The Effectiveness of a Sequenced Multicomponent Intervention: Reducing Blood Urea Nitrogen (BUN) test ordering in Alberta Hospitals

Authors: Pamela Mathura, Sandra Marini, Madison Godfrey, Yvonne Suranyi, and Narmin Kassam

Background and Problem

In Alberta, ~80 million laboratory tests are ordered annually (2018-2019). A Provincial Laboratory Utilization Report (2018) identified:
- Blood Urea Nitrogen (BUN) test utilization - top 10 ordered tests for all health zones in Alberta, except Calgary.
- BUN-test ordering was higher in the hospital setting.

In a response, the Edmonton Zone Medicine Quality Council-Physician QI leadership Coalition completed 4 separate QI projects in the Edmonton zone that identified key sequenced intervention components to reduce BUN test ordering in a paper-based hospital charting setting.

Objective

- The primary objective was to reduce the monthly BUN-testing ordering in hospital medicine units and/or emergency departments (ED) in 4 health zones (Edmonton, Central, South, and North) in Alberta.
- The expectation was a physician led initiative that provided targeted education, simple paper-based interventions along with audit & feedback would reduce BUN-testing ordering.

Methods/Approach

- Ethical approval obtained from the University of Alberta REB (study number Pro00092863, April 24, 2020).
- Pre/Post intervention interrupted time series design.
- Adapt the sequenced multicomponent intervention to the following locations: Edmonton Zone-Misericordia Community Hospital (MCH)-Emergency Department
  Central Zone: Red Deer Regional Hospital (RDRH)-Medicine Units and Emergency Department
  South Zone: Chinook Regional Hospital (CRH)-Medicine Units
  North Zone: Queen Elizabeth II Hospital-Medicine Units

Approach

Step 1: Coalition Physician project leader communicated with appropriate local medicine, ED, zone or hospital physician leaders.
Step 2: Coalition QI consultant and Research Assistant completed current state review/includes completion of QI tools and review of monthly BUN-test count data) to determine local processes.
Step 3: Share current process finding with local hospital physician and operational leaders.
Step 4: Develop local QI team led by a local physician champion to adapt interventions to local context.
Step 5: Provide audit and feedback to physician champions.
Step 6: Analysis of the monthly BUN-test count data over time.
Step 7: Annual cost avoidance approximation, calculated using a reference median of $5.00 per BUN test (Ma et al., 2019).

Results

- Monthly BUN test ordering declined for all participating hospital medicine units and emergency departments.
- Emergency departments - monthly visit count was compared to the total monthly BUN test ordered to measure a reduction.
- Hospitals that incorporated form or IT system changes where the BUN test was removed from lab panels resulted in higher reductions.
- Medicine units required to frequently switch to COVID units resulted lower BUN test reduction.
- Total cost avoidance approximation for the 3 participating hospitals is $13,300.00 per month or $160,000.00 per year

Conclusions

- QI projects focused on lab testing, physician QI leaders are critical for change acceptance.
- Targeting one blood test using brief education, audit and feedback supported BUN test order reductions.
- To encourage physician participation and leadership in QI activities, design interventions that require minimal effort and disruption to clinical processes along with support personnel (QI and analytics).
- For intervention sustainability - incorporate changes to order processes and IT systems, provide laboratory data access (audit and feedback) and provide physicians QI and clinical laboratory education.
- This project made recommendations to the design of Connect Care - (i.e., BUN test was removed from all order sets where appropriate to support sustained reduction.

Why this QI Work Matters

To Patients: Reduction in possible complications and illnesses as the result of repetitive blood draws
To Clinicians: Reduction in unnecessary components of practice that do not add value to patient care. Practice focus on thoughtful ordering and mindful prescribing for patients.
To Health System: Reducing inappropriate laboratory testing would have the dual benefits of making the health system more efficient and improving patient outcomes and experience.

Acknowledgements

This project received a Choosing Wisely Alberta Grant

The authors are grateful to all the physicians who participated in this QI initiative

Reference: