



ELSEVIER

Contents lists available at ScienceDirect

Data in brief

journal homepage: www.elsevier.com/locate/dib

Data Article

Dataset of test volume and tests repeated for complete blood count and electrolyte panels from hospitals in a Canadian province in 2018

Irene Ma ^a, Maggie Guo ^b, Cheryl K. Lau ^b, Vijay Kandalam ^a, Christopher Naugler ^{a, b, c, d, *}

^a Department of Pathology and Laboratory Medicine, Cumming School of Medicine, University of Calgary, Canada

^b Alberta Public Laboratories (formerly Calgary Laboratory Services), Canada

^c Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Canada

^d Department of Family Medicine, Cumming School of Medicine, University of Calgary, Canada



ARTICLE INFO

Article history:

Received 2 January 2020

Accepted 10 January 2020

Available online 14 January 2020

Keywords:

Laboratory utilization
Repeat testing
Complete blood count
Electrolyte panel
Laboratory medicine
Health informatics

ABSTRACT

All laboratory tests performed within the province of Alberta in Canada are captured by three Laboratory Information Systems (LIS; Millennium, Sunquest and Meditech), which comprise the provincial Consolidated Laboratory Data Repository (CLDR). The following secondary laboratory data for electrolyte panel (EP) and complete blood count (CBC) test panels performed in emergency room (ER) and inpatient settings were collected from January 1 – December 31, 2018: total test panel volume, total number of test panels repeated, number of test panels repeated within the 24 hour period, test result, date of testing, time of test, and patient Provincial Health Number (PHN). Patient PHN were used as a linking variable to match subsequent tests performed on the same patient. The first time a test was recorded per patient was defined as the “index test”. If the same test panel was performed within a 24-h period following the index test for the patient, data for the repeated test panel was also collected. The index test was defined as “normal” or “abnormal” according to established laboratory normal values and laboratory test reference ranges. For CBCs, we considered the panel to be abnormal if any of the hematocrit (Hct), hemoglobin (Hgb), mean corpuscular hemoglobin concentration

DOI of original article: <https://doi.org/10.1016/j.clinbiochem.2019.12.011>.

* Corresponding author. Department of Pathology and Laboratory Medicine, Cumming School of Medicine, University of Calgary, Canada.

E-mail address: cnaugle@ucalgary.ca (C. Naugler).

<https://doi.org/10.1016/j.dib.2020.105144>

2352-3409/© 2020 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

(MCHC), mean corpuscular volume (MCV), platelet (PLT), red blood cell (RBC), red cell distribution width (RDW) or white blood cell (WBC) values were outside the normal laboratory reference range. For electrolyte panels, we considered the panel to be abnormal if any of the chloride (Cl), potassium (K), and sodium (Na) were outside of the normal laboratory reference range. All EP results were from clinical chemistry analyzers only. The reuse potential of this dataset can allow other jurisdictions in Canada to compare their redundant repeat testing in their hospital settings with this dataset as a benchmark. This article was submitted via another Elsevier journal as a co-submission (“Inappropriate repeat testing of complete blood count (CBC) and electrolytes in inpatients from Alberta, Canada” [1]), and readers should refer to the co-submission article for interpretation of the results.

© 2020 Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Specifications Table

Subject	Pathology and Medical Technology
Specific subject area	Laboratory Medicine
Type of data	Table
How data were acquired	Secondary laboratory data was collected from the Consolidated Laboratory Data Repository, which includes all three Laboratory Information Systems in Alberta - Millennium, Sunquest and Meditech.
Data format	Raw Filtered Analyzed
Parameters for data collection	Test order mnemonic (complete blood count and its constituents, and electrolyte panel and its constituents), test encounter (emergency room, inpatient), test volume, number of tests repeated, number of test panels repeated within the 24 hour period, test result, date of testing, time of test, and patient Provincial Health Number (PHN) in the 2018 calendar year (January 1 – December 31).
Description of data collection	Laboratory data was retrieved and aggregated by an independent Alberta Health Services data analyst (MG). Patient PHN were used as a linking variable to match subsequent tests performed on the same patient, which was then permanently removed upon completion of data retrieval. The first time a test was recorded per patient was defined as the “index test”. If the same test panel was performed within a 24-h period following the index test for the patient, data for the repeated test panel was also collected. The index test was defined as “normal” or “abnormal” according to established laboratory normal values and laboratory test reference ranges. For CBCs, we considered the panel to be abnormal if any of the hematocrit (Hct), hemoglobin (Hgb), mean corpuscular hemoglobin concentration (MCHC), mean corpuscular volume (MCV), platelet (PLT), red blood cell (RBC), red cell distribution width (RDW), or white blood count (WBC) values were outside of the laboratory reference range. For electrolyte panels, we considered the panel to be abnormal if any of the chloride (Cl), potassium (K), or sodium (Na) were outside of the laboratory reference range. All EP results were from clinical chemistry analyzers only.
Data source location	Institution: Alberta Precision Laboratories City/Town/Region: Alberta Country: Canada
Data accessibility	With the article
Related research article	Kandalam, V., Lau, C.K., Guo, M., Ma, I., and Naugler, C. Inappropriate repeat testing of complete blood count (CBC) and electrolytes in inpatients from Alberta, Canada. Clin. Biochem. (2019) In Press.

Value of the Data

- This dataset can be useful for other jurisdictions to assess laboratory utilization appropriateness in their own hospital settings
 - Laboratorians, ordering physicians, patients, experts in laboratory utilization management can benefit from this data
 - Results from this data and its associated article can assist policy makers in implementing utilization initiatives and update clinical practice guidelines to reduce redundant testing while optimizing patient care
 - Additional value of this dataset include using it as a benchmark to compare with other Canadian jurisdictions who order CBCs and EPs in their inpatient and emergency room settings. This dataset can also be used as a template to assess testing appropriateness in other commonly ordered laboratory tests
-

1. Data description

Secondary laboratory data was collected from CLDR, which contains laboratory data from all three LIS for the province of Alberta in Canada (Millennium, Sunquest, Meditech). Test volume, number of tests repeated within the 2018 calendar year, number of tests that were repeated within a 24-h period that was previously normal or abnormal (as defined by the laboratory reference range) for CBC and electrolyte panels by test in all inpatient and emergency room encounters across Alberta, matched by patient PHN, are summarized in [Table 1](#). Complete blood count panels were considered to be abnormal if at least one of the following had an abnormal test result: Hct, Hgb, MCHC, MCV, PLT, RBC, RDW, or WBC. Electrolyte panels were considered to be abnormal if at least one of the following had an abnormal test result: chloride, potassium, sodium. The number and percentage of tests repeated, and tests repeated that were previously abnormal or normal were reported in [Table 1](#) for each of the Laboratory Information Systems in Alberta.

2. Experimental design, materials, and methods

Laboratory data was retrieved and aggregated by an independent Alberta Health Services data analyst with access to CLDR, which contained laboratory data performed in all settings across Alberta. All laboratory tests performed within the province were captured by Millennium, Sunquest and Meditech LIS. The following secondary laboratory data for electrolyte panel (EP) and complete blood count (CBC) test panels performed in emergency room (ER) and inpatient settings between January 1 to December 31 in 2018 were collected: total test panel volume, total number of test panels repeated, number of test panels repeated within the 24 hour period, test result, date of testing, time of test, and patient Provincial Health Number (PHN). For each patient who received a test panel of interest, the PHN was temporarily used as a grouping variable to match subsequent tests to the same patient. There was no retrieval or collection of patient name and other individually identifying information by the researchers. The unique PHN was permanently removed upon completion of data retrieval. The first time a test was recorded per patient was defined as the “index test”. If the same test panel was performed within a 24-h period following the index test for the patient, data for the repeated test panel was also collected. The index test was defined as “normal” or “abnormal” according to established laboratory normal values and laboratory test reference ranges. For CBCs, we considered a result to be abnormal if any of the Hct, Hgb, MCHV, MCV, PLT, RBC, RDW, or WBC values were outside of the laboratory reference range. For electrolyte panels, we considered a result to be abnormal if any of the sodium, potassium, or chloride were outside of the laboratory reference range. To calculate the percentage of the repeated previously normal or abnormal results, the numerator was defined as the number of tests repeated within a 24 hour period that were previously normal or abnormal, whereas the denominator was defined as the total number of tests repeated within the study period of one year. All EP results were from clinical chemistry analyzers only. This article was submitted via another Elsevier journal as a co-submission, and readers should refer to the co-submission article for interpretation of the results [1].

Table 1

Dataset of test volume and tests repeated for complete blood count (CBC) and electrolyte panel (EP) in inpatient and emergency room settings in Alberta, Canada, in the 2018 calendar year. All three Laboratory Information Systems (LIS) contains laboratory data for the entire province of Alberta. If at least one of the test for the CBC or electrolyte panels was outside the normal reference range, the test panel was considered to be abnormal.

LIS	Test Panel	Test Volume; n	Tests Repeated; n (%)	Repeated, ^a Previously Abnormal; n (%)	Repeated, ^a Previously Normal; n (%)			
LIS number 1	CBC	Hct	639,921	450,211 (70.4)	210,180 (44.7)	87,422 (19.4)		
		Hgb	639,921	450,211 (70.4)	215,828 (47.9)	72,774 (16.2)		
		MCHC	639,931	450,218 (70.4)	76,065 (16.9)	212,544 (47.2)		
		MCV	639,931	450,218 (70.4)	43,637 (9.7)	244,972 (54.4)		
		PLT	639,931	450,218 (70.4)	98,388 (21.9)	190,221 (42.3)		
		RBC	639,921	450,211 (70.4)	205,347 (45.6)	83,255 (18.5)		
		RDW	639,931	450,218 (70.4)	78,220 (17.4)	210,389 (46.7)		
		WBC	639,931	450,218 (70.4)	122,737 (27.3)	165,872 (36.8)		
	EP	Cl	417,973	337,258 (80.7)	57,919 (17.2)	192,588 (57.1)		
		K	417,973	337,258 (80.7)	43,938 (13.0)	206,569 (61.2)		
		Na	417,973	337,258 (80.7)	51,396 (15.2)	199,111 (59.0)		
		LIS number 2	CBC	Hct	752,411	550,056 (73.1)	271,148 (49.3)	91,305 (16.6)
				Hgb	752,411	550,056 (73.1)	276,180 (50.2)	86,273 (15.7)
				MCHC	752,411	550,056 (73.1)	39,519 (7.2)	322,934 (58.7)
MCV	752,411			550,056 (73.1)	45,792 (8.3)	316,661 (57.6)		
PLT	752,409			550,054 (73.1)	96,773 (17.6)	265,680 (48.3)		
RBC	752,411			550,056 (73.1)	242,335 (44.1)	120,118 (21.8)		
RDW	752,411			550,056 (73.1)	131,930 (24.0)	230,523 (41.9)		
WBC	752,411			550,056 (73.1)	150,558 (27.4)	211,895 (38.5)		
EP	Cl		610,176	464,928 (76.2)	68,600 (14.8)	247,155 (53.2)		
	K		610,176	464,928 (76.2)	60,337 (13.0)	255,418 (54.9)		
	Na		610,176	464,928 (76.2)	66,426 (14.3)	249,329 (53.6)		
	LIS number 3		CBC	Hct	627,346	367,148 (58.5)	101,411 (27.6)	48,495 (13.2)
				Hgb	627,476	367,249 (58.5)	103,252 (28.1)	46,705 (12.7)
				MCHC	627,262	367,074 (58.5)	25,988 (7.1)	123,881 (33.7)
MCV		627,330		367,134 (58.5)	29,161 (7.9)	120,733 (32.9)		
PLT		627,123		367,020 (58.5)	36,357 (9.9)	113,484 (30.9)		
RBC		627,336		367,129 (58.5)	96,535 (26.3)	53,356 (14.5)		
RDW		566,652		331,534 (58.5)	53,829 (16.2)	81,847 (24.7)		
WBC		628,103		367,835 (58.6)	66,294 (18.0)	84,214 (22.9)		
EP		Cl	427,830	267,408 (62.5)	46,402 (17.4)	84,921 (31.8)		
		K	427,794	267,379 (62.5)	36,546 (13.7)	94,752 (35.4)		
		Na	427,819	267,395 (62.5)	29,074 (10.9)	102,241 (38.2)		

Abbreviations: CBC – complete blood count; Cl – chloride; EP – electrolyte panel; Hct – hematocrit; Hgb – hemoglobin; K – potassium; LIS – Laboratory Information System; MCHC – mean corpuscular hemoglobin concentration; MCV – mean corpuscular volume; Na – sodium; PLT – Platelet; RDW – red cell distribution width; RBC – red blood cell; WBC – white blood cell.

^a Tests repeated within a 24 hour period that had a previously normal, or abnormal test result, where abnormal was defined as outside the normal laboratory reference range for that test.

Acknowledgments

This study was funded by the Canadian Institutes of Health Research (CIHR) Foundation Scheme [GrantNo. RN254781-333204].

Conflict of Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- [1] V. Kandalam, C.K. Lau, M. Guo, I. Ma, C. Naugler, Inappropriate repeat testing of complete blood count (CBC) and electrolytes in inpatients from Alberta, Canada, *Clin. Biochem.* (2019) (In Press).