Outcomes-based health human resource planning for maternal, child and youth health care in Canada: A new horizon for the 21st century

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Ideally, health human resource (HHR) planning for maternal, child and youth health care should be based not only on an understanding of present and future health care needs, but also on well-defined health-related outcomes. Most of the previous HHR strategies have relied on predictive mathematical models based on the number of existing health care professionals (most often physician numbers) and changes in both total population and population demographics. However, alterations in demands related to health status (or 'need') or desired population health-related goals (or 'outcomes') were not specifically or strategically addressed.

Given the unprecedented demand for resources from the impending 'silver tsunami' of aging baby boomers, ensuring that pregnant women, children and youth compete favourably for health care resources is vital. The present article offers examples of relatively accessible data sources that are available at a population level and suitable for assessing maternal and child health care needs, details the limitations of a simple needs-based approach, and describes a more comprehensive and relevant outcomes-based HHR planning horizon suitable for the 21st century. We also highlight the importance of innovative models of care that service an effective, sustainable and high-quality health care system. Finally, we argue that this new outcomes-oriented, interprofessional framework will be the most effective strategy for improving maternal, child and youth health in Canada.

GUIDING PRINCIPLES AND CONTEXT

Four principles should guide HHR planning for maternal, child and youth care.

- Equitable and timely access to high-quality health care is necessary to maximize health outcomes.
- The goal of maximizing key measurable health outcomes should be the principal driver of HHR planning.
- Achieving desirable health outcomes may be possible and feasible with different numbers, models and compositions of health care and nonhealth care professionals in different regions.
- Central to child health outcomes are maternal health outcomes. The child health community should be actively engaged in maternity care HHR planning.

CHANGES IN LANDSCAPE

The landscape of child and youth health has changed dramatically over the past several decades as a result of the epidemiological transformation of childhood diseases, the evolution of health systems, as well as the large social changes in the concept of the family unit (1). Similar changes have influenced maternal health (2). Bold advances in health care technologies, coupled with the remarkable success of public health measures, such as enhanced hygiene and universal vaccination programs, have resulted in important shifts in the care of pregnant women, children and youth. We have moved from treating predominantly acute, intermittent infectious diseases to managing the sequelae of complex and chronic conditions such as children who have a very low birth weight, are medically fragile and/or technology dependent, morbidly obese or with a serious mental illness. The health care system has also profoundly changed with a transfer of care from hospitals and mental health institutions to community- and home-based settings. This has had a powerful and lasting effect on families' realities when caring for children and youth with complex and chronic conditions. Finally, the family in society has changed in Canada, with an increasing proportion of families led by single parents, a majority of families with both parents in the workforce, a growing number of immigrant families adapting to both new language and cultural norms, and the widening of income disparity. All of these changes demand a transformation in the objectives and strategies designed to deliver suitable and effective health care to Canada's children and youth.

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TABLE 1
National surveys related to maternal and child health

Survey	Source	Main focus	Ages	Years
Canadian Community Health Survey (replaces the National Population Health Survey)	Statistics Canada (22)	Health status, determinants of health, health care use	>12 years	Every two years starting in 2000
National Longitudinal Survey of Children and Youth	Statistics Canada (23)	Development, behaviour	0–11 years at inception	Every two years starting in 1992
Health Behaviour in School-Aged Children	Public Health Agency of Canada (24)	Health-related behaviour, health	11–15 years	Every four years starting in 1987 in Canada
Canadian Health Measures Survey	Statistics Canada (25)	Physical measures and health questionnaires	>6 years	Planned

TABLE 2
Other population-based data systems that use routinely collected health administrative data or health provider survey data

Data set	Source	Main focus	Ages	Years	Comments
Canadian Perinatal Surveillance System	Public Health Agency of Canada (26)	Pregnancy and neonatal outcomes, congenital anomalies	All	1981 and on	
National Diabetes Surveillance System	Public Health Agency of Canada (27)	Diabetes	All	2001 and on	No differentiation of type 1 and 2 using routine data
Ontario Asthma Surveillance System	Institute for Clinical Evaluative Sciences (3)	Asthma	All	1991 and on	
Ontario Crohn's and Colitis Cohort	Institute for Clinical Evaluative Sciences (8)	Inflammatory bowel disease	1–18 years	1991 and on	
Immunization Monitoring Program ACTIVE	Canadian Paediatric Society (28)	Vaccine preventable diseases	0–18 years		Not entirely population-based
Canadian Paediatric Surveillance Program	Canadian Paediatric Society (29)	Multiple uncommon diseases	Condition-dependent	Varying – data collected usually for a 'first look' at incidence/prevalence and not trends over time	
Canadian Hospitals Injury Reporting and Prevention Program	Public Health Agency of Canada (30)	Injuries seen in emergency departments	0–18 years	1991 and on	Not entirely population-based

The necessary data to create these cohorts were available in all provinces

JURISDICTIONAL CONSIDERATIONS

HHR planning is the responsibility of the provincial and territorial governments. Since the approval of the Framework for Collaborative Pan-Canadian HHR Planning by the Conference of Federal-Provincial-Territorial Ministers of Health in October 2005, there has been increasing cooperation among jurisdictions, recognizing the potential gains from sharing innovative health care delivery models, and of limiting redundancy, duplication and the inadvertent generation of interjurisdictional competition. While much can be gained from national idea-generating and experience-sharing strategies, the ultimate accountability for developing and implementing HHR strategies belongs to each provincial or territorial Ministry of Health.

MEASURING MATERNAL, CHILD AND YOUTH HEALTH NEEDS AND OUTCOMES

As provinces move toward needs-oriented, and eventually outcomes-based, planning to define priorities and guide HHR strategy, defining valid, desirable and measurable maternal, child and youth needs and outcomes will become vital. Fortunately, some readily available, population-based

data defining health care needs and outcomes exist. Table 1 describes examples of national survey data that include measures of maternal and child health and development. The sampling frames allow estimates of problems and conditions to be calculated at the level of the province/territory and occasionally at the level of the health region. Table 2 describes several different data sets, many of which have capitalized on health administrative data routinely collected by all provincial Ministries of Health (such as hospitalization discharge abstracts and physician billing claims). In provinces (including Ontario, Manitoba and British Columbia) where independent research institutes are allowed to document and analyze these data, this information has been used to identify many important conditions such as asthma (3,4), diabetes (5), attention-deficit hyperactivity disorder (6,7) and inflammatory bowel disease (8). A leader in this important field, the Manitoba Centre for Health Policy routinely publishes a *Child Health Atlas Update* using these health administrative data, reporting on several measures of children's health and describing many relevant population-level health needs (9). There are, of course, limitations to administrative data sets; clearly, there

are no validated case definitions in these administrative data sets for many diseases, and important considerations, such as functional status, are obtained only from surveys. However, these routinely collected sources are feasible and cost-effective first steps in defining health care need for certain populations. Additionally, several important outcomes related predominantly to health care use (hospitalizations, emergency department visits, physician visits or lack thereof, and mortality) can also be defined with these data. Ultimately, however, defining broader and more relevant health care outcomes for these groups of children will be more important for meaningful resource planning.

FOCUSING ON HEALTH CARE OUTCOMES

Building an HHR plan focused on outcome demands of the medical community is a significant paradigm shift. The true measure of a child health care system is not a measure of the volume of health services delivered, nor is it a description of current health care need, but it is the documentation of maternal, child and youth health outcomes achieved. More important than tracking the number of health care encounters for children with moderate asthma, for example, is tracking the number of school days (or gym classes) missed by children with moderate asthma. In addition to tracking the absolute number of premature births, it is important to track the number of premature infants who meet developmental milestones appropriate for corrected gestational age. While one measure of system performance may be health care use by children with cerebral palsy, a far more valuable measure is the extent to which these children are integrated into their communities.

Moving forward to a sound, relevant and feasible outcomes-based system of allocating resources will require many important steps. First, both evidence and consensus are needed to define the most meaningful outcome measures. For these measures to be sound, there should be evidence that links the desired outcome to service delivery. For these measures to be relevant, they must reflect not only what providers and funders of health care value, but also what children and families consider to be of highest value. For those measures to be feasible, we require data that are cost-effective to collect and data that are effectively applied across sectors.

Second, and equally important, is the development of intersectoral (and/or interministerial) data sets. If, for example, educational attainment or community engagement is recognized as a fundamental measure of health system performance, we must make the bold commitment to link our respective data holdings. There have been impressive efforts in several provinces to link health care data with data from other ministries. Manitoba has been at the forefront of these efforts, but Alberta and British Columbia have developed information system platforms to enable work in this vital area. As more provinces develop this capability, there will be exciting opportunities for cross-provincial comparisons of child health outcomes and for a consequential evaluation of differing models of care.

TYING RESOURCES TO OUTCOMES

Once relevant outcome measures are defined, delineating where resources are either accessible or needed must occur. Benchmarking is the most refined approach, comparing outcomes across regions, noting where they are superior and assessing what health care resources are used to achieve that superior result (10). However, as we challenge our measures to reflect both cross-sectoral inputs and outputs, we must take note that the relevant units of analysis likely will not naturally align. While regions defined by some administrative accountability are ideal, often such service delivery regions are defined differently across sectors. Public health units do not usually match home care regions, nor are these always related to other important networks of care, such as regional networks for tertiary care referral. Currently, some of the relevant proposed outcomes are measured in aggregate form only at the level of schools or school boards, and do not always map neatly on areas defined for health care administration. Nevertheless, many provinces have rationalized the borders of health regions to match service delivery, and many new mapping technologies make the definition of these relevant areas more feasible.

MODELS OF CARE

All regions do not necessarily need (or realistically could have) the same resources to achieve comparable outcomes. We know of no example internationally in which provider distribution is equal between rural and urban areas. While classic HHR models focus predominately on physician numbers (due to better available data, the long cycle of training, and the natural tendency for medical professional organizations to lobby in their own interest), recent evidence suggests that the distribution of physicians, and not simply the absolute supply of physicians, is more important (11,12).

Specialized services and providers are often regionalized, which can be desirable and necessary for many reasons. Children living in areas further away from these services often do not have the same regular access to them, and in adaptation, other providers of care (less specialized physicians, nonphysician providers, etc) fill the gap. Of note, in many cases, this is done without compromising outcomes. As an example, in Ontario, researchers have recently completed work assessing access to subspecialty care for children with poorly controlled asthma. Subsequent access to subspecialist care is driven largely by local availability, but outcomes as measured by need for acute care are no different for children living in areas with or without subspecialists. This is not to say that subspecialist care is not important for some children with asthma. However, it is likely that physicians and other asthma care providers with fewer specialized resources available are more judicious in their referrals and have developed other models of care to manage children with asthma. Other examples of differing models of care for children with chronic diseases include diabetes care in Ontario. Children with diabetes are seen at 34 multidisciplinary diabetes centres across the province. For children who do not live in one of the cities with a paediatric

academic science centre, the physician component of care comes from general paediatricians and family physicians, with remote backup from the tertiary care paediatric endocrinologists. The judgment of success of this resource allocation is best made using patient outcomes and not the number of pediatric endocrinologists in every area.

Primary care offers another compelling example of how models of care are more relevant than simply counting physicians for planning purposes. Within Canada, there are provinces where a significant number of children receive primary care services from paediatricians (26% in Ontario) (13). Based on work in Ontario and Manitoba (13,14), we know that these children are more likely to be from the highest income neighbourhoods, where health care needs are arguably not the highest. Many provinces rely exclusively on family physicians as well as public health nurses to provide primary care, with paediatricians acting as consultants. Limited work has assessed whether different models of care differ in efficiency and effectiveness. Immunizations, one of the most important outcomes of well-child care, are delivered entirely or largely within the public health system in some provinces, and although comparable high-quality data are hard to find, it seems that these provinces achieve higher rates of immunization uptake than those with a physician-dominant system of well-child care. (15) More innovative thinking regarding primary care delivery has also focused on the use of nonphysician providers for routine anticipatory guidance, innovations in the use of information technology to improve quality of care, and the use of interdisciplinary teams. (16) Current primary care reform in Canada is focused on some of these innovations, but there has been little direction from the child health community to make these specific to maternal and child outcomes.

Finally, at the opposite end of the care spectrum, children with special health needs represent a small but important group of children for whom innovative models of care are essential. While accounting for a relatively small proportion of Canada's children, those with complex health needs account for the vast majority of health care resources. A growing body of literature suggests that there are pervasive effects on the physical, mental and financial health of the family unit that cares for such children (17,18). Unfortunately, the adoption of well-designed interdisciplinary care across multiple settings seems to be more common in adults than children with chronic disease (19), possibly due to the relatively small number of children and wide diversity of diagnoses among children with chronic disease, as well as a lack of policy focus for these children and families.

Fortunately, excellent examples exist across the country of 'best practices' that have been developed to meet the needs of children and families with relatively limited resources. Alberta was faced with a shortage of licensed caregivers (eg, registered nurses, licensed practical nurses) to provide safe respite and night-time home care for medically vulnerable tracheostomy-dependent infants and children. After surveying families and health care providers, it

was determined that children with routine but complex activities of daily living that could be performed with predictable outcomes were suitable for alternate (unregulated) caregivers trained appropriately. Key to the success of this model has been that the quality of care is maintained, and that in each individual assessment of the child and family, the correct paid caregiver is used. Similarly, in Quebec, the Intensive Ambulatory Care Program, housed at The Montreal Children's Hospital (Montreal, Quebec) has developed a model of care coordination for children with a variety of complex needs using a multidisciplinary approach. With an aim to keep children with complex needs at home and out of the hospital, the service set up a 24 h on-call service and a Monday to Friday drop-in clinic staffed by nurses and physicians. The program serves a diverse group of children with complex conditions, including those with hemophilia, home ventilation, heart and lung transplants, and total parenteral nutrition. Inherent to the success of this program is that the frontline personnel are adequately trained to treat children with more than one set of problems, outside the normal scope of organ-specific care.

There are common threads to recognize. The first is ensuring that all providers practice to their maximal scope of practice. Families of children with complex needs frequently articulate the need for improved continuity of care, and a single go-to person for assistance with navigation through the health system. This role, a 'key worker', combines those of health advocacy and management (20). Traditionally, the 'key worker' has been the primary care physician. However, this requires a single relatively highly paid practitioner to have sufficient time, energy, remuneration incentives and skills to help families access sufficient and appropriate health resources across the spectrum of care in the hospital, clinic, home and school. This antiquated model of care needs updating to include our colleagues in nursing, social work and rehabilitation therapy who have a growing role not just as members of interdisciplinary teams, but as leaders in the circle of care as well.

THE IMPORTANCE OF MATERNITY CARE

Finally, we challenge the child health community to serve as leaders in advocating for the equitable distribution of high-quality and timely maternity care services. Clearly, as child health professionals, we are in a unique position to understand the importance of the best possible start in life (21). Excellent child and youth health outcomes depend on excellent maternal health outcomes, and we must join our maternity care colleagues with sincere commitment to a joint cause.

RECOMMENDATIONS

- Child and youth health professionals and their organizations need to engage in discussions with provincial governments to define meaningful maternal, child and youth health outcomes, and must challenge their provincial jurisdictions to consider new and more holistic approaches to HHR planning.

- Funding through organizations such as the Canadian Institutes of Health Research and academic research institutes should be directed to increase capacity for maternal, child and youth health services research, because this research can address disparities in maternal and child health outcomes, as well as highlight effective health care delivery models. Child and youth health professionals must advocate for this increased research funding.
- Child and youth health professionals must begin national outcomes-oriented benchmarking discussions. Sharing ideas about and results achieved by innovative models of care must continue.
- Child and youth health professionals must involve themselves in discussions of maternity care needs and outcomes, and they should advocate for this important area of health care delivery.

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