Reducing Laboratory Test Ordering Overuse in General Internal Medicine Units at the Grey Nuns Community Hospital

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DEFINE OPPORTUNITY

Background:

In Canada, laboratory tests are the most common medical activity performed in the healthcare system[1]. It is estimated that 20.6% of laboratory tests in various clinical settings are overused[2]. Approximately 5.9 billion dollars is spent each year on laboratory tests in Canada, as such a continued growth in testing cannot be sustained by the healthcare system. It is critical to ensure appropriate lab ordering in order to reduce healthcare costs and improve patient experience. This project is a continuation of an initial project in General Internal Medicine (GIM) completed at the University of Alberta Hospital.

Problem Statement:

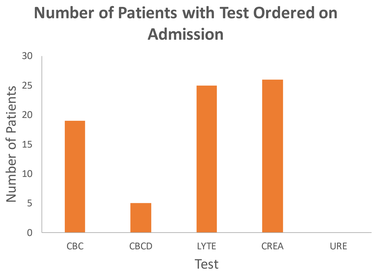
On Grey Nuns Community Hospital (GNCH) GIM units, electrolytes, CBC/CBCD, urea, and creatinine make up 66% of all laboratory tests ordered. Upon admission to GNCH GIM units, CBCD and basic chemistry are commonly ordered on a repeating daily basis. This includes daily urea, which has few clinical indications to be ordered on an indefinite daily basis. On GNCH GIM units there is no standard process for laboratory test ordering frequency to be reviewed upon admission and during inpatient care. This process increases the number of inappropriate and over utilized laboratory tests which creates system-wide wastes, increases operational costs and negatively impacts patient experience while often causing iatrogenic anemia.

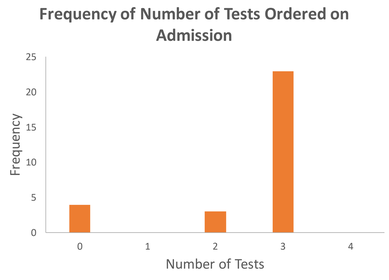
Baseline Data:

Lab Data – 15 months : 66% of tests ordered on units 44 and 54 were CBC/CBCD, electrolytes, creatinine, and urea.

Test	Baseline GNCH 44 & 54 January 2018 to March 2019
CBC/CBCD	15,913
Electrolytes	48,248
Creatinine	6,963
Urea	3,704
Total Tests	74,828
Total Annual Cost	$405,966

Chart Audit: 65% of patients had one of these tests ordered daily at admission; 2% of daily orders were indefinite, 23% limited to just once, 3% daily x2, 37% daily x3, 2% daily x5. 87% of admission orders had greater than ≥ 2 lab tests ordered. No explicit comments regarding daily blood work in progress notes.





Aim Statement:

- 30% reduction of total number of daily labs ordered on GNCH units 44 and 54 during a three-month study period
- 20% reduction in total number of CBCD and urea ordered during a three-month study period

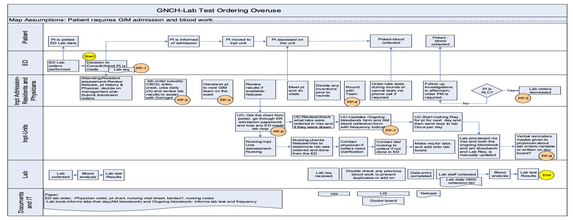
BUILD UNDERSTANDING

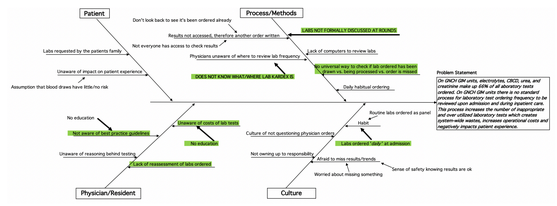
Process Assessment:

A literature review was completed to provide background information. Process mapping and a cause and effect analysis was completed to identify current gaps and future solutions. Based on these solutions, Plan-Do-Study-Act (PDSA) cycles were implemented.

References:
1. Naugler, C., & Wyonch, R. (2019, February 23). What the doctor ordered: improving the use and value of laboratory testing. Retrieved from https://www.cdhowe.org/public-policy-research/what-doctor-ordered-improving-use-and-value-laboratory-testing

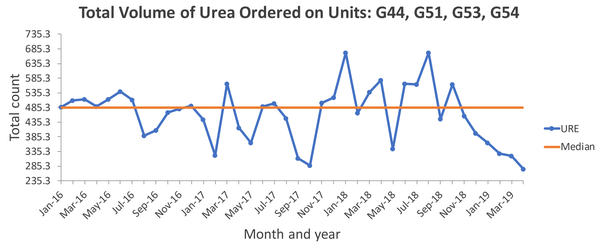
2. Zhi, M., Ding, E. L., Theisen-Toupal, J., Whelan, J., & Arnaout, R. (2013). The Landscape of inappropriate laboratory testing: A 15-year meta-analysis. *PLoS ONE*,*8*(11). doi:10.1371/journal.pone.0078962





PDSA 1:

An educational awareness session was held in December 2018 discussing the project and mindful laboratory test ordering. As a result, attending physicians started reviewing the orders upon admission and when daily was ordered at admission it was modified to daily x3. The total number of urea tests ordered on all units has decreased by 40% since December 2018 along with a reduction of admission 'daily' lab test orders.



MANAGE CHANGE

Collaboration and Communication Strategies:

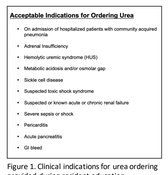
- Quality Improvement (QI) team members included an Executive Director, Program Managers, Unit Managers, Unit Clerks, Laboratory Services, a Medical Student, a Resident, an Attending GIM Physician and a QI Consultant.
- An initial meeting and mapping session was held with the QI team, increasing their awareness of why this project is needed and to obtain their knowledge of current process in order to understand and identify areas of opportunity.
- A second meeting with the QI team was held to discuss the key interventions that will be implemented and how they will be carried out. Consensus determined interventions that would be used.

ACT TO IMPROVE

Improvement Selection and Implementation Plan:

Target Units 44 and 54
September 1, 2019 – December 31, 2019

Gaps	Solutions
Residents are unaware of appropriate lab ordering practices and the impact of inappropriate ordering.	Ongoing resident education at the beginning of a resident unit training block to educate appropriate ordering practices. Provide clinical indications for when to order urea (Figure 1). Encourage no 'daily' lab tests ordered upon admission unless medically required and justified. Post hospital admission, assess both lab test order frequency and results to ensure test frequency adjustments are made. Do not add a differential to a CBC unless it adds useful diagnostic information.
Physicians are ordering daily labs and are unaware of the frequency already ordered.	Unit clerks will be reviewing admission lab orders and flagging charts with daily orders for reassessment. Copies of the ongoing blood work form with highlighted daily orders will be provided to physicians indicating the frequency of lab tests ordered. Any daily orders will be auto-substituted to "daily x3" using an auto-sub sticker (Figure 2). Physicians will review and sign off. Physicians are encouraged to have regular discussions regarding lab test ordering frequency during morning medical rounds and at physician handover.
Lab frequency is recognized often close to discharge or several days post admission.	Patients that are medically non-acute will have an Alternate level of Care (ALC) sticker (Figure 3) placed in their chart for reassessment or discontinuation of all blood work and other care plan adjustments.


Acceptable Indications for Ordering Urea

- On admission of hospitalized patients with community acquired pneumonia
- Adrenal insufficiency
- Hemolytic uremic syndrome (HUS)
- Metabolic acidosis and/or osmolar gap
- Sickle cell disease
- Suspected toxic shock syndrome
- Suspected or known acute or chronic renal failure
- Severe sepsis or shock
- Pericarditis
- Acute pancreatitis
- GI bleed

Figure 1. Clinical indications for urea ordering provided during resident education.

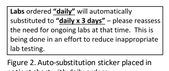
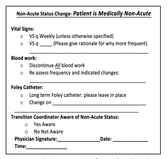

Labs ordered **"daily"** will automatically substituted to **"daily x 3 days"** – please reassess the need for ongoing labs at that time. This is being done in an effort to reduce inappropriate lab testing.

Figure 2. Auto-substitution sticker placed in patient chart with daily orders


Non-Acute Status Change- *Patient is Medically Non-Acute*

Vital Signs:
- V.s q Weekly (unless otherwise specified)
- V.s q_____ (Please give rationale for why more frequent) _____

Blood work:
- Discontinue All blood work
- Re assess frequency and indicated changes: _____

Foley Catheter:
- Long term Foley catheter: please leave in place
- Change on _____

_____

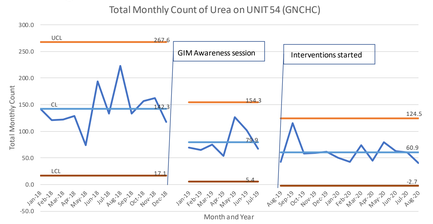
Transition Coordinator Aware of Non-Acute Status:
- Yes Aware
- No Not Aware

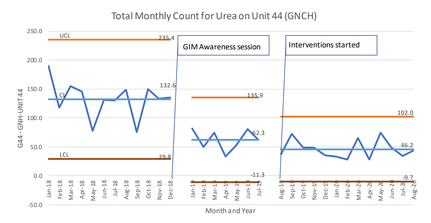
Physician Signature:_____ **Date:** _____
Time:_____

Figure 3. Alternate Level of Care (ALC) sticker placed patient chart that are medially non-acute.

Results:

Comparing urea ordering volume from January to December 2018 and 2019 shows a 48% reduction in the total number of urea tests ordered on Units 54 and 44. For PDSA#1, in December 2018, GIM education was provided which resulted in a sharp reduction. For PDSA#2, a total of 500 urea tests were ordered on Unit 44 and 54 from Sept to Dec 2019 for a total estimated cost of $2500 as compared to 1064 tests from Sept to Dec 2018 for a total estimated cost of $5320, showing a reduction of 564 urea tests ordered and a cost avoidance of $2820. When combined with the reduction in urea tests ordered in PDSA#1, this resulted in a cost avoidance of $8615. Further, the graph indicates a sustained change from January 2020 to August 2020 for both units.





For PDSA#2, comparing CBCD annual order volume from January to December 2018 and 2019 indicated a 16% increase in CBCD ordering.

Process measure – use of auto-substitution labels.

- Number of auto-substitution labels used varied weekly during Sept-Dec 2019, suggesting that some physicians may require further awareness regarding daily orders on admission.
- No data was recorded for the weeks of Dec 22 and Dec 29.

SUSTAIN RESULTS

Reinforce Ownership, Measurement and Continuous Improvement:

- Analysis of lab data for PDSA#2 demonstrated a positive effect to urea test utilization.
- For PDSA#3, we recommend to scale and spread to units 51 and 53 and to develop a monitoring plan to sustain physician awareness of appropriate laboratory test ordering and order frequency. Also, to further encourage physicians to reduce the ordering of CBCD where appropriate.
- Continual resident education will occur at the start of each resident training block.
- Spread and share project learning with other hospitals in Alberta.

SHARE LEARNING

Why This QI Project Matters:

To patients: Decreasing inappropriate laboratory blood tests reduces patient discomfort, anxiety, stress and bruising, rates of nosocomial anemia, and length of hospital stay.

To Albertans & the health care system: Decreasing inappropriate laboratory blood tests can save hundreds of thousands of health care dollars per year, reducing labour burden on hospital and lab staff, allowing resources to be allocated to other areas/programs.

Lessons Learned:

- Physicians were not aware of lab order frequency, or where to find this information. Providing this information and having a standard formal process to review frequency can improve patient care and reduce costs.
- Educating medical students, residents and attending physicians on best practice guidelines plays a key role in changing the culture and habits of lab test ordering overuse.

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