Repetitive Bundled Testing in Inpatient Units in Newfoundland and Labrador

Choosing Wisely Canada Recommendation

Do not order aspartate aminotransferase (AST) or Urea for routine screening in the initial workup of common diagnostic investigations. Review order sets regularly for diagnostic utility and uncouple low value routine tests [i.e. AST and Alanine aminotransferase (ALT)].

Objectives

1. Compile data on several commonly repeated tests that may or may not be unnecessary.
2. Analyze ordering patterns to identify test bundles (i.e., sets of four or more tests).
3. Analyze test bundles with respect to collection location (inpatient unit).

Practice Points

1. Certain commonly repeated tests are used for ongoing queries into patient health in prespecified clinical scenarios.
2. Which testing is legitimately needed is a subject of ongoing discussion between health care providers, researchers and policymakers.
3. While ordering multiple tests simultaneously (i.e., bundling) is intended to ensure efficient use of lab resources, it may also encourage excessive testing.
4. Certain tests frequently yield normal results yet are often repeated unnecessarily.
5. Whether a certain subset of tests is avoidable is determined by factors such as clinicians' attitudes toward testing, social context, and recent changes in medical practice.

Methods

1. Laboratory test records were obtained from 1 Apr 2024 to 31 Mar 2025 via Meditech and made available by Newfoundland and Labrador Health Services (NLHS) Digital Health. Information on hospital length of stay (LOS) was provided by NLHS, which was used to focus on inpatients with a LOS of at least three days. Patients with LOS greater than six months were excluded as they comprised a small percentage of hospital stays (<1%). Reference range values were retrieved from the Medical Council of Canada.
2. A test bundle was defined as four or more tests with the same date and time of collection. Test bundles were analyzed by groups of tests that comprise individual tests as follows:

    a. Complete Blood Count (CBC)
    b. Electrolytes – Sodium, Potassium
    c. Kidney Function (Fn) – Creatinine, Urea
    d. Liver Fn - ALT, AST
    e. Other individual tests by name [e.g., Amylase, Creatinine Kinase (CK)]

3. Repeat normal testing was defined as any test in a bundle having four consecutive results within the normal range with less than seven days between tests.

Results

Legend for Tabe 1-2 and Figures 1-4	
TB = Test Bundles	SURG = Surgery
MED = Medicine	HSC = Health Sciences Centre
CARD = Cardiology	N = North
SCU = Special Care Unit	S = South

Table 1. Top Five Test Bundles by Volume and the Test Groups They Comprise, 1 Apr 2024–31 Mar 2025

Name	Total Tests	Test Groups
TB 1	761,567	CBC, Electrolytes, Kidney Fn
TB 2	229,006	CBC, Electrolytes, Kidney Fn, Liver Fn
TB 3	124,079	Electrolytes, Kidney Fn
TB 4	29,879	Amylase, CBC, Electrolytes, Kidney Fn, Liver Fn
TB 5	17,516	CBC, CK, Electrolytes, Kidney Fn

- The highest volume test bundles all contained electrolytes and kidney fn.

Table 2. Top Five Highest Volume Test Collection Locations Analyzed by Hospital LOS, 1 Apr 2024–31 Mar 2025

Collection Location	Average LOS (Days)	Median LOS (Days)
4NA-MED-HSC	12.9	8
5SA-CARD-HSC	11.7	7
4NB-SURG-HSC	11.0	6
4SA-MED-HSC	13.6	8
CARD SCU-HSC	13.9	12

- The longest average LOS was seen in the cardiac special care unit in the Health Sciences Centre (HSC).

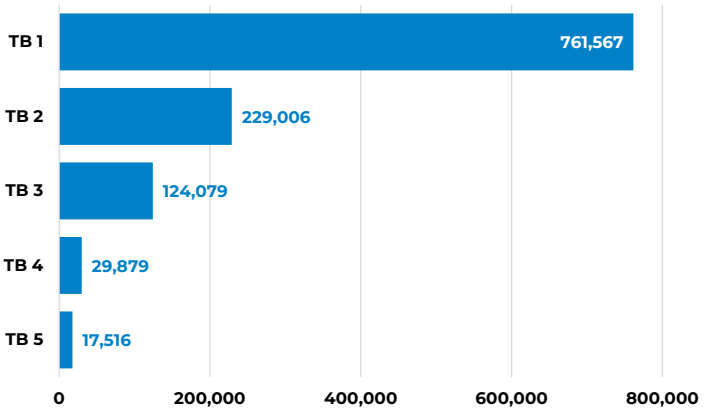

Figure 1. Total Number of Tests Analyzed by Test Bundle, 1 Apr 2024–31 Mar 2025

- Test Bundle 1 and Test Bundle 2 accounted for 58.5% and 17.6% of all tests, respectively, with the remaining bundles each making up less than 10%.

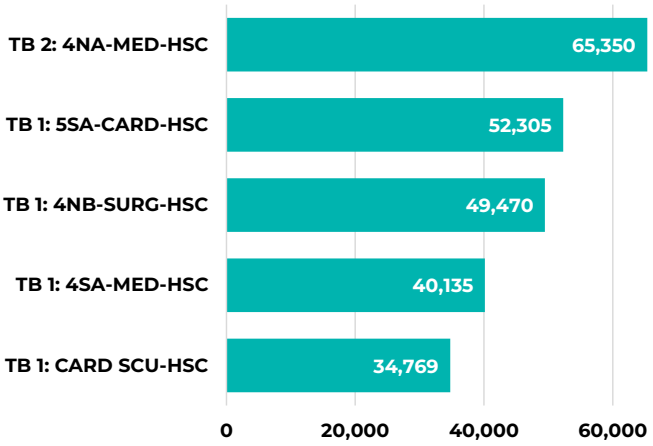

Figure 2. Total Number of Tests Analyzed by Test Bundle and Collection Location, 1 Apr 2024–31 Mar 2025

- The five highest volume test bundles analyzed by collection location accounted for 18.6% of all tests. The remaining bundles comprised lower volume tests from inpatient units across the province.

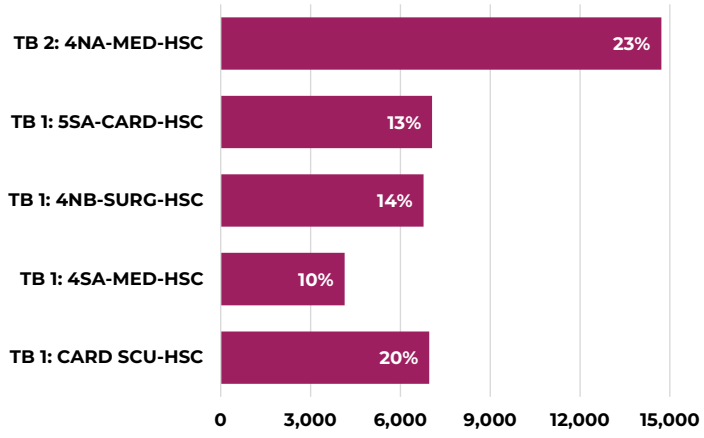

Figure 3. Tests Recurring at 24 Hours Analyzed by Test Bundle and Collection Location, 1 Apr 2024–31 Mar 2025

- The 4NA medicine unit and cardiac special care unit at HSC, which have high concentrations of very sick patients, had the greatest proportions of tests that recurred 24 hours after the previous test.

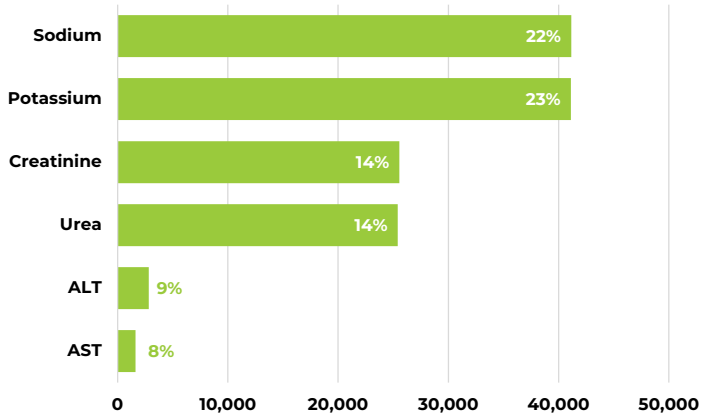

Figure 4. Repeat Normal Tests Analyzed by Test Name, 1 Apr 2024–31 Mar 2025

- Out of all tests for electrolytes (sodium, potassium) and kidney function (creatinine, urea), 18.5% were repeat normal tests, amounting to 124,772 tests.
- There were similar proportions of repeat normal tests across the highest volume test collection locations.

Conclusions

1. High volume test bundling was common across inpatient units and there were few differences in ordering patterns between units.
2. High volume tests such as sodium and potassium comprised slightly greater proportions of repeat normal tests.
3. The proportions of routine repetitive testing were slightly greater in medicine and cardiac special care units that tend to see sicker patients.
4. Test bundles with the greatest proportions of repeats comprise targets for Choosing Wisely initiatives to reduce low-value lab testing (i.e., urea). Reducing tests such as urea and AST would create cost savings for the laboratory. However, changing test bundles requires input from clinicians and is outside the lab's control.
5. Creatinine alone is sufficient to check kidney function because laboratories automatically report estimated GFR; UREA is often an unnecessary addition.