Establishing Provincial System Indicators

Purpose

This document provides an abbreviated summary of the environmental scan and literature review completed in preparation for PLMS engagement with BC laboratory organizations in development of a set of provincial system indicators.

Context

Indicators to assess medical laboratory performance has been a driver for continuous laboratory improvement for decades and is fundamental to ensuring appropriate, effective and safe patient care and treatment. System indicators are customized metrics selected and established by organizational leadership that enables an objective and quantitative means for monitoring progress towards organizational goals. System indicators can provide valuable insights into organizational efficiency, generating actionable information and ideas for improvement and positive change through data-driven evidence.

Each laboratory provider in BC has adapted to delivering their services within their specific health authority mandate. This complexifies the provincial laboratory system as it evolved with limited coordination with provincial system priorities. The MoH maintains the key objective of achieving a provincial vision of integrated laboratory services to advance system optimization and innovation, ensure patient-centered, equitable, accessible, high quality, affordable, and sustainable services into the future**.** Critical towards achieving this vision is the commitment from laboratory service providers to **harmonize system indicator metrics and actively cooperate to optimize core principles of quality, safety and efficiency of service delivery within their jurisdictions and across the province.**

Selecting Laboratory System Indicators

No international consensus exists on the use of system indicators focusing on all steps of the laboratory total testing process (TTP), although there have been international endeavors towards benchmarking of medical laboratory performance such as the Q-Probes program of the American College of Pathologists and the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) but international agreement on QI standardization is still pending.[1-5]

The performance indicators a laboratory selects should be relevant and actionable. Facility and provincial level indicators could be tracked and aggregated as part of a provincial laboratory system monitoring program. Additionally, each laboratory provider within the province is required to implement a Quality Management System that includes quality and performance indicators as an integral part of continual improvement and requirements of accreditation to *ISO 15189:2022 Medical laboratories — Requirements for quality and competence requires* standards.[6] Because a laboratory system encompasses both clinical and public health laboratories as well as community based diagnostic medicine, system-level performance indicators should be selected which capture the expectations of

these providers. However, a global consensus on medical laboratory quality and performance benchmarking is still pending.

The IFCC Model of Quality Indicators (MQI)

The MQI proposed by the International Federation of Clinical Chemistry and Laboratory Medicine (IFCC) is a routine, formal, proactive monitoring and reporting system based on standardized data collection to monitor processes, encourage improvement and decrease the error rate in the total testing process.[7] The latest MQI (2016), includes 53 measurements to monitor 27 quality indicators (QI's) including turnaround time to measure timeliness of service delivery.[8] A priority index has been assigned to each quality indicator ("1" is the higher priority; "4" the lower). These tables with suggested QI's are referenced on the IFCC website.

Among laboratory quality indicators, turnaround times (TAT) are particularly significant as they reflect the laboratory's ability to deliver timely results, which is critical for clinical decision-making and patient care.[9] Monitoring turnaround times helps identify delays, optimize workflows, and enhance service delivery. TAT is commonly included among the most important quality indicators and is consistently measured.[10-12]

While a faster TAT is universally seen as desirable, it does not necessarily improve patient outcomes. Steindel et al. examined the timeliness of early morning routine clinical laboratory tests for inpatients in 653 institutions and *found little evidence that longer routine test turnaround times affect patient length of stay (LOS)*. [13]

To date, medical laboratories in BC have been at liberty to set TATs for their facilities. While guidelines and literature do cite TAT benchmark recommendations, global TAT benchmarks in laboratory medicine are predominately set by the individual medical laboratory and communicated with their customer base.

Additional indicators such as the specimen rejection rate, sample recollection, transcription errors, corrected reports, and safety—complement TAT metrics by providing a comprehensive view of laboratory quality, performance and reliability.[14] Additional customer satisfaction indicators are referenced in literature and note below:

- Service downtime
- Patient appointment wait times
- Patient recalls
- Third Next appointment
- Patient satisfaction
- Clinician satisfaction
- Length of stay (LOS)
- Care services delayed (due to waiting on lab results etc.)

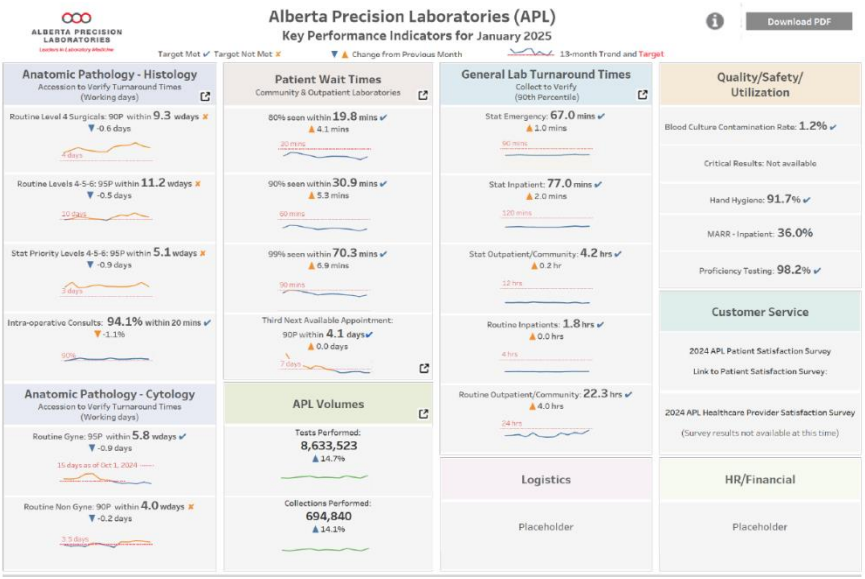
Canadian Perspective

Published literature from Canada is limited. Desk research conducted to date by PLMS indicates there is no one size fits all in Canada and each Province is approaching system performance indicator selection and monitoring differently. Below is a snapshot of system indicators from Alberta and Ontario.

Alberta

Provincial wide KPI dashboard called the Alberta Precision Labs (APL) Corporate Dashboard. APLs Provincial LIS data populates the dashboards which are built in Tableau and include several types of data visualization options. APL's Dashboard monitors system matters over a rolling 13-month period and displays trend lines in 9 major areas which are:

1. Total Volumes
2. Anatomic pathology histology (accession to verify -working days 90th percentile)
3. Anatomic pathology cytology (accession to verify -working days)
4. Patient wait times for community and outpatient labs (min-90th percentile)
5. Third next available appointment (days-median, average, 90th percentile)
6. General lab TAT (collection to verify -min/hrs 90th percentile)
7. Quality, Safety and Utilization:
   - Blood culture contamination rate
   - Hand hygiene
   - Proficiency testing results
   - Critical results reporting (not yet available)
   - Mean abnormal result rate (MARR –inpatient only)
8. Logistics (placeholder)
9. HR/ Financial (placeholder)
10. Customer Service (patient satisfaction surv



APL also uses a zonal dashboard to monitor inpatient TAT's by hospital operation and APL a workforce dashboard to monitor vacancies and inform placement. They compile this province wide data annually and publish an annual report.[15]

Ontario

This province looks at performance indicators from different administrative levels:

Community laboratory

- Specimen collection wait time compared with locally accepted policy
- Test volumes
- Additional performance measures are currently under development

Hospital laboratory

- Test volumes
- Laboratory expenditures
- Laboratory workload units (the amount of time spent on laboratory testing by staff)

Public Health Ontario laboratory

- Test volumes
- Percentage of certain laboratory tests completed within target turnaround time (from receiving specimens to reporting test results)
- Number of complaints received (in-office)

Greater Toronto Area (GTA)

In 2020 The Laboratory Medicine and Pathobiology Quality Council at the University of Toronto established a preliminary consensus of 10 core laboratory QIs spanning the entire total testing process (TTP) as shown below.[16]

Laboratories should include all of the following high-priority quality indicators for regular monitoring of critical processes that impact patient care.

Pre-Examination Phase	Intra-Examination Phase	Post-Examination Phase
• Misidentification errors • Incorrect fill level • Hemolysed samples • Clotted samples	• Unacceptable performances in EQAS-PT schemes	• Inappropriate turnaround time (TAT) for STAT potassium • Inappropriate TAT for STAT INR • Inappropriate TAT for STAT WBC • Inappropriate TAT for STAT troponin • Notification of critical results

Eastern Ontario Regional Laboratory Association (EORLA)

EORLA has established collective laboratory performance indicators that are not currently published. The 2024/2025 Annual Report indicates 82% performance for identified quality indicators. A request for the quality indicator list is pending.

Yukon

Yukon hospitals post quarterly balanced scorecards including outpatient laboratory wait time performance (target <30min), performance quarterly and fiscal year performance with green, yellow, red indicators.[17] There was no publicly available information providing additional laboratory performance metrics.

References

1. Cadamuro, J, Gaksch, M, Mrazek, C, Haschke-Becher, E, Plebani, M. How do we use the data from pre-analytical quality indicators and how should we? *J Lab Precis Med* 2018;3:40. https://doi.org/10.21037/jlpm.2018.04.04.

2. Barth, JH. Clinical quality indicators in laboratory medicine: a survey of current practice in the UK. *Ann Clin Biochem* 2011;48:238–40. https://doi.org/10.1258/acb.2010.010234.

3. Schifman, RB, Howanitz, PJ, Zarbo, RJ. Q-Probes: a College of American Pathologists benchmarking program for quality management in pathology and laboratory medicine. In: *Weinstein RS. Advances in Pathology and Laboratory Medicine*. Chicago: Mosby-Yearbook; 1996. pp. 83–120.

4. Sciacovelli, L, Plebani, M. The IFCC Working Group on laboratory errors and patient safety. *Clin Chim Acta* 2009;404:79–85. https://doi.org/10.1016/j.cca.2009.03.025

5. Sciacovelli, L, Panteghini, M, Lippi, G, Sumarac, Z, Cadamuro, J, Galoro, CAO, et al.. Defining a roadmap for harmonizing quality indicators in laboratory medicine: a consensus statement on behalf of the IFCC working group "Laboratory Error and Patient Safety" and EFLM task and finish Group "Performance specifications for the extra-analytical phases." *Clin Chem Lab Med* 2017;55:1478–88. https://doi.org/10.1515/cclm-2017-0412.

6. ISO 15189:2022, Medical laboratories — Requirements for quality and competence

7. https://ifcc.org/ifcc-education-division/working-groups-special-projects/wg-leps/quality-indicators-project/

8. IFCC model of quality indicators (MQI). Clin Chem Lab Med. 2017;55(10): 1478-1488. Defining a roadmap for harmonizing quality indicators in Laboratory Medicine: a consensus statement on behalf of the IFCC Working Group "Laboratory Error and Patient Safety" and EFLM Task and Finish Group "Performance specifications for the extra-analytical phases".

9. Hawkins, Robert C. "Laboratory Turnaround Time." *Clinical Biochemist Reviews*, vol. 28, no. 4, 2007, pp. 179-194.

10. Valenstein, P. Laboratory Turnaround Time. *Am. J. Clin. Pathol.* 1996; 105:676-688

11. Howanitz, P.J. Quality Assurance Measurement in Departments of Pathology and Laboratory Medicine. *Arch. Pathol. Lab. Med.* 1990; 114:112-115.

12. Howanitz, P.J. · Steindel, S.J. Intra-Laboratory Performance of Laboratorians' Expectation for Stat Turnaround Times: A College of American Pathologists Q-Probes Study of Four Cerebrospinal Fluid Determination. *Arch. Pathol. Lab. Med.* 1991; 115:977-983

13. Steindel SJ, Jones BA, Howanitz PJ. Timeliness of automated routine laboratory tests: a College of American Pathologists Q-Probes study of 653 institutions. Clin Chim Acta. 1996 Jul 15;251(1):25-40. doi: 10.1016/0009-8981(96)06298-5. PMID: 8814348.

14. Sciacovelli L, Padoan A, Aita A, Basso D, Plebani M. Quality indicators in laboratory medicine: state-of-the-art, quality specifications and future strategies. Clin Chem Lab Med. 2023 Jan 23;61(4):688-695. doi: 10.1515/cclm-2022-1143. PMID: 36660807.

15. Alberta Health Services. Alberta Precision Laboratories 2023-2024 Annual Report. Accessed from: if-lab-about-annual-report-2023-24.pdf.

16. University of Toronto. Key Core Laboratory Quality Indicators [Internet]. [cited 2025 Apr 7]. Available from: https://lmp.utoronto.ca/db-resource/key-core-laboratory-quality-indicators.

17. Yukon Hospitals. Balanced Scorecard Metrics - Quarter Q3, 2024-25 Our Commitment Indicator Target Q1 Q2 Q3 Q4 [Internet].Available from: https://yukonhospitals.ca/sites/default/files/2025-03/2024-25%20Q3%20Balanced%20Scorecard%20Web.pdf