Overcoming Canada's Healthcare Challenges with Analytics

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Over the past 10 years, total annual healthcare spending in Canada has increased by more than $10 billion. It reached $172 billion in 2008, or $5,170 per person, outpacing inflation and population growth annually. Even when adjusted for inflation, this escalation in public expenditures cannot fail to attract the attention of taxpayers and consumers alike (Canadian Institute for Health Information 2008).

The Canadian government has expressed concern over funding increases allocated to healthcare that have failed to result in a measurable improvement in health status. As a consequence of this concern, across federal and provincial jurisdictions, we've seen growing interest in performance accountability – not just in healthcare but across the public sector as a whole. As healthcare costs mount, so do expectations for improvements in planning, delivery and evaluation of health services.

The reality for most health providers is that the demand for services still outstrips the capacity to deliver care, so decisions must be made regarding how and where to allocate funds and resources more effectively. In the face of pressures for cost control and accountability, trustees and senior executives of health agencies expect to be better informed about how their organizations are fulfilling their mandate.

Unfortunately, many organizations lack this essential information. Data resources are often inadequate to the task. Fragmented and inconsistent data sources abound, often degraded by significant data quality problems. Unresolved anomalies among data sets and poor conformance to standards make benchmark comparisons difficult. In addition, much of these data are historical and only support demand-based planning rather than needs-based planning.

Immediacy and urgency tend to characterize issues that arise in healthcare, with a resultant tendency toward a reactive management style. Because available information is typically limited and historical in nature, management finds itself attempting to solve tomorrow's challenges with yesterday's information.

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In the late 1990s, software solutions began to evolve from research and development investments into more advanced statistical techniques, emerging as "predictive analytics." These techniques introduced enterprise data architectures and consumer behaviour simulation and used operations research methods to identify optimal business strategies. Private-sector organizations have demonstrated success using predictive analytics for several years as they upgraded from retrospective legacy planning models to predictive models to achieve enhanced corporate performance and competitive advantage.

But new methodologies cannot be adopted overnight – information management infrastructure and skills must mature to effect a successful transition to the desired future state. Still, health authorities that adopt an analytics-based approach to executing their mandates are better positioned to deliver needs-based quality care today, and to anticipate and meet needs that are likely to arise tomorrow.

Canada offers universal access to healthcare as a core foundation of its social policy. However, the system is vulnerable to two

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traditional pitfalls faced by government-run entities. Resources can easily be allocated to satisfy political ends rather than to meet the explicit health needs of a particular population; and resources are scarce, which takes its toll on the standard of care a particular health authority is able to deliver.

The incidence of the severe acute respiratory syndrome (SARS) outbreak in the early part of this century served as a wake-up call to a reality of pandemics that had previously been largely textbook knowledge. It highlighted the fact that centralized healthcare is vulnerable to decisions made on relatively sparse information. Healthcare managers must probe the limited data they do have, using the basic analytical resources available to them.

The demand for complex system analysis has never been greater to assist healthcare management professionals, at all levels, in providing evidence-based, forward-looking healthcare delivery. Healthcare has been described as the most complex of all industries. Behavioural scientists commented as early as the 1970s on the complexity of managing the array of loosely interdependent functions that comprise major hospitals. This was long before the advent of the larger multi-billion-dollar healthcare delivery mega-agencies that we now see emerging across Canada.

Value for money and quality of care dominate public and political agendas. Over and over again, a dearth of reliable information has hampered attempts to effectively evaluate respective arguments. In its 2007 report on wait times, the Health Council of Canada noted that the information needed to paint a cross-Canada picture – information that allows Canadians to see changes over time and compare wait times data from different parts of the country – is not available from all jurisdictions, despite widespread recognition that it should be.

But consumer demand for service improvements continues to mount. According to an Ipsos Reid survey, a majority of Canadian adults rank a patient wait times guarantee as more important than any other of the government's priorities (Ipsos News Center 2006, November 29). In January 2008, a similar survey concluded that 78% of Canadians believed healthcare wait times cost Canada money (Ipsos News Center, January 2008).

Between 2000 and 2004, provincial governments commenced organizational restructuring of their healthcare systems with the aim of improving service delivery and governance. These newly centralized models led to the emergence of large integrated healthcare-delivery networks. But the absence of relevant data, poor data quality and limited standards compliance made it difficult to assemble a true overall picture of enterprise-wide performance. Another problem is a scarcity of statistical analysis staff who have planning experience in large, complex organizations.

In response, $41.3 billon of additional federal funding was committed to system-wide healthcare improvement initiatives, of which $612 million was used to help accelerate the implementation of reduced wait times guarantees. The resulting wait time reduction initiatives made extensive use of analytics, integrating performance data from local institutions with national data and benchmarks from sources such as the Canadian Institute for Health Information, enabled by SAS software. In order to handle the large volumes of data and sophisticated numerical analyses needed to resolve wait list issues, many health agencies found themselves forced to establish their own operations research and analytics capabilities.

In addition to wait times, the healthcare industry is also faced with severe operating difficulties including human resource shortages, escalating pharmaceutical costs and the disruptive consequences of organizational realignments. As a result, managers are confronted with demands for higher levels of performance and are expected to drive sustainable operational improvements throughout the health system. Analytics has begun to emerge as a valuable tool, supporting substantial improvements in planning capabilities by improving the availability and appropriateness of data. This has begun, albeit slowly, to enhance the power of managers to better understand the complex interrelationships between their resource allocation decisions and health outcomes. It has become crystal clear that trying to use dated online analytical processing (OLAP) business intelligence technology to extract reports from obsolete cubes of fragile legacy data just won't meet the need any more.

Customarily, strategic planning for the Canadian healthcare system has been based on studies of historical demand for services. Many health agencies currently find themselves heavily invested in a weighty legacy of past demand-based planning data and practices. The usefulness of this information as an accurate predictor of future needs is questionable. Using historical demand data for future planning is akin to navigating the road ahead by looking only at the rear-view mirror. But today's emerging cadre of analytics-aware managers suggest that future information expectations of healthcare executives are less likely to be met from the analysis of past events and more likely to be met through planning solutions supported by predictive analytics. In fact, the rapid development of analytics skills becomes even more important as sources of good-quality, reliable data become available from e-health initiatives and new-generation electronic health record systems. The complete picture will emerge from combining operational data, cross-institutional data from client-centred electronic medical records and comparative performance data.

So, for health executives to successfully respond to the challenges of managing large, complex organizations within

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demanding performance criteria today and in the future, they will need significantly better decision-making tools and timely high-quality information. This could include, for example, a health-needs profile prediction of their consumer population that goes beyond age and gender and includes key influencers of health status, such as genomic, cultural, social and economic factors. They will require a forward-looking strategic approach to health services planning based on constituents' predicted needs. Executives may need to learn new decision-making processes founded on predictive analytics to translate this new management information into service requirements and make timely corrections to resource allocation and priorities. The demand for complex system analysis has never been greater to assist healthcare management professionals, at all levels, to provide evidence-based, forward-looking healthcare delivery.

A major contributing factor to sustaining the Canadian healthcare system will be the quality of decision-support information provided to its boards and executives. Data are expensive to acquire and are usually captured by our most costly and scarce front-line healthcare practitioners, in complex and demanding work environments. We should always be mindful that health information is usually collected at some cost to patient care. Moving beyond conventional business intelligence, predictive analytics will be our future key to unlocking the value from this critical enterprise asset.

References

Canadian Institute for Health Information. 2009. *Health Care in Canada* 2009: *A Decade in Review,* Ottawa, ON: Author.

Health Council of Canada. 2007. *Wading through Wait Times: What Do Meaningful Reductions and Guarantees Mean?* Ottawa, ON: Author.

Ipsos News Center. 2006. *Canadians Agree That a Wait Time Guarantee Is the Most Important Priority for Canada's New Government.* Author. <http://www.ipsos-na.com/news/pressrelease.cfm?id=3287>.

Ipsos News Center. 2008. *The Cost of Waiting.* Author. <http://www.ipsos-na.com/news/pressrelease.cfm?id=3789>.

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