Frontline Health
Beyond Health Care

R E P O R T

Dynamic Simulation Model Workshop

Making the Economic Case for Investments in Public Health and the Social Determinants of Health to Improve Health and Health Equity for All in Canada

May 22, 2012

CPHA ACSP
CANADIAN PUBLIC HEALTH ASSOCIATION
ASSOCIATION CANADIENNE DE SANTÉ PUBLIQUE

"Health is a many determined thing."

Dr. Richard Lessard, comments made during the May 22, 2012 workshop

"Understanding the economic benefits and costs of preventive health interventions enables policymakers and program managers to make better-informed decisions about where and how to invest to improve the health of the population. While the economic dimension is only one of many inputs to consider when considering the merit of an intervention, having such knowledge on hand allows for a more rigorous, systematic and transparent decision-making process in a world of limited resources."

Public Health Agency of Canada *Investing in Prevention: The Economic Perspective. Key findings form a survey of the recent evidence.* May 2009.

"Achieving the goal of improved health and wellness depends to a significant degree on actions both within and beyond the health care system, involving population health promotion, public health services, clinical prevention and support for healthy living choices. Achieving this goal will also support the remaining goals. Improving the health and wellness of the population will reduce the burden of disease, which will assist in the achievement of a sustainable, affordable health care system…"

Office of the Provincial Health Officer/British Columbia. *Investing in Prevention: Improving health and creating sustainability. The Provincial Health Officer's Special Report.* September 2010

"To determine the most effective policies and to establish priorities between competing options, policy makers need to place …. Forecast scenarios in their broader context. Leaders need to consider a broad range of criteria, including cost effectiveness, implementation cost, and feasibility, when determining where to set priorities and spend additional resources."

Conference Board of Canada. *Cost Risk Analysis for Chronic Lung Disease in Canada. Economic Performance and Trends*. February 2012.

"We don't want to only look backwards and sideways… We want to project, to look forward… we are looking for an envelope of pathways under different assumptions, exploring the consequences of different scenarios within very complex situations. We need to get a sense of what the destiny would be, highlighting trade-offs and revealing alternative trajectories to decision-makers over a long time horizon."

Dr. Bobby Milstein, comments made during the May 22, 2012 workshop

"If a critical mass of provinces asks the federal government to do something, then the federal government might do something. But this means that the provinces need to have a coherent 'ask'. The question becomes how to make a compelling case for investment in public health: we believe in early intervention, we believe in prevention, but the politicians are still not convinced."

Dr. Michael Wolfson, comments made during the May 22, 2012 workshop

The Canadian Public Health Association (CPHA) is a national, independent, not-for-profit, voluntary association representing public health in Canada with links to the international public health community.

CPHA's members believe in universal and equitable access to the basic conditions, which are necessary to achieve health for all Canadians.

CPHA's mission is to constitute a special national resource in Canada that advocates for the improvement and maintenance of personal and community health according to the public health principles of disease prevention, health promotion and protection and healthy public policy.

This workshop is part of CPHA's Frontline Health: Beyond Health Care initiative. CPHA is grateful to AstraZeneca Canada for its financial support for this initiative.

This version is based on the original report prepared by Michael Trottier, Meeting Facilitator, TTG International (Gatineau, QC).

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Introduction

Health care expenditures in Canada continue to grow faster than government revenues. These are driven mostly by an increase in the utilization of drugs, technology and human resources (Canadian Institute for Health Information, 2011) to treat a growing burden of largely preventable diseases such as diabetes, hypertension, heart disease, stroke, cancer, mental illness and musculo-skeletal conditions. (Millar, 2012) It is clear that these financial pressures reduce governments' ability to fund important programs such as education, social services (including income supports), early childhood care and learning, social housing and access to nutritious food. This situation could seriously have a negative impact on health and well-being of the general population, exacerbate inequities and erode public confidence in publicly funded health care and public health services.

A considerable number of studies have been produced in Canada showing the return on investment of disease and injury prevention and health promotion interventions. Notwithstanding this body of evidence, only a small proportion of investment is made by federal and provincial/territorial governments in 'upstream' public health functions (Kendall, 2010; CIHI, 2012) and in the 'social determinants of health' as a means to improve human health and control 'downstream' health care costs to treat preventable illness and injury (PHAC, 2009; NCCDH, 2011; HESA 2011).

There are several promising, emerging methodologies investigating the impact in disease prevention and health promotion on health and health care costs. Dynamic simulation modeling is one of them. What differentiates this approach is its capacity to project and estimate different pathways under different assumptions, exploring the consequences of different scenarios (Milstein et al, 2012). The evidence in the United States derived from economic modeling analysis (Milstein et al, 2011) shows that 'upstream' investments in primary prevention and public health reduce health care expenditures over the long term. Increasing efficiency (reducing waste) in the healthcare system, while slowing the rate of increase in expenditures, does not have as much impact.

The Canadian Public Health Association (CPHA) invited a group of experts from the fields of public health, health economics and economic modeling (Annex 1) to explore the feasibility and utility of dynamic simulation modeling, or similar models, to demonstrate the impact of investments in disease prevention, health promotion and health protection. This event, held on May 22, 2012 in Ottawa, was supported through the CPHA's *Frontline Health: Beyond Health Care* project, an initiative funded through Astra-Zeneca. This project explores what public health and other sectors are doing with respect to addressing the social determinants of health and health equity in Canada and how these experiences can be used to inform public policy and public health practice as a means of achieving "health for all".

The objectives of the workshop were to:

- *Explore the feasibility and utility of dynamic simulation modeling, or similar models, to demonstrate the impact of investments in disease prevention, health promotion and health protection in Canada;*
- *Examine what is being done in the United States and Canada on this topic; and,*
- *If consensus is reached, start mapping the next steps if such an exercise is to be undertaken in Canada*

This report provides a summary of the workshop discussions and the suggested 'next steps'.

Discussion

Dr. Bobby Milstein, Dr. David Buckeridge, Dr. Paul Thomassin and Dr. Michael Wolfson presented information on their use of dynamic simulations for health interventions. Their respective power point presentations are available on the CPHA web site (see Reference section).

Dr. Milstein described three models: the *Prevention Impact Simulation Model (PRISM)* which covers risk factors over many conditions, the *Healthbound* model which measures health care by looking at evidence around what these policies can accomplish, and the *Rethink Health* model, which adapts the *Healthbound* approach for local level scenarios.

The PRISM model is a relatively large system dynamic model. It simulates trajectories for health and cost outcomes for a large population. This model shows relationships among risk factors and chronic disorders. These factors are integrated and inter-connected so they represent a chronic disease system. PRISM also looks at various interventions (e.g., various medical interventions, smoking, physical activity) and provides an analysis of actions, costs and effects that helps shape decisions about what should be done. PRISM uses historical trends, population trends, history of how a disease has changed over time and the cost of interventions. A great deal of economic data is included including hospital costs, the costs of managing risk factors, like drug management as well as implementation costs.

The Healthbound model looks at high levels of morbidity and mortality to determine why these rates occurred, how they can be reduced, how the health care system reacts, where the trade offs exist and who should decide what changes to make. The full Healthbound model has 12 domains of interventions, each concerned with examining the quality of care, the systems capacity to deliver care, insurance market efficiencies and waste in the system. The goal is to flag areas where care can be better coordinated. Healthbound starts by explaining where the demand in services is coming from. The model allows researchers to illustrate a pattern of results and describe how certain policies have had no positive results – very valuable information for policy makers. It also provokes and structures the kinds of conversations stakeholders have with one another regarding how the system could change and why.

The ReThink Health model simulates the behavior of a local health system. It tracks changes in health status, utilization, costs, and equity all within a single, testable framework that is linked to many sources of empirical data. The ReThink

model is used as a prelude to action in the real world, exposing schemes with significant downsides and building support for plans with promising features. It helps planners and decision-makers better understand and anticipate the possible effects of different interventions and investment strategies on the long-term trends in health outcomes, care delivery, and costs.

Dr. Milstein and his associates have used these models to create a different conversation with decision-makers with respect to the consequences of different scenarios and complex investment decisions. He noted the importance of 'polycentric governance' that engages people from a multitude of centres and sectors, and in particular key decision-makers, to consider a variety of scenarios along the policy pathway.

Dr. David Buckeridge reviewed the *McGill World Platform for Health and Economic Convergence* (http://tinyurl.com/9hcz3ux), a project that takes a "whole of society" approach to social determinants and disease prevention by looking at health status information, neighborhood data, health indicators, area level measurements such as the built environment and indicators from the marketing and sales of food. The goal is to bring this information together into a conceptual framework that policy makers, stakeholders, health providers and the public could use. The system describes a population, monitors changes over time and determines the impacts of changes. In this regard the concept of a population health record becomes important as a repository of information made up of a series of health indicators that allow us to organize knowledge of complex systems and enable more knowledge to be added to it by humans and computers so we can understand what is happening over time.

Dr. Paul Thomassin discussed the use of an integrated modeling approach for better public policy discussions and decision-making. Using a system dynamic approach allows researchers to look at complex systems and, by making changes through the use of scenarios, evaluate the impact government decision-making and policies have on population health. This approach identifies what a population will look like in 20 to 40 years by using an applied simulation regarding interventions that apply to population cohorts.

Conducting macroeconomic impacts of health policy supports the development of an economic case to support investments in preventive health interventions. Macro modeling provides politicians with tangible information they can use immediately and helps broaden the public discussion regarding policy choices by pulling together information that tests certain probable projections.

Dr. Michael Wolfson presented information on the *POHEM/ModGen Family Microsimulation Model* (www.pophealthmodels.ca). This model, in looking at inter-connections, requires huge data collection and collation efforts. The key to this type of modeling is to be clear about what is being addressed. Some examples already exist that can serve as guides for future efforts. The Canadian Partnership Against Cancer, for example, identified different levels of decision makers and what they needed using a cancer risk conceptual model: they looked at risk factors, screening and new treatments. The HealthPaths Model looks at risk factors and functional health status to show the links between health and age and health inequality and demonstrate how health adjusted life expectancy varies by income. The STAR network (Simulation Technology for Applied Research) is a good example of several researchers from different countries working together with different subject matter to understand where socio-economic gradient comes from. Data from the United States and the UK show a relationship between inequality and mortality while data from Sweden Australia and Canada show no relationship between inequality and mortality.

The discussants concluded that public health has its silos but the major problem is finding and gaining access to appropriate data. The real challenge is not the modeling but how to find the data needed to conduct the simulation exercise.

The workshop's participants had a free-flowing discussion about the challenges facing the utilization of economic dynamic simulation models for public health in Canada and 'next steps' for future direction in this regard.

Seize the Moment to Promote Meaningful Change

Change is in the air and the timing may never be better to promote investments in public health and the social determinants of health. The growing financial pressure on the provinces and territories is creating a sense of urgency in the minds of many policy makers. The recently published 'Drummond Report' in Ontario, for example, suggests that in reforming that province's health care system *there should be a heightened focus on preventing health problems, including the role of public health in meeting this goal.* (Commission on the Reform of Ontario's Public Services, 2012)

In a brief to the Standing Committee on Finance in August 2011, the Canadian Coalition for Public Health in the 21st Century recommended that *the federal government explore and put into place incentives and strategies tailored to the for-profit and not-for-profit sectors as well as for communities to support the implementation of cost-effective interventions that address the social determinants of health, especially as they concern populations affected by conditions that predispose to vulnerability.* (CCPH21, 2011) The Coalition emphasized that Canada spends nearly 12% of its Gross Domestic Product on health and that amount will continue to increase on an annual basis in terms of its share of total provincial and territorial spending (approaching 50% of total program spending in Ontario and several other provinces). The health promotion and protection aspects of public health are particularly important as up to 80% of the current burden of disease in Canada is due to chronic diseases, the vast majority of which are preventable.

Even though many activities in the health care system are seen as not particularly useful, change has been difficult. The pressure for real change is becoming concrete. For example, it has been known for years that certain procedures persist where costs do not line up with the effort. The paradox is that even though everyone seems to agree that investing in

the 'up-stream' population-based health promotion and disease prevention components of the health system is more cost-effective than increasing support to the 'down-stream' components, meaningful change is slow and hard to come by.

Seizing the moment and making the case for change by presenting the results of a simulation is a critical component of this process. The results of a robust simulation are bound to surface resistance to change by shining a light on the choices that exist, thereby providing a practical tool for stewardship.

Dynamic modeling can promote change because it allows policy makers to find and hold an objective high ground, especially in a divided society where there is a range of views. Models do not make funding decisions; people do. Models, by presenting options in an objective, non-emotional manner however, can support change by creating a constructive dialogue about the kind of evidence leaders want in order to make decisions. Most policy professionals want to know the area of greatest benefit to action and where the greatest promise lies. Although we can over-rely on models to influence decisions – there are some bad models out there – it is better to over-rely than under-rely on them and end up making investment decisions based on ideology, narrow interests or inaccurate assumptions.

Deal With Health Inequalities

Although Canadians are among the healthiest people in the world some groups of Canadians are not as healthy as others. We know that major health disparities exist throughout the country. These health disparities are not randomly distributed; they are differentially distributed among specific populations (e.g. Aboriginal peoples), by gender, educational attainment and income and other markers of disadvantage or inequality of opportunity. Although the argument for reducing inequalities is often considered a humanistic argument, health inequities also have significant economic consequences. It is well known that they are health system cost drivers.

Making the economic case for shifting resources toward public health functions and the social determinants of health has to be more than merely making a cost/money argument; it must also include making a compelling case for equity and social justice. Dynamic models should not deal exclusively with the economics of the system; they should also deal with inequities created by and within the system. Upstream determinants of health are important in addressing inequities. This suggests making sure the broader social determinants (for example job training, education policies, the possibility of earning a living wage, food prices and availability) are taken into consideration and proposing how these factors, if they were handled differently from a policy standpoint, might alter the overall health status and health care cost landscape.

Create Structure and Partnerships

A key part of the success will be the degree to which influential researchers and policy leaders are involved from the start. It will be very helpful to identify a handful of thought leaders to act as a steering group able to represent the interests of this initial core group and who can use their prestige and connections to open doors and promote the concept at important tables. Establishing a steering group to help guide efforts towards building and conducting dynamic economic modeling for public health and the social determinants of health in Canada will be an important step.

Several key 'leaders' already exist in Canada who might be interested in participating in this initiative. The Canadian Institute for Advanced Research could also be approached. The discussants recommended approaching key individuals with provincial and territorial governments to determine their interest in the approach being proposed and to identify what information would be useful to them for investment decisions. Marketing the approach to the Council of the Federation as an innovative approach to health care reform and system sustainability will be an important step in the short-term as this body may be an excellent resource to help with next steps.

Shape the Message for a Specific Audience

Success will depend on determining the target audience for this research approach. The Premiers of PEI and Saskatchewan have lead responsibility within the Council of the Federation of moving things forward with respect to identifying innovative approaches for health system sustainability.

Getting politicians to listen and 'buy-in' to the proposed concept relies on talking to them in ways they can understand and use. Although a discussion of 'costs' is important, the discussion should be broadened to the impact of health-related policy decisions on the economy as a whole. A shift beyond discussions focused solely on intervention cost effectiveness and health costs towards talking about making investment that will pay off inter-generationally are needed.

Establishing the story we want to tell has to include data about how investments impacting the determinants of health must influence policy decisions made today. It is important to think of this before identifying 'the best model'. Establishing the positive impacts must be as broad as we can make them and must include benefits linked to issues such as increased productivity, lower rates of crime and other positive impacts.

Identify Capacity and Data Sources to Create an Early Win

Getting a clearer picture of what's going on in Canada and our internal capacity to conduct dynamic simulation modeling is important. A handful of researchers in Canada do dynamic economic simulation modeling. Another issue is data availability and accessibility suitable for modeling. There is a great deal of existing Canadian capacity in modeling that is not currently linked to health. Identifying it could be very beneficial as a means of moving forward action on the use of dynamic economic modeling for public health and the social determinants of health in Canada.

Going to where data exist as a starting point to make the case for using the proposed approach is important. A cheaper way to proceed is to begin with the capacity map and not the modeling. This involves determining what people are doing in the system, what data exist and whether they are suitable for the purpose and can be accessed and used. This will provide a good starting point. Even though it doesn't indicate what has to change, it does help in understanding how engaged researchers can adapt existing models, how they can share resources and where the planning opportunities at the system-wide level might lie.

In terms of how to proceed, there is a real window of opportunity linked to current discussions at the provincial and territorial levels with respect to health budgets and innovative health care strategies. This renewed 'sense of purpose' should be used to create positive energy for the proposed approach. The challenge will be to create a dynamic simulation based on a topic using existing data and to make a compelling case for its adoption and utilization as a foundation for decision-making. Building on the great work already happening seems to be a better way to ride the wave of urgency. Releasing a meaningful workshop report to potential key allies and decision-makers will be an important first step. A pilot approach engaging with a small number of provinces and territories might be the best approach rather than rolling it out as a national strategy.

Considering federal/provincial/territorial priorities such as mental health, childhood obesity, nutrition, healthy weights, and wellness will be important in deciding what modeling to use. For example, focusing on developing a dynamic economic simulation model on the long-term impacts of childhood obesity may be a smart choice as this is a subject that is at the top of everyone's list. Looking at agricultural policy at provincial/territorial level as a determinant of health could also be a good place to start given the wealth of existing data. The objective is to give governments a menu of options and a clear sense of where to get the best value for money.

Although there has been some overlap and a network of activity, few collaborative projects exist. At McGill various modelers are doing different things but the models are not linked directly. There are plans for inputs to be shared at McGill and while people are aware of each other's work researchers tend to proceed independently. In the United States, NIH funding tends to lead to consensus because distinct modeling groups analyze the same question from a variety of perspectives The trend in the United States is to have a group of teams looking at the same things separately. Generally speaking, in Canada, projects have been piecemeal so far.

In order to create an early win, transparency among researchers and policy makers is important. An 'open source' approach should be explored. Efforts should also be made to identify and learn from other modeling initiatives in other sectors, as health may be able to use/get involved and interest them in becoming involved in health-related modeling efforts.

Next Steps

Several 'next steps' were proposed:

- Share the workshop report with invitees unable to attend the meeting, inviting them to comment on the report.
- Share the revised report with a wider audience, perhaps including the Council of the Federation and the private for-profit sector.
- Identify other "modelers" in Canada, to learn from their experience and seek their advice and involvement in the proposed initative.
- Identify several key allies/champions ('star power') who could move the conversation forward in the corridors of power at the federal and P/T leaders.
- Design a marketing tool to sell the concept of looking beyond health care system efficiencies to politicians.
- Engage with other sectors (e.g., agriculture, private for-profit) to look at economic impact of investments on health.
- Map what is happening around economic modeling for public health, research capacity on this issue and data availability for modeling.
- Engage with the media to define how to tell the economic story to the public.
- Convene a small working group to reach out to other individuals and groups/sectors to obtain 'buy-in' on the concept and to develop a research proposal to conduct a pilot study using a dynamic simulation model and to identify funding sources.

Appendix: Workshop Attendees

Experts (alphabetical order by surname)

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