of 9 for males vs. 9 out of 9 for females. Following intervention, the mean increased to 6 out of 9 for males indicating increased comfort in performing pap smears and less likelihood in referring out. Passing rate for the post-intervention knowledge quiz was higher for female (100%, n = 3) than male (n = 7; 71%) residents. In the month following the intervention, 58% (n = 7) of cervical cancer screenings were completed by female residents and 25% (n = 3) were completed by male residents.

**Discussion:** We found improvement in comfort and confidence level of male residents after intervention. However, increased resident knowledge and comfort did not equate to more equitable distribution of screens completed by male and female residents. Next steps for continuing to improve equity of cervical cancer screening in our clinic include understanding barriers to male residents' comfort and assessing female patients' reasons, and preferences regarding receiving Pap smears from male physicians.

***Reducing Overreporting of Hospital-Acquired Clostridium difficile Infection by Increasing Accuracy of Labeling Results and Decreasing Unnecessary Testing: A Quality Improvement Study***  
**Abraham Baidoo, MD, Ben Maynard, MD, Rehana Siddiqui, MD, Eleanor King, MD,\* Elizabeth Towner, PhD\***

**Background:** *Clostridium difficile* infection (CDI) is a diarrheal illness caused by a bacterium that can be life-threatening. Lowering rates of hospital-acquired CDI (HACDI) is a common institutional goal because it prevents illness and the associated monetary cost but this focus has led to increased rates of testing and overdiagnosis. In 2018 and 2019 Ascension Providence Rochester Hospital was considered “far from target” for HACDI by the National Health Safety Network, which is concerning because hospitals in the bottom quartile lose 1% of all discharge reimbursement funds from Medicare. A quality improvement initiative was recently launched to address this concern. The critical first step of this process is to review internal records for accuracy of reported HACDI cases.

**Methods:** Hospital policy for CDI Testing and the Infectious Disease Society of America definitions of HACDI were applied to determine whether HACDI cases at our hospital were (1) confirmed, (2) mislabeled or (3) indeterminate.

**Results:** Of the 34 reported cases of HACDI from 2018-2019, 16 were confirmed, 18 were mislabeled, and 2 cases were indeterminate. Mislabeled cases were due to inaccurate diagnosis and inappropriate testing. Inaccurate diagnoses were made when patients staying in the rehab unit were labeled (n = 3), when patients had diarrhea on the day of admission indicating a non-hospital acquired CDI (n = 2), and when laboratory testing ruled-out HACDI (n = 8). Cases that showed inappropriate testing (n = 2) were due to laxative use within 48 hours of testing. The two indeterminate cases were due to a delay in testing on a comatose patient and incomplete documentation.

**Discussion:** Establishing an accurate baseline metric and appropriate labeling system is essential for reducing HACDI. Our analysis showed 53% of HACDI cases from 2018-2019 were inaccurately reported, leading to a falsely high rate and significant financial penalty. Our next steps are to examine the impact of appropriate-testing educational interventions and use of an algorithm we developed to assist the infection control team in reviewing cases for errors.



*Assessing and Improving Continuity of Care Utilizing Care Teams Within a Family Medicine  
Residency Clinic*

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**Background:** Continuity of care (CoC) leads to quality patient care by providing long-term health care from a primary care physician (PCP). As a resident-run clinic, CoC is difficult to maintain since resident schedules vary, resulting in scheduling conflicts with patients. One solution is creation of resident care teams (CT). CT assignments allow for seamless transitioning of patient care between residents familiar with the patient for improved CoC. In our clinic, residents are assigned to a CT upon entering residency and each CT consists of a first, second, and third year resident. Our clinic did not have a process to assign patients to a CT. Chart review in the month prior to beginning our quality improvement initiative revealed 55% (n = 173) of chronic care patients had already been assigned to a CT and within that group, 69% were seen by their PCP and 6% by another member of the CT.

**Methods:** The purpose of this project was to improve CoC by increasing the number of chronic care patients assigned to a CT and utilization of the CT to schedule follow-up appointments by 50%. For PDSA cycle one, we placed posters in the clinic halls and resident lounge to remind residents to review and update the patient's CT assignment during follow-up care visits. In PDSA cycle two, posters were placed by the check-out staff to facilitate their scheduling follow-up appointments with a member of the patient's CT if an appointment could not be scheduled with the patient's PCP. The same chart review procedures were applied at the conclusion of both PDSA cycles to evaluate change. Specifically, chronic care patients seen within a 1-month period were coded as (1) assigned vs. not to a CT and (2) if assigned, then "seen by PCP," "seen by other member of CT," or "not seen by CT member."

**Results:** In the month after PDSA cycle 1, the number of patients assigned to a CT increased to 74% (n = 146) and the majority of this group were seen by their PCP (76%) or another member of the CT (3%). Following PDSA cycle 2, the number of patients assigned to a CT was stable (73%, n = 230) but decreases were observed in the number seen by their PCP (66%) or another member of the care team (5%). The most frequent reason the staff was unable to schedule patients within the CT was that no member of the CT was in clinic during the requested follow up time.

**Conclusion:** Our interventions led to more patients in the clinic assigned to a CT. It is unclear why our intervention initially led to a decrease in patients seen by non-PCP or CT providers but then returned to a pre-intervention level. In the future, if we were to explain CT functioning to new and established patients, they'd be able to prompt the front desk staff at checkout as to which resident physician is in their CT if their PCP is unavailable for their next visit. CoC can lead to decreased patient turnover between residents, less frequent patient handoffs and comfort to patients in minimizing the anxiety of seeing multiple providers.



## ***Increasing Physician Confidence and Consistency in Controlled Substance Prescribing via Education and Office Policy***

**Hassan Baiz, MD, Bradford Woelke, MD, David Kazanowski, MD, Eleanor King, MD\***

**Background:** Controlled substance medications (CSs) have potential for misuse. Each is Federally classified into “schedules” based on their potential for abuse. Overdose deaths related to opiate-based Schedule 2 CS are rising within the US. In 2017, Michigan legislation was enacted to curb CS misuse by requiring prescribers to be in a bona fide prescriber-patient relationship prior to prescribing CSs. Additionally, patients receiving Schedule II opiates must sign an “Opioid Start Talking” form which outlines risks of opioids. CDC guidelines recommend that patients on opioids have periodic urine drug screens (UDSs). Our hospital system created a controlled substance agreement (CSA) that outlined requirements for prescribing CSs including UDSs and signing the CSA to establish the bona fide relationship. With multiple levels of institutional recommendations, many physicians report concerns about insufficient training in prescribing CSs. Our aim was to implement a CS policy and education to increase physician confidence and consistency in CS prescribing by 90% in a 6-month period. We focused on increasing rates of signed CSAs, signed OST forms, and obtaining UDSs.

**Methods:** Baseline data on CS prescribing patterns of a community Family Medicine residency clinic were collected from July-September 2019. Evaluated metrics included documentation of an annually signed CSA, UDS, and an OST. The OST form was only required for Schedule II opiate CSs. The standing office CS policy was revised to include requirements for a baseline UDS, signed CSA and OST (if Schedule 2 CS) *prior* to issuing any prescription. During a presentation at our monthly staff meeting, we educated physicians on state law and our updated office policy. The education included interactive scenarios, a review of state law and institutional mandates. Post-intervention, we reviewed data of CS prescribing patterns from January 2020. A survey assessing physician comfort and knowledge in CS prescribing was administered pre- and post-intervention.

**Results:** Pre-intervention, 123 CS prescriptions prescribed between July-September 2019 were reviewed. Of all 123 prescriptions, 71% had documented CSAs and 63% had documented UDSs. Of the 17 Schedule II opiate CSs prescriptions, 36% of the charts had a completed OST form. Post intervention, 47 CS prescriptions prescribed in the month of January 2020 were reviewed. Of the 47 prescriptions, 74% had documented CSAs and 76% had documented UDSs. OST implementation increased to 40% albeit the sample size was small. Of the 22 physicians who completed the pre-intervention survey, 5 (23%) reported they strongly felt comfortable prescribing CSs, 8 (36%) felt they strongly understood state laws and 8 (36%) felt they strongly understood office policy for prescribing CSs. Post-intervention, 17 physicians completed the survey with 7 (41%) felt strongly comfortable prescribing CSs, 11 (64%) felt strongly that they understood state laws and 10 (59%) strongly understood office policy for prescribing CSs.

**Discussion:** With multiple laws, recommendations and institutional requirements, it can be a challenge for physicians to know how to safely prescribe CSs. However, through education and revised CS office policy, it is possible to increase physician confidence and consistency in CS prescribing patterns. Our method of disseminating a cohesive office policy that supports all levels of recommendations and requirements can be used as a model for other clinics. Future direction for our project includes monitoring for long-term efficacy of our intervention, educate physicians and office staff and train MAs to review patient’s charts and assist physicians in following CS office policy.

***Respiratory Inhaler Education in a Family Medicine Residency Program***  
**Ashley Aragona, MD, Michael Duarte, MD, Oneil Doha, MD, Pierre Morris, MD,\***  
**Elizabeth Towner, PhD\***

**Background:** Chronic Obstructive Pulmonary Disease (COPD) is a progressive life-threatening lung disease that affects more than 16 million Americans. Misuse of respiratory inhalers and medication non-compliance increases risk for exacerbations and hospitalizations. This quality improvement project focuses on improving respiratory inhaler education in a family medicine residency program through an educational series, continuing from Plan Do Study Act (PDSA) cycles 1 and 2 completed in 2018/2019 academic year. In PDSA 1 and 2 we assessed self-confidence level (CL) on inhaler teaching before and after watching general and specific inhaler education videos. We saw a slight increase in self-reported confidence level post intervention. Residents were also given a task to correctly list the proper inhaler steps using a Qualtrics survey. We found that after two educational video session only 22% of residents listed the steps correctly demonstrating that videos alone were not enough to improve resident education leading to PDSA 3. The purpose of PDSA 3 is to improve family medicine resident knowledge on respiratory inhaler use by providing a two-part educational series with a hands-on demonstration and a practical session.

**Methods:** Didactic lecture time was used for a two-part educational series focusing on COPD management with hands-on inhaler demonstration of common respiratory inhalers with a hands-on practical session. Residents reported their CL on teaching proper inhaler techniques to patients before and after the intervention using a 0-10 (10 = very confident) scale. In the first session, we presented a general review of COPD management focusing on the 2 inhalers listed above, then residents were able to practice hands-on with the inhalers. Three weeks later residents attended a practical session for inhaler teach-back where they were given both inhalers and were instructed to demonstrate inhaler technique in a step-by-step fashion to a member of the QI team. The inhalers required 7-8 steps. Residents were graded objectively using a standardized rubric; one point was given per correct step.

**Results:** Prior to PDSA 3, the average for self-reported CL among residents was 6.21. Post-intervention average increased to 9.0. The average score for hands-on practical was 93% and 62.5% of residents scored >90%. We did not find a commonality among missed steps.

**Conclusion:** Our two-session educational series was successful in increasing resident CL in teaching inhaler use to patients. Across PDSA cycles to date, our work shows that greater gains in confidence and skill were achieved by hands-on compared to didactic and video-based training. We plan to incorporate this educational series into our didactics yearly. Future goals are to see how respiratory inhaler education impacts COPD patients in our family medicine clinic.

***The Implications of Adherence to the Heart Failure (HF) Clinic on Readmission Rates to the Hospital***  
**Peter Ly, MD, Roshan Patel, MD, Zeeshan Sharif, MD, Elizabeth Jackson, PA-C, Crystal Loveday, NP-C,  
Elizabeth Towner, PhD,\* Salieha Zaheer, MD\***

**Background:** Heart failure (HF) is a complex clinical syndrome characterized by the reduced ability of the heart to pump and/or fill with blood. HF is a global pandemic and places a considerable burden to the health-care system, responsible for costs of more than \$39 billion annually in the USA alone. Reducing rates of readmission for HF patients was identified as a quality improvement priority at Ascension Providence Rochester Hospital in 2019 as the current readmission rate (18.8%) exceeded the readmission target (15.10%). Our goal was to reduce 30-day readmission rates by >5% through optimal medical and lifestyle management. We aimed to achieve this goal by increasing patient attendance at the HF clinic post discharge specifically by calling patients. In the year prior to our intervention, HF clinic follow up was 14.9%.

**Methods:** We followed the PDSA model (Plan, Do Study, Act) for this quality improvement initiative. Our team included five residents in collaboration with the Ascension Heart Failure Clinic Nurse Practitioners (HFC NP) and IT. Residents met with HFC NP to discuss current procedures and opportunities for modifications to improve clinic attendance rates and discovered there was no formal communication system in place for post discharge follow up. To address this gap in care, resident physicians used a script and personally made the calls to the HF patients within 1-2 days after discharge to ensure a follow-up appointment was scheduled and remind them about this appointment. The intervention was implemented over a 3-month period. Attendance at follow-up visits was confirmed by HF NP and readmission rates determined by review of the electronic medical record. For our PDSA cycle 2 we decided to look at cause of readmission and found that 2/3 of our patients were readmitted for a primary cause other than CHF specifically pneumonia (PNA). With this information we altered our script to include questions regarding antibiotic adherence and follow up.

**Results:** From September to December 2019, 12 patients were admitted and treated for HF exacerbation. Among the 8 who were discharged, 5 (63%) attended post-discharge clinic visits as prescribed and none of these patients were readmitted within 30 days. All patients who failed to attend their post-discharge clinic visit (n=3) were readmitted within 30 days. Patient barriers to follow up included lack of transport, frustration with too many appointments, and feeling as though attendance was not necessary because of access to home care workers or living in a nursing home. Systems barriers included inability to identify patients hospitalized for HF over the weekends and no protocol for documenting follow-up calls. Of the 3 that were readmitted, 2 were found to have a primary cause of admission as PNA.

**Discussion:** Calling HF patients in the days immediately after their discharge for exacerbation improved follow-up at HF clinic and in turn, reduced rates of readmission. Moving forward we would like to implement a sustainable system for follow up calls rather than having residents assigned. We would like to conduct further in-depth analysis with regards to association between HF and PNA.



***Observation Status Patient Discharge Optimization in the Setting of an Academic Residency Program***  
**Peter Ly, MD, Taisia Litvinow, DO, Salieha Zaheer, MD,\* Elizabeth Towner, PhD\***

**Background:** Hospital patients can be placed in two categories upon admission: inpatient or observation status. Admitting physicians select the appropriate status of patient stay based on presenting condition, diagnosis, severity and possible time required to improve prior to safe discharge. Observation status stay is given when physicians anticipate patients will be treated and discharged in <48 hours. If a patient categorized as observation status exceeds 48 hours, then the stay is not reimbursed, which is a burden on hospital resources. Ascension Providence Rochester Hospital identified timing of teaching rounds as the number one barrier to observation discharge. The objectives of this quality improvement initiative were to examine the impact of (1) a brief (2-week) elective rotation on reducing observation status patient length of stay and (2) education on resident and attending knowledge of observation status discharge process.

**Method:** We followed PDSA model (Plan, Do, Study, Act) for this quality improvement initiative. Two residents completed the elective rotation. The first part of the elective included a) comprehensive review of observation status patients in the month prior to the intervention, b) discussion with the hospital multidisciplinary (MDR) team about current protocols for observation status patients, and c) assessment of resident and attending knowledge about observation status patient protocols. Information gleaned from these efforts informed protocol revisions to appropriately triage (i.e. transfer to inpatient status) and decrease delay (e.g., expediting home oxygen evaluations) in discharge of observation patients and a 2-part didactic for residents and attendings.

**Results:** In the month prior to intervention, 10 patients were admitted under observation status and had an average hospital stay of 33.9 hours. During the intervention period, 7 patients were admitted and had an average stay of 19.3 hours. Prior to the didactic education, 87% ( $n = 13$ ) of residents answered 50%> of questions about observation status correctly. This improved to 100% at following the education intervention. Attendings ( $n = 3$ ) answered all questions correctly at both assessments.

**Conclusion:** Unnecessary stays beyond 48 hours have consequences to patients, providers, and the hospital. Our inpatient observation elective rotation decreased length of stay for observation status patients. The largest impacts came from establishing patients' expectations from the start, early rounding, keeping in close contact with specialists onboard. Didactic education also improved resident knowledge of observation status patients' discharge process. Given the success of this elective rotation, next steps include developing an inpatient medicine observation team comprising of one to two residents who will be responsible for observation patients' timely triage and discharge.

## **INTERNAL MEDICINE**

\*Indicates a faculty mentor

### ***Improving Morning Hospital Discharges in an Inpatient Internal Medicine Service*** **Reina Badran, MD, Ankita Aggarwal, MD, Frederick Bittner, MD, Brandon Dmytruk, MD, Mohammad Fityan, MD\***

**Problem:** Morning hospital discharge is a concept that is gaining popularity worldwide amongst various health institutions. University Health System Consortium described 50% of discharges in the morning as clinical “best practice.” This concept stems from recent studies highlighting the positive effect of early discharge on various aspects of patient safety and quality of care. Early discharge of medically stable patients has been shown to improve patient flow and reduce boarding time in the emergency department. This, in turn, prevents overcrowding of emergency departments and reduces wait times, thereby improving patient satisfaction. In addition, timely discharge reduces length of stay as it results in timely transfer of new admissions from the emergency department to the floor, which results in better utilization of the admission day in terms of diagnostic and therapeutic management. Despite the known benefits, timely hospital discharge remains a challenge. Studies done to understand the barriers to early discharge have found multiple reasons, most common of which is late discharge order placement by physicians.

**Methodology:** The PDSA cycle was used to guide and format this project. During PDSA cycle 1, the IT department provided hospital-wide data regarding the number of discharge orders placed prior to noon for inpatients on the internal medicine (IM) teaching service in June 2018. Root cause analysis revealed that the discharge of medically stable patients was often delayed because of lack of awareness among physicians about the benefits of timely discharge and lack of appropriate planning for the upcoming discharge ahead of time. A mandatory educational session outlining the benefits of early hospital discharge was conducted January 2019 for resident physicians on this service. Data was then collected for January-February 2019. During PDSA cycle 2, we explored the effect of incorporating this educational material into the mandatory monthly floor orientation sessions to provide frequent reminders to the resident physicians since the end of PDSA cycle 1 (March 2019). Data was collected for October-December 2019.

**Findings:** Of the total number of discharges, 59.87% of patients were discharged prior to noon by the IM teaching service in October-December 2019. This is a significantly higher percentage in comparison to our PDSA cycle 1 result, which was 17.33%.

**Conclusion:** There was significant improvement (42.54%) in the percentage of discharges prior to noon among an inpatient teaching service after incorporating educational materials into mandatory monthly floor orientation sessions. We plan to continue to do so and expand the educational session to attending physicians as well.

***Improving Resident Error Reporting: A QI Initiative***  
**Anubhav Jain, MD, Padmini Giri, MD, Verisha Khanam, MD, Sarwan Kumar, MD,\***  
**Vesna Tegeltija, MD\***

**Problem:** In 2014, our hospital was evaluated by CLER and lack of error reporting by residents was recognized as an area of concern. This project's aim is to improve error reporting by resident physicians.

**Method:** We are using the IHI model to guide this study, structured around Plan Do Study Act (PDSA) cycles.

**PDSA 1: Plan:** As a part of a root cause analysis a survey was conducted. Over 30% of residents replied that they are, "not sure what constitutes a medical error," 21% admitted that they are "unaware of the process that occurs after errors are reported." Brainstorming was used to identify areas of improvement. **Do:** Education was provided to residents during a conference and focused on defining medical errors. Residents also participated in an interactive session demonstrating a step-by-step approach to reporting an error. **Study:** Post education, there was an overall improvement in resident error reporting from one report per year to five reports in three months. **Act:** Desirable outcomes were achieved with the first PDSA cycle.

**PDSA 2: Plan:** Brainstorming using fishbone diagram, we identified the need for a multidisciplinary team to address reported errors. A team, including hospital administration, quality department and program directors was developed to investigate and ultimately implement change in response to the reported error. **Do:** Workflow process was created. Process begins with error report placement. It is received by quality department who reviews and sends the report to relevant departments. The involved departments provide feedback to the QI department. The conclusion is then sent to the program director and communicated to the resident who filed the report. **Study:** Following implementation of the workflow process, a total of 12 reports were placed and communicated back to residents in a one-month period. In a six-month period, 75 errors were reported by residents, with 100% response from the hospital regarding each error. **Act:** Our study revealed favorable outcomes with an overall improvement in the number of error reports generated by residents.

**PDSA 3: Plan:** A survey was conducted to assess additional barriers. Responses regarding encouraging environment and encouragement by seniors to report errors were collected. **Do:** Incoming PGY-1 class was educated regarding the error reporting system, workflow and what constitutes an error. Seniors were reeducated to promote error reporting. **Act & Study:** A survey with 10 questions was sent out to all residents about error reporting. More than 90% of residents are aware of the process of error reporting, have been encouraged to report an error, and are comfortable reporting errors. 87% of residents reported "time consuming" as a reason for not reporting errors. Will implement the suggestions of this study through more feedback to the residents and protected time/encouragement for error reporting.

**Findings:** Resident error reporting has shown some improvement, and promising results were achieved with education. Continued improvement in error reporting was seen following implementation of workflow process and incorporation of multidisciplinary teams for error resolution. This resulted in improved satisfaction and engagement of more residents in error reporting. Medical errors represent opportunities for improvement. Reporting and resolution of errors ultimately results in improved patient safety. We are currently working to involve attending physicians and senior residents to incorporate error reporting discussions into daily rounds. Our plans also include further education, especially for the upcoming intern class and implementing protected time/encouragement for error reporting.



### *ICU Transition of Care*

**Victoria Gonzalez, MD, Bernadette Schmidt, MD, Danyal Taheri Abkouh, MD, Zain Kulairi, MD,\*  
Sarwan Kumar, MD\***

**Problem:** Transition of patient care from the Intensive Care Unit (ICU) to the medical wards has been identified as imperative for communication and accuracy in these patients who are at high risk for potential harm due to medical errors. This time is crucial, as the lack of a universal standardized hand-off could lead to detrimental consequences. Previous studies have focused on the Transition of Care (TOC) within specialties, particularly in: OR to ICU, and shift-to-shift hand-offs. However, the complexities of transitioning a patient from the ICU to the medical wards safely and effectively are less understood. This increased risk for adverse events is thought to be a multisystem failure due to the lack of standardization of the communication, process, and policies surrounding ICU TOC. Our focus is to formulate a standardized transfer process that improves documentation, policy and puts emphasis on communication. Our aim is to create a hand-off template to streamline when transferring a patient from ICU to medical wards with a goal of appropriately incorporating this tool in 25% of cases in the first month of implementation.

**Methods:** Initially, an observation was made that there was no standard process for physicians and residents when handing-off patients from the ICU to the medical ward. Following the IHI, a fishbone diagram was used to identify areas of improvement in the hand-off process. The persons involved, process, policy, and communication were identified as contributing factors in formulating a standardized TOC process. After observing the need for this process to become ubiquitous, using the Plan Do Study Act (PDSA) cycle, literature was reviewed, and a TOC template was formulated. The template includes key components of the patient's ICU course to serve as a short summary to guide providers during this crucial transition period. Internal medicine residents, faculty, ICU attendings and the ICU committee were educated on the implementation and the use of the new macro TOC template with the goal of a 25% use of the template in the first 1 month.

**Findings:** Of all ICU cases reviewed from November to December 2019, 0% revealed any form of hand-off documented at the time of patient transfer out of the ICU. After formulating the template, educating users and implementing its use in February 2020, data was collected. Charts of 65 patients admitted to the ICU from February to March 2020 were reviewed. This analysis revealed that a total of 53.8% (35) had a documented successful hand-off with appropriate use of the template and provider to provider communication. There were 30 (46.2%) documented transfers which either used the template inappropriately or not at all and thus, deemed as incomplete patient TOC.

**Conclusion:** The goal of this QI project was to use a multisystem approach to formulate a standardized transfer process to ensure patient safety. The success of this initiative was attributed to the paradigm created which, ultimately led to improved communication, and a fundamental change in culture. In implementing this new TOC tool, the need for a standardized medication reconciliation from ICU to medical wards was magnified, and of which will be the focus of the upcoming PDSA cycle moving forward. The ultimate goal remains the same, focusing on improvement in patient care by implementing a standardized multisystem process centered around safe and effective communication in the patient TOC process.

## *Improving Management of Inpatient Diabetes During Hospitalization*

**Raashi Chawla, MD, Saad Chaudhry, MD, Kristen Hughes, MD, Shubkarman Dhillon, MD,  
Vesna Tegeltija, MD\***

**Rationale:** Hypoglycemia is a potentially fatal condition that is frequently encountered during hospitalizations. Endocrinology societies have recommended discontinuation of oral hypoglycemic agents during inpatient hospitalization to avoid unpredictable glucose levels. Newer guidelines have been established for management of diabetes in the hospital with the use of basal and bolus insulin in addition to sliding scale. Recent studies have shown that insulin sliding scale alone is inferior to a basal/bolus regimen in achieving adequate blood glucose control for hospitalized patients. However, our community hospital did not have an updated policy regarding the initiation of long acting basal insulin for insulin naïve diabetic patients, resulting suboptimal control of blood sugars during their inpatient stay.

**Aim:** Our aim was to improve overall blood glucose control inpatient with avoidance of hyper and hypoglycemia. This was achieved through an inter-disciplinary approach with providing education to physicians and resident staff, and utilization of an EMR check-point system with pharmacy to help adhere to guideline therapy.

**Method:** We used the Institute for Healthcare Improvement model to guide our quality improvement project.

**PDSA 1:** Our interdisciplinary QI team, including residents, endocrinologists and pharmacists, reviewed the charts of patients who received oral hypoglycemic agents. Our team created a presentation that outlined the current society recommendations regarding management of hyperglycemia in the hospital with the use of basal and sliding scale insulin. The results revealed a 70% overall reduction in prescribing oral hypoglycemic agents. However, we noted that patients who were switched to insulin in the hospital only received sliding scale and were noted to have hyperglycemia.

**PDSA 2:** Although patients who had orders for oral hypoglycemic medications were automatically switched to sliding scale insulin by the pharmacy system, these patients did not receive a basal insulin regimen. Root cause analysis revealed that new incoming residents were unaware of the hospital policy. We provided education to residents regarding our oral hypoglycemia transition policy. Our plan is to assess number of hospitalized patients who received both basal and short acting insulin and evaluate the rate of hyperglycemia and hypoglycemia.

**Conclusion:** Limiting the use of oral hypoglycemic medications in the hospital, by substituting insulin, leads to more consistent glucose and thus less unpredictable blood sugar level. Our pilot study revealed promising results as the overall use oral hypoglycemic medications in the hospital decreased. However, barriers remain, as physicians are not ordering basal insulin coverage due to fear of hypoglycemia. We plan to further educate and expand our study to private physicians with admitting privileges and nursing staff.

## ***Overutilization of Amylase and Lipase Testing in Acute Pancreatitis***

**Laith Al-Janabi, MD, Yashar Eshman, MD, Mulham Hamdon, MD, Vesna Tegeltija, MD\***

**Rationale:** Acute pancreatitis is one of the most common gastroenterology related hospital admissions in the US, costing over \$2.6 billion. The American College of Gastroenterology has published clear guidelines regarding diagnosis and management of acute pancreatitis. Guidelines suggest that serum lipase alone is sufficient to diagnose acute pancreatitis. Repeating either lipase or amylase has no role in monitoring or management of acute pancreatitis. Despite these recommendations, concurrent ordering of serum amylase and lipase during diagnosis and follow-up of acute pancreatitis is common at many institutions.

**Aim:** Our aim is to reduce concurrent ordering of amylase and lipase in diagnosis and follow-up of acute pancreatitis by more than 50% in one year at our hospital.

**Methods:** The Institute of Healthcare Improvement model was used for this quality improvement project. An interdisciplinary team approach was utilized which included IM physicians, ED physicians, lab staff and EMR specialists. The Plan, Do, Study, Act (PDSA) cycle was used to guide and format this project. Root caused analysis was investigated using the fishbone diagram. Retrospective chart review was performed. The team reviewed 111 patients who were admitted to the hospital with acute pancreatitis. In the ED, both amylase and lipase levels were ordered at the time of acute pancreatitis diagnosis in 109 of the 111 patients. Furthermore, 82 percent of the patients who were diagnosed with acute pancreatitis had amylase and lipase levels repeated during their hospitalization.

A PowerPoint presentation was created to summarize current ACG acute pancreatitis guidelines. This education was provided to family medicine residents, internal medicine residents and attending physicians.

Following education, we reviewed 150 patients over 3 months. There was no improvement in co-ordering of amylase and lipase to diagnose pancreatitis. Further analysis revealed that out of 150 patients, only 13 patients (8.7%) had repeat testing of amylase and lipase during the hospitalization. This is a significant decrease compared to 82% noted in the pre-intervention data.

The average cost of amylase and lipase testing is \$35 and \$55 respectively. After implementation, 137 patients did not have repeated labs which sums up to \$12,330. Over a course of one year this savings would equal to nearly \$50,000. The project made not only a financial impact but it also decreased amount of complication associated with repeat blood draws and may have improved LOS. Although the project achieved tremendous success in decreasing repeated testing, the team hopes to further improve unnecessary co-ordering of both amylase and lipase on admission.

The team noted that the ED EMR order set for abdominal pain contains a pre-selected lab testing of both amylase and lipase. Our team has recruited an EMR specialist to address this system-wide culprit. We plan to deselect amylase from the order set, as ordering both serum amylase and lipase in cases of suspected pancreatitis is unnecessary.

**Conclusion:** Despite guidelines and evidence, co-ordering of serum amylase and lipase during diagnosis and management of acute pancreatitis is common at many institutions. This leads to unnecessary lab draws that affect patient safety in addition to increased healthcare costs. Nearly 100% of patients at our institution had both amylase and lipase ordered during diagnosis of acute pancreatitis and 82% had repeat testing inpatient. Our project decreased repeat testing by 73% following education. Unwarranted testing and lab expenditure can be reduced by ordering lipase alone during diagnosis of acute pancreatitis. With system-based EMR best practice alerts, we plan to decrease admission co-testing by more than 50% in the next year while sustaining success with unnecessary repeat tests.



***“Cardiac Care Checklist”: An Initiative to Improve the Screening of Cardiovascular Diseases in a Resident-Driven Internal Medicine Clinic***

**Ankita Aggarwal, MD, Anubhav Jain, MD, Mishita Goel, MD, Zachary Johnson, MD, Joseph Zebelian, MD, Sarwan Kumar, MD\***

**Problem:** Despite advent of new treatment modalities, 1 in every 4 deaths are still related to atherosclerotic cardiovascular disease (ASCVD) making it the leading cause of mortality in United States. As per the recent guidelines from ACC/AHA, 80% of these events are preventable through promotion of healthy lifestyle. However, various studies have shown that adherence of these guidelines remains low. We aimed to increase compliance of screening for risk factors of cardiovascular diseases in adults aged 40-75 years without established ASCVD by 50% in 6 months in our primary care clinic.

**Methodology:** A QI team was formed which included internal medicine residents and faculty. Model for improvement as described by Institute for healthcare Improvement (IHI) was used to design the study. Plan-Do-Act-Study (PDSA) cycle was used to test the change post implementation. *Plan:* A retrospective chart analysis of adults 40-75 years without established cardiovascular disease from our clinic was conducted. Compliance with screening for ASCVD was assessed in terms of proportion of eligible patients screened during their annual physical exam. A root cause analysis was performed to identify the reasons for low screening rate using a fault tree. It revealed lack of knowledge, awareness among residents and lack of well described process for screening and documentation. *Do:* For the ease of remembering and use, a “cardiac care checklist” outlining the ASCVD risk factors as described by ACC/AHA in alphabetical order (A: ASCVD, B: Blood Pressure, C: Cigarettes, D: Diet, E: Exercise, F: Fat [lipid panel], G: Girth [BMI], H: HbA1C) was created and made available to the residents and faculty. A mandatory educational session was conducted for the internal medicine residents and faculty in first week of February 2020 to create awareness regarding the importance of and process of screening of cardiovascular disease. Based on the feedback from the session, a text macro was created in the electronic medical record (EMR) to streamline documentation. Paper forms of the checklist and steps to use the text macro were also made available in the clinic. *Study:* Data was again collected and assessed for compliance with screening for the described risk factors. *Act:* More such sessions will be conducted to reiterate the information. In current PDSA cycle we addressed system and provider-based problems. For the next PDSA cycle, we plan to further improve screening by involving patients in the process.

**Findings:** 300 patients underwent annual physical examination in the academic internal medicine clinic. After removing patients with incomplete records, 159 patients were left for analysis. None of the patients were screened for all the ASCVD risk factors. Significant variability existed between assessment of individual risk factors. A month after the session, an improvement of 30% in screening for the overall with significant improvement ranging from 9% to 42% in documentation of individual risk factor was observed.

**Conclusion:** Our study revealed low screening rates for cardiovascular diseases. Creating awareness and streamlining the process showed encouraging improvement within a month. We expect to achieve our set goals in the specified time.

*Establishment of a Program Wellness Committee: Faculty, Resident Partnership for  
Addressing Wellness Issues*

**Victoria Gonzalez, MD, Bernadette Schmidt, MD, Neeharika Ralh, MD, Mohammad Fityan, MD\***

**Background:** Wellness is a multifaceted: it is a balance of physical, emotional, and intellectual domains. Increased rates of burnout are associated with a decreased personal and professional satisfaction; resulting in an increased number of physicians leaving medicine.

**Aim:** Generate a model of multi-level cooperation that recognizes the signs of burnout and promotes respect, self-confidence, and delivery of high-quality patient care.

**Methods:** Following the IHI Model, in March 2018, the Wayne State Internal Medicine Program established a Wellness Committee to recognize resident burnout. Monthly meetings with faculty and residents targeted personal and institutional values to reduce burnout. Education was provided to resident physicians, and an anonymous survey was created to assess work environment, personal satisfaction, nutrition, and physical activity.

**PDSA 1:** During PDSA cycle 1, survey results reflected that the most robustly positive responses were linked to vitality of work, co-worker support, and connection to their work. The lowest scores were seen when asked about the validity of their work in “making the world a better place” and the eagerness to return to work.

**PDSA 2:** Resident work-satisfaction, sense of validity, and meeting basic and nutritional needs was the focus of PDSA cycle 2. To focus on personal reflection, a senior resident/intern mentor program, referral for free yoga and meditation classes were introduced. This resulted in an improvement in both the areas of focus, pride in work, connection to work, and enjoyable patient interactions. In general, there was a favorable upward trend in most areas with no significant areas of decline.

**PDSA 3:** The focus of PDSA cycle 3 was sustainability. The Wellness Committee now included representatives from each class who also attended monthly PEC meetings. A weekly resident led meditation group was implemented during protected time provided. The emphasis of this initiative was to introduce mindfulness; as a tool to carry into their personal and professional practice. Results showed that residents remained deeply connected to their work with sustained validity, vitality and a significant increase in patient interactions. The majority of responses in relation to tragedies at work were unfavorable and eagerness to return to work continued to be one of the lowest scoring areas.

**Discussion:** Wellness initiatives shifted to focus on introspection and reflection with an emphasis on resident and faculty support in PDSA cycle 3. This was reflected in not only the connection, validity and vitality of work, but also by a large increase in meaningful patient interactions. Lowest scoring areas focused on: response to tragedies at work and eagerness to work. This could have been influenced by the timing of the survey conduction, as it was during the projected peak of the COVID-19 pandemic. Conducting multiple yearly surveys in the future will facilitate detecting trends in a timely fashion and allow for immediate action.

### *Improving Sepsis Care in a Community Hospital*

**Radha Adusumilli, MD, Manishkumar Patel, MD, Jurgena Tusha, MD, Michael Meehan, MD, Sarwan Kumar, MD,\* Vesna Tegeltija, MD\***

**Background:** Sepsis is one of the leading causes of hospitalizations and death worldwide. Inpatient sepsis treatment protocols have been developed and standardized to decrease mortality across different healthcare systems. The Surviving Sepsis Campaign is a global initiative to reduce mortality from sepsis. This campaign utilizes a multidisciplinary approach to implement protocols that have been shown to improve outcomes in sepsis. Time specific bundles call for providers to complete different tasks based on lapsed time since recognition of sepsis in order to improve outcomes.

The one-hour sepsis bundle includes measuring lactate, obtaining blood cultures, administering antibiotics and administering fluid if the patient is hypotensive or has an elevated lactate level of more than 4 mmol/L. A follow up three and six-hour bundle call for the provider to re-evaluate the patient, repeat Lactate and make necessary changes to fluid depending on the clinical condition.

**Aim:** The aim of this project is to improve compliance with sepsis follow up in our community hospital by 50% in one year.

**Methods:** Using the IHI Model, a quality improvement project was initiated. A multidisciplinary sepsis team was created including the ER physician, code physicians, IM residents, nurses, pharmacists and EMR representatives. The team had monthly sepsis meetings which focused on performing a root cause analysis and developing improvements in the system. Prior to this, there were no hospital specific protocols in our community hospital. Physicians treating sepsis were using individual approach and follow up. The root cause analysis identified multiple different deficits and areas for improvement. Education about sepsis outcomes, gaps and protocols was provided to the entire hospital staff via grand rounds and department meetings. Protocols were established. Residents were educated about documenting adherence to protocols using a template in the EMR labeled as a three hour and a six-hour bundle. Following implementation, we are collecting data to analyze compliance with documentation in terms of follow up.

**Conclusion:** Improving Sepsis outcomes has been a worldwide goal, utilizing surviving sepsis campaign guidelines. Most effective and sustainable results are usually created using a system-based approach. Our team plans to continue education to incoming residents and eventually have a sepsis alert through the system. This alert would prompt physicians to perform the follow up and complete an assessment in the EMR.



## *Process to Improve Cardiac Telemetry Use in a Community Hospital*

**Manishkumar Patel, MD, Gloria Hong, MD, Ankita Aggarwal, MD, Ameer Khan, MD,  
Zain Kulairi, MD,\* Vesna Tegeltija, MD,\* Sarwan Kumar, MD\***

**Background:** Inpatient telemetry monitoring is commonly used to identify arrhythmias and ischemia and can be life-saving. The ACC/AHA have classified telemetry use as class I (indicated), class II (may be beneficial) or class III (unlikely to benefit). Strict adherence to these telemetry guidelines led to patients benefiting from the monitoring while causing a decrease in alarm fatigue, an increase in telemetry bed availability, and a decrease in cost. Our QI project assessed the appropriateness of telemetry utilization in our community hospital and formed unique processes to decrease inappropriate telemetry use while also remaining strictly adherent to the ACC/AHA guidelines.

**PDSA 1:** We discovered that a telemetry order can be placed without selecting an appropriate indication for its use. An ACC/AHA guideline-based list of indications was integrated into our EMR, where an indication would need to be selected before completion of the order. Post-implementation review revealed no improvement in adherence due to the physician's ability to bypass this checklist.

**PDSA 2:** Educational sessions were provided to IM residents to document telemetry alarms in their progress notes. A review of 50 patient charts showed 30% had documented telemetry alarms in their progress notes, however, despite negative alarms during hospitalization, there was no reduction in telemetry discontinuation. 60% had no appropriate indication for telemetry continuation after 72 hours.

**PDSA 3:** A pop-up was integrated into the EMR which appeared at 72 hours after the telemetry order was placed. This contained the telemetry indications and was aimed to guide physicians on whether it was appropriate to renew the telemetry order or to discontinue if no longer indicated. Post-implementation review revealed 34% telemetry use was addressed by either renewing or discontinuing the telemetry order. It was also found that physicians were frequently bypassing the pop-up.

**PDSA 4:** Physician education sessions were conducted to emphasize telemetry indications, reminding physicians not to bypass the pop-up and to re-address telemetry indication status or discontinue telemetry. Post-implementation review of 50 patients showed no further improvement in the discontinuation of telemetry.

**PDSA 5:** Nurses were encouraged to provide daily reminders during physician rounds of a patient on telemetry and any significant alarms in the past 24 hours. Post-implementation review of 40 patients showed an improvement to 65% appropriate telemetry use at 72 hours.

**Conclusion:** Our project has been successful in bringing attention to the overuse of telemetry. Physicians are now required to select a telemetry indication when placing an order and are also reminded to re-address telemetry indication status with the 72-hour pop-up. Overall, in a small community-based hospital our QI project showed a simple pop-up on an EMR, as well as including nursing staff in reminding physicians about telemetry alarms, help to decrease inappropriate telemetry use.

***Process Improvement to Reduce Inappropriate Use of Total Parenteral Nutrition***  
**Vera Pochtarev, MD, FNU Sourabh, MD, Kristen Hughes, MD, Tapasya Mandalapu, MD, Vesna Tegeltija, MD,\* Sarwan Kumar, MD\***

**Problem:** Total parenteral nutrition (TPN) was developed to provide intravenous nutrition to patients unable to tolerate oral feeding. Although TPN provides life-saving nutrition, inappropriate utilization is associated with complications such as catheter-related sepsis, metabolic abnormalities and acid-base disturbances. Careful patient selection, appropriate formulation, and close monitoring can minimize these effects. Compared to national averages, overutilization of TPN was noted in our community hospital by the pharmacy committee. Our quality improvement project aims to reduce unnecessary inpatient TPN use by 25% in one year.

**Methods:** We used the institute for healthcare improvement model to guide our quality improvement project. A multidisciplinary QI team was formed, including physicians, a pharmacist, a dietician and an EMR specialist. PDSA (Plan-Do-Study-Act) cycles were used to evaluate and implement this quality improvement project.

**PDSA 1:** We performed a root cause analysis using a fish bone diagram to evaluate the process of ordering TPN. We identified several problem areas. For one, the method in which TPN was ordered was changing. In 2017 TPN prescriptions were changed from paper orders to an EMR system which allowed pharmacy to monitor orders closer and encouraged documentation of indication for treatment. In 2018, the supplier of TPN changed with new ownership of the hospital, which returned the orders back to paper. However, orders were to be placed daily via verbal order with the pharmacist, further involving pharmacy in monitoring TPN use. In addition, our QI team reviewed patient data from the 2017 TPN orders and identified IM residents contributed to 3 inappropriate orders. We created an educational power point presentation on TPN for our residents. In 2019, a pharmacy consult became mandatory giving independence to pharmacists to work with nutritionists to tailor TPN on a daily basis. The physician's role was to initiate and stop TPN.

**Findings:** Our team reviewed patient data from 2017 and 2018 TPN orders. We compared the amount of inappropriate orders between the two years based on guidelines. We found that, prior to our intervention, in 2017, 24.6% (17/69) of orders did not have appropriate indications. Following our intervention, 8.3% (8/96) of orders were inappropriate in 2018, a 66.26% drop in inappropriate TPN utilization in two years. The IM resident education in 2017 was helpful to reduce inappropriate orders from 3 to 0 in 2018. In 2019, 10/95 (10%) of orders were inappropriate, indicating that initiating a mandatory pharmacy consult helped sustain our previous results.

**Conclusion:** Total parenteral nutrition is a prescription with many side effects and is costly to the healthcare system. Specific indications for its use have been developed by ASPEN and ACG. Despite these guidelines, TPN orders have been over utilized without clear indications. Education, EMR changes, and increasing pharmacy and nutritionist involvement have resulted in a substantial decrease in inappropriate TPN prescriptions at our community hospital. We believe that the sustainability observed this year is a result of a strong interdisciplinary approach to prescribing TPN. Collaboration between pharmacists and nutritionists has resulted in daily personalized adjustments to TPN, ensuring exceptional patient centered care. However, only the physician can place the order to initiate or stop TPN order. We believe that an interdisciplinary approach to deciding appropriateness of initiating TPN can further improve TPN utilization and will be the basis of our next PDSA cycle.

### *Decreasing Inappropriate Use of Vancomycin*

**Mulham Hamdon, MD, Ankita Gandhi, MD, Mohammad Abu, MD, Sarwan Kumar, MD,\*  
Vesna Tegeltija, MD\***

**Problem:** Vancomycin has become a frequently prescribed antibiotic in the hospital as empiric treatment for variety of infections. CDC developed criteria for appropriate use of Vancomycin, but despite this intervention, inappropriate Vancomycin use is reported to be between 20% and 70%. Although this is an excellent antibiotic in specific, indicated situations, it does carry many side effects including nephrotoxicity, neutropenia and thrombocytopenia. Furthermore, since it is given via parenteral route, it requires close monitoring to assure therapeutic effect. Lastly, overusing Vancomycin increases risk for resistant infection. Our community hospital was noted to have one of the highest Vancomycin usages compared to other healthcare systems. Our QI project aims to reduce inappropriate prescribing of Vancomycin, which would result in decreased cost, improved quality and patient safety.

**Methodology:** Our team used IHI to guide the project. Antimicrobial stewardship committee and pharmacy provided Vancomycin usage data. During root cause analysis, the team noted that Vancomycin is frequently prescribed to treat lower respiratory infections without evidence of MRSA infection. As a result, an interdisciplinary team developed a policy addressing appropriate Vancomycin use criteria for treating pneumonia. The policy was introduced to the medical staff and resident physicians.

**Findings:** Prior to implementing our Vancomycin use policy, from September 2019 through December 2019, 30-40% of total Vancomycin ordered in our hospital was used for the treatment of pneumonia. Our team implemented a new policy to decrease Vancomycin use by requesting testing for MRSA using a nasopharyngeal swab in cases where Vancomycin is ordered to treat pneumonia. As this test has high negative predictive value, Vancomycin should be stopped if this test is negative. We implemented the intervention and educated resident physicians in Jan 2020. We are in the process of collecting post implementation data to evaluate our Vancomycin use in the treatment of pneumonia based on MRSA proven culture testing.

**Conclusion:** Decreasing inappropriate Vancomycin use will decrease Vancomycin adverse effects, cost and resistance. This would result in improved patient safety and quality of care. Implementing a policy that calls for testing for MRSA in order to continue Vancomycin course would result in appropriate treatment of patients and elimination of unnecessary use of Vancomycin when treating pneumonia.



## *Improving Indicated Administration of Vitamin K in Patients with Supratherapeutic INR*

**Monica Dhawan, MD, Laith Al-Janabi, MD, Gloria Hong, MD, Raashi Chawla, MD, Sarwan Kumar, MD,\* Vesna Tegeltija, MD\***

**Rationale:** For patients who are anticoagulated with Coumadin, the annual incidence rate of fatal, major, and minor bleeding has been reported to be five times higher than those not taking Coumadin. Reversal agents including FFP, PCC and vitamin K are available and have improved our approach to supratherapeutic INR levels. Current recommendations for reversal of supratherapeutic INR, developed by the American College of Chest Physicians (ACCP), are based on the presence of active bleeding and INR values. These guidelines assist physicians in appropriate dosing of antidotes. However, despite availability of guidelines, inconsistent doses of vitamin K were frequently observed in our community hospital. The AIM of our project is to improve adherence to ACCP guidelines when correcting supratherapeutic INR levels by 50% in one year.

**Method:** The IHI model was used to guide and format this project. A Plan-Do-Study-Act (PDSA) cycle was used to test change. In the first PDSA cycle, a chart review of 160 patients admitted with ICD9 billing code for supratherapeutic INR revealed 35 patients on Coumadin whom had received vitamin K as a reversal agent. For patients with an INR 5-9, 57% received the appropriate vitamin K dosage, all of those with an INR greater than 9.0 were managed in line with ACCP protocol and a total of 31% of patients received vitamin K in the absence of an indication. Root cause analysis identified that many physicians were unaware of ACCP guidelines and there was a lack of a unifying reference in the EMR. In order to increase physician adherence to ACCP guidelines, in collaboration with IT and pharmacy, a best practice pop up screen was developed that included ACCP recommended doses of vitamin K based on INR levels and bleeding. Following implementation of a system-based intervention, 50 cases were reviewed, of which 22 were on Coumadin and received vitamin K. For patients with an INR of 5-9, 50% received the appropriate dose of vitamin K, those with an INR greater than 9, only 20% received the guideline recommended dosage of vitamin K and 17% of patients received vitamin K in the absence of an indication. A follow up chart review was conducted on 73 patients, 40 of which were on Coumadin receiving Vitamin K. For patients with INR 5-9, 73% received the correct dose, those with an INR > 9 100% received the correct dose and 47% of patients received vitamin K in absence of indication. Based on these results, the post-implementation data reveals improvement of adherence to ACCP guidelines.

**Conclusion:** Despite availability of guidelines, inconsistent doses of vitamin K were frequently administered in our community hospital. Our project aimed to improve adherence to ACCP guidelines via EMR changes with an interdisciplinary team approach that would target the entire system. Following EMR implementation, and educational sessions, post-implementation data demonstrated improved overall adherence to ACCP guidelines with supratherapeutic INR in our community hospital. However, the percentage of patients who inappropriately received vitamin K increased. This discrepancy was investigated, and an overwhelming majority of these patients were those requiring procedural intervention. In summary, implementation of the pop-up window improved physician awareness and knowledge leading to appropriate vitamin K dosing.

## **COVID-19 RESEARCH PROJECTS (initiated spring 2020)**

\*Indicates a faculty mentor

### ***Impact of Angiotensin-Converting Enzyme Inhibitors on Severity of COVID-19***

**Ankita Aggarwal, MD, Anubhav Jain, MD, Monica Dhawan, MD, Mishita Goel, MD, Jurgena Tusha, MD, FNU Sourabh, MD, Ameer Khan, MD, Verisha Khanam, MD,\* Vesna Tegeltija, MD\***

**Background:** Coronaviruses are a large family of viruses that have been around for many years and may cause illness in humans or animals. In humans, coronaviruses cause respiratory infections ranging from the common cold to more severe diseases. In early December 2019, the first pneumonia cases of unknown origin were identified in Wuhan, China. The pathogen has been identified as a novel (NEW) enveloped RNA betacoronavirus that has currently been named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2).

Coronaviruses bind to their target cells through angiotensin-converting enzyme 2 (ACE2), which is expressed by epithelial cells of the lung, intestine, kidney, and blood vessels. The expression of ACE2 is substantially increased in patients treated with ACEi and ARBs.

Hypothetically, the increased expression of ACE2 would facilitate infection with COVID-19 and treatment with ACE2-stimulating drugs may increase the risk of developing severe and fatal COVID-19.

The goal of this prospective study is to analyze the severity of COVID-19 in patients who are on ACEi and ARB therapy. The study will compare the severity of COVID-19 using IDSA/ATS severity score, intubation, extent of pneumonia, ICU admission and length of stay between patients who received ACEi or ARBs.

**Aim:** To assess severity of COVID-19 pneumonia in patients who receive ACEi or ARBs.

**Methods:** Prospective observational study including adult patients (Age >18 years) presenting to the emergency unit with suspected pneumonia, found to have COVID-19 and receive ACEi or ARBs. Positive COVID-19 pneumonia patient list will be obtained from the COVID-19 team. Patient characteristics will be analyzed to rate the severity of pneumonia using IDSA/ATS criteria. Patients will then be divided into two groups, one group who received ACEi or ARBs and a second group who did not. Severity of pneumonia will be compared in addition to length of stay, intubation, ICU admission, extent of pneumonia based on imaging.

**Study population:** From March 15, 2020 we will evaluate patients aged more than 18 years who present to Ascension Providence Rochester Hospital with COVID-19 positive pneumonia.

**Inclusion criteria:** Any adult patient more than 18 years old who present who present to Ascension Providence Rochester Hospital with COVID-19.

**Exclusion criteria:** Patient age less than 18, no suspected COVID-19, no history of sick contact with patient COVID-19 positive or with travel history to endemic area.

## *Utilizing Serum Markers to Aid in Diagnosing COVID-19 Viral Pneumonia in Patients with Congestive Heart Failure*

**Laith Al-Janabi, MD, Manish Patel, MD, Padmini Giri, MD, Tusha Jurgena, MD, Verisha Khanam, MD, Sarwan Kumar, MD\***

**Background:** Globally, pneumonia is one of the leading causes of hospitalizations and death. In the US, pneumonia accounts for over 4.5 million outpatient and emergency room visits annually. Respiratory bacteria and viruses are frequently detected in specimens collected from patient with pneumonia. Identifying the infectious agents can guide management of the infection and facilitate judicious use of antibiotics. Differentiating bacterial from viral pneumonia based on clinical characteristics is challenging as the clinical signs and symptoms overlap. Patients present with variable symptoms, most commonly a cough. Fever may or may not be present on admission. Adding to the diagnostic challenge is underlying heart failure as it remains a clinical diagnosis and may present itself with some of the same symptoms.

A recently described new virus causing a pneumonia illness, known as COVID-19, is now the cause of a global pandemic. The virus is a contagious global threat that has depleted the world's personal protective equipment (PPE) supply. COVID-19 poses a diagnostic dilemma during which providers continue to utilize the short supply of PPE. Physicians are still learning about COVID-19 and analyzing different characteristics to provide much needed quick diagnostic results and therapeutic option.

The goal of this prospective study is to compare the accuracy of different serum markers in differentiating viral from bacterial pneumonia with concomitant heart failure. Currently, there is a lack of significant research on serum biomarkers and possible utilization towards a definite diagnosis of pneumonia and heart failure. At present, irrational, broad-spectrum antibiotic use and increasing antibiotic resistance in microorganisms are still one of the greatest challenges in clinical settings. The use of biomarkers in clinical practice would not only facilitate accurate diagnosis but would also help to reduce the amount of antibiotics overuse.

**Aim:** To assess value of routine labs and serum biomarkers for diagnosis of CAP in patients with CHF.

**Methods:** Prospective observational study including adult patients (Age >18 years) presenting to the emergency unit with suspected pneumonia. Patient who present to Ascension Providence Rochester Hospital with cough, shortness of breath, fever, diarrhea with or without radiologically finding, history of sick contact with patient COVID-19 positive or with travel history to endemic area. In addition to routine tests/procedures, C-reactive protein (CRP), procalcitonin (PCT), Ferritin, LDH, and brain natriuretic peptide (BNP) levels will be evaluated.

**Study population:** Starting March 15, 2020 we will evaluate patients aged more than 18 years who present to Ascension Providence Rochester Hospital with cough, shortness of breath, fever, diarrhea with or without radiologically finding, history of sick contact with patient COVID-19 positive or with travel history to endemic area.

**Inclusion criteria:** Any adult patient more than 18 years old who present who present to Ascension Providence Rochester Hospital with cough, shortness of breath, fever, diarrhea with or without radiologically finding, history of sick contact with patient COVID-19 positive or with travel history to endemic area, In addition to routine tests/procedures C-reactive protein (CRP), procalcitonin (PCT), Ferritin, LDH, brain natriuretic peptide (BNP) levels were measured. Chest computed tomography was done to verify/exclude CAP.

**Exclusion criteria:** Patient age less than 18, no suspected COVID-19, no history of sick contact with patient COVID-19 positive or with travel history to endemic area.



### ***Gaps in Care of Sepsis Patients with COVID-19 ARDS***

**Saad Chaudhry, MD, Mary Dickow, MD, Bernadette Schmidt, MD, Ahmed Zaki, MD, Ankita Aggarwal, MD, Vesna Tegeltija, MD,\* Sarwan Kumar, MD\***

**Background:** Sepsis is one of the leading causes of hospitalizations and death worldwide. Inpatient sepsis treatment protocols have been developed and standardized to decrease mortality across different healthcare systems. The Surviving Sepsis Campaign, a global initiative to reduce mortality from sepsis, uses a multidisciplinary approach to implement protocols which have been shown to improve outcomes in sepsis. Time specific bundles call for providers to complete different tasks based on lapsed time since recognition of sepsis. The one-hour sepsis bundle includes measuring lactate, obtaining blood cultures, administering antibiotics and administering fluid if the patient is hypotensive or has an elevated lactate level of more than 4 mmol/L. COVID-19 is a disease caused by a novel enveloped RNA betacoronavirus that has currently been named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The disease varies from a mild respiratory illness to severe acute respiratory distress syndrome (ARDS). Patient who progress to ARDS usually require ventilator support and have poor outcomes. Their clinical course may involve secondary bacterial infections and sepsis. Historically ARDS treatment involves conservative fluid approach and even diuretics. Using antibiotics in treatment of ARDS has depended on the underlying etiology.

**Aim:** The aim of our study is to assess adherence to sepsis bundle in COVID-19 ARDS patients who develop sepsis.

**Methods:** This will be a retrospective study including adult patients (Age >18 years) admitted to the ICU with suspected ARDS, found to have COVID-19. A list of positive COVID-19 patient admitted to the ICU from March 15, 2020 to April 15, 2020 will be obtained from the COVID-19 team. Patient characteristics will be collected in an excel sheet including date of admission, date of intubation, patient age, gender, Oxygen requirement, FiO2:PaO2 ratio, chest x-ray findings, Ct chest finding, BNP, echo results, SIRS criteria, antibiotics given, fluid given, lactate level, blood culture results, steroid treatment. This data will be analyzed and severity of ARDS will be calculated in addition to SIRS positivity and compliance with sepsis bundle.

**Study population:** From March 15, 2020, we will evaluate patients aged more than 18 years who present to Ascension Providence Rochester Hospital with COVID-19 positive disease, admitted to the ICU with suspected ARDS.

**Inclusion criteria:** Any adult patient more than 18 years old who present who present to Ascension Providence Rochester Hospital with COVID-19, admitted to the ICU with ARDS.

**Exclusion criteria:** Patient age less than 18, no suspected COVID-19, no ARDS, no ICU admission, negative SIRS.

## ***The MuLBSTA Score: Predicting Risk of Mortality and Disease Severity in Patients with COVID-19 Pneumonia***

***Jurgena Tusha, MD, Verisha Khanam, MD, Vesna Tegeltija, MD,\* Sarwan Kumar, MD\****

**Introduction:** An influx of SARS-COV2 infections has led to several unanswered questions. One such question was how to risk stratify these patients in order to better direct further management. The MuLBSTA score recently developed by Guo L. et al. in Shanghai, China is designed to predict 90-day mortality in patients with viral pneumonia. Since very little is known regarding patients with SARS COV-2 infection and COVID-19 disease, we aim to explore the applicability of the MuLBSTA score in predicting disease severity and risk of mortality in these patients.

**Methods:** A single-center, retrospective chart review of 163 hospitalized patients with COVID-19 pneumonia at Ascension Providence Rochester Hospital from March 15 to April 10, 2020. Several clinical characteristics were reviewed and six risk factors were incorporated into the MuLBSTA score: multilobe infiltrate, absolute lymphocyte count  $\leq 0.8 \times 10^9/L$ , bacterial coinfection, smoking history, history of hypertension and age  $\geq 60$  years. The calculated score was then compared to the primary outcome of mortality and secondary outcomes, which included length of stay and ventilator support. Data collected was then analyzed using SPSS, validity of the data was analyzed using regression analysis and receiver operating characteristic curve.

**Results:** A total of 163 patients were reviewed, of which there was an overall mortality rate of 29.4%, an ICU mortality rate of 50.9%, and ventilator associated mortality of 62.8%. The MuLBSTA score was applied to each patient manually at time of hospitalization. There was a mean MuLBSTA score of 8.67 (4.066) for patients who survived and a mean MuLBSTA score of 13.6 (1.87) for patients who died. There was a significant positive correlation of the MuLBSTA score with mortality (OR = 1.37, 95% CI 1.23-1.53,  $p = .0001$ ). The area under the receiver operating characteristic (ROC) curve of MuLBSTA for predicting in-hospital mortality at time of admission was 0.813(SE 0.037). A positive correlation was also found with ventilator support (OR= 1.30, 95% CI 1.17-1.44,  $p = .0001$ ) and length of stay ( $r(161) = .35, p < .0001$ ).

**Conclusion:** Analysis of data indicated that in patients with COVID-19 pneumonia, the MuLBSTA score successfully stratified hospitalized patients based on severity and accurately predicted overall outcome. This score correlated significantly with mortality, ventilator support and length of stay, which may be used to provide guidance to screen patients and make further clinical decisions. Further studies are required to validate this study in larger patient cohorts.

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