

Optimizing Analytics in AHS: A Description of Analytic Functions

The Analytics Executive Committee has identified the following analytic functions as necessary to enable a high-performing, quality-focused and analytically mature health system; as such, each of these should be standing functions for AHS.

Clinical Analytics functions:

1. **Clinical Decision Management** – the real-time information needs / decision supports / order sets required to aid clinicians to make the next decision in care. This involves embedding best practice knowledge into clinical information systems to support clinical decision making at the point of care, and also measuring the extent to which decision support tools are actually used. Decision support can include alerts, reminders, and outcome prediction models that are based on a series of historical interactions and decisions from patients with similar conditions. Outcome prediction models are developed after the fact and are fed back into the clinical information systems.
2. **Clinical Performance Management** – involves measurement and reporting on key clinical care processes that are linked to health outcomes. Measurement sets are developed across the continuum of care for specific clinical populations and are balanced across the domains of quality in the [Alberta Quality Matrix for Health](#). These measurement systems focus on the desired health outcomes, both clinical and patient reported, and link these outcomes to clinical processes with a view to increasing clinical process reliability. Measurement systems are developed for specific clinical populations and roll up across broader clinical categories. For example, a heart attack care measurement set would include aspirin within 1 hour of confirmed diagnosis, reperfusion within 90 minutes, on beta blockers or ACE inhibitors, and appropriate secondary prevention.

The Clinical Performance Management analytic function supports quality management in that changes to clinical processes are tested and evaluated relative to reducing care variability (increasing reliability), adherence to evidence based best practice, and improving outcomes. Clinicians are readily examining their clinical performance relative to peers and relative to best practice. Clinical program leaders monitor their area's clinical performance and work with clinicians under their purview to help them get to higher levels of performance.

Beyond using real-time support and lagged measurement to manage clinical performance, clinical analytics teams also have the data and analytical talent to address their most important clinical questions. For example:

- *How many high-risk bowel cancer cases with stage II cancer have adjuvant chemotherapy following surgery? Or, how many stage III cancer patients (any size tumor that has spread to lymph nodes) have surgery plus adjuvant chemotherapy?*

3. **Population Health Analytics** – this function would manage the following:

- Population risk factor reporting and monitoring: Routine reporting on behaviours that impact health and health care utilization at a meaningful/actionable level of geography. Reported measures include smoking and drinking levels, eating and exercise habits, and safety behaviours. These measures are examined in terms of variation across geography and are used to evaluate the impact of interventions that are designed to reduce risk factor levels both over time and across geographies.
- Quality of Life reporting and examining the variation in quality and quantity of life across the province with the goal of reducing inequalities in health.
- Modeling to estimate the impact of population health interventions in terms of improved health and reduced utilization, as well as the timeframe to deliver these improvements.

Operational Analytics functions:

1. **Real-time Capacity Management** – this function involves predictive analytics to anticipate capacity crunches before they happen and includes remedy actions to avoid a capacity crunch. Data feeds are real-time from both the demand and the capacity side. These include hospital capacity command centres with care traffic control.
2. **Operational Performance Management** – lagged reporting and analytics for the purpose of improving operational efficiency by reducing delays in service times and improving the flow of patients across the continuum of care.

Operational Performance Management reporting is implemented at (or drills down to) the functional unit level for specific sectors (e.g., community care, hospitals, continuing care). These dashboards or measurement sets mix workload, HR, Finance, and patient experience measures to present a comprehensive picture of total operational activity and performance.

Operational analytics is largely based on operations management analytical techniques such as queuing theory, systems dynamics stock and flow modeling. Measurement sets focus on operational performance and health system flow (e.g., service utilization, demand and capacity, cost, wait times, patient experience, etc.).

Zone/Operational teams will have the data and analytical talent to address their most important operational questions. Examples include:

- *What is the right balance of capacity across primary, hospital, and continuing care to ensure good system flow?*
- *What is the variation in staff mix and spending relative to clinical workload on a unit?*

Corporate Analytics functions:

1. **Health System Planning Analytics** – This function focuses on health service demand/need forecasting, needs assessments, and service distribution modeling. This modeling work is focused around health service delivery models across the continuum of care from prevention to end of life care. Scenarios may involve shifting more care to the community and reducing inpatient care, or estimating the impacts of primary care reform and better chronic disease management on acute care utilization, among others. This overarching integrated health system planning analytic function includes and connects workforce planning, capital planning, and financial planning. Some examples of questions include:
 - *What are the estimated health care services (and related expenditures) that will be required based on population growth and aging (at community, Zone and provincial levels)?*
 - *What would be the potential effects of various service allocation, reallocation or re-design decisions?*
 - *What are the opportunities to reduce avoidable utilization through service delivery redesign options?*
 - *What are the minimal service delivery capacity thresholds required to maintain high quality patient outcomes?*

2. **Resource Allocation Analytics** – Analytics and modeling required for allocating operational health dollars across Zones and/or service delivery units. Involves developing funding formula principles and frameworks and funding model methods. Careful analytics on incentives both positive and perverse that are created via selected funding methodologies. Sample questions include:
 - *If we fund Zones based on relative need, what would a Zone receive as compared to what they are actually spending?*
 - *If we fund acute care on a pure activity based funding formula, how would current funding levels compare to an activity based funding model?*

3. **Health Economic Evaluation** – This function leads all major economic evaluations (e.g., cost/benefit analysis, cost/effectiveness analysis of planned interventions), sometimes described as value for money or benefits realization assessments. Also includes health technology assessments and reassessment. It includes both the prospective assessment of potential benefits in the business case development phase, as well as both concurrent and retrospective economic evaluation of new investments.

This analytic function involves rigorous assessments of what an initiative or intervention will cost (full costs) and the financial notional value that is expected. Notional value is also assessed in terms of what will actually be extracted from the system and reinvested. Tradeoffs in cost and outcomes are evaluated using economic methods. Once a rigorous business case assessment has deemed the intervention as adding value for money, formal monitoring is put in place to ensure expected outcomes are being realized and if not, the intervention is altered or halted altogether.

The data needs for this function (and others) drive the strategic costing requirements for the organization and our approach to investments in quality improvement and innovation. Methods are developed that attach value (including costs where appropriate) to clinical activities and then to outcomes. Sample questions include:

- *What are the estimated benefits and cost implications of implementing ERAS (Enhanced Recovery After Surgery) province-wide across all surgeries? (prospective business case assessment)*
- *What was the actual cost and value of ERAS in terms of reduced complications and length of stay? (retrospective evaluation)*

4. **Performance Management Analytics** – Analytics to support estimating the size and timing of interventions designed to move strategic AHS performance measures to target. Evaluations of the alternate approaches to determine those interventions that have the lowest cost, highest probability of success, with the highest expected movement towards target. Once interventions are developed, additional measurement sets are created that directly relate to the interventions. This function also includes ongoing monitoring of the interventions to make sure they are having the anticipated effects, with interventions being modified or halted if expectations are not being realized. Sample questions include:

- *What is the relationship between activities, inputs and outputs on outcome performance measures?*
- *What key drivers (leading measures) are most likely to affect change in lagging strategic performance measures?*
- *When do we expect to reach targets based on the interventions that are planned for implementation?*
- *What monthly or quarterly variation in performance is within expectation and what are trigger points requiring further action for improvement?*

5. **Human Capital Analytics** – Analytics to assist in the optimal deployment of the workforce in support of organizational priorities, both now and for the future. As workforce represents the majority of organizational expense and is the most critical element in the delivery of service and transformation of the system, it is essential to be effectively informed with respect to the organization’s human capital investments. This function supports the evaluation of HR-related strategies, programs, and services across each phase of the Talent Life Cycle: Source & Select, Assess, Develop & Deploy, Reward, Engage & Retain. It allows for assessments of the best allocation of resources, how best to predict and manage human capital risks, and positions the organization for long term success. Sample questions include:

- *Which training and development programs are leading to sustainable improvements in operational performance?*
- *Which segments of the workforce are key to driving organizational transformation?*
- *Where are the risks of employee turnover greatest in relation to impact on the organization?*
- *What is the return on investment of an increase in employee compensation?*
- *Which HR practices best correlate to improved employee engagement? Is there an actual correlation between engagement and organizational performance?*
- *What selection criteria best correlate to employee performance?*