Delays in Patient Care: Insulin Drip Protocol in the ICU vs Emergency Department

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(1) Background & Problem Statement

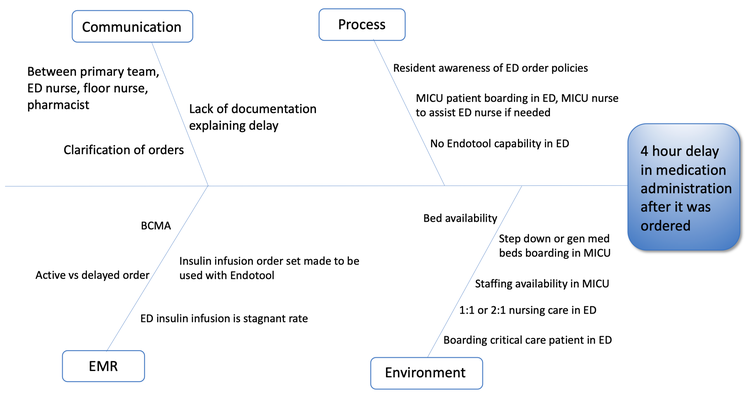
Insulin Drip vs Endotool in ED

- ED can function as ICU (if ICU beds at capacity)
- ED can administer insulin drips, but no titration protocol
- Endotool software not available in ED
- ED nurses not trained on Endotool
- ICU residents, fellows, attendings not trained on titration of insulin drip without use of Endotool

Endotool ≠ Insulin

- Endotool is a software that replaces standard paper protocols for dosing and titrating insulin drips for patients w/ hyperglycemia, diabetic ketoacidosis, hyperosmolar hyperglycemic state
- Fewer incidences of hypoglycemic and hyperglycemic events, hypokalemia, hypophosphatemia, etc.
- Takes into account variety of factors: diabetic status, weight, steroid dosing, renal function, indication for insulin, response to insulin, etc

(2) Fishbone Diagram



(3) Discussion

Emergency room boarding

- ED boarding time >4hrs associated with increased length of stay and hospital mortality[1,3]
- Should ED assume primary of (ICU and floor) patients boarding in ED?
- Dedicated hospitalist-ED team (for medicine patients boarding in ED)
- ED nurses unfamiliar with resident orders/ names; expect admitting physician to CALL to obtain necessary labs, medications

Expansion of Emergency rooms

- Will this improve patient flow?
- Increased ED bed capacity has led to unintended consequences of increased boarding time in ED[5]

Active vs Delayed Order

- All depends on WHERE patient is located
- Patient boarding in ED:
  - Active order → Orders (labs, medications, imaging) needed in real time
  - Delayed order → Standard admission orders, morning labs once transported to assigned bed (IF one is available)

(4) Proposed Action Items & Conference Follow Up

ED administration of Endotool	How long would training take? Is it worthwhile (financial and time investment)? Is the software on all the computers? Studies limited
MICU bed availability	Hybrid ED-ICU
Balanced communication	Is verbal communication mandatory once insulin rate was inserted? Whose responsibility? Pharmacist or MD?
Additional Resources	ED pharmacist: Role Bar Code Medication Administration (BCMA)

(5) Next Steps

- ED Administration of Endotool
- Meet with IT to discuss feasibility of downloading Endotool on at least 1 ED monitor
- Meet with Dept of Education to discuss feasibility of training ED nurses on Endotool
- Meet with Chief of Nursing with Director of Emergency Services to discuss logistics of training ED nurses on Endotool

Teams I have already met:

- Deputy Director of Emergency Services
- Chief of Pharmacy Operations

(6) References

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Epidemiology and Clinical Outcomes of Microscopic Colitis: Preliminary results from the Loyola University Microscopic Colitis Registry (LUMiCoR)

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Background

- Microscopic colitis (MC) is a common cause of chronic, watery diarrhea with limited long-term data.
- MC is used as an umbrella term to categorize a subgroup of colitides with distinct clinicopathological phenotypes and no significant endoscopic abnormalities.
- The prevalence of MC exceeds 20 per 10^6 in many countries and MC is found in ~10–15% of patients with chronic watery diarrhea undergoing colonoscopy with biopsy, with higher detection rates in the elderly and females.
- MC consists of 2 distinct histopathological diagnoses:
  - Lymphocytic colitis (LC) marked by >20 intraepithelial lymphocytes (IELs) per 100 epithelial cells (ECs).
  - Collagenous colitis (CC) characterized by >or < 20 IELs/100 ECs and a thickened subepithelial collagen band (>10 microns).
- Variant forms with fewer characteristic features have been reported:
  - Incomplete Collagenous Colitis (CCi)
  - Incomplete Lymphocytic Colitis (LCi)
  - CCi or LCi may represent different manifestations during the disease course or different stages of disease development.
- The differential diagnosis of MC includes resolving infectious colitis and drug-induced colitis from non-steroidal anti-inflammatory drugs (NSAIDs).

Objectives

Primary objective

- Describe the local epidemiology and risk factors for microscopic colitis using a population-based case series.

Secondary objectives

- Describe the frequency of MC and other associated clinical disorders.
- Describe histological changes in a sub-group of patients with MC who underwent follow up colonoscopy after treatment.

Methods

- We conducted a natural language search of the pathology records at our institution from 2008 to 2018 using the words “lymphocytic colitis” and “collagenous colitis.”
- Total sample included patients with either a diagnosis of MC or MCi (CCi/LCi).
- Chart review was performed to obtain data on:
  - Demographics
  - Comorbidities
  - Medication
  - Diagnosis
  - Treatment and Outcomes
- Data were analyzed for descriptive statistics. Logistic regression was used to estimate the unadjusted effects of different variables on MC

Results

Variable	n	Summary Measure
Age (years), Mean (SD)	216	67 (16)
BMI, Mean (SD)	215	27.2 (6.2)
Sex, n (%)	216	
Female		174 (80.6)
Male		42 (19.4)
Race n (%)	214	
Non-white		25 (11.7)
White		189 (88.3)
Hormonal Therapy	174	
Yes		38 (21.8)
No		136 (78.2)
Smoking, n (%)	216	
Yes		113 (52.3)
No		103 (47.7)
Diagnosis	216	
Collagenous colitis (CC)		108(50.0)
Lymphocytic colitis (LC)		87(40.3)
Microscopic colitis “incomplete” (MCi)		21(9.7)

Table 1: Clinical Characteristics of Patients

Variables	LC n=87	CC (REF) n=108	LC vs. CC OR (95% CI) *	P-Value
Smoking				
Yes	44 (50.6)	62 (57.4)	0.76(0.43, 1.34)	0.34
No	43 (49.4)	46 (42.6)		
Statins				
Yes	48 (55.2)	63 (58.3)	0.88(0.50, 1.55)	0.65
No	39 (44.8)	45 (41.7)		
Tricyclic Antidepressants				
Yes	14 (16.1)	6 (5.6)	3.23(1.18, 8.80)	0.02*
No	73 (83.9)	101(94.4)		
Aspirin				
Yes	40 (46.5)	64 (59.3)	0.60(0.34, 1.06)	0.07
No	46 (53.5)	44 (40.7)		
Beta Blocker				
Yes	33 (37.9)	47 (44.3)	0.77(0.43, 1.37)	0.89
No	54 (62.1)	59 (55.7)		
*Logistic regression; unadjusted odds ratio with 95% confidence interval (C.I.) P-value <0.05 statistically significant.				

Table 2: Association of smoking and medication with LC compared with CC

Variables	Cci/LCI n=21	CC (REF) n=108	CCi vs. CC * OR (95% CI) *	P-Value
Smoking				
Yes	7 (33.3)	62 (57.4)	0.37(0.14, 0.99)	0.04
No	14 (66.7)	46 (42.6)		
Statins				
Yes	5 (23.8)	63 (58.3)	0.22(0.08, 0.65)	0.006
No	16 (76.2)	45 (41.7)		
Tricyclic Antidepressants				
Yes	1 (4.8)	6 (5.6)	3.23(1.18, 8.80)	0.87
No	20 (95.2)	101 (94.4)		
Aspirin				
Yes	5 (23.8)	64 (59.3)	0.22(0.07, 0.63)	0.005
No	16 (76.2)	44 (40.7)		
Beta Blocker				
Yes	3 (14.3)	47 (44.3)	0.21(0.06, 0.75)	0.017
No	18 (85.7)	59 (55.7)		
*Logistic regression; unadjusted odds ratio with 95% confidence interval (C.I.) P-value <0.05 statistically significant.				

Table 3: Association of smoking and medication with MCi compared with CC

Summary of Results

- 216 patients (88.32% white, 80.56% females), mean age 67 +/- 16 were studied.
- 50% had CC, 40.3% had LC and 9.7% had MCi.
- 52.3% were smokers and 21.8% of females were using some form of hormonal therapy (Table 1).
- There was a statistically significant association between use of tricyclic antidepressants (TCAs) and LC compared with CC (OR 3.23, 95% C.I 1.18- 8.80, p=0.02; Table 2).
- Smoking, statins, aspirin and beta-blockers were significantly associated with CC compared with MCi (all p< 0.05; Table 3).
- 29 (13.4%) patients with unresolved symptoms underwent repeat colonoscopies with biopsies.
- One case of MCi resolved, 8 (72.7%) out of 11 cases of LC resolved, 2 (18.2%) continued to be LC and 1(9.1%) transformed to CC, 8 (47.1%) out of 17 cases of CC resolved, 8 (47.1%) continued to be CC and 1 (5.9%) transformed to LC.

Conclusion

- The majority of patients had CC.
- TCA use was more likely to be associated with LC than CC.
- MCi was less likely to be associated with smoking and medications compared with CC.
- Biopsies from repeat colonoscopies in some patients revealed changes in the pathological diagnoses raising the question of interchangeability of MC (CC to LC and vice versa).
- However, our results need to be prospectively validated in a larger population.
- Future studies will explore novel clinical associations and risk factors for MC and track clinical care and outcomes of patients with MC.

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CODE BLUE IN THE DIALYSIS UNIT- Now what?

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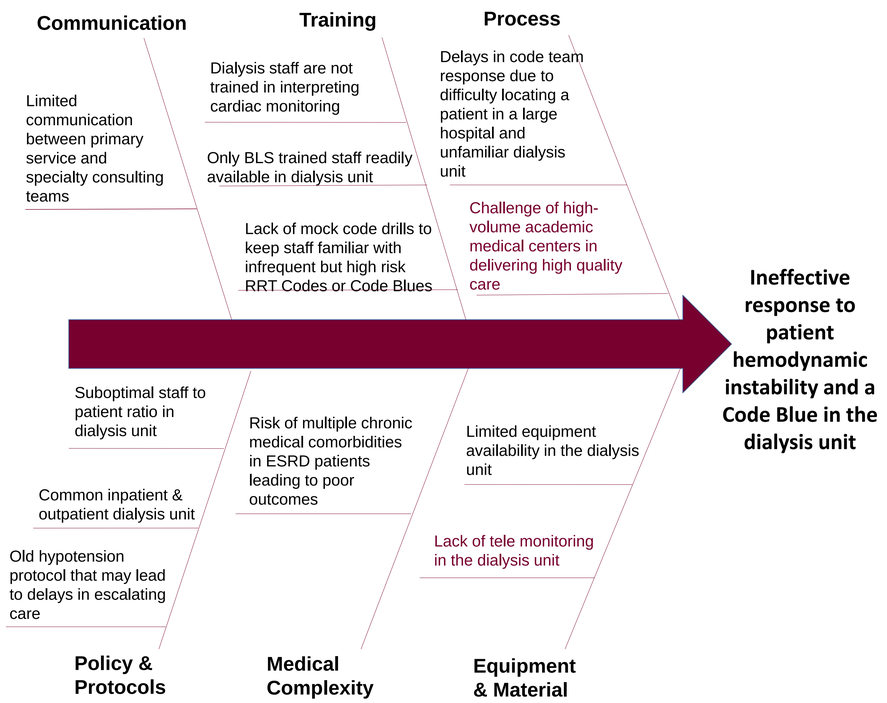
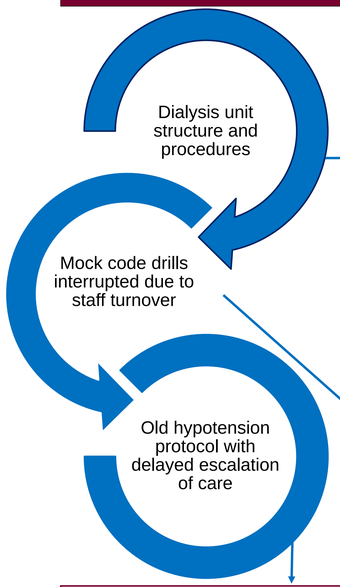
Background & Problem Statement

- Sudden cardiac arrest is a leading cause of cardiac-associated mortality in dialysis patients.
- Dialysis unit based cardiac arrest is one of the most feared complication
- Incidence rate is 7 per 100,000 hemodialysis sessions.[1]
- Suboptimal performance of staff and an inefficient Code Blue can lead to poor patient outcomes.
- End Stage Renal Disease (ESRD) patients admitted to the hospital are at slightly increased risk for sudden cardiac arrest during dialysis and can suffer complications like anoxic brain injury.
- It is important for dialysis units to be well trained in detecting hemodynamic instability and running efficient Rapid Response Team (RRT) Codes and Code Blues.

Fishbone Diagram

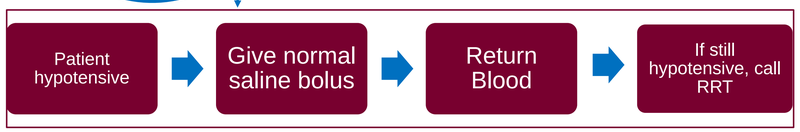


Discussion



- Combined inpatient and outpatient dialysis center can exhibit the following process/system vulnerabilities:
  - Staff: Patient ratio is 1:5 (1:2 at LUMC)
  - Potential failures to differentiate between inpatient vs outpatient status
    - ESRD patients admitted to hospital are usually sicker and have different needs compared to outpatient ESRD patients
- Vitals checked every 30 minutes
  - Staff are required to notify physician in charge of any changes in vitals (based on protocols)
- Lack of telemetry monitoring capabilities
- During codes, cardiac monitors are not placed on patients because nurses are not trained in interpreting heart rhythms
- Nurses are BLS trained (not ACLS trained)

- Dialysis Unit manager and Resuscitation Education Initiative (REdI) coordinator turnover



Proposed Action Items

Establish culture of safety, where safe practices are a priority and reporting of adverse events and 'near misses' is encouraged in a non-punitive environment

Dialysis staff training to standardize rapid response protocol

- Frequent Mock Codes in the Dialysis Unit
- Ensure monitors in place prior to arrival of code team
- Code sheets can be made assigning roles

Improved communication between primary and consulting teams

Next Steps

Leadership involved in making changes

- Dr. Anuradha Wadhwa- Dialysis Unit Medical director
- Dr. Mary McCabe – HVA Quality & Improvement
- Ms. Genevieve Natividad – Dialysis Unit Medical Director
- RedI Coordinator
- Rapid Response Team Nurses

Initiatives Underway at Hines' Dialysis Center

- The RRT nurses are working with dialysis nurses on first "**3 Minute Training".**
  - Goal is to provide increased training and improved action plans before the code team arrives.
- Plan to have at least **2 mock codes** a year.
- RRT nurse goes back to the dialysis unit after a CODE/Rapid to debrief.
  - Debriefings help staff get immediate feedback and establish action items for improvement.
- Intend to create separate inpatient and outpatient unit by year 2021.

New Hypotension Protocol in the Dialysis Unit

- Care is escalated immediately.

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Attempting to Move the Needle on 30-day Heart Failure Readmissions: Early Experiences and Reflections

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Introduction

30-day heart failure readmission rate is a major performance indicator for modern American hospitals. Finding solutions to reduce readmissions had become, shortly prior to the COVID-19 pandemic, an area of increasing focus for Loyola Medical Center (LUMC) and its parent company Trinity Health. Empiric study specifically of Loyola's population has recently found that increased length of stay was associated with a higher risk of readmission, while prompt follow-up with a cardiologist was associated with lower risk of readmission. Multifaceted and multidisciplinary interventions involving frequent patient contact seem to have the best empiric evidence of success in the broader literature, though heterogeneity of interventions and quality of implementation exists.

Objectives

To implement and assess a "first generation" of interventions to reduce 30-day heart failure readmissions and generate insights that might contribute to the next iterative phase of this effort.

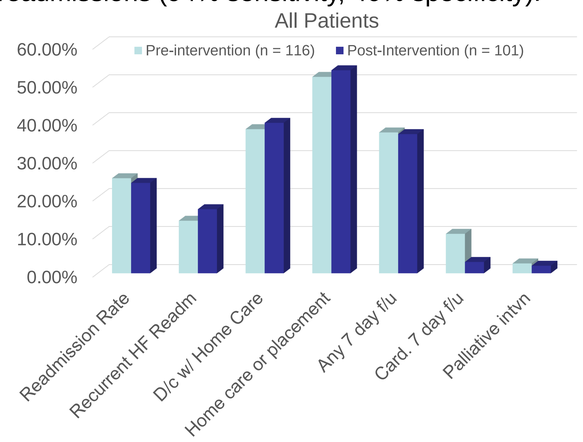
Methods

A set of interventions for patients 18 years and older hospitalized with primary diagnosis of acute on chronic heart failure who had not yet received advanced therapies was established consisting of efforts to, based on institutional priorities of LUMC's parent company, Trinity Health, as well as empiric observations from prior study of LUMC's inpatient heart failure population, a). Schedule provider follow-up within 5 days of discharge, including cardiology follow-up for "high risk patients" defined as those with LACE score >= 11, >= 2 prior admissions within 12 months, or length of stay (LOS) >= 7 days, b). Place home health referral for patients meeting above high-risk criteria being discharged home, and c). Encourage palliative care interventions for appropriate patients.

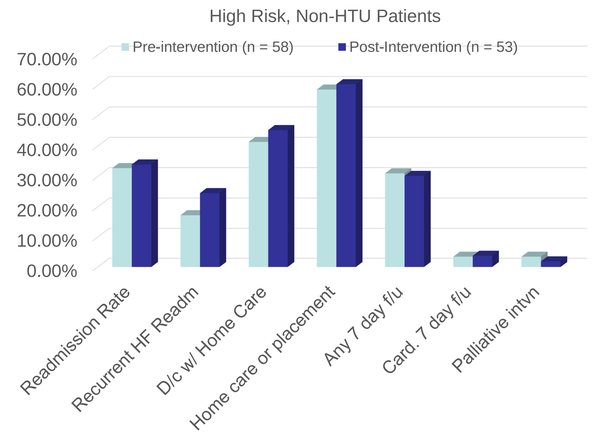
Interventions were implemented starting in January, 2020 through an interdisciplinary rounds checklist introduced through the social workers and nurse case managers working with medical teams most likely to care for heart failure patients (general medicine, cardiology/CCU). Data from all 217 unique heart failure hospitalizations (190 unique patients) with discharge dates between November 1, 2019 through February 29, 2020 in which the patient survived the index hospitalization were then analyzed with special attention to pre and post intervention metrics. Outcome measures studied included total 30-day readmission rate and 30-day recurrent decompensated heart failure readmission rate, while process measures included rates of 7-day follow up with any provider and with a cardiologist, rates of home health referral and inpatient placement after the index hospitalization, and rates of palliative care intervention by index discharge.

Results

There was no major difference between pre and post intervention samples in 30-day readmissions, 30-day recurrent heart failure readmissions, or any of the process measures. This was true both for all patients, and for patients meeting high-risk criteria who were not admitted to the advanced heart failure service (HTU), a sub-category of patients that was specifically targeted by the interventions. Baseline features of pre and post intervention samples appear equivalent, both among all patients and among high risk non-HTU service patients. Results of chi-squared tests for independence and multivariable logistic regression are pending. Of note, the patients noted as "high-risk" by the criteria of this study were much more likely to suffer 30-day readmissions than those who did not meet these criteria (roughly 33% vs 5%), and the criteria were highly sensitive for 30-day readmissions (94% sensitivity, 40% specificity).



All Patients	Age (years)	LOS (Days)	% High Risk	Required inpt placement on discharge
Pre-intervention (n = 116)	70.96	6.8	68.97%	13.79%
Post-intervention (n = 101)	69.90	6.5	68.32%	13.86%



High risk non HTU patients	Age (years)	LOS (Days)	Required inpt placement on discharge
Pre-intervention (n = 58)	71.69	6.93	17.24%
Post-intervention (n = 53)	73.21	6.62	15.09%

Discussion

Our results indicate that despite being the focuses of our multi-component intervention, there was no increase in home health utilization, prompt outpatient follow-up, or use of palliative care resources for high-risk patients. Results of chi-squared tests for independence and a multivariable logistical regression will help provide further empiric exploration of whether these components of care are currently associated with any significant reduction in readmissions, and thus whether or not they might be expected to result in reduced readmissions if fully implemented. Even if there is a a robust association, causality will need to be assessed further. For instance, does a single follow-up appointment with a cardiologist result in crucial management interventions that reduce likelihood of readmission, or does the ability to complete this follow-up signal other patient traits that make readmission less likely?

It is clear that the strategy of implementing interventions primarily through multidisciplinary rounds has been ineffective, and this approach will need to be revisited and augmented in future iterations of this project. Future efforts would also benefit from a designated control group to provide greater certainty as to a causal link between a bundle of interventions and any potential changes in readmission outcomes. Finally, quantifying the net financial effects of readmissions would provide greater context to the problem. The onset of the COVID-19 pandemic unfortunately places a degree of doubt as to whether the resources to successfully see these implementations through will be available in the foreseeable future.

On a more optimistic note, our criteria for identifying patients at high risk for readmission appear to have been highly sensitive, more so than any single tool currently at our disposal. These criteria can be invaluable in future heart failure readmissions work, especially when used in combination with more specific risk assessment tools, and should be assessed for similar performance in other disease states.

Conclusions

-The efficacy of a set of interventions to reduce 30-day heart failure readmissions consisting of increased home health utilization, prompt outpatient follow-up, and increased use of palliative care resources remains unknown, and will need to be more effectively implemented for future evaluation.

-A set of simple criteria in combination with the LACE score was highly sensitive (94%) for 30-day heart failure readmission, and can be invaluable for targeting future interventions, especially if combined with a more specific tool.

Sources
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Belmont, M. MD/MBA, Smith, K,, MD. "Identification of Patient and Process Characteristics Associated With 30-Day Heart Failure Readmissions at an Academic Medical Center: A Retrospective Analysis. Poster presented at 2019 HVPAA Conference

Utility of a Structured Self-Audit to Educate Internal Medicine Residents on Lessons Learned from Unplanned, 30-Day Readmissions

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Introduction

From 2003-2004, 19.6% of Medicare beneficiaries who had been hospitalized were readmitted within 30 days of discharge, and 34.0% were readmitted within 90 days.(1)

The most common interventions to prevent readmission include patient education, discharge planning, follow-up telephone call and patient-centered discharge instructions.2,3)

One university created a structured post discharge follow up review for medical residents. They performed an EHR query to find patients that they managed on the inpatient service and then residents reviewed their EHR and completed a reflection worksheet.(4)

Residents found structured post-discharge follow up valuable to their professional development.(4)

There is a paucity of data on educating internal medicine residents about hospital readmissions

Self-audits are underutilized as a method to engage young clinicians in quality and patient safety principles.

Objectives

To design an educational intervention via a structured self-audit to identify preventable and non-preventable causal factors for unplanned 30-day readmissions.

To study resident perceptions on causal factors for readmissions at our Veteran Affairs (VA) hospital and the educational value of the intervention.

Methods

Eleven PGY2 internal medicine residents performed a structured self-audit of up to 5 randomly selected patients with a 30-day unplanned readmission after discharge under their care during a General Medicine rotation.

Chief residents reviewed admissions data and compiled a list of each resident's unique patients with a 30-day, unplanned re-admission. They then randomly assigned up to 5 patients per resident for review.

On average, each PGY2 completed self-audits on 4.5 patients. A total of 50 readmissions were reviewed with patient demographics and index admission/readmission characteristics recorded. Residents then rated the likelihood of 23 causal factors in contributing to each readmission. Residents completed pre and post intervention surveys.

Results

Pre-intervention survey responses revealed that all eleven residents stated they were rarely provided objective data about the quality of their inpatient care (Table 1).

The majority of residents, 63.7%, rarely or never performed systematic evaluation of causes for readmission (Table 1).

Table 1: Preintervention Responses to Questions (n=11)

	Responses				
	Never	Rarely	Sometimes	Often	Always
How often are patient safety and quality of clinical care central to your educational experience?	0% (0)	0% (0)	18.2% (2)	72.7% (8)	9.1% (1)
Do you review the EMR* of patients you took care of on your General Medicine service after discharge?	9.1% (1)	9.1% (1)	54.5% (6)	27.3% (3)	0% (0)
Do you routinely perform a systematic evaluation of causes for readmission after the index hospitalization was under your care?	18.2% (2)	45.5% (5)	27.3% (3)	0% (0)	9.1% (1)
How often are you provided with objective data about the inpatient care you provide?	0% (0)	100% (11)	0% (0)	0% (0)	0% (0)

After the intervention, 90.9% of residents responded that the activity "very much so" or "absolutely" facilitated a relevant review of patient safety or quality of clinical care (Table 2).

All eleven residents answered they "probably will" or "definitely will" change how they manage future discharges.

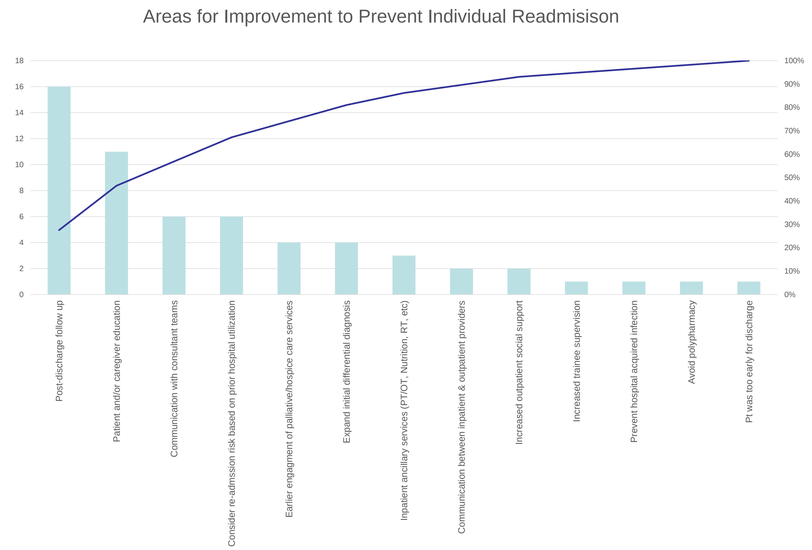
Table 2: Postintervention Responses to Questions (n=11)

	Responses				
	Not at all	Slightly	Moderately	Very Much So	Absolutely
Did this activity help facilitate a relevant review of patient safety or quality of care topics?	0% (0)	0% (0)	9.1% (1)	81.8% (9)	9.1% (1)
	Never	Rarely	Sometimes	Often	Always
At the end of a rotation, if given a list of your readmitted patients (with the intention of practice-based improvement), how often would you review your care?	0% (0)	0% (0)	36.4% (4)	63.6% (0)	0% (0)
	Definitely won't	Probably won't	Undecided	Probably will	Definitely will
After completing this exercise, will you change how you facilitate or manage future discharges?	0% (0)	0% (0)	0% (0)	54.5% (6)	45.5% (5)

Results

Residents were asked how the review may facilitate change in future clinical practice. The three most frequently cited areas for improvement to prevent readmission included:
1) post-discharge follow up
2) patient and/or caregiver education at time of discharge
3) communication with consultant teams (Figure 1).

Figure 1 (Pareto Chart): Resident Identified Areas for Improvement to Prevent Readmission Based on Responses from a Qualitative Questionnaire



Conclusion

Residents responded favorably to the self-audit indicating that it was educationally valuable and likely to alter their future practice.

Post-discharge follow up and patient and caregiver education were identified most frequently as areas of improvement by residents.

A structured self-audit intervention to evaluate unplanned 30-day readmissions aids in practice-based improvement to enhance house-staff learning and potentially, care of future patients.

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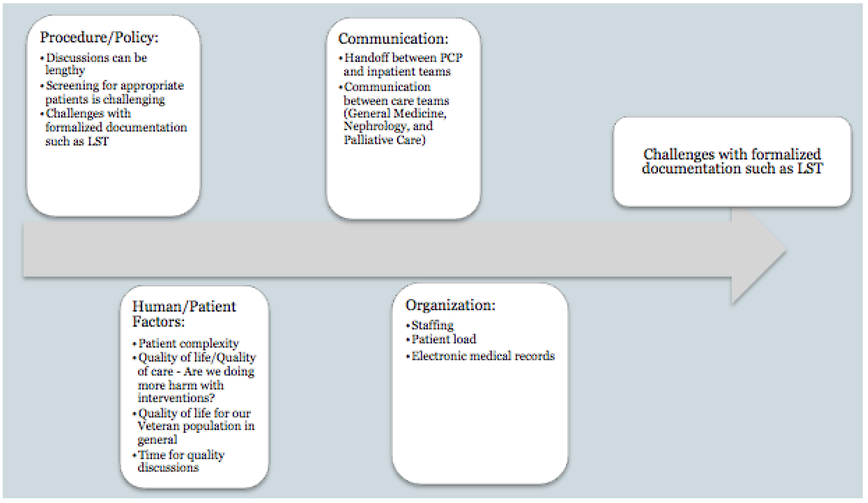
Identifying and Engaging Patients in Goals of Care Discussions

Cody Braun, MD
Edward J. Hines Jr. VA Medical Center, Loyola University Medical Center

Background & Problem Statement

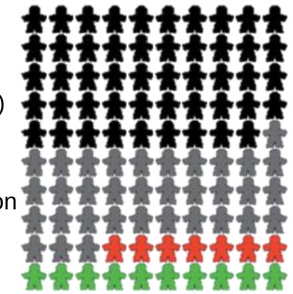
- As patients near the end of their lives, their course can often progress quickly to high level intensive care. This high level care, in some cases, proves futile despite prolonged periods of artificial life support.
- Many of our patients have complex comorbidities associated with high morbidity and mortality. Having pre-emptive discussions with selected patients can help patients, families, and medical teams when patients are in critical condition or nearing the end of life.
- Unfortunately, our discussions regarding this important topic often take place too late, when care has escalated rapidly and patients are no longer able to participate in goals of care discussions. (Hakim, 1996)
- Definitions/Terms:
  - LST: Life Sustaining Treatment
  - CAN Score: Care Assessment Needs Score
  - PCAS: Primary Care Assessment System

Fishbone Diagram



Discussion

- Thorough LST discussions can be challenging in a 20-30 minute clinic visit. Older patients with many co-morbidities are less likely to survive CPR. Using pamphlets and handouts with specific data regarding our veteran population, one can help a patient navigate these decisions. Engaging patients in goals of care discussions can be more meaningfully accomplished in primary care clinic with providers who have already established strong relationships with their patients.
- Among adults who received CPR in the hospital:
  - 56% died during resuscitation
  - 27% died before hospital discharge
  - 17% survived to discharge
- 65 and older that received CPR in hospital:
  - 49% died during resuscitation (black)
  - 34% died before discharge (gray)
  - 17% survived to discharge (red and green)
  - 10% were alive one year after discharge



- The chart presented to the left is a representation of the above data. Using figures to represent statistics can help patients better comprehend the data
- Source of images: http://www.geripal.org/2013/09/outcomes-of-in-hospital-cpr-not-as-rosy.html

Proposed Action Items & Conference Follow Up

- Identify appropriate patients that would benefit from Life Sustaining Treatment discussions

Setting	Timeframe
VA Community Living Center	Within 7 days
Primary Care: General Medicine, Home based primary care, Geriatrics, Women's Health	Within 6 months or earliest opportunity
Palliative Care consultation	Within 72 hours for inpatients and by second visit for outpatients
Hospice referral (within Hines)	Prior to referral
Hospice referral (from community)	Within 24 hours of admission
Prior to initiating or discontinuing a treatment intended to prolong life when patient would be expected to die soon thereafter without the treatment	Within 24 hours
VA acute care	Within 24 hours of admission and no later than 72 hours after admission

Above information informed by VHA Handbook 1004.03

Next Steps

- Strategies for engaging patients:
  - Probe for patient's preferences and answer any questions
  - Provide patients with resources including brochures and helpful websites to help inform decisions
  - Prepare the patient for a formal discussion at the next visit. Ensure that they talk to family members and bring important people to the next visit
  - Follow up closely with patients and plan entire visits to discuss further
- Within my clinic patient panel, I have identified 20/55 patients that would benefit from goals of care conversations and having formal LST notes in place. Patients were selected by identifying high CAN scores in the Primary Care Almanac. Patients seen in clinic that refused further evaluation of abnormal findings were also probed regarding their preferences. Patients with multiple hospitalizations were also chosen.
- With the help of clinic nurses and attendings, we have been successful in initiating and documenting patients wishes.
  - PACT RN: identifies appropriate patients based on PCAS and CAN scores
  - Attending: helps identify appropriate patients while staffing

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Comparison of echocardiographic IVC assessment to right heart catheterization in patients after heart transplant

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Loyola Medical Center, Department of Internal Medicine[1], Loyola Medical Center, Department of Cardiology[2]

Introduction

Volume status can be difficult to assess even with combining physical exam and laboratory findings. Echocardiographic assessment of the internal vena cava (IVC) is a proven method to estimate right atrial pressure (RAP). Right heart catheterization (RHC) is the gold standard for measuring RAP. However, RHC is invasive and not readily accessible at the bedside. Furthermore, IVC assessment of RAP has only been a proven modality in native hearts. We compared IVC estimations of RAP with RHC results in patients after heart transplantation.

Objectives

In patients who have undergone heart transplantation, surveillance is performed with regular endomyocardial biopsies where a RHC is also performed. Echocardiography is used to monitor for complications after RHC. Correlating the accuracy of echocardiographic estimations of RAP with the gold standard, RHC, may prove that echocardiography can be a substitute for RHC. We hypothesize that despite the anatomical changes that occur after heart transplantation, echocardiographic measured RAP will correlate with RHC RAP.

Methods

We retrospectively reviewed 51 patients who received a heart transplant and compared our data with the American Society of Echocardiography's (ASE) guidelines regarding IVC diameter and respirophasic variation:

- IVC ≤ 2.1cm with >50% collapse = RAP 0-5 mmHg
- IVC >2.1 cm with >50% collapse = RAP 5-10 mmHg
- IVC >2.1 cm with <50% collapse = RAP 10-20 mmHg

IVC was measured 2 cm from the right atrium or 1 cm from the hepatic vein. Only RHC and echocardiogram data performed on the same day were compared.

Data analyzed with Graph Pad Prism using linear regression and ANOVA.

Figure 1. Comparison of RAP with IVC diameter

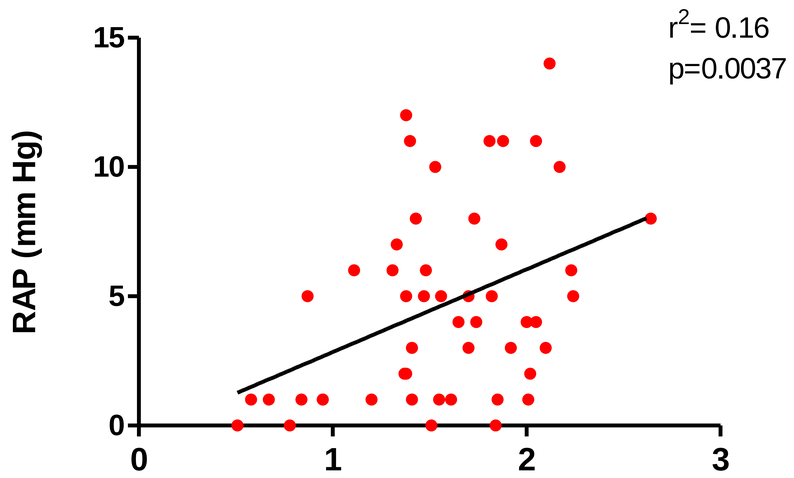
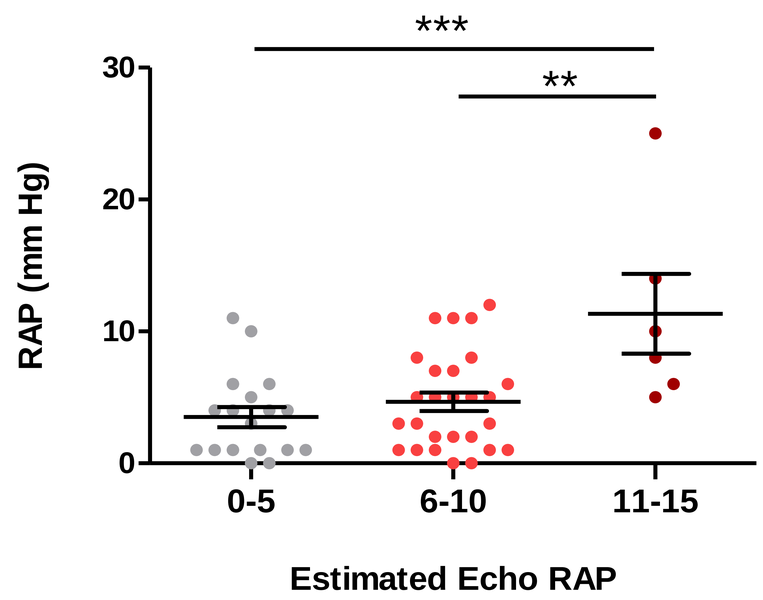


Figure 2. Analysis of variance between eRAP and RAP pressure



Results

Comparison of IVC diameter with invasive RAP measurement demonstrated significance with linear regression (p=0.0037), seen in Figure 1. After translating IVC diameter and respirophasic variation into estimated right atrial pressures (eRAP), the variance between each of the groups was measured. There was a non-significant difference between eRAP of 0-5 and 6-10. However, we observed a significant difference between eRAP of 0-5 and 11-15 ($p<0.001$ = ***, CI 95% -12.61 to -3.054) as well as eRAP of 6-10 and 11-15 ($p<0.01$ = **, CI 95%-11.24 to -2.090).

Conclusion

Our findings suggest that echocardiography can be used to estimate RAP in patients after heart transplant as there is a statistically significant correlation between IVC diameter and RAP (figure 1). However, our comparison of eRAP and RAP implies that placing a numerical value on a set of parameters based on respirophasic variation and IVC diameter may not be as definitive. Our data implies that echocardiography can be very useful in distinguishing high RAPs from intermediate and low, but has more difficulty defining differences between low and intermediate RAPs. Admittedly, as a retrospective study, there is no clear indication if a true "sniff" test was performed. As a surrogate, diaphragmatic movement was used as an indicator of inhalation and exhalation. Furthermore, the majority of the exams were performed on an outpatient basis, creating a selection bias for lower RAPs. Taken together these data suggest that echocardiographic eRAP can be used as a potential substitute for RHC.

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Quality Improvement Self Audit: Maybe It's All Experience

HEALTH SCIENCES DIVISION

Andrew Crone, MD
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Introduction

Part of the quality improvement elective at Loyola is to review readmission data from a small sample of patients after completing a rotation as the senior resident on a Hines VA general medicine service. During this review, each patient's chart is analyzed looking at various data points including length of stay, Post-discharge time to readmission, reason for readmission, as well as how follow-up was arranged up for the patient at the initial discharge. This is commonly referred to as an "audit". The data indicated that the readmissions were seen as "preventable", but bigger questions arose as to how they could be prevented as there were not uniform trends. Readmissions are studied more closely due to the Affordable Care Act, and Centers for Medicaid & Medicare Services (CMS) monitoring that followed(3). Some studies have demonstrated that communicating with outpatient providers post discharge(1), and provider demographics(3) may have little weight on readmission rates. The reviewed data also suggests that uniformly physician experience with discharge may play a role in the success of the discharge. The ways to improve experience may prove to be more difficult, as the studied methods of success largely rely on the experience of the physician with discharges(3), and their prior experience with caring for these specific patients(2).

Gap Analysis

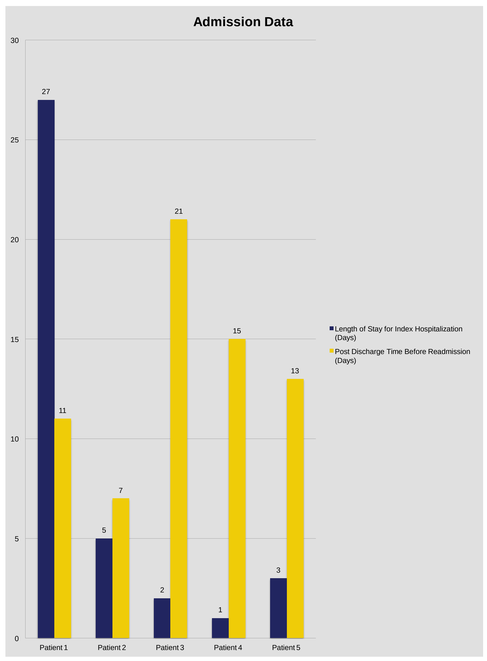
After self-reviewing the data, these were the most salient findings regarding the information from the readmission data:

- 4 of 5 patients were "moderate" or "very likely" to be discharged before optimization
- Every readmission was categorized as "moderate" or "slightly likely" to be preventable
- "Infection" comprised the majority of readmission diagnoses (3 of 5)

Proposed Intervention

- Discharge planning largely focuses on placement, and post-discharge care.
- Incorporate "medical readiness" checklist could aid in gaining experience from discharge from a physician perspective
- Discharges improve when overall experience improves, so a global focus should be used
- Checklist could include:
  - Medications needed and available
  - Risk of infection minimal
  - Appropriate follow up ordered
  - Discharge summary completed

Hines VA General Medicine Readmission Self-Audit Results



- 4 of 5 patients had post discharge calls
- 5 of 5 patients had post discharge appointments scheduled
- 3 of 5 patients were seen by a healthcare provider post discharge
- 2 of 5 were admitted prior to their follow up appointments

Action Items & Lessons

- Majority discharged before "medical optimization" upon review which may indicate premature discharge in hindsight
- Increased experience with discharging patients likely to play a major role (more than other metrics) in safe discharges with decreased readmissions
- Action Items:
  - Increase familiarity with discharge mechanisms at specific hospital (in this case Hines VA)
  - Maintain consistency with discharges and confirm appropriate follow up
  - Incorporate daily systematic assessment of patient's medical readiness to discharge

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Impact of Meropenem De-escalation on Outcomes of Febrile Neutropenia Patients

Hina Dalal, DO, Maressa Santorossa, PharmD, Fritzie Albarillo, MD, Gail Reid, MD, Nina Clark, MD, Stephanie Tsai, MD

Loyola University Medical Center, Edward Hines, Jr. V.A. Hospital

Background

Numerous studies have shown clinical benefits and lack of adverse effects when patients with febrile neutropenia are de-escalated from more broad to narrow-spectrum antibiotics.

As a result, we seek to evaluate the impact on various efficacy and safety outcomes after implementing a formal algorithm for de-escalation of antibiotics at LUMC.

Baseline Data

Data is being collected based on the following:

- ICD-10 coded febrile neutropenia in patients at LUMC from July 2018 to June 2020
- Exclusion criteria:
  - <18 years of age
  - Clinically does not meet definition of febrile neutropenia
  - Did not receive meropenem for ≥ 48 hrs

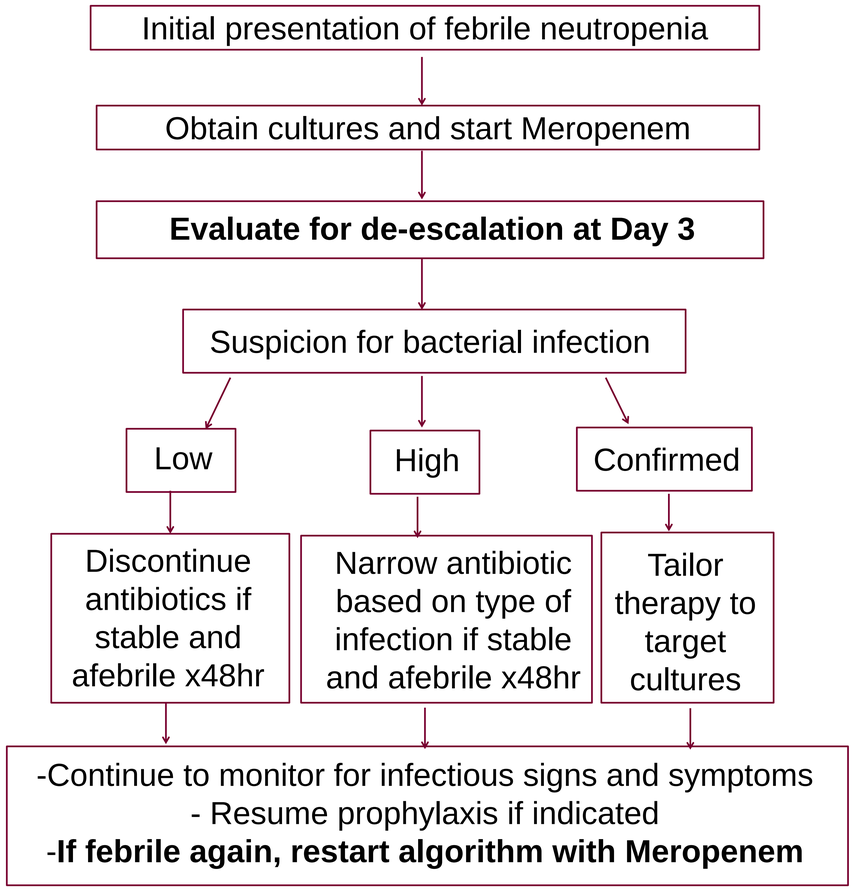
Outcomes	
Primary measure	Rate of appropriate Meropenem de-escalation
Process measures	Meropenem days of therapy (DOT) in the pre vs post algorithm groups
	Rate of C. difficile infection
Balancing measures	Infectious complications
	Mortality
	Length of stay

Proposed AIM Statement

Increase the rate of appropriate meropenem de-escalation in patients with febrile neutropenia by ≥ 25% within one year of implementing de-escalation algorithm.

Ideal State Process Map

Below is an adaptation of the **primary intervention**: an algorithm approved by the LUMC pharmacy & therapeutics committee in July 2019.



Gap Analysis

Based on multi-disciplinary discussions amongst the departments of Infectious Diseases, Hematology/Oncology, and Pharmacy, barriers with implementing the algorithm include:

- Varying physician preference regarding timing the de-escalation of antibiotics
- Lack of clinician awareness of recently implemented de-escalation algorithm
- Clinician preference on consulting ID to assist in managing febrile neutropenia
- Pharmacy has protocol for Meropenem approval but de-escalation is dependent on the primary provider.

Secondary Interventions

- ID physicians to reference algorithm with electronic address in clinical documentation via Epic dot phrase
- Physical copies of algorithm to be posted in all resident Heme/Onc work spaces
- Algorithm to be included on Heme/Onc and ID residency rotation website and included in rotation orientation emails.
- Consider additional involvement of Heme/Onc and transplant pharmacists in monitoring antibiotic use and guiding timely de-escalation

References

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A Retrospective Analysis of Treatment Outcomes for Elderly Patients with Aggressive Non Hodgkin Lymphomas

Hina Dalal, DO, Sonam Patel, MD, Shruti Singh, MD, Hanh Mai, MD
Loyola University Medical Center

Introduction

As our population ages, the incidence of patients diagnosed with cancer at an elderly age will also continue to rise. It is anticipated that the incidence of cancer in persons ≥ 65 will increase by 67% by year 2030, amounting to nearly 1.6 million new cancer diagnoses.

Despite these growing numbers, clinical trials include patients who are traditionally younger (< 60) and with an ECOG performance status of ≤1. Older patients with multiple co-morbidities and frailties are not included. Thus, the extent of treatment older patients can tolerate is unknown.

Objectives

Our study aims to retrospectively analyze outcomes of elderly patients diagnosed with aggressive NHL by doing the following:

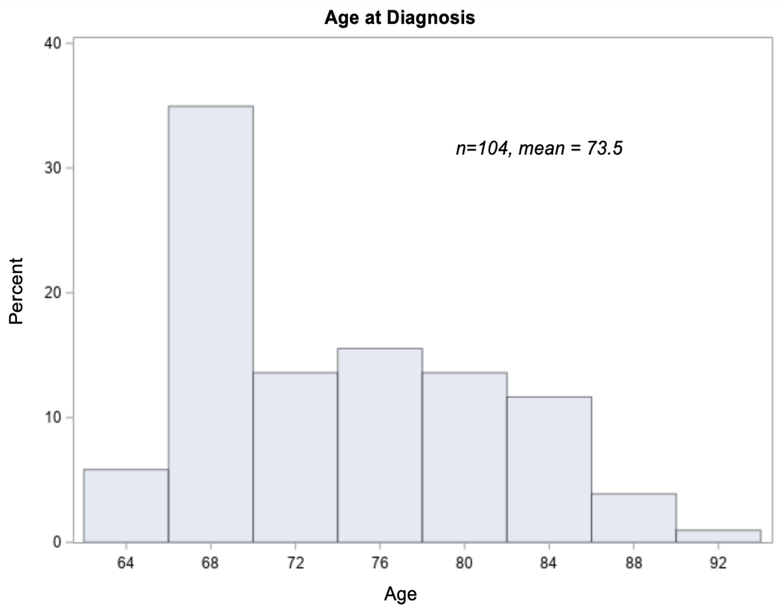
- Distinguishing which patients received treatment
- Determining whether the treating physician utilized a geriatric assessment tool prior to deciding the treatment plan
- Differentiating types of treatments prescribed
- Determining rate of treatment related complications defined as:
  - Delays in treatment
  - Dose reductions in therapy
  - Hospitalizations
- Comparing the overall outcome of patients who received treatment versus those who did not

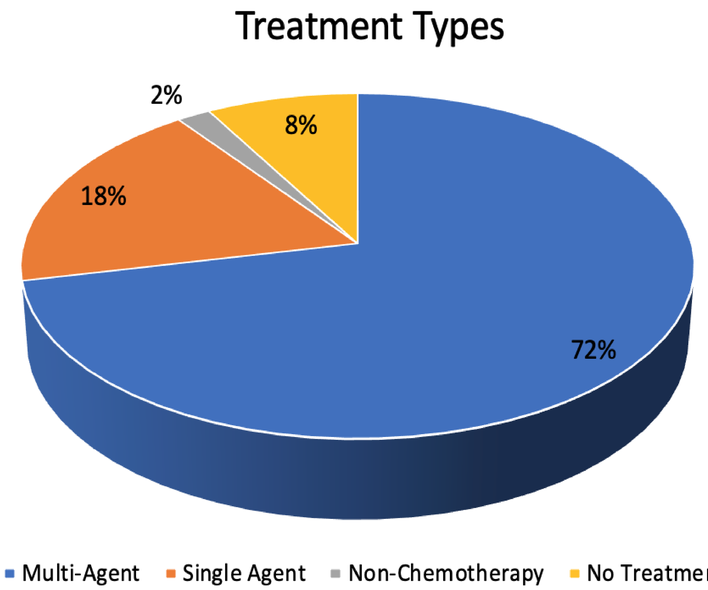
Methods

- Retrospective, single-center study
- Sample obtained by performing an EPIC query using ICD-10 diagnostic codes of all patients at LUMC diagnosed with aggressive NHL from January 2005 to December 2015
- All patients that met the following criteria were included:
  - Age greater than or equal to 65
  - Diagnosis of aggressive NHL, which includes the following:

Diffuse Large B-Cell Lymphoma
AIDS-associated Lymphoma
Burkitt Lymphoma
Post-transplant Lymphoproliferative Disorder
Central Nervous System (CNS) Lymphoma
Mantle Cell Lymphoma
Peripheral T-Cell Lymphoma
Angioimmunoblastic Lymphoma

Results

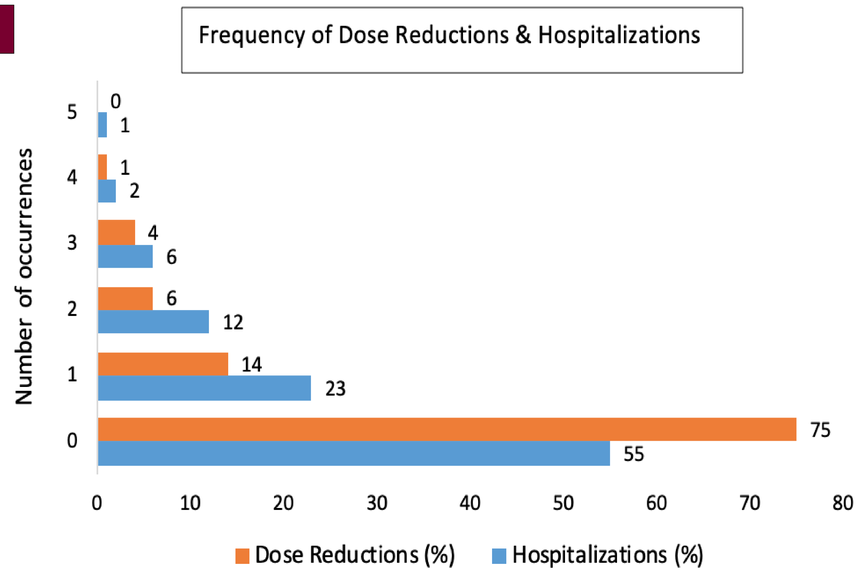




There was no documented use of a geriatric assessment tool for any of the patients included.

13 of the 104 patients (12.5%) had their treatment discontinued due to adverse effects, worsening performance status, or clinical decompensation.

11 of 13 had received a multi-agent chemotherapy regimen, while the remaining 2 of 13 received single agent therapy.



Survival	Frequency (n)	Percent (%)
Death due to Lymphoma	36	34.62
Death due to other cause	12	11.54
Patient still alive	29	27.88
Unknown	27	25.96

Conclusion

This study demonstrated that despite their age and co-morbidities, majority of this elderly population with aggressive NHL tolerated multi-agent chemotherapy. Over half were able to complete their planned first-line regimen without any dose reductions or hospitalizations related to treatment toxicities. However, at least one third of these patients passed away from lymphoma, prompting the need for further analysis of response to treatment and relapse.

Future direction includes consideration of a study investigating how implementing the use of a geriatric assessment tool can affect the studied outcomes, including overall survival.

References

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Right Heart Dysfunction and Outcomes in Severe Mitral Regurgitation after MitraClip

Travis DeSa, Rashad Belin, Igor Wroblewski, Cara Joyce, Verghese Mathew

LOYOLA UNIVERSITY CHICAGO HEALTH SCIENCES DIVISION

Introduction

At present, it is unclear whether right heart dysfunction (RHD) predicts adverse outcomes in patients with severe mitral regurgitation (MR) after transcatheter mitral valve repair.

Methods

74 consecutive patients treated with MitraClip at our institution were included in the analysis. Right heart catheterization (RHC) hemodynamics were assessed to determine right atrial pressure (RAP), right ventricular diastolic pressure (RVDP), RV+dP/dT, RV systolic pressure (RVSP), mean pulmonary artery pressure (MPAP), right ventricular failure index (RVFI, ratio of RAP to pulmonary capillary wedge pressure (PCWP)), and pulmonary vascular resistance (PVR). Transthoracic echocardiograms were reviewed to determine RA volume index (RAVI), severity of tricuspid regurgitation (TR), RV diameter, tricuspid annular plane systolic excursion (TAPSE), DTI-derived tricuspid lateral annular systolic velocity (RV S'), severity of pulmonic regurgitation (PR), RVSP, PASP, and RVFI. Cox proportional hazard models were utilized to examine the relation between variables and mortality.

Results

The median STS risk was 10%. RAP >15 mmHg (HR: 4.1, 95%CI: 1.1-16), RVDP >10 mmHg (HR: 13, 95%CI: 2.5-67), MPAP >40mmHg (HR: 3.5, 95% CI: 1.03-12), RVFI (RA/PCWP) >0.63 (HR: 3.0, 95%CI: 1.04-8.5), and PVR >3 Woods units (HR: 3.5, 95% CI: 1.2-10.1) were significantly associated with increased risk of death. In contrast, none of the echocardiographic variables were predictive of death after MitraClip.

Table 1

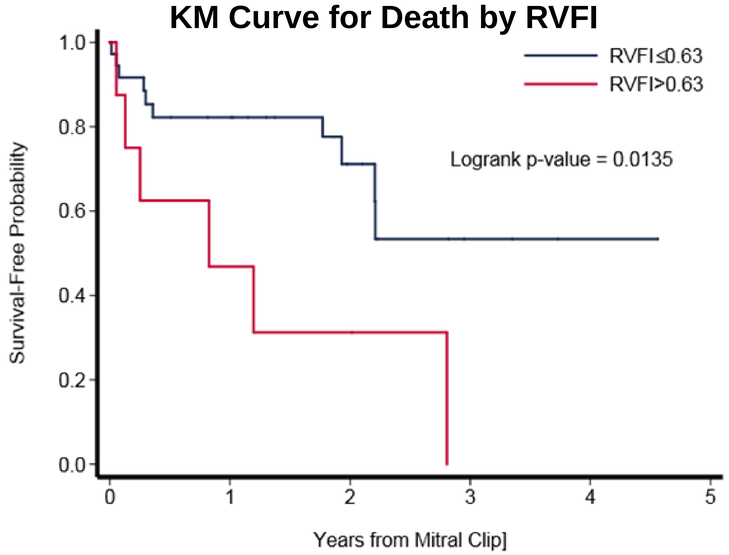
Hazard Ratios for Death by RHC and Echo

Right Heart Catheterization	Death (HR)
RAP >15mmHg	**4.1 (1.1-16)**
RVDP >10mmHg	**13 (2.5-67)**
RVEDP >15mmHg	1.2 (0.38-4.0)
RV +dP/dT <400ms	1.5 (0.55-3.9)
RVSP >40mmHg	1.0 (0.31-3.5)
MPAP >40mmHg	**3.5 (1.03-12)**
PASP >50mmHg	2.4 (0.84-6.6)
PASP >70mmHg	3.3 (0.90-12.4)
PCWP >25mmHg	0.72 (0.16-3.2)
PAPI <4.8	1.3 (0.43-3.7)
RA/PCWP >0.63	**3.0 (1.04-8.5)**
PVR >3 Woods units	**3.5 (1.2-10.1)**

Echo	Death (HR)
RAVI >34ml/m^2	0.81 (0.32-2.1)
Moderate/severe TR	0.87 (0.34-2.2)
Severe TR	1.1 (0.40-2.8)
RV diameter-base >4.2cm	1.5 (0.44-5.3)
TAPSE <1.3cm	1.1 (0.24-4.9)
RV S' <8cm/s	1.4 (0.42-4.4)
Moderate/severe PR	0.77 (0.16-3.7)
Estimated RVSP >40mmHg	0.64 (0.25-1.6)
Estimated PASP >50mmHg	1.3 (0.49-3.6)
Estimated PASP >70mmHg	0.86 (0.11-6.6)
RA/PCWP >0.63	0.89 (0.28-2.9)

Table 2

KM Curve for Death by RVFI



Conclusion

Invasively measured reduced RV systolic function (elevated RFVI (RA/PCWP)), elevated RH filling pressures (RAP and RVDP), and pulmonary artery hypertension (elevated MPAP and PVR) may identify patients with severe MR undergoing MitraClip who are at increased risk of adverse outcomes.

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Impact of the *MAP* Protocol on Therapeutic Inertia amongst Hines VA General Medicine Clinics

Karam Gardezi MD, Kevin Walsh MD, Matthew Thomas DO, Brian Birks DO, Leo Gozdecki DO, Meghan O'Halloran MD and Holly Kramer MD, MPH
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Introduction

New developments recently spearheaded by the SPRINT trial and 2017 ACC/AHA guidelines have sparked continuous debate on optimal BP parameters[3]

Therapeutic inertia (TI), or failure of healthcare providers to adjust treatment when the blood pressure targets are not met, has consistently shown to be a significant barrier to optimal hypertension management[1]

Rates of TI in multiple European countries is as high as 85%[1]

Causes of TI are not well described, particularly in high-risk populations in which the blood pressure target has been newly reduced (i.e. those patients with CKD, CVD, DM, ASCVD risk >10% and age 65-75). Identifying causes of TI may identify common barriers to optimal BP control and help devise new ways to reduce its occurrence.

The *Measure Accurately, Act Rapidly and Partner with Patients,* or (*MAP*) protocol, has been studied and shown to reduce TI and improve overall BP control in underserved primary care clinics. [2]

Objectives

This is a sub-analysis of the population from our larger *MAP* protocol study at Hines GMC clinic. Our goals included:

- Describe the impact of the *MAP* protocol on TI when implemented in a high-risk hypertensive veteran population
- Identify potential demographics, clinical characteristics, or comorbid conditions that could increase the risk for TI occurrence
- Perform a qualitative analysis of TI typology amongst clinic providers
- Assess changes in medication prescribing habits among PCPs post-*MAP* implementation

Methods

2,309 patients were evaluated for the study. 1,128 were initially excluded from the pre-*MAP* group and another 489 were later excluded from the post-*MAP* group due to lack of PCP follow up during the study period. 692 patients were followed for a total of 20 weeks.

PCP progress notes related to individual patient visits provided justification for TI. The various justification attributes were aggregated and categorized through a manual chart review process.

Inclusion criteria:
- VA patients 18 - 85 years old
- Established diagnosis of HTN
- At least 1 clinic visit with their assigned PCP and 1 recorded office BP between July 31, 2018 – August 1, 2019

Exclusion criteria:
- < 18 years old or > 85 years old
- No previous diagnosis of HTN
- Hospice and/or palliative care enrollment
- ESRD requiring hemodialysis
- Heart transplant recipient

Measurement Protocol: Mandatory 5 minute rest period in proper seated position within a private exam room. If initial attended AOBP was ≥ 140/90, two additional unattended AOBP measurements were taken. The PCP was instructed to use the average BP for treatment decisions.

Therapeutic Inertia definition:

$$\frac{\#\text{ of patient encounters with average AOBP over goal without medication intensification}}{\#\text{ of patient encounters with average AOBP over goal}}$$

Results

Pre-MAP intervention group (baseline):
- 465 of 1181 patient encounters had BP above goal.
- TI occurred 393 times (84.5%).
- 1 medication intensification for every **6.7** patient encounters where BP was above goal.

Post-MAP intervention group:
- 531 of 831 patient encounters had BP above goal.
- TI occurred in 345 times (55%).
- 1 medication intensification for every **2.8** patient encounters where BP was above goal

Justification Attributes	Pre-*MAP* Intervention	Post-*MAP* Intervention	Potential Typology Based on Attributes
PCP's Opinion of Goal BP	27.8% (113)	15.8% (56)	•Scientist
Multiple Managers	3.0% (12)	2.3% (8)	•Negotiator
Scheduled Re-evaluation	4.4% (18)	6.5% (23)	•Checker
Intercurrent Disease	2.5% (10)	5.7% (20)	•Contextualiser
Specialists Advice	3.9% (16)	5.1% (18)	•Scientist
White Coat HTN	1.0% (4)	0.6% (2)	•Contextualiser •Negotiator •Scientist
Non-Medical Intercurrent Events	0.7% (3)	0.6% (2)	•Contextualiser
Borderline results	3.9% (16)	3.1% (11)	•Rounder •Checker
Adverse effects/Precautions of use	2.2% (9)	4.2% (15)	•Cautious
Circumstances of Measurement	6.7% (27)	10.8% (38)	•Contextualiser •Negotiator •Rounder
Treatment Interupted	1.7% (7)	2.3% (8)	•Contextualiser •Negotiator
Lifestyle modification emphasis	3.2% (13)	4.5% (16)	•Optimist
Adherence to treatment	5.1% (21)	2.5% (9)	•Contextualiser •Negotiator
Recent Medication Changes	0.7% (3)	0.6% (2)	•Optimist •Cautious
Patient's Preference	3.4% (14)	4.8% (17)	•Optimist •Negotiator
Addressing secondary causes	0.7% (3)	0.6% (2)	•Scientist •Checker
No Time	0.2% (1)	0.6% (2)	n/a
No Justification Found	28.6% (116)	29.5% (104)	n/a

Table 1: In the pre-*MAP* group 27.8% of TI resulted because providers believed patient's BP was "at goal" when it was objectively above goal. In the post-MAP group this reasoning decreased to 15.8% of cases.

Attributes for 7 major TI Typologies[1]
- Negotiator: prioritize patient preference, partial treatment modification, difficulty convincing
- Checker: relied on home results, "close enough" to goal, scheduled re-evaluation
- Contextualiser: credited to other medical or social issues (stress, family life, acute illness)
- Scientist: rely on specialist advice, disagreement on guidelines, cites alternative evidence
- Rounder: accepted borderline or "close enough" results
- Cautious: fear of adverse effects or previous history of medication intolerance
- Optimist: High expectations related to recent or expected lifestyle/diet changes

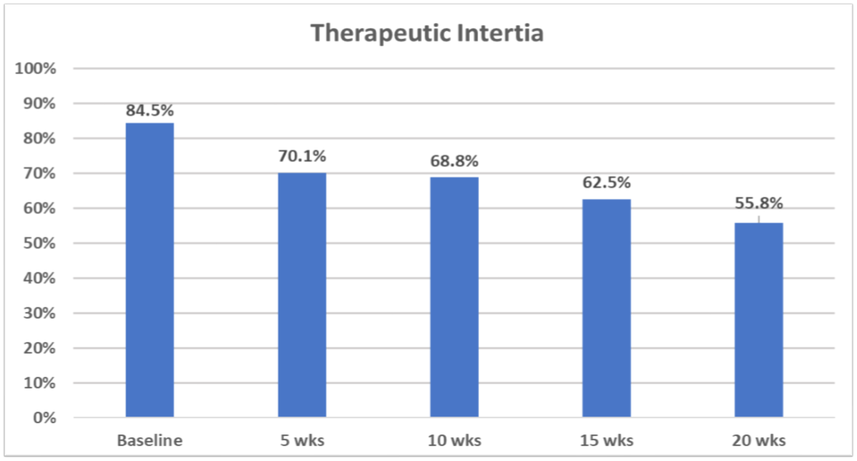

Figure 1: Rates of TI decreased nearly 30% by the end of the study period.

Conclusions

1) Effect of *MAP* protocol implementation on TI: Our study depicted an absolute reduction of TI between pre-*MAP* and post-*MAP* groups of almost 30%.

2.) Identifying Risk Factors for TI: In the pre-*MAP* group, the average number of medications for patients experiencing TI was 1.95, while those patients not experiencing TI was 1.40. 36% of the TI group had known CV disease, as opposed to 28% in those without TI. Incidence of DM and CKD were similar in both groups. Other demographic data, clinical data and the post-*MAP* group are further being analyzed.

3) TI justification and typology: Smaller proportion of PCPs in post-*MAP* encounters cited that the reason for TI was because their patients' BP were "at goal". This suggests increased awareness of new and current BP targets. The most common potential typologies were contextualiser, negotiator and scientist.

4.) Changes in Medication Prescribing Practices: Ace-inhibitors and thiazide diuretics were the most common medications to be adjusted in both the pre- and post-*MAP* interventions groups.

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Standardizing Cardiac Evaluation Prior to Kidney Transplantation

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Introduction

A variety of approaches are undertaken for cardiovascular screening prior to approval for kidney transplantation. We sought to evaluate the effect of a revised pre-transplant cardiac assessment protocol at our institution, which included more frequent use of coronary angiography in patients at increased cardiac risk.

Methods

Single center, retrospective study that examined all patients (n=419) who underwent kidney transplantation three years before (2013-2015, n=184) and after (2016-2018, n=235) initiation of a new cardiac evaluation protocol. The primary endpoint was a composite of cardiovascular mortality, non-fatal myocardial infarction, need for emergent revascularization, and hospitalization for unstable angina.

Screening Protocol

- ❖ Diabetes Mellitus
- ❖ Peripheral Arterial Disease
- ❖ Male age > 45
- ❖ Females age > 55

→ ❖ No risk factors = **Low**
❖ 1 factor = **Intermediate**
❖ 2+ risk factors = **High**

- ❖ History of MI
- ❖Need for Revascularization
- ❖ LVEF < or = 40%

→ ❖ 1+ factor = **Very High**

Pre-Operative Screening:

- Low Risk: No screening required
- Intermediate: Yearly non-invasive testing
- High or Very High Risk: Angiography

Conclusion

In patients undergoing evaluation for kidney transplant, our revised cardiac screening protocol resulted in a higher rate of coronary angiography and was associated with a reduction in cardiovascular events and overall mortality after transplant.

Results

	12 Months		36 Months	
	Pre-protocol (n=184)	Post-protocol (n=235)	Pre-protocol (n=184)	Post-protocol (n=235)
Composite Outcome	11 (6.0%)	1 (0.4%)	17 (9.2%)	1 (0.4%)
▪Non-fatal MI	4 (2.2%)	1 (0.4%)	7 (3.8%)	1 (0.4%)
▪CV Mortality	7 (3.8%)	0 (0.0%)	10 (5.4%)	0 (0.0%)
Overall Mortality	11 (6.0%)	4 (1.7%)	17 (9.2%)	6 (2.6%)

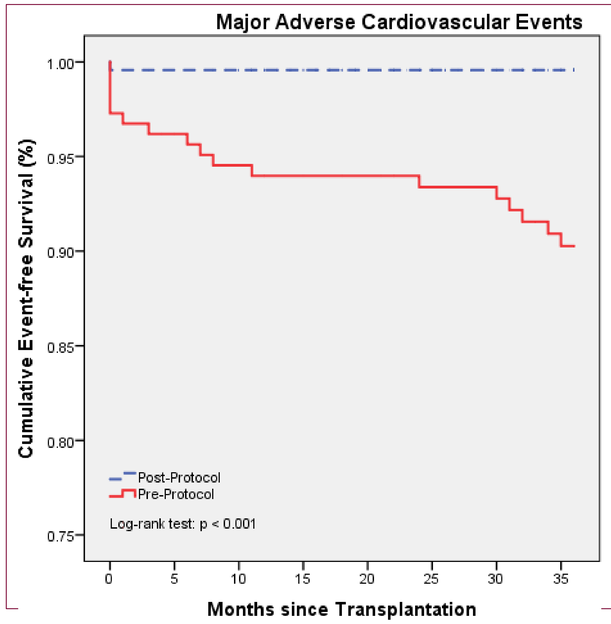

Figure 1: Kaplan-Meyer survival curve of composite cardiovascular events

Major Adverse Cardiovascular Events:

- At 12 months: 11 (6.0%) of the pre- and 1 (0.4%) of the post-protocol groups – adjusted 0.08 (95% CI: 0.01-0.620, p=0.016)*
- At 36 months: 17 (9.2%) and 1 (0.4%) patients, before and after the revision resulting in an adjusted HR 0.06 (95% CI: 0.01-0.45, p = 0.006)*
  - Number needed to treat (NNT) – 11
- Non-fatal Type II NSTEMI:
  - 32 (17.4%) in the pre- and 26 (11.1%) post-groups, (p=0.06)

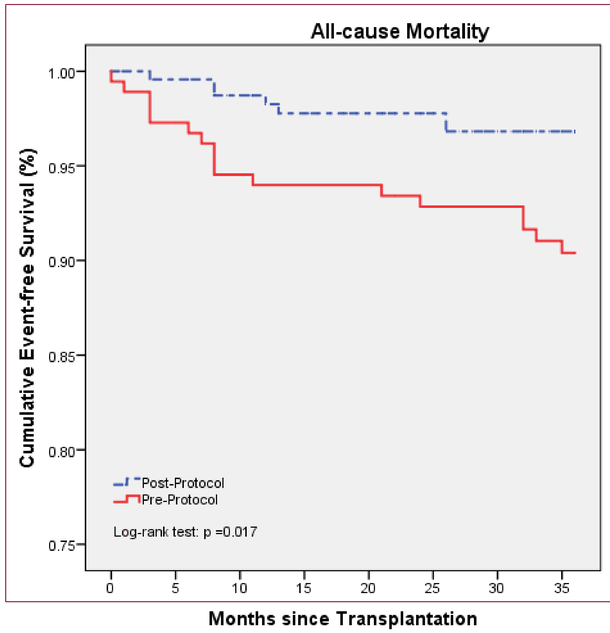

Figure 2: Kaplan-Meyer survival curve of all-cause mortality.

All-cause mortality:

- At 12 months: 6.0% pre- vs 1.7% post-, with an adjusted HR 0.21 (95% CI: 0.06-0.715, p=0.012)*
- At 36 months: 17 (9.2%) and 6 (2.6%) – adjusted HR 0.28 (95% CI: 0.11-0.75, p = 0.011)*
  - Number needed to treat (NNT) – 15
- 47.8% of all deaths in the study were cardiovascular

*Cox-models adjust for history of CAD, smoking, diabetes, peripheral vascular disease, age, left ventricular ejection fraction, aspirin, statin, or beta-blocker use

- Majority of patients who underwent angiography were already on renal replacement therapy (RRT).
  - 9 in the pre- and 7 in the post-protocol groups were pre-RRT
  - 2 in both cohorts proceeded to RRT within 6 months of angiography (p = 0.539).

Discussion

- Death due to cardiovascular disease is the leading cause of functioning graft loss, accounting for approximately half of all cases [1].
- The new approach resulted in increased rates of angiography in patients deemed high or very high risk (64.1% pre- vs 95.7% post-, p<0.001), without a significant change in those considered intermediate or low risk (18.3% pre- vs 12.8% post-, p=0.210).
- When comparing event rates to registry data from the United States Renal Data System:
  - We note similar 1- and 3-year mortality rates pre-protocol initiation – 5.6% (95% CI: 5.3-5.8%) vs our observed 6.0% (95% CI: 3.0-10.4%), and 11.1% (95% CI: 10.7-11.5%) vs our observed 9.2% (95% CI: 5.5-14.4%), respectively[2].
  - After standardization of screening practices, the rate appears significantly lower at both 1 and 3 years, only 0.4%(95% CI: 0.0-2.3%).

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Disclosures: None of the authors have conflicts of interest to report.

Communicating Critical ECG Interpretations QI Project

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Background & Problem Statement

- Currently, at Edward Hines V.A., there does not exist a protocol allowing medical support staff to notify providers of abnormal automated critical electrocardiogram (ECG) results.
- As medical support staff are the first to view automated ECG results, a delay in patient care can occur with provider response time.
- For example, if the automated ECG result reads Acute ST Myocardial Infarction (STEMI), the time it takes for the ordering provider to visualize the ECG can cause a delay in patient care and increase door to balloon time that should ideally be less than 90 minutes.
- A notification protocol allowing the medical support staff to alert the ordering provider would help to reduce that delay.
- Other notable abnormal ECG findings that can lead to poor patient outcomes if not acted upon in a timely manner include:
  - complete heart block
  - bradycardia
- The aim of this quality improvement (QI) project is to implement an ECG notification policy to minimize delay in provider response to actionable findings and improve patient care at Edward Hines V.A. over the course of 6 months.
- A secondary outcome of this notification protocol is to allow multiple members of the medical team to visualize the ECG and take responsibility of abnormal findings to help ensure abnormal ECG findings are acted upon and not missed.

Objectives

- The aim of this QI project is to increase provider notification of critical ECGs results within 15 minutes from a current baseline of 0 to 85% on the 8th floor of HVA.
- Initiate change from current state (figure 1) to target state (figure 2) through ECG notification protocol (figure 3).
- RN will follow notification protocol and initiate Rapid Response Team (RRT) for automated abnormal ECG results including:
  - Acute myocardial infarction
  - Complete heart block
  - Tachycardia with a heart rate > 120 bpm
  - Bradycardia with a heart rate < 35 bpm

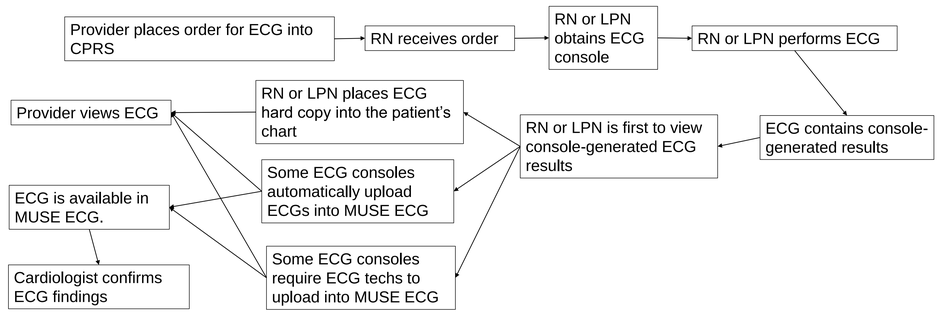

Figure 1. Flow diagram of current state of process in obtaining ECG.

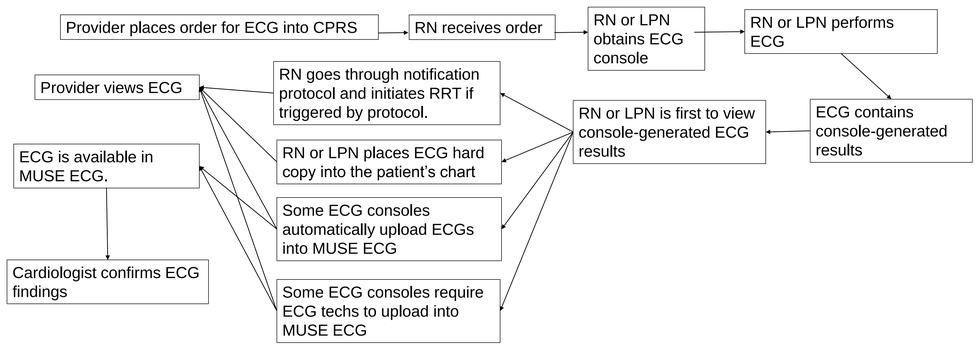

Figure 2. Flow diagram of target state of process in obtaining ECG.

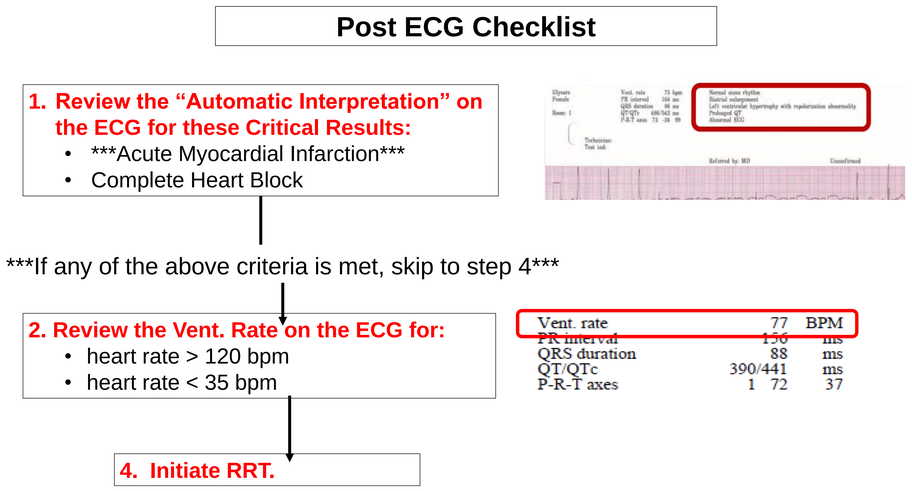

Figure 1. Post ECG checklist identifying the steps of the notification protocol that will be distributed to medical support staff.

Next Steps

- Obtain approval by nursing manager to initiate protocol.
- Develop an interdisciplinary team composed of floor RN's, nursing managers and physicians to pilot the ECG checklist.
- Initiate protocol on 8th floor (telemetry floor).
- Run PDSA's and collect data to create run charts to determine if the notification protocol has created a positive impact on patient care.
  - Monitor time to action for critical ECG results from time ECG was obtained to time RRT was initiated.
  - Ensuring notification protocol does not create other unintended consequences such as disruption in workflow, or excessive RRTs.
- Implement the notification protocol throughout Edward Hines V.A.
- Spread the notification protocol to other V.A. hospitals across the country to continue improving patient care and outcomes.

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Quality Improvement Initiative Reduces Standardized Utilization Ratios for Indwelling Urinary Catheters in Hospitalized Patients

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Background

- Urinary tract infections (UTIs) account for > one third of healthcare associated infections (HAI)
- Urinary catheters (UC) are placed in 15-25% of hospitalized patients and >75% of HAI UTIs are related to UCs
- Bacteria introduced via UC can colonize bladder within 3 days
- Greatest risk factor for acquiring a catheter-associated UTI (CAUTI) is prolonged use of indwelling UC
- Nursing staff noted inconsistency with appropriate use of UC with UCs commonly remaining in place well after their original indication had expired

Objectives

GOAL: Reduce UC days & UC SUR

- To identify & quantify opportunities to remove UCs
- To determine number of identified opportunities for UC removal by RNs & Clinical QI Specialists (CQIS)
- To determine RN vs CQIS discordance
- To track UC standardized utilization ratio (SUR)

Standardized Utilization Ratio (SUR)

$$\text{SUR} = \frac{\text{Actual \# of UC days}}{\text{Predicted \# of UC days}}$$

RN Identified Opportunity to Remove

CQIS Identified Opportunity to Remove

Difference between RN and CQIS

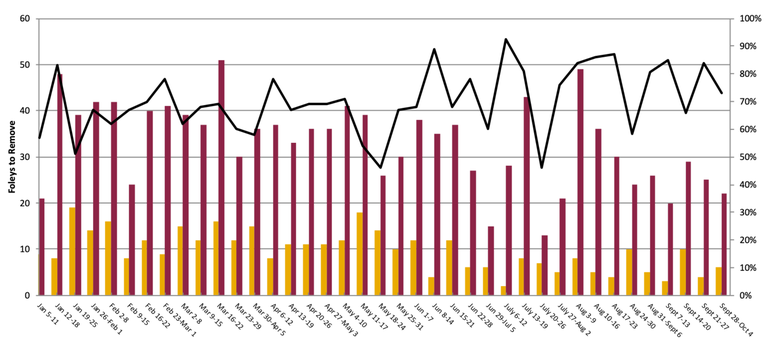
This was a single center study and may reflect events perhaps unique to our institution.

Methods

- Daily critical reviews of UC indications were conducted by two groups:
- **RN Group**
  - Night-shift RNs identified patients who no longer had a valid justification for continued UC, & report data to day-shift RNs
  - Day-shift RNs suggested removal of UC during daily rounds with physician teams
- **CQIS Group**:
  - CQIS reviewed UC data & reported their discontinue UC recommendations to care teams
- Monthly UC SURs were tracked
- Initiative fully rolled out by January 2019 in the CVICU, MICU, SICU

Results

Fig.1: Identified Opportunities for UC Removal by RNs & CQIS & Percent RN-CQIS Discordance, January to October 2019



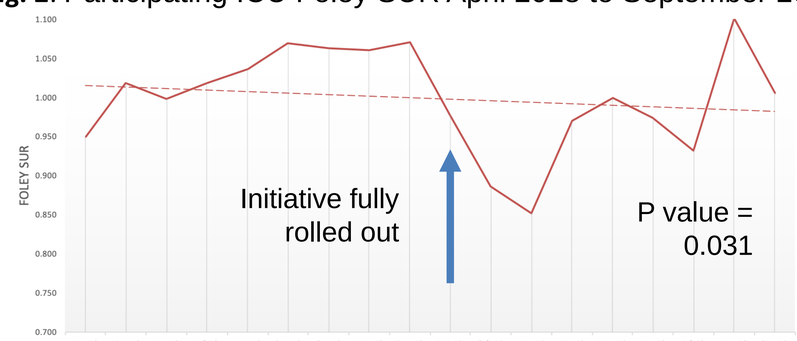
Results

- CQIS identified many more removable UCs than RNs (888 vs 256)
- 377 UC were removed after RN reviews
- 925 UC were removed after CQIS reviews
- **Figure 2** shows the marked corresponding decline in our SUR
- After full roll out of program, SUR statistically significantly decreased, P = 0.031 compared to the prior 9 months SUR

Conclusions

- As more units participated in the initiative, we saw increasing numbers of "discontinue UC" recommendations
- CQIS routinely identified many more UCs to be removed compared to RNs, & more than doubled the number of discontinued UC
- **Overall, we saw a statistically significant reduction in UC SUR**
- Lower SUR contribute to decreasing the risk of CAUTI
- Unclear reason for uptick in SUR near end of trial period

Fig. 2: Participating ICU Foley SUR April 2018 to September 2019



GRP78 as a Predictive Marker in Pancreatic Ductal Adenocarcinoma

Anshu Hemrajani MD, Brian Johnson MD, Reginald Hill PhD, Xianzhong Ding MD, Mike Wesolowski MPH
Principle Investigator: Asha Dhanarajan MD

Introduction

Pancreatic Ductal Adenocarcinoma (PDAC) is associated with high mortality, chemoresistance, and recurrence

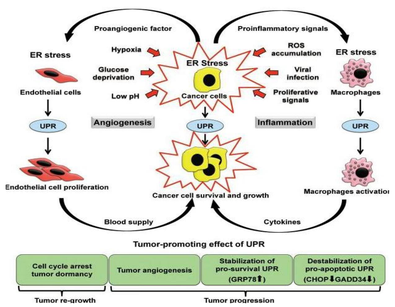
- PDAC is the fourth leading cause of cancer-related death in western countries
- PDAC has one of the lowest five-year survival rates of all cancers at approximately 9% with 60% of cases being unresectable at diagnosis
- Perioperative chemotherapy with or without radiation is the standard treatment for resectable PDAC. Yet, recurrence rates remain as high as eighty percent.
- The poor prognosis of the disease can be attributed to its late detection, aggressive tumor biology, and poor response to available therapies

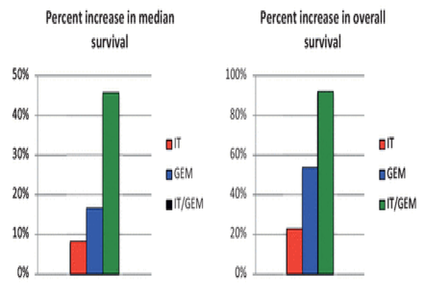
GRP78 is a molecule that regulates normal cellular function and proliferation

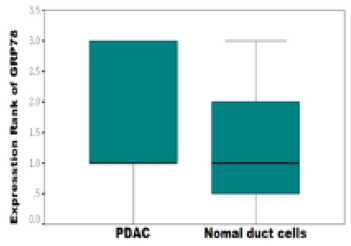
- GRP78 is an endoplasmic reticulum (ER) chaperone protein involved in regulation of the ER stress response
- Thus, this leads to pro-survival pathway activation promoting tumor proliferation, anti-apoptosis, and resistance to therapeutic agents

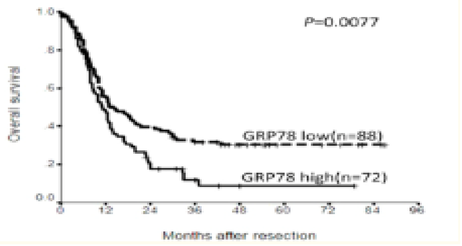
GRP78 may be a factor involved in PDAC chemoresistance

- GRP78 expression was increased in pancreatic cancer tissue compared to adjacent noncancerous duct cells in mice models with various degrees of pancreatic injury
- GRP78 expression in human PDAC grafts was associated with increased resistance to gemcitabine chemotherapy
- GRP78 knockdown mice showed increased response to gemcitabine
- GRP78 xenografts treated with IT-139 that downregulates GRP78 expression in cancer cells showed increased response to gemcitabine
- GRP78 expression in tissue from 180 patients with PDAC demonstrated that expression was higher in PDAC cells compared to adjacent non-tumor tissues. The higher GRP78 expression correlated with higher T stage and overall shorter survival









Objectives

To use immunohistochemistry (IHC) to assess the level of GRP78 expression on the PDAC archived in the Loyola Pathology Department during the period of time of interest

To correlate the level of GRP78 expression with clinical data on response to chemotherapy and overall survival

Methods

PATIENT SAMPLES

- We conducted a single institution retrospective review of 125 patients who underwent resection of PDAC from 1/1/2009-7/1/2016 by querying the LUMC pathology department database using specific diagnoses
- Patients were excluded if found to have a diagnosis of pancreatic neuroendocrine tumor, cholangiocarcinoma, or ampullary carcinoma or for inadequate follow-up

CLINICAL DATA:

- Corresponding clinical data obtained included date of birth, age at diagnosis, presenting symptoms, labs at diagnosis, date of tumor resection, type of surgery, chemotherapy and/or radiation therapy, date of recurrence if any, and date of last follow-up or death

TISSUES SAMPLES:

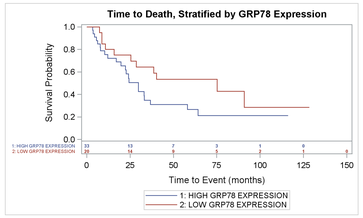
- Archived tumor tissues were assessed by immunohistochemistry (IHC) for GRP78 expression
- Researchers blinded to all clinical data analyzed stained slides and graded GRP78 expression on scores 0-3+
- GRP78 IHC scores of 0-1+ were categorized as low expression and scores of 2-3+ as high expression

STATISTICAL ANALYSIS:

- Adjusted effects of GRP78 expression on the hazard of treatment failure or death were estimated using Cox proportional hazards models.
- Type III Wald Chi-square p-values are reported for the overall effect in each model

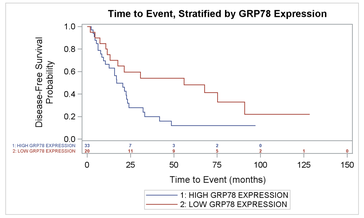
Results

	Deceased	
GRP78 Expression Level	Yes	No
High GRP78 Expression	22 (66.67)	11 (55.00)
Low GRP78 Expression	11 (33.33)	9 (45.00)



Predictor Effect	Covariate	HR (95% CI)	p
GRP78 Expression (High vs. Low (REF))	Unadjusted	1.80 (0.87, 3.75)	0.11
GRP78 Expression (High vs. Low (REF))	ECOG Performance Status	2.20 (0.99, 4.91)	0.05
GRP78 Expression (High vs. Low (REF))	Initial Overall Stage	1.97 (0.93, 4.16)	0.08
GRP78 Expression (High vs. Low (REF))	Clinical Category	1.82 (0.87, 3.82)	0.11
GRP78 Expression (High vs. Low (REF))	Surgical Pathology Tumor Stage	2.19 (1.04, 4.63)	0.04*
GRP78 Expression (High vs. Low (REF))	Surgical Pathology Node Stage	2.60 (1.21, 5.59)	0.01*
GRP78 Expression (High vs. Low (REF))	Resection Margins	1.81 (0.87, 3.75)	0.11
GRP78 Expression (High vs. Low (REF))	Neoadjuvant Therapy	1.80 (0.86, 3.74)	0.12
GRP78 Expression (High vs. Low (REF))	Adjuvant Therapy	1.72 (0.82, 3.59)	0.15

	Treatment Failure or Deceased	
GRP78 Expression Level	Yes	No
High GRP78 Expression	26 (66.67)	7 (50.00)
Low GRP78 Expression	13 (33.33)	7 (50.00)



Predictor Effect	Covariate	HR (95% CI)	p
GRP78 Expression (High vs. Low (REF))	Unadjusted	2.00 (1.01, 3.97)	0.05*
GRP78 Expression (High vs. Low (REF))	ECOG Performance Status	2.27 (1.08, 4.78)	0.03*
GRP78 Expression (High vs. Low (REF))	Initial Overall Stage	2.02 (1.00, 4.08)	0.05*
GRP78 Expression (High vs. Low (REF))	Clinical Category	2.07 (1.04, 4.15)	0.04*
GRP78 Expression (High vs. Low (REF))	Surgical Pathology Tumor Stage	2.40 (1.16, 4.95)	0.02*
GRP78 Expression (High vs. Low (REF))	Surgical Pathology Node Stage	3.19 (1.52, 6.70)	< 0.01*
GRP78 Expression (High vs. Low (REF))	Resection Margins	1.99 (1.00, 3.95)	0.05*
GRP78 Expression (High vs. Low (REF))	Neoadjuvant Therapy	2.00 (1.01, 3.96)	0.05*
GRP78 Expression (High vs. Low (REF))	Adjuvant Therapy	1.96 (0.98, 3.94)	0.06

Conclusion

INTERPRETATIONS:

- High GRP78 expression was associated with worsened DFS in patients with resectable PDAC in unadjusted analyses as well as when adjusting for performance status, initial overall stage, pathological stage, pathological node stage, resection margins, and neoadjuvant therapy
- High GRP78 expression had a similar impact on OS when adjusting for pathological tumor and pathological node stage

LIMITATIONS:

- Patient data analyzed from 2009-2016, with inability to use older tissue samples due to degradation of samples that may affect immunohistochemistry results
- Patients whose pathology samples were not in our database or received treatment and/or follow-up elsewhere were not included in analyses
- All covariates of interest were not able to be included in a single model due to sample size and event/non-event rates

FUTURE DIRECTIONS:

- Include more recent patient data in our analysis to increase sample size
- Investigate affect of GRP78 expression level on response to gemcitabine chemotherapy
- Prior studies have demonstrated that tissue treated with agents downregulating GRP78 expression showed improved chemosensitivity
- Conduct human studies of biologic agents inhibiting GRP78 to assess their safety and optimal dosing when combined with chemotherapy
- Ideally, these biologic agents will increase patient survival and response to chemotherapy

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Risk Factors And Outcomes Of Unplanned Intensive Unit Care Transfers Within 24 Hours Of Admission

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1 Background

Previous research has demonstrated that **patients admitted to the hospital floor and subsequently transferred to the intensive care unit (ICU) within 24 hours have higher mortality than other ICU admissions**. This challenges the appropriateness of the initial triage in these patients.

It is possible that given the need for rapid escalation of care from admission, these patients may have been **too sick for floor level care** and actually **needed earlier stabilization** in the ICU upon admission.

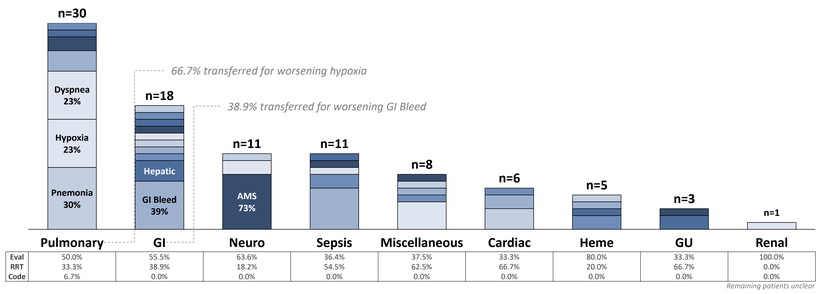
Primary objective: identify significant risk factors associated with unplanned ICU transfers within 24 hours of admission at our institution. Risk factors would include the context of the initial admission (ED triage VS no ED triage i.e. direct admit or outside hospital transfer), pertinent admission lab values, and physiologic scoring systems (qSOFA).

Our goal is to **decrease early, unplanned transfers to the ICU. The reduction in such transfers would ultimately reduce hand-offs between different medical teams, thus eliminating potential sources for medical error and adverse events within the first 24 hours of a patient's hospitalization.**

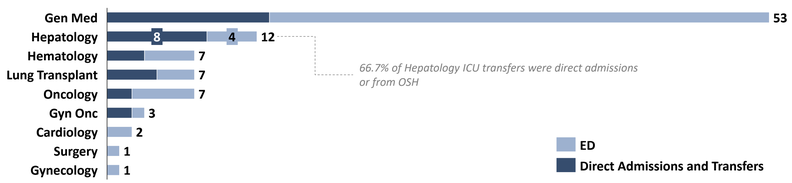
2 Baseline Data

Of all ICU transfers between years June 2016-June 2019, 26.2 % (241 out of 920 total patients) were unplanned ICU transfers (within 24 hours of admission). Additional unplanned ICU transfers information:

Admitting Diagnosis



Primary Team



Triage

3 Proposed AIM Statement

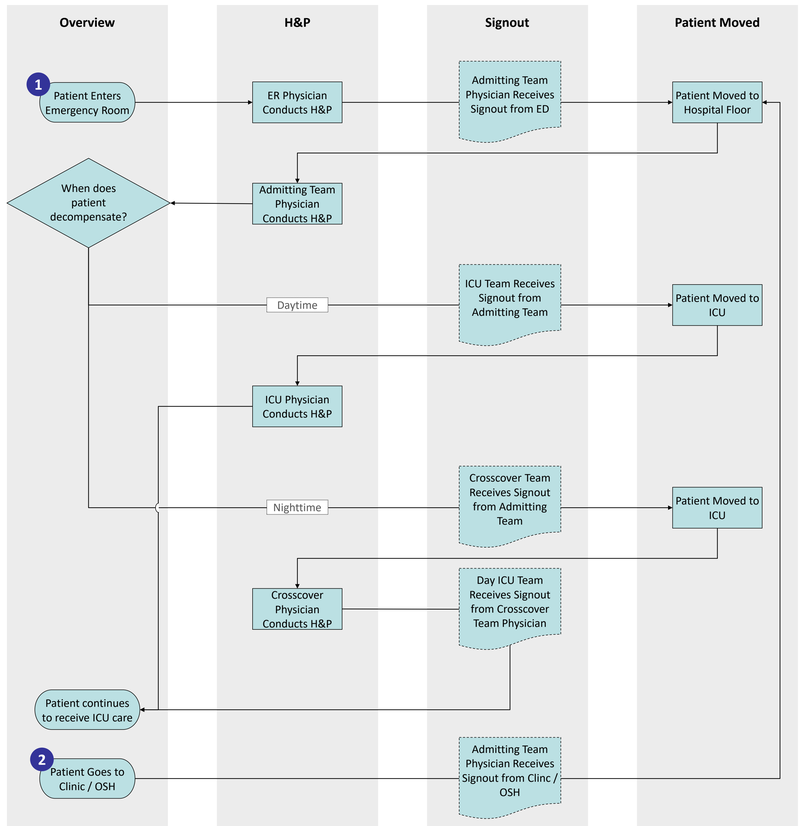
NOW → ***FUTURE***

26.2% of critical care unit transfers occur within 24 hours of admission

Our goal is to ultimately **reduce unplanned ICU transfers** within 24 hours of a patient's admission by 10% by December 2020

4 Current State Process Map

Initial 24 hours of a patient's admission who is eventually transferred to ICU within 24 hours:



Ideal state replaces patient movement through floor team with direct admission to ICU

5 Analysis and Discussion

Out of the pool of 920 patients admitted to the ICU within June 2016-2019, our goal was to randomly select and compare risk profiles of ~100 who were admitted within 24 hours of their admission, and ~100 other ICU admissions (admitted after 24 hours).

	Patients admitted < 24 hours of admission (n=93)	Patients admitted > 24 hours of admission (n=100)	
Admission labs (normal range)	**% abnormal**	**% abnormal**	**P-Value**
WBC (4-11)	38.2%	42.4%	p=0.66
Hb (12-17)	68.1%	65.7%	p=0.84
Platelet (150-450)	35.1%	48.5%	p=0.08
Tbili (0.1-1.2)	34.1%	40%	p=0.54
Cr (0.5-1.1)	54.8%	63.6%	p=0.27
CO2 (22-26)	48.4%	55.6%	p=0.39
Admission physiologic parameters			
Fever on adm	6 (6.32%)	3 (3.03%)	p=0.46
qSOFA (average)	0.47	0.30	p=0.049
Required O2 on adm	25 (26.3%)	28 (28.2%)	p=0.88
Initial MAP (average)	89.38	87.35	p=0.4
Mortality (death this hospitalization)	18.9%	42.4%	p=.0007

- **Earlier ICU stabilization within 24 hours of admission is associated with improved mortality compared to those requiring intensive care >24 hours after admission,** but comes with an associated cost of early hand-offs and care transitions which may be avoided by examining the level of care designation process upon admission.
- We reviewed and compared risk profiles (i.e. admission labs and physiologic parameters above) between these two groups in order to examine what risk factors on admission have the highest rates of early decompensation.
- Although the specific risk factor profiles on admission that we evaluated do not show significant difference, further analysis into our baseline data does show promising areas of potential intervention in order to ensure less handoffs while providing early, necessary ICU stabilization for these patients.

6 Proposed Interventions

A large % of hepatology patients being transferred to the ICU within 24 hours are from outside hospital transfers or direct admissions (i.e. not triaged by ED or any in person evaluation).

- These OSH transfers and direct admits may benefit from ED or some other type of initial screening/triage where they are evaluated before being admitted to the floor.
- If the patient ends up on floor anyway, this could introduce another level of care/screening; however, may lead to earlier ICU stabilization and possibly improved mortality if critical care was actually needed.

GI bleed and Pneumonia were the most common admitting diagnoses.

- This warrants further investigation into specific events preceding decompensation; is there a delta Hb, MAP, or O2 requirement within initial time period in ED that could be implemented into a scoring system to triage these patients to go directly to ICU instead of the floor, and therefore decrease transitions of care and multiple initial admitting teams.
- It may be useful to study, modify or reinforce previously validated scoring systems in the ED to triage pneumonia patients specifically, i.e. SMART-COP score. This system includes specific labs, vitals, age, CXR findings to predict need for intensive respiratory or vasopressor support.