Canadian Health Services and Policy Research Alliance

Making an Impact:

A shared framework for assessing the impact of health services and policy research on decision-making

PREPARED BY THE IMPACT ANALYSIS WORKING GROUP OF THE CANADIAN HEALTH SERVICES AND POLICY RESEARCH ALLIANCE (CHSPRA)

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List of Acronyms

CAHS
Canadian Academy of Health Sciences

CCRA
Canadian Cancer Research Alliance

CHSPRA
Canadian Health Services and Policy Research Alliance

CIHR
Canadian Institutes of Health Research

DSEN
Drug Effectiveness Safety Network

EIS
Electronic Information System

FABRIC criteria
Focused, Appropriate, Balanced, Robust, Integrated, Cost-effective

HSPR
Health Services and Policy Research

IAWG
Impact Analysis Working Group

ICRT
Indigenous Cultural Responsiveness Theory

IHSPR
Institute of Health Services and Policy Research

IPHRC
Indigenous Peoples' Health Research Centre

ISRIA
International School on Research Impact Assessment

LGBTTIQ+
Lesbian, Gay, Transgender, Two-Spirit, Intersex, Queer plus others not defined in the acronym

NAPHRO
National Alliance of Provincial Health Research Organizations

NGO
Non-Governmental Organization

OECD
Organisation for Economic Co-operation and Development

ORCID
Open Researcher and Contributor ID

PDSA
Plan-Do-Study-Act

R&D
Research and Development

REF
Research Excellence Framework

RRS
Research Reporting System

SHRF
Saskatchewan Health Research Foundation

SPOR
Strategy for Patient-Oriented Research

Executive Summary

BACKGROUND

The Canadian Health Services and Policy Research Alliance (CHSPRA) was established in 2015 as an alliance of research funders, health charities, health system organizations and university training programs that are committed to advancing a pan-Canadian vision and strategy for health services and policy research (HSPR), and to collaborating on joint initiatives where shared goals and priorities exist. The pan-Canadian vision and strategy contains five key research priorities and seven strategic directions that provide guidance for and facilitate strategic alignment of individual CHSPRA organizations. One of the strategic directions, measuring HSPR impact, drove the decision to use CHSPRA's collaborative potential to develop a shared framework for assessing the impact of HSPR in Canada. In addition to directing HSPR impact assessment, a shared framework could also assist organizations in strategic planning and action by highlighting opportunities for partnerships, guiding funding allocation, and advocating for research.

While considerable effort has been made to understand the magnitude of investment in HSPR and the programs and priorities to which the investment has been allocated, very little is known about the outcomes and impact of investments at a pan-Canadian level. This is particularly true in terms of understanding the impacts of HSPR on decision-making. CHSPRA identified that the Canadian Academy of Health Sciences (CAHS) Impact Framework would provide the base to develop a shared impact framework that would improve both the assessment and use of research in informing health services and policy decision-making. Therefore, in September 2015, CHSPRA launched an Impact Analysis Working Group (IAWG), co-chaired by Kathryn Graham of Alberta Innovates and David Peckham (formerly)* from the Canadian Institutes of Health Research (CIHR), to:

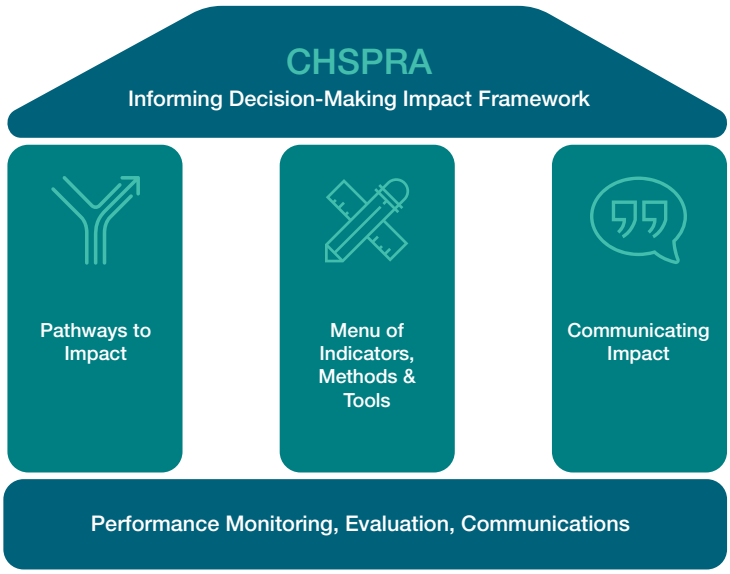
- Build upon the CAHS Impact Framework in ways that enable a more systematic and comprehensive assessment of the impacts of HSPR on decision-making; and
- Advance testing, refinement, and shared use of the Framework and supporting resources.

Approach to Developing the CHSPRA Informing Decision-Making Impact Framework

Assessing the impact of HSPR is a challenge, especially as it relates to the complex process of decision-making. To achieve the nuanced understanding required to expand on the CAHS Impact Framework, the IAWG took multi-phased and iterative approach to co-develop the CHSPRA Informing Decision-Making Impact Framework (herein, 'the Framework') with HSPR stakeholders. A systematized literature review was completed to identify current and emerging trends and ensure the Framework was evidence informed. The IAWG also convened task forces to develop the pathways to impact (i.e., logic model) and the initial stage of indicator generation. Indicator selection was completed using a modified Delphi approach carried out by a pan-Canadian indicator review panel of fifteen members from academia, government, funders, public, and research management whose combined expertise provided robust selection of indicators and comment on implementation and future development. The IAWG also addressed the importance of capturing complex pathways of HSPR use in decision-making by considering the use of case studies as well as impact narratives as a tool to communicate HSPR impact to various audiences. An impact narrative template was provided to facilitate implementation.

Components of the Framework

The resulting Framework consists of three key components: 1) a visual representation of the non-linear pathways to impact; 2) a menu of performance indicators that can be used as a guide to monitor progress for achieving impact, along with a reference table of commonly used data collection methods for assessing impact; and 3) an impact narrative tool for capturing and communicating more qualitative case-based assessments of impact. Internal and external experts have been engaged throughout the development process to provide feedback on the importance, feasibility, and scientific merit of the proposed indicators and methods. The **three components of the Framework** are illustrated below.



Component 1
The HSPR Informing Decision-Making Pathways to Impact

The **HSPR Informing Decision-Making Pathways to Impact** (see figure on next page) presents a visual representation of the complex and non-linear pathways from research to impact and also recognizes the complex and multi-dimensional nature of decision-making. The Framework illustrates that:

- Processes are fluid and can be bi-directional (the feedback loops);
- Researcher-knowledge user engagement is critical throughout (the dashed lines);
- There are multiple sectors in which health services and policy decision-making occurs and in which HSPR can make an impact;
- Research can inform decisions about different kinds of pathways to health services and policy innovations (i.e., pathways to policies, practices, processes, products and behaviours) that warrant different indicators for measurement;
- The effect of external influences in the achievement of different pathways; and
- The context within which decision-making occurs plays an important role.

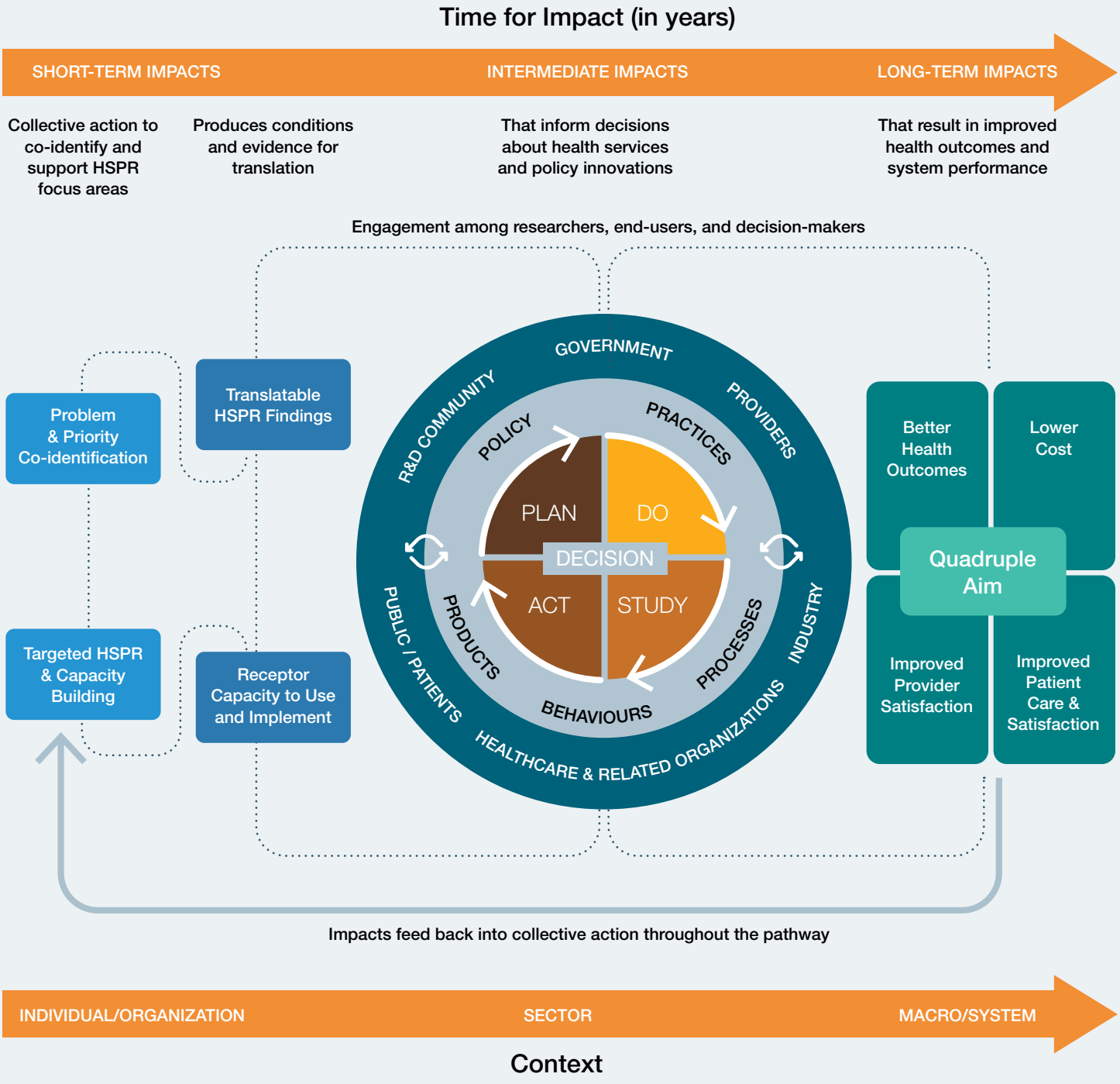
The Quadruple Aim Framework identifies improved patient and provider satisfaction, better health outcomes, and lower cost as the long-term impacts that can stem from research-informed decision-making.

A description of how research can achieve impact using different pathways was proposed (i.e., theories of change) using the following logic: the co-identification of pressing problems warranting research attention, coupled with targeted HSPR and capacity building funding initiatives, produce the evidence and enabling conditions for the translation of research, which informs decision-making about health services and policy innovations that effect adoption (or non-adoption) of decisions, which can contribute, over the longer-term, to improved health impacts and system performance. Context and external influences play a mediating role along the full research pathways to impact.

Component 2
Informing Decision-Making Indicators, Methods, and Data Collection Tools

2i) Indicators

Aligning with Adam et al.'s ten-point guideline for effective impact assessments, the IAWG recommends a balanced menu of informing decision-making impact indicators that include proximal and distal impacts and a mix of quantitative metrics (e.g., number and per cent of end users that reported HSPR evidence was useful) and qualitative measures (e.g., decision-makers' attitude towards the value of research evidence). No single indicator is sufficient to capture and demonstrate overall impact, and the IAWG recommends using a balanced set of indicators, purposefully chosen based on the assessment question(s) at hand, in conjunction with qualitative measures and narrative text to capture the full breadth of impacts and the contextual factors that enhance or hinder impact.


Time for Impact (in years)
SHORT-TERM IMPACTS
INTERMEDIATE IMPACTS
LONG-TERM IMPACTS
Collective action to co-identify and support HSPR focus areas
Produces conditions and evidence for translation
That inform decisions about health services and policy innovations
That result in improved health outcomes and system performance
Engagement among researchers, end-users, and decision-makers
Problem & Priority Co-identification
Translatable HSPR Findings
Targeted HSPR & Capacity Building
Receptor Capacity to Use and Implement
GOVERNMENT
PROVIDERS
INDUSTRY
HEALTHCARE & RELATED ORGANIZATIONS
PUBLIC / PATIENTS
R&D COMMUNITY
POLICY
PRACTICES
PROCESSES
BEHAVIOURS
PRODUCTS
PLAN
DO
DECISION
ACT
STUDY
Better Health Outcomes
Lower Cost
Quadruple Aim
Improved Provider Satisfaction
Improved Patient Care & Satisfaction
Impacts feed back into collective action throughout the pathway
INDIVIDUAL/ORGANIZATION
SECTOR
MACRO/SYSTEM
Context

The core set of 12 indicators prioritized by the Indicator Review Panel listed by their ranking within each section of the Informing Decision-Making Pathways to Impact.

SECTION 1: *Collective Action to Co-Identify and Support HSPR Focus Area* — Short Term

- Important problems warranting HSPR attention are co-identified with decision-makers [number (#) and description of type of problems]
- Number (#) and type of HSPR funding programs/ projects according to HSPR priority theme areas
- Trend in funding investments over time for HSPR [per cent (%) growth of HSPR funding over time, open and strategic, and by HSPR priority theme areas]

SECTION 2: *Produce Conditions and Evidence for Translation* — Short Term

- Number of HSPR projects that include meaningful participation of patients or members of the public as appropriate
- Number (#) and per cent (%) of policies that cite research evidence
- Number (#) of HSPR researchers engaged in capacity development with end user audiences

SECTION 3: *Inform Decisions about Health Services and Policy Innovations* — Medium Term

- Research evidence directly informed agenda setting, priority-setting, policy debates, briefings (e.g., invited policy papers and consultancies, information requests by decision-makers, invited meetings and interactions with decision-makers)
- Research directly underpinned policy decision (e.g., legislation, regulation, program, practice, behaviour, service delivery)
- Evidence of participation of researchers in process of making decisions (e.g., participation in policy networks, boards, advisory groups)

SECTION 4: *Intermediate by Target Sectors* — Medium Term

- Number (#) and per cent (%) of policies with use of HSPR evidence in their development
- Number (#) and per cent (%) of end users that reported HSPR evidence was useful
- Number (#) of public service and broader public sector organizations formally requiring use of research to inform health services and policy (over time)

The IAWG completed a systematic process to select a core set of indicators as a starting point to assess the impact of HSPR on a pan-Canadian scale. This process, informed by a systematized review of the literature, included the generation of an initial menu of indicators by a task force, followed by further indicator refinement and vetting by the IAWG. The process culminated in a 3-round modified Delphi approach carried out by the Indicator Review Panel. The modified Delphi consisted of two online surveys, including written comments from Panelists, and one in-person meeting that involved a paper survey and group discussion. Indicators were assessed on five criteria: validity, reliability, importance, feasibility, and actionability.

The above process resulted in a total of twenty-three indicators (see Appendix A) accepted as valid, reliable, important, feasible, and actionable. Of these, twelve were ranked most important to pursue for pan-Canadian assessment at this time (i.e., 'core set' of indicators). The indicators align with the four sections of the Informing Decision-Making Pathways to Impact.

2ii) Methods

Given the diversity of impacts in HSPR, mixed methods using multiple data sources are recommended for assessing the impact of HSPR across Canada. A table of commonly used methods, including advantages and disadvantages, are outlined in the Framework document. Given the national and international interest in impact assessment, there are many emerging methods and tools (e.g., altmetrics, text mining, network analysis) that will need to be tested, with the necessary time and resources, by CHSPRA and the HSPR community in general.

2iii) Data Collection Tools – An Opportunity for Collective Impact

The Framework presents an important opportunity for collective action and impact to harmonize and standardize data collection tools and platforms. Standardized tools will enable comparative analyses of HSPR impacts and the factors that enable and hinder impact across organizations and over time. Canada is fortunate to have comprehensive, world-class national and provincial data resources and emerging initiatives, such as the Pan-Canadian Real-world Health Data Network (PRHDN), hold great promise for multi-province, pan-Canadian, and comparative analyses. However, a number of the indicators recommended in this report require qualitative assessments and efforts are needed to develop standardized tools (e.g., interview/survey protocols). In terms of standardization, challenges exist given there are various end users of HSPR, including decision/ policy-makers in government, industry, and healthcare organizations as well as patients and healthcare providers. This diversity creates issues with systematic assessment across end user groups to achieve accurate and meaningful results. Although challenges exist, collectively developing tools and leveraging current data platforms are beginning steps in developing a harmonized approach that addresses a pan-Canadian assessment approach.

Component 3
Communicating Impact

This shared Framework focuses on two tools for communicating impact: impact narratives and scorecards and dashboards. The impact narrative is a communication tool used to report impact to different audiences. *Impact narratives* are particularly useful for communicating with government and the public. A template was adapted from an existing tool set (see Appendix B) and uses the Informing Decision-Making Pathways to Impact as the frame for the logical flow for impact narratives. Researchers can use this tool to describe the different pathways taken, allowing both the narration of the impact story and integration of data from the menu of indicators. *Scorecards and dashboards* are useful tools for graphically displaying data to monitor progress to impact and achievement of impact. Scorecards are typically linked to the organization's strategic objectives while dashboards are used at an operational level to monitor key performance indicators. The scorecard results are both qualitative and quantitative and follow the structure of the pathways to impact. Scorecards and dashboards can be easily updated and therefore used to present the most critical impact results making them useful to stakeholders, such as researchers and decision-makers. Also, their parsimonious visual presentation makes them easily digestible, which can be very appealing to decision-makers who benefit from the translation of complex information to direct messaging.

Conclusion

CHSPRA envisions that its member organizations and key partners will use the Framework and tailor it to assess the impact of the HSPR they support and produce. It is hoped that as use of the Framework increases, the pathways to impact will be applied to a wide array of HSPR examples, and the indicator menu, data sources, and data collection tools will continue to evolve.

As a starting point, the Framework will generate insight and knowledge regarding the nature and scope of impacts that HSPR has on decision-making, and the methods, tools and techniques that can be harnessed to optimize its impact. It may also help inform research funding allocation decisions and program design to ensure optimal effectiveness and efficiency of investments, as well as help answer important questions such as whether current HSPR investment levels are sufficient to meet the ultimate health impact of the quadruple aim which has goals of improved population health, better patient and provider experience, and lower (or maintained) cost.

Recommendations

To successfully implement the framework, the IAWG recommends:

1. The HSPR Framework and its corresponding core set of indicators should be endorsed and tested by CHSPRA member organizations and key partners.
2. CHSPRA strike a formal impact assessment secretariat to lead the pan-Canadian implementation of the Framework, monitoring of its use, and development of common platforms and tools for more robust and comparable impact assessments. This will provide the backbone infrastructure required for successful uptake, use, and ongoing improvement of the Framework.
3. Future development of the Framework and indicators should appropriately and thoughtfully address equity and inclusivity across a broad spectrum of communities (e.g., Indigenous peoples, Lesbian, Gay, Bisexual, Transgender, Two-Spirit, Intersex, Queer, and others not included in the acronym (LGBTTIQ+), rural/ remote communities).
4. Future development of the Framework and indicators include the promotion, development and strengthening of a learning health system in Canada.
5. CHSPRA collaborate with others nationally and internationally to continue to advance the science and tools for HSPR impact assessment

If Canada can implement these recommendations and begin to routinely collect data, assess, report, and communicate HSPR impacts, the potential benefits will be substantial. In a time of economic uncertainty and scarcity of resources, evidence on how to fund impact-generating research can give Canada a significant edge in health services and policy R&D and contribute to improved health impacts and system performance.

Background

A New Era: A Pan-Canadian Vision and Alliance for Health Services and Policy Research

Health services and policy research (HSPR) in Canada has entered a new era. The first-ever *Pan-Canadian Vision and Strategy for Health Services and Policy Research* was released in March 2015.(1) This seminal report defines a shared vision for HSPR in Canada and priorities for collective action to strengthen the HSPR enterprise and optimize the impact of HSPR on health and health system outcomes. The report is the result of a year-long collaboration between federal and provincial health research funding organizations, health charities, and a number of cancer and other healthcare organizations from across Canada that saw value in working together to lay the groundwork for building a high-performing HSPR enterprise that adds value to the health of Canadians and health services for Canadians.

An important outcome of the Pan-Canadian Vision and Strategy has been the establishment of the Canadian Health Services and Policy Research Alliance (CHSPRA). CHSPRA is an alliance of research funders, health charities, health system organizations and university training programs that are committed to advancing the *pan-Canadian vision and strategy* and to collaborating on joint initiatives where shared goals and priorities exist.* CHSPRA is intended to bring greater collaboration and coordination to HSPR activity and investment in Canada and optimize the relevance and impact of research investment in priority areas of pan-Canadian interest. Ultimately, CHSPRA aims to bolster the performance of the HSPR enterprise and propel it into a new era where research intelligence drives health system transformation.

PAN-CANADIAN VISION

Research intelligence driving health system transformation in Canada.

PAN-CANADIAN MISSION

Build and sustain an integrated and high-performing pan-Canadian health services policy and research community that adds value to the health of Canadians and health services for Canadians.

* *The idea for and approach to the Pan-Canadian Vision and Strategy and the CHSPRA were inspired by the Canadian Cancer Research Alliance, which has successfully tackled a similar challenge in the cancer research funding enterprise.*

CHSPRA Priority:
A Shared Impact Framework for HSPR

CHSPRA's top priority for collaborative action is the development of a shared framework to assess, measure and communicate the impact of HSPR.(1) HSPR represents an investment in generating and translating new knowledge that can inform decision-making about health policies, services and products with the ultimate goal of improving patient experience, patient and population health, and health system outcomes. According to a 2014 analysis of Canada's HSPR investments and assets, federal and provincial health research funders, health charities and cancer organizations collectively invested $770 million in HSPR between 2007/08 and 2011/12.(2) CHSPRA recognizes the importance of understanding the impacts that these and future investments are having. Such knowledge can help demonstrate accountability to the public, garner increased support for the HSPR enterprise, optimize research impact through evidence-informed funding allocation, enable ongoing analysis and learning for future impact assessments and, ultimately, improve the benefits Canadians receive from research.(3-6)

Given that CHSPRA member organizations each independently grapple with assessing and capturing the full impact of their respective HSPR investments and activities, collaborative efforts to co-develop a shared framework and suite of indicators for HSPR impact assessment are a top priority. An Impact Assessment Working Group (IAWG) of CHSPRA was established to operationalize this priority. CHSPRA envisions that its member organizations, as well as other research funders and health and health-related organizations, will use the proposed framework and indicators to assess the impact of the research they support and produce. It is hoped that as the Framework's use increases, so too will our knowledge about the impact of HSPR on decision-making and the methods that can be harnessed to optimize its impact.

The Context

Health Services and Policy Research in Canada

Defining Health Services and Policy Research

Health services and policy research is the innovation engine of a healthcare system.(7) Institute of Health Services and Policy Research, Canadian Institutes of Health Research (CIHR-IHSPR) defines it as the field of scientific investigation that generates evidence on how to invest in programs, services and technologies that maximize health and health system outcomes.(8) The value proposition for investing in HSPR is apparent when one considers that health spending in Canada now exceeds $211 billion and represents 11.2% of gross domestic product, which is high when compared to other Organisation for Economic Co-operation and Development (OECD) countries. Notably, this investment has not translated into better health system performance when compared to Commonwealth Fund countries.(9, 10) By producing knowledge of what works, for whom, at what cost, and under what circumstances, HSPR can help improve the performance of Canada's healthcare system and the health and wellbeing of individuals and populations.

HSPR involves multiple disciplines, professions, and methodologies that are harnessed to creatively address health system challenges and answer high-priority questions.(8) Examples of such questions include: whether pay-for-performance works; how to prioritize (dis)investment decisions about (in)appropriate and (un)necessary services and treatments; how to remunerate delivery organizations and providers to incentivize better outcomes for patients; whether integrated delivery models improve patient experience and outcomes; how to sustainably finance long-term care in the face of an aging population; and how eHealth innovations can be harnessed to improve access to mental health services, among others.(8)

Canada's Health Services and Policy Research Landscape: A Brief History

Canada officially acknowledged the need for health services research in 1969 with the creation of the National Health Grant, and its importance was reaffirmed in 1975 with the establishment of the National Health Research and Development Program (NHRDP).(7, 11) Canada's HSPR enterprise has evolved significantly since then, particularly with the establishment of the Canadian Health Services Research Foundation in 1996 (name changed to the Canadian Foundation for Healthcare Improvement in 2012), CIHR in 2000, with CIHR-IHSPR as one of its 13 founding institutes, and the Canadian Association for Health Services and Policy Research (CAHSPR) in 2003. Over the period of 1979 to 2008, provincial health research funding organizations were also established in most provinces, and as the 2014 analysis of HSPR investments and assets showed, they provide significant investment in HSPR (38.9% of total pan-Canadian HSPR investment between 2007/08 and 2011/12).(2) Cancer organizations and health charities are also important contributors to HSPR. Together, these organizations have done much to advance the growth and impact of HSPR in Canada.

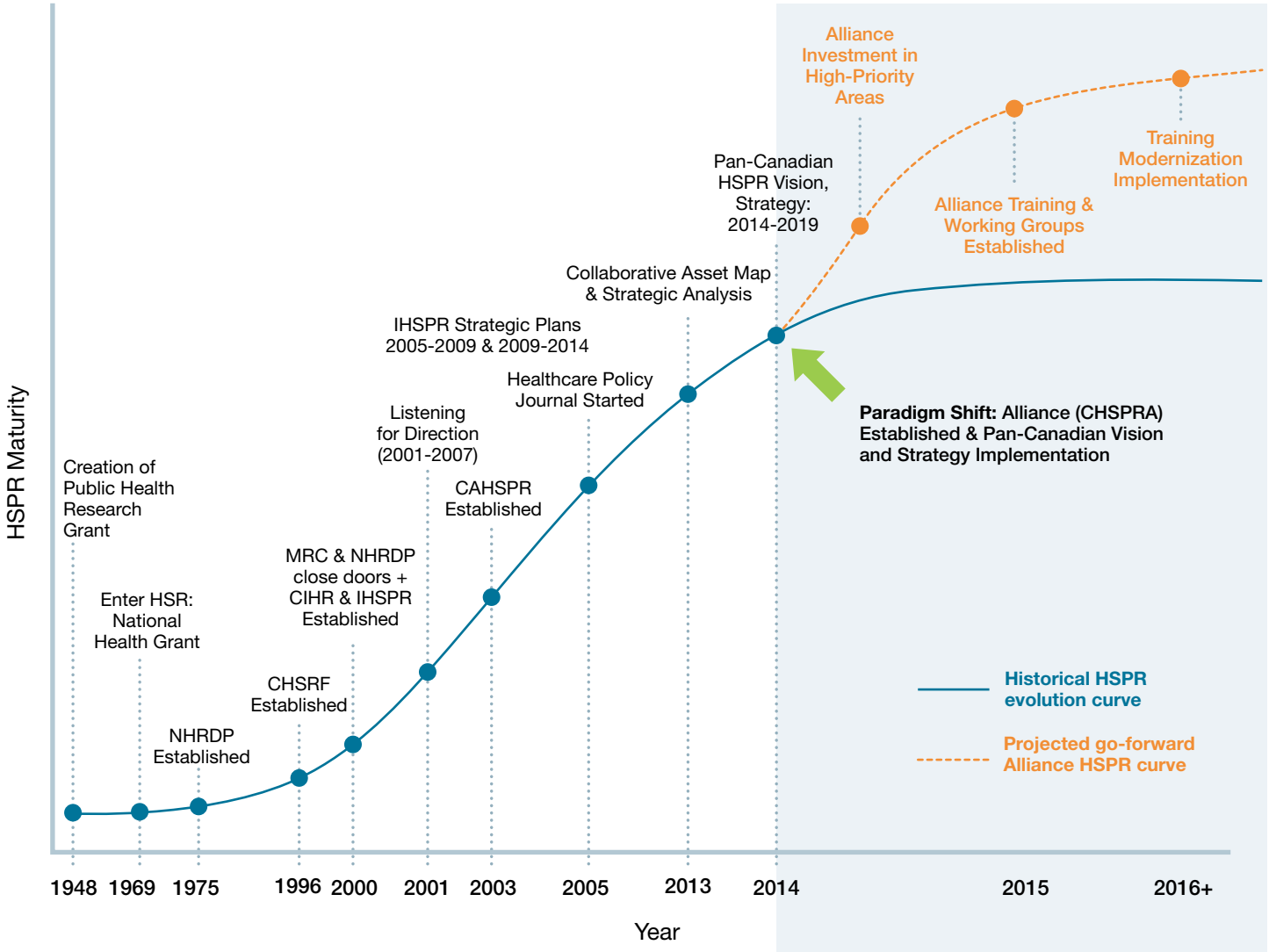
Canada's HSPR enterprise has witnessed substantial growth in funding and programs to support research, as well as in the size of the community and number of trainees entering the field. Based on CIHR data, funding for HSPR grant applications grew from $12.6 to $48 million between 2001 and 2011.(7, 8) Over this same period, the annual number of applications for HSPR grants increased more than three-fold from 327 to 1,137 and the number of HSPR scientists (i.e., nominated principal investigators) more than doubled from 290 to 659.(7, 8) Despite this tremendous growth, HSPR continues to receive the lowest share of total grant funds awarded by CIHR when compared to the other three research pillars (i.e., biomedical research, clinical research, population health research): HSPR accounted for 3.2% of total CIHR funding in 2001-02 and 6.3% of all funding in 2011-12.(7, 8)

Figure 1 illustrates the evolution of HSPR in Canada and shows that the creation of CHSPRA in 2014 is an important milestone for the field.(1)

The Missing Piece: A Framework for HSPR Impact Assessment

Considerable effort has been made to understand the magnitude of investment in HSPR,(2, 8, 12) the programs and priorities to which the investment has been allocated,(1, 2) and the predictors of obtaining successful grant funding.(7) However, very little is known about the impact of investments, especially in terms of understanding the impacts of HSPR on policy and decision-making. Historically challenging to assess, informing decision-making is the 'magic in the middle' between moving knowledge from research to long-term social and economic impacts. Increasing capacity to assess these impacts and improving our knowledge of the key factors that enable and hinder impact are of critical importance given the field's strong connection to the healthcare system and the current movement towards learning health systems that are built upon sophisticated data, analytics, and evidence-informed decision-making. Is the $48 million that was invested in HSPR in 2011 (7, 8) sufficient to generate innovation and knowledge for the policy and decision-making that drives a $200 billion sector (9) as well as support the successful transition to learning health systems? An impact assessment framework can advance current understanding of the full scope of impact that HSPR has and whether current levels of investment are sufficient to meet the goals of health system innovation and transformation. An impact assessment framework that expands upon the Canadian Academy of Health Sciences (CAHS) Impact Framework (13) and enables thoughtful and systematic analysis of the full impacts that HSPR has on decision-making is an important and timely contribution to Canada's HSPR enterprise.

FIGURE 1
The history of HSPR in Canada*



* *The source of the figure is the Pan-Canadian vision and strategy for health services and policy research 2014-2019.(1)*

Approach

to Developing the CHSPRA Informing Decision-Making Impact Framework

Purpose and Scope

The IAWG was established in the fall of 2015 with a mandate to develop a shared framework to assess and communicate the impact of HSPR. CHSPRA identified HSPR impacts with respect to informing decision-making as the priority focus. It recommended building on the nationally and internationally recognized CAHS Impact Framework (4, 13) and its "informing decision-making" category with a nested framework that includes pathways to impact, a menu of indicators, and methods and tools relevant to the field of HSPR.

The IAWG is led by individuals from CHSPRA member organizations with expertise and interest in impact assessment. Specifically, the working group has been co-chaired by representatives from provincial (Michael Smith Foundation for Health Research and Alberta Innovates) and federal (CIHR) research funders and has been operationally supported by the CIHR-IHSPR, Alberta Innovates, and the CIHR Performance and Accountability Branch.

The IAWG developed a work plan that was presented to and endorsed by the CHSPRA Executive Committee. Working group task forces were established to tackle key priorities, such as reviewing and synthesizing the literature, developing pathways to impact (i.e., a logic model), and identifying potential corresponding indicators and tools. The working group met regularly by teleconference, in conjunction with its task forces, over approximately a 2.5-year period and presented work-in-progress to the CHSPRA Executive on a quarterly basis.

Building on Canadian Strengths in Research Impact Assessment

The CAHS Impact Framework (see Box 1 for a brief overview) is used by the National Alliance of Provincial Health Research Organizations (NAPHRO) as well as a number of organizations across the country and internationally. It was based on the Payback Framework,(14) which is the most widely used health research impact assessment framework,(3, 15, 16) and includes similar features such as multiple dimensions of impact and underlying pathways to impact. Like the CHSPRA Informing Decision-Making Impact Framework, the CAHS Impact Framework is the result of a collaborative effort between various stakeholders who contributed at different points in the development process: an international expert panel of academics, policymakers, and academic heads to construct the framework; endorsement by twenty-eight Canadian stakeholder bodies including government and research funders; and the public's input during refinement.(15) The "informing decision-making" category in the CAHS Impact Framework is noted as a key component of the pathway to health, social and economic return on research investment. Figure 2 is an excerpt from the CAHS Impact Framework highlighting the informing decision-making category. Informing decision-making is particularly relevant to HSPR given its proximity to the health system and is the central focus of the tailored framework proposed in this document.

BOX 1

Overview of the CAHS Impact Framework (13)

Overview: The CAHS Impact Framework includes five main impact categories: 1) advancing knowledge; 2) building capacity; 3) informing decision-making; 4) health impacts; and 5) broad socio-economic impacts. The CAHS Impact Framework is purposefully generic to all pillars of health research: it is intended to inform impact assessments of biomedical, clinical, health services and policy, and population and public health research.

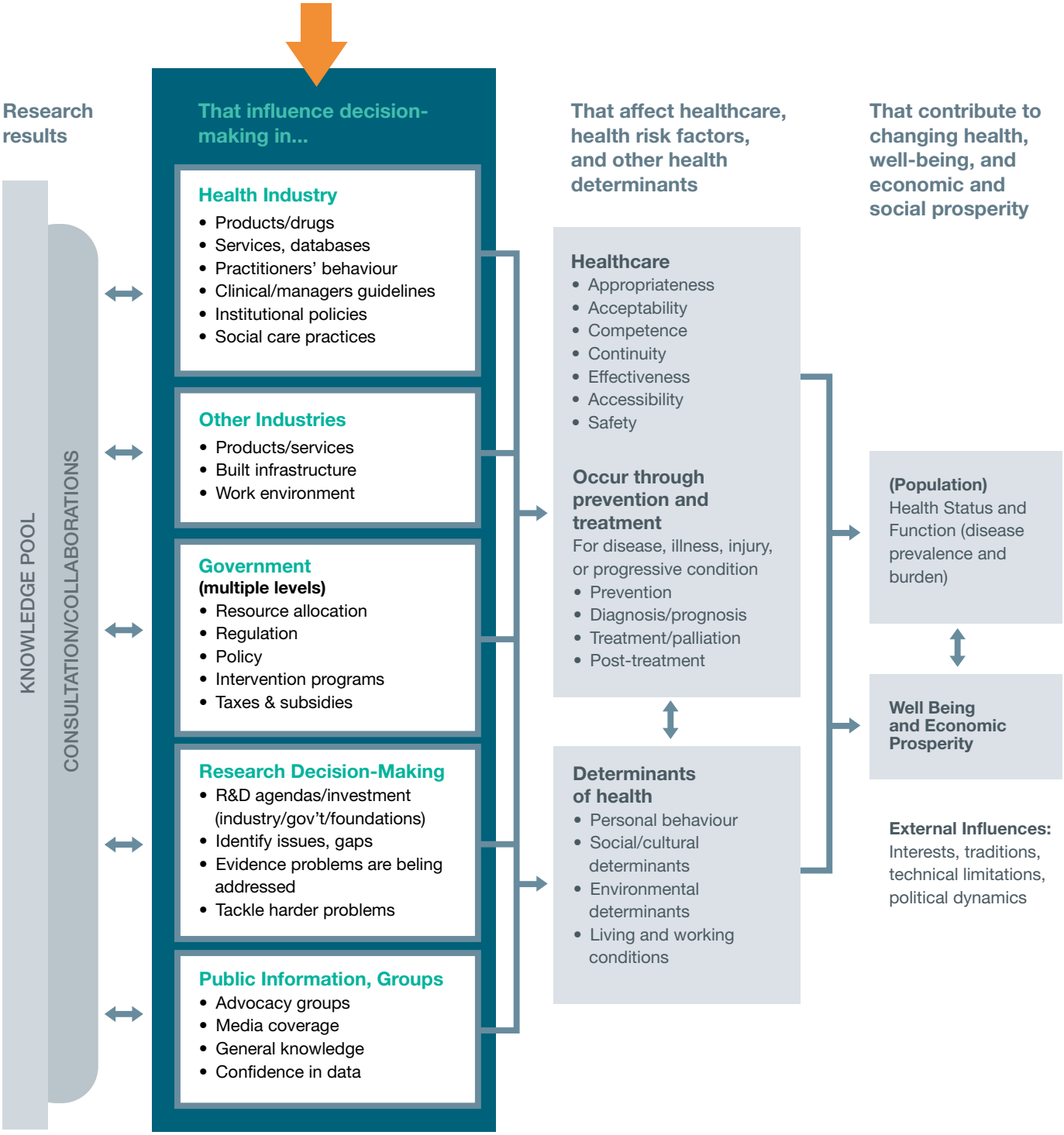
Five pathways from decision-making to health and prosperity: The framework includes "informing decision-making" as a component of the pathway to health, social and economic return on research investment. It specifies five major sectors and audiences (see Figure 2) within which informing decision-making occurs (i.e., five pathways to informing decision-making):

- **Health industry** (e.g., products/drugs, services, practitioners' behaviour, clinical guidelines, institutional policy)
- **Other industry** (e.g., products/services, built infrastructure, work environment)
- **Government** (e.g., resource allocation, regulation, policy, programmes)
- **Research decision-making** (e.g., R&D investment, priority identification)
- **Public, Information Groups** (e.g., advocacy groups, media coverage, general knowledge)

The CAHS Impact Framework includes a menu of 18 indicators for informed decision-making. Example indicators include use of research in clinical guidelines and policy formulation. Aspirational indicators include media citation analysis and citation in public policy documents. Data collection methods range from reviewing documents to using bibliometrics and surveys.

FIGURE 2

Excerpt from an illustration of the CAHS Impact Framework's pathways to impact with a focus on decision-making*



* *The source of the excerpt is the report Making an impact: a preferred framework and indicators to measure returns on investment in health research. Adapted with permission. (13)*

Approach Overview

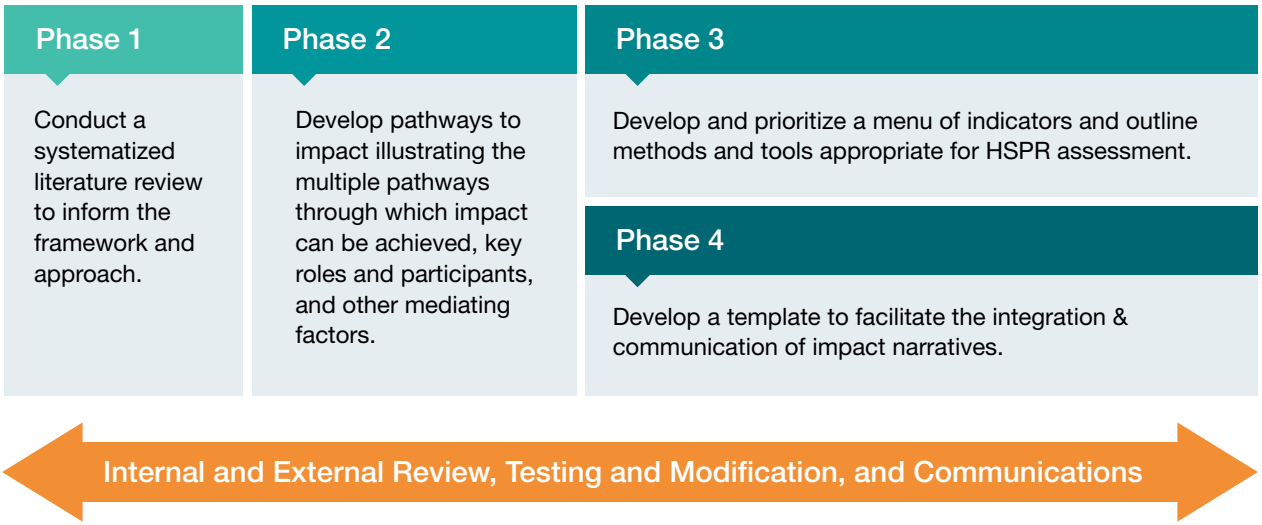
The Framework proposed in this document was developed through a multi-phase, collective impact* approach. Collective impact requires the commitment of a group of leaders from different sectors or organizations to a common agenda for addressing a specific problem,(17, 18) which in this case was to improve the methods, tools, and practice of HSPR impact assessment. Using a collaborative approach to develop the Framework is consistent with the approach used to build the CAHS Impact Framework (as previously described) and Redman et al.'s SPIRIT Action Framework. The SPIRIT Action Framework lays out a structure to design and test interventions that influence the use of research to inform policy decisions.(19) It was developed in collaboration with researchers, health policy-makers, and knowledge exchange specialists and included a literature review and interviews with Australian state and federal health policy-makers.(19) Additional work to identify capacity assessment scales has also been completed in close collaboration with policy-makers.(20)

As with Redman et al.'s framework,(19) an iterative approach was taken to develop the Framework. The four phases of the Framework's development are described in Figure 3. Additionally, internal and external reviewers have been consulted throughout the process to ensure the Framework is evidence-informed, proposed indicators are important, feasible, actionable and of scientific merit, and suggested methods are appropriate.

In **phase 1**, the IAWG undertook a systematized review, as described by Grant & Booth, (21) of the peer-reviewed and grey literature to understand the latest evidence and emerging trends, and to ensure the resulting framework was evidence-informed. The systematized review addressed three specific questions (see Box 2) and was externally reviewed by an international expert in research impact assessment. The key findings that informed this Framework are highlighted in the Findings section.†

FIGURE 3

Overview of the approach used to develop the Framework



* *John Kania and Mark Kramer (17) originally defined collective impact as "the commitment of a group of important actors from different sectors to a common agenda for solving a specific social problem." Collective impact initiatives involve a centralized infrastructure, a dedicated staff, and a structured process that leads to a common agenda, shared measurement, continuous communication, and mutually reinforcing activities among all participants.*

† *The full report includes 10 exemplars of HSPR achievements that have had a direct or indirect impact on healthcare.*

The results of the review informed the work in **phase 2**, which involved developing pathways to impact for informing decision-making in health services and policy. A task force was established to lead this work involving CHSPRA representatives from research funding organizations, research institutes and alliances, and a health charity. Dr. Gretchen Jordan, a research and innovation evaluation consultant who helped develop the original CAHS Impact Framework, was instrumental in developing the first iterations of the pathways to impact. The task force strived to ensure the model embodied the characteristics of collective impact, was evidence-informed, aligned with the core concepts underpinning the CAHS Impact Framework (e.g., Rogers' diffusion of innovations), and would be practical and feasible for practitioners from diverse organizations around the globe to operationalize in their real-world contexts. The task force met consistently between April and August 2016.

Phase 3 involved the production of evidence-informed recommendations for a core set of indicators, common and emerging methods, and tools for assessing informing decision-making impact. Between September and December 2016, an indicator task force of the IAWG met regularly to review, discuss, and prioritize indicators based on the core guiding principles of: validity (i.e., does the indicator reasonably reflect the underlying construct it aims to measure?),(13) reliability (i.e., can the measurements be made consistently?),(22) importance (i.e., is the indicator a priority for stakeholders?) and feasibility (i.e., can the measurements be made easily?). (22) This work resulted in an initial menu of sixty-seven indicators, which was then further vetted to forty-six by the IAWG. In early 2018, the IAWG launched an Indicator Review Panel composed of external experts and practitioners to obtain feedback and select a core set of indicators. The Indicator Review Panel was chaired by Dr. Adalsteinn Brown and followed a modified Delphi approach.

Phase 4 involved the production of an impact narrative template. The template will be used to standardize how impact narratives are written to facilitate writing and future analysis. A guideline for writing impact narratives and plan for an impact narrative repository to store and make the narratives publicly available are in development.

BOX 2

Literature Review's Key Questions

- How is "impact" with respect to "informing decision-making" defined in the literature?
- What is known from the existing literature about the impacts of HSPR on informing decision-making?
- What are some of the challenges encountered with measuring the impact of HSPR on informing decision-making, and what strategies have been used to overcome them?

KEY CONSULTATION AND TESTING ACTIVITIES:

- **2015: Initial panel consultations** with CHSPRA members, as well as external practitioners and experts in impact assessment and HSPR
- **May 2016: Completed draft Framework document** that details the pathways to impact, initial menu of indicators and methods, and impact narrative template
- **May 2016: Solicited feedback** on the Framework from the CHSPRA Executive
- **September 2016: External expert review** of the systematized literature review
- **April and August 2017: External expert review** of the draft Framework document
- **November 2017: Solicited feedback** on the Framework from investors in HSPR at the Funders' Forum meeting
- **Winter 2018: Assessment and prioritization of indicators** by an indicator review panel of experts
- **May 2018: International and national expert review** of the white paper prior to public release

Key Challenges and Opportunities Identified in the Literature

A core guiding principle of this work is to establish a framework that is grounded in the literature and explicitly addresses the unique challenges typically encountered in HSPR impact assessment. The systematized review of the literature completed in Phase 1 summarizes these challenges to provide background contextualization to the Framework.

Common Research Impact Assessment Challenges

Research impact assessment is a burgeoning field, and the literature is clear in its consensus that assessing the impact of research is complex and challenging. Some of these common challenges include: demonstrating contribution, such as through contribution analysis (i.e., what was the contribution and who contributed), how much of the observed impacts are attributable to the research itself as well as other factors; establishing a counterfactual (i.e., what would have occurred without the intervention); time lags that include the lengthy research process and slow to emerge benefits; and the fact that many decisions are made on a body of evidence rather than a single study.(23, 24) Methodological challenges include how to move beyond bibliometrics and citation analysis to measure broader impacts, and finding a balance between the comprehensiveness and feasibility (cost, time) of the impact assessment.(6, 15, 16, 25, 26)

Challenges Unique to Policy and Decision-Making

Assessing the impact of HSPR on specific dimensions of policy and practice decision-making is further complicated by at least five key factors.

The first challenge is that decision-making is a messy, complex, fluid "inherently political process involving ideology, vested interests, institutional norms and path dependencies".(12, 15, 27-29) As quoted in an article by Buykx et al, "Policy is not made once and for all; it is made and re-made endlessly".(5) The policy and decision-making process is typically characterized and overly simplified (30) as a cycle comprised of five key stages: (1) problem identification and agenda setting; (2) policy design (identify and analyze options); (3) policy/practice adoption (make a decision); (4) implementation (make the change); and (5) monitoring and evaluation (refine and improve as needed).(30) Within this cycle, policy- and decision-making usually involves multiple decision points (e.g., identifying the issue, deciding the options, determining how to implement and evaluate, etc.), all of which exist within 'policy environments' that consist of many system levels and are influenced by personal and contextual factors, institutional structures, networks, and information sources.(30, 31) Therefore, the act of decision-making is oftentimes highly variable.

The second challenge is that the context (e.g., political, economic, legal, social, technical) in which decisions are made plays a significant, generally non-modifiable, and sometimes unpredictable role. (32) Policy decisions can be political, influenced by "emotional appeals" and made by decision-makers who are not attached to prescribed hierarchies of evidence.(30) Research is typically one of many inputs into the decision-making process (31) and often competes with other pressures (e.g., stakeholder interests, lobbyists, government priorities, the constraints of prior policy, financial constraints, values, traditions) and other forms of evidence (e.g., public opinion polls, local information on services).(33) While the literature reflects growing interest to understand the role and influence of context, there are few indicators to capture it.

The third challenge is that research evidence can enter the decision-making picture for different purposes, such as to inform agenda setting, policy development, policy decision-making, implementation, and/or for monitoring and evaluation.(19) It can enter the picture at different levels, such as to inform decisions at the individual, organization or system level.(19) And it can originate due to efforts by researchers to share evidence with decision-makers ("researcher push"), from decision-makers' demand for evidence ("user pull"), or from linkage and exchange efforts between the two ("exchange").(34-36) Additionally, there are multiple ways in which research can inform decision-making (e.g., instrumental, symbolic, conceptual, imposed).(37-40) While much emphasis is placed on instrumental/direct impacts (e.g., change in policy, improved health outcome), there is emerging consensus in the literature that a comprehensive lens is beneficial and that imposed, symbolic, and conceptual uses should also be captured.(19, 37, 41) The literature suggests that research is more often used conceptually (for general enlightenment) or symbolically (to justify a chosen course of action) in policy-making than instrumentally.(15, 39) Haynes et al.'s realist scoping review that explores interventions to increase policy-makers' capacity to use research affirms that instrumental use of research to influence policy appears rare.(31) While there has been some advancement in terms of assessing research impact on decisions made in practice and policy,(40) in general, the literature offers little guidance on how impacts other than the instrumental ones should be measured.

A fourth challenge is that well-established methods for measuring research productivity, such as citation analysis, are too blunt to capture the nuanced world of decision-making and the value that HSPR brings to informing decision-making. The apparent lack of correlation between knowledge production impact and policy impact heightens the importance of moving beyond traditional measures of academic impact (42, 43): "Some projects with substantial research impacts (papers and citations) yielded only minimal policy and practice impacts. This reinforces that traditional indices of research impact are not always an accurate guide to the policy and practice impacts of their research".(42) Hanney et al. suggest that a rolling triangulation of methods and data sources – including semi-structured interviews, surveys, documentary analysis – provides a way to address some of the complexities and challenges of impact assessment.(4) However, approaches thus far have faced criticism for being labour- and resource-intensive.

Finally, the majority of research impact assessment frameworks are founded on logic models, which are attractive for their ability to portray the research activity life cycle and the logic flow of the pathway to impact, but have faced criticism for portraying the research to impact process too simplistically and in a linear fashion – a particularly relevant concern when assessing impacts with respect to the complex realm of decision-making.(44-46) The risk of employing an overly simplistic approach to all assessments of health research impact is that some of the fundamental, oftentimes conceptual, impacts of HSPR will be missed, such as how it has shifted and altered our perception of major issues (e.g., variation in healthcare use and costs; moral hazard and supplier-induced demand; socioeconomic disparities in health; more care/treatment is not always better; involving patients and patient experience redefines goals of care; quality of care varies and is important to monitor).(46, 47) The methods (e.g., case study) and tools (e.g., impact narrative) used in impact assessments can provide detailed and nuanced description and explanation, complementing a logic model's articulation of a clear line to impact.

The Way Forward - Building on the CAHS Impact Framework to Create an Impact Assessment Framework Focused on Informing Decision-Making

The CAHS Impact Framework (13) is one of the most frequently used frameworks of the 20 that have been reported in the literature (3, 6, 15) and is the most widely used framework in Canada. The CAHS Impact Framework has also been used in other jurisdictions to assess the impact of health services research (48) and informing decision-making,(44, 48) which bodes well for using the framework as a foundation upon which to enhance the "informing decision-making" domain. Greater clarity will increase our understanding of the influence on decisions, thus increasing the relevance, applicability, and value-add of research impact assessment to the field of HSPR. There are four key opportunities to add value:

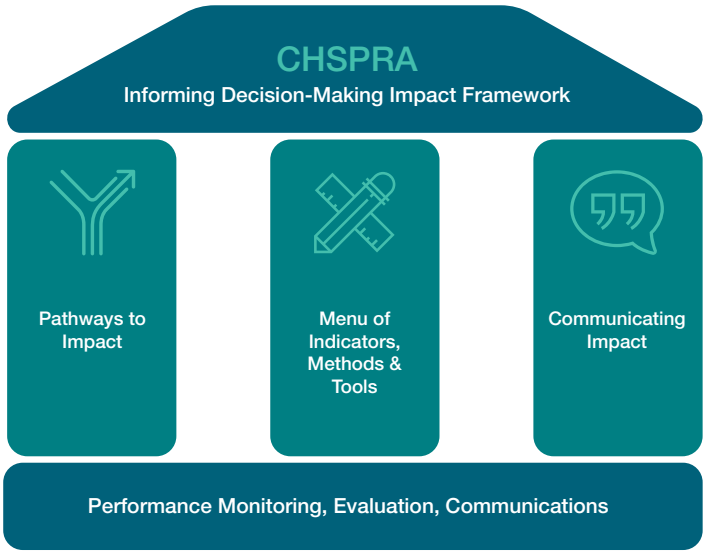
1. Enrich the CAHS Impact Framework's pathways to impact foundation to add detail and reflect the complexity and non-linearity that is inherent in decision-making processes, the paramount role of context, and the enablers and barriers to research evidence uptake.
2. In addition to instrumental/direct impacts (e.g., decision to adopt or de-adopt a product, new policy, behaviour change, etc.), explicitly incorporate (and therefore give recognition and value to) conceptual and symbolic impacts as well (e.g., change in awareness, knowledge or attitude about key issues; tactical use to support existing policies/programs/services).
3. Enhance existing indicators for informed decision-making with a menu of prioritized indicators that are directly relevant to health services and policy decision-making. Also, recognize that indicators will not be adequate in and of themselves.
4. Be mindful of the importance of balancing comprehensiveness with feasibility of measurement, such that the Framework garners widespread support and uptake. Developing practical guidance for organizations designing and undertaking impact assessments of HSPR on policy- and decision-making will help.

Components of the Framework

The four-phased approach described in Figure 3 has resulted in a framework composed of three key components: 1) a figure that graphically displays the HSPR Informing Decision-Making Pathways to Impact*; 2) a menu of performance indicators that can be used as a guide to monitor progress for achieving impact and a reference table of commonly used data collection methods and tools for assessing impact; and 3) communicating impact using impact narratives and scoreboards and dashboards. As illustrated in Figure 4, these three components, supported by an ongoing process of performance monitoring, evaluation, and communication, offer a constructive way forward for assessing the impact of HSPR.

FIGURE 4

Three components of the Framework



* *The Informing Decision-Making Pathways to Impact illustrate the non-linear and varied ways that research can inform decision-making. By using the term 'pathways to impact' in lieu of 'logic model', the focus becomes the necessary critical pathways from research to decision-making impact as well as who needs to be engaged with to achieve impact.*

BOX 3

Theories of Change

A description of how research can achieve impact using different pathways was proposed (i.e., theories of change) using the following logic: the co-identification of pressing problems warranting research attention, coupled with targeted HSPR and capacity building funding initiatives, produce the evidence and enabling conditions for the translation of research, which informs decision-making about health services and policy innovations, that effect adoption (or non-adoption) of decisions (in products, processes, policy, practice and behaviours) in public, not-for-profit and/or private sectors, which can contribute, over the longer-term, to improved health outcomes and system performance. Context and external influences play a mediating role along the full research impact pathway. Greater detail about each of the key outcome areas and their respective categories and sub-categories is provided subsequently, along with the recommended indicators, methods, and data sources (see Appendix A).

Component 1: The HSPR Informing Decision-Making Pathways to Impact

The IAWG's primary mandate was to develop a practial framework for measuring the impacts of HSPR on informing decision-making. The HSPR Informing Decision-Making Pathways to Impact of the Framework (Figure 5) were developed in Phase 2.

The graphic and text in the **HSPR Informing Decision-Making Pathways to Impact figure** (Figure 5) illustrate the complex and often non-linear progression from the production of research to its impact on health services and policy decision-making. Pathways to informing decsion-making are varied, determined by stakeholders, and context dependent. Figure 5 attempts to make this clear by illustrating that processes and relationships are fluid and can be bi-directional (the feedback loops), that researcher-knowledge user engagement is critical throughout (the dashed lines), and that the context within which decision-making occurs is important to capture.

The development of the Informing Decision-Making Pathways to Impact progressed from a traditional logic model format to one that more accurately reflects the non-linear reality of decision-making. It reads from left to right: the narrative along the top of the diagram describes short, intermediate and long-term impacts (each associated with impact categories*) for how HSPR informs decision-making, eventually resulting in improved health impacts and system performance (i.e., theories of change, see Box 3). The context in which decisions are made spans the width of the Framework, illustrating that context exerts an influence at all stages of the research to impact pathways.

* *Each impact category also contains sub-categories. For example, the impact category 'Receptor Capacity to Implement' contains the sub-categories 'individual', 'organization', and 'system'. The impact categories and their associated sub-categories are found in Appendix A.*

FIGURE 5
The HSPR Informing Decision-Making Pathways to Impact

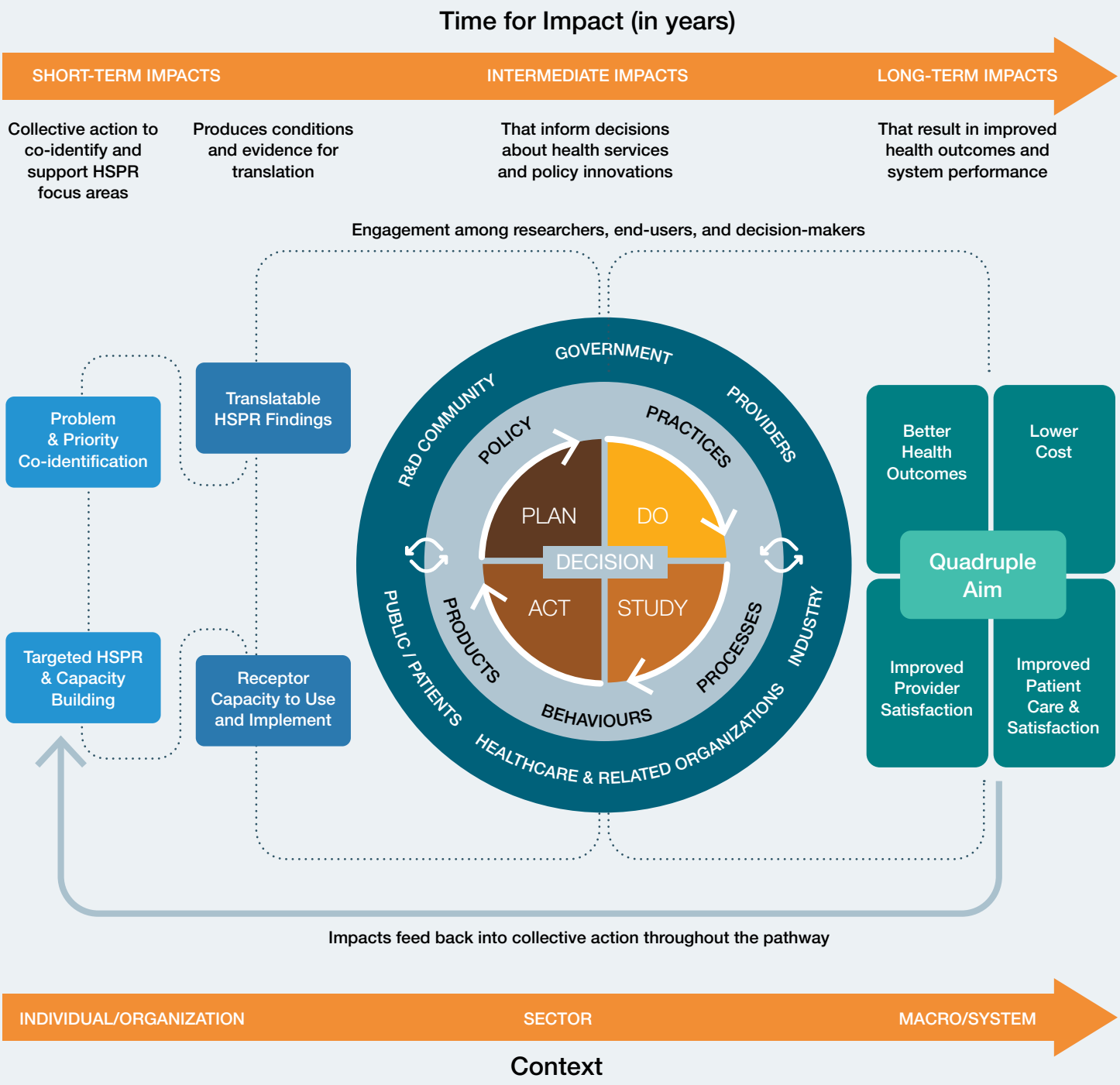


Figure 5 also shows how research impacts feed back upstream, potentially influencing the identification of new priorities, the diffusion and impact of other research, and/or creating inputs for future HSPR (i.e., impact feedback arrow). We acknowledge, however, that not all phases of the Framework always occur in real-world decision-making (and not always in this order) and that HSPR can enter the decision-making process at any given stage. For example, while co-identified research priorities are ideal, it is neither a necessary nor sufficient condition for impacts to occur. As well, the processes can be generative, thereby deepening the potential for impact. For example, stakeholder engagement and relationships can develop over time, which can lead to co-identification of more refined problems and priorities and increased involvement in the research process as stronger connections are forged. An in-depth description of the Pathways to Impact sections and related categories follows.

Short-Term: Action to Co-identify and Support HSPR Focus Areas

The Framework's starting point is that the relevance, use, and potential impact of HSPR are enhanced through collective action among HSPR stakeholders to co-identify relevant priorities for research investment and collective action. Collective impact initiatives necessitate the involvement of a group of actors from a range of sectors that commit to a common agenda in order to solve a complex and pressing challenge.(17) In the context of healthcare, collective impact initiatives recognize that the majority of the complex challenges confronting decision-makers cannot be solved by any one organization. The expertise and perspectives from different system actors who have formally and informally established relationships, such as between policy/decision-makers and researchers,(33, 49) can generate innovative solutions.(50) Ultimately, when a complex challenge affects many and where common goals are shared, the premise of collective impact is that more can be achieved by working together than by working in isolation.

The defining characteristics of collective impact initiatives include a backbone infrastructure, a structured process that leads to a common agenda, a forum of shared measurement, continuous communication, and mutually reinforcing activities among all participants.(17, 18, 51)

Of note, collective action in this Framework is viewed as an important but aspirational goal. That is, the Framework characterizes collective action as the recommended approach used in practice when tackling complex health system challenges (and the approach adopted by CHSPRA). However, the Framework recognizes that HSPR focus areas are not always identified and supported through a collective action approach and was designed to be applicable for informing decision-making impact assessments of HSPR at multiple levels (e.g., individual researcher, research team, organization, network, alliance), regardless of whether or not the research was initially identified through collective action.

Figure 5 illustrates that the Framework hypothesizes that "Collective Action to Co-Identify and Support HSPR Focus Areas" is enabled through: (i) problem and priority co-identification; and (ii) targeted HSPR and capacity building.

1i) Problem and Priority Co-identification

The literature is clear that one of the primary facilitators of the use of research by policy- and decision-makers is its relevance to their questions and challenges.(6, 31, 34, 36, 43, 52-55) Relevance can be enhanced through explicit, structured, and transparent activities to identify and prioritize key challenges and research questions, such as through strategic planning and priority setting exercises, as well as through informal and ongoing linkage and exchange.(6, 31, 34, 43, 48, 56-58) Developing relationships early in the research process (e.g., during problem identification) and providing multiple types of interaction opportunities have been identified as enablers of a co-production approach.(50) Efforts to align research with health services and policy priorities are increasingly widespread and viewed as a way to target investments in areas with the greatest potential to contribute to health system improvements.(1, 8, 56-58)

There is growing literature on health research priority-setting methods and while a gold standard process does not yet exist, general principles and promising practices for its conduct have been suggested.(56, 59) A fundamental principle of research priority-setting, regardless of the method used (e.g., technical and data-driven assessments, stakeholder surveys, roundtables and focus groups, nominal group or Delphi techniques, James Lind Alliance method) or the level at which priority-setting occurs (e.g., at the national level to inform a research agenda, at the organization level to inform investment decisions, or at the program level to identify relevant research questions), is the engagement of knowledge users in the process. According to Lomas et al., "the function of priority-setting in applied health services research …is to identify those areas in which research investments are most likely to improve service delivery and organization. This implies significant representation in the process from system managers and policy-makers, those most closely related to service delivery and organization on a daily basis".(59)

Importantly, priority-setting processes are not intended to be unidirectional, such that the resulting priorities are only those identified by decision-makers. Instead, a co-identification or "listening model" is suggested whereby researchers and decision-makers listen to each other's challenges and ideas in order to identify priorities that are relevant, important, and feasible.(59) This approach could facilitate genuine collaboration where researcher and policy-maker roles and resources are negotiated, with an aim of enhancing policy-maker ownership of the research.(31) A bolstered sense of ownership is projected to increase policy-makers' capacity to use research in decision-making.(31)

1ii) Targeted HSPR and Capacity Building

Problem and priority co-identification facilitates the development of targeted funding programs and identifies where capacity building initiatives are needed. Efforts can then be designed to generate the evidence and capacity (e.g., people, partnerships and infrastructure) required to address identified priorities. For example, national and provincial research funders can develop targeted funding programs based on identified priorities - such as the Training Modernization Initiative, the SPOR Network on Primary and Integrated Healthcare Innovations, or the former Partnerships for Health System Improvement program - in order to build the knowledge base, partnerships and capacity required to inform policy, practice, and/or influence system change (i.e., impact). In addition to specifying priority areas of focus, research funders also use peer review criteria as a tool to improve the potential for impact. Peer review criteria, for example, often include relevance to the specified priorities, demonstration of meaningful involvement of knowledge users (e.g., decision-makers, clinicians, patients) throughout the research process, and potential for impact.

Additionally, research funders and health system organizations increasingly partner to create the infrastructure necessary to generate relevant research. Recent examples include the SPOR SUPPORT Units, the dynamic cohort of complex high system users (a CIHR and Canadian Institute for Health Information collaboration), the Statistics Canada Research Data Centres, and the Training Modernization Start-Up Grants.

A 2014 analysis of Canada's HSPR investments and assets revealed that in addition to targeted research and capacity building initiatives, priority-relevant research is also supported through "open / investigator-driven" funding streams and internally by federal and provincial government and other health-related organizations (referred to as "hidden assets").(2) Accordingly, efforts to capture the full scope of HSPR impacts will need to include both open and targeted funding streams and also, as much as possible, "hidden assets" in health system settings, such as capacity embedded within ministries of health and delivery organizations. Documenting these hidden assets and their impacts will become increasingly important with the spread of learning health systems, which rely heavily on internal data and analytics.

Although much is known about past investments in capacity – including, for example, the amount invested in graduate-level training – little is known about the career trajectories of graduates. (60, 61) Efforts are underway to change this through a Training Modernization Initiative led by a CHSPRA working group.

In summary, co-identified and relevant research priorities, targeted funding initiatives, highly trained researchers, and supportive infrastructures are essential inputs on the research impact pathway to informed decision-making.

Short-Term: Conditions and Evidence for Translation

Co-identified research, coupled with targeted HSPR funding and capacity building initiatives, are important facilitators of the use of HSPR to inform decision-making but insufficient in and of themselves to influence decisions and generate impact. The literature indicates that certain conditions – including timely and digestible research findings and receptor capacity to use and implement research (31) – also play an important role in the pathway to research impact. The Framework (see Figure 5) hypothesizes that the conditions for research translation are enhanced with: (i) translatable research findings; and (ii) capacity to use and implement research.

2i) Translatable Research Findings

The literature suggests that characteristics of the research can enable or hinder its use. In addition to being relevant and salient (i.e., perceived as addressing a key challenge or priority), decision-makers must have confidence that the research is high quality. The research should also be timely (i.e., align with the decision-making time horizons), tailored to the decision-maker's context, conveyed in a digestible format with clear language and summaries of key findings (e.g., briefing notes with actionable findings), and shared by a credible messenger.(31, 36, 53, 62, 63)

The process through which research is translated is also important. Interactive processes (i.e., linkage and exchange) are generally more effective than passive processes (i.e., publications). (62) Research can be translated through researcher push activities (e.g., dissemination), decision-maker pull activities (e.g., evidence requests, commission requests for research projects, embedding researchers within the organization), and exchange activities (e.g., collaborative research projects).(5, 31, 35, 37, 39, 49) Formal and informal structures can be harnessed to facilitate translation, including alliances, networks, coalitions, partnerships, knowledge brokers, and informal relationships.(3, 5, 12, 27, 28, 31, 35, 36, 52, 62) The Ministry of Health in British Columbia has recognized these factors in a strategy to strengthen its research culture and infrastructure.(49) The strategy emphasizes developing relationships between government and the research community as well as building capacity within government to effectively use research for policy decisions.(49)

2ii) Receptor Capacity to Use and Implement Research

The capacity of decision-makers and health system organizations to engage in, use, and act on HSPR evidence occurs at four levels: individual, interpersonal, and organizational and system.(19, 31, 36, 53) Based primarily on the findings of systematic reviews on this topic (31, 36, 53, 63):

- *Individual-level* capacity is enhanced when one values research, has access to resources that support research use (e.g., electronic journals), has skills and training in research, and has authority to implement change.(31)
- *Interpersonal* capacity speaks to the relationships policy-makers have with researchers. The quality of relationship is enhanced through ". . . a spectrum of interactivity from information exchange forums to formal partnerships and the co-production of research."(31, 39)

- *Organization and system-level* capacity is bolstered with: leadership;(12, 36) in-house research capacity (i.e., embedded scientists, staff with research training and skills, in-house research units like the UK's Behavioural Insights Team, research leadership training programs like the Canadian Foundation for Healthcare Improvement's EXTRA program); (53, 64-66) supportive resources and tools (e.g., data, technology, money, rapid response literature review services);(27, 36) policies and structures that encourage research use (e.g., government requirements that policy submissions include an evidence checklist documenting the degree to which a policy submission has used available research and the quality of the research);(27) and collaborative academic and research partnerships.(36, 39) The spread of learning health systems, in-house research units within government and other organizations, embedded research opportunities, research training opportunities for health leaders (e.g., the Canadian Foundation for Healthcare Improvement's EXTRA program,(66) and the University of Alberta's Health System Improvement Fellowship,(67)) and experiential learning positions for graduate students and post-doctoral fellows within health system settings* are examples of recent efforts to build demand and capacity for research directly within organizations.

Intermediate: Informs Decisions About Health Services and Policy Innovations

Health services and policy decision-making involves processes, products, and actors that interact and influence one another to develop and implement health services and policy innovations that will positively impact the health system. The Framework represents this complexity by clarifying the following components: (i) 'how' decisions are made (i.e., the decision-making cycle); (ii) 'what' is affected by and affects decisions (i.e., health services and policy innovation domains); and (iii) 'who' is influenced by and influences decisions (i.e., health services and policy target sectors). These components are described below.

3i) The Decision-Making Cycle

There is agreement in the literature that policy and decision-making is not a linear process or fluid cycle. It is complex, iterative, highly affected by context, occurs on different and oftentimes unpredictable time horizons, considers research evidence as one of many and often competing inputs, and may not always include all of the decision-making stages. Moreover, decisions can be **evidence based** (acting upon specific research evidence, such as with instrumental/ direct types of research use), or **evidence informed** (acting upon a knowledge of the evidence, but not on a specific piece of evidence, such as with conceptual types of research use), and it is important to consider both of these concepts as well as other forms of research use, such as when research:

- Directly **informs** new content, direction, or change in policy/practice/process/ product/behaviour (instrumental use)
- Generates new ideas, awareness, or knowledge that **influence** thinking about health policy/practice/ process/product/behaviour (conceptual use)
- Justifies or **supports** existing policies or decisions that have already been made (symbolic use)
- Is used to meet organizational, funding, or legislative mandates that research be **used** (imposed use)

In Figure 5, the policy- and decision-making process is characterized in the Plan-Do-Study-Act (PDSA) cycle in order to shed light on where to look for potential research impacts. The PDSA cycle is a tool for testing change that is frequently used in healthcare quality improvement (i.e., Plan it, Do it, Study the results, Act on what is learned),(68) and the Framework hypothesizes it is relevant and adaptable to identifying research impacts within decision-making. Cycles that are commonly used to describe the policy-making process could be substituted for the PDSA. The PDSA is highlighted here because it is widely recognized and used in healthcare.(68)

* *Examples of experiential learning positions include: AcademyHealth's Delivery System Science Fellowship, CIHR's Health System Impact Fellowship and Embedded Clinician Scientist Award, Michael Smith Foundation for Health Research's Health Policy Fellowship, Nova Scotia Health Research Foundation's REAL Impact Fellowship.*

The PDSA cycle for decision-making should be interpreted as:

- **Plan** (for decisions): research is used to identify key problems, inform agenda setting, develop and analyze options, and understand the context in which the decision/policy will be implemented. Planning can include activities such as debates, briefings, commissioning of systematic reviews, and agenda setting.
- **Do** (make decisions): research is used to support the actual decision to adopt/change/stop a policy/practice/service, and to inform its implementation/modification/de-adoption.
- **Study** (test the intervention/decision and evaluate impacts): an evidence-informed approach is used to monitor and assess the implementation/change/de-adoption of policy/practice/service and its effects.
- **Act** (on impact assessment results): results inform adaptations, refinements, improvements, and course corrections to the policy/practice/service based on what was learned from the evaluation.

3ii) Health Services and Policy Innovation Domains

Health services and policy research is an innovation driver that can positively influence the efficiency and effectiveness of the healthcare system in order to address present and future system challenges.(7) The Council of Canadian Academies defines innovation as "new or better ways of doing valued things,"(69) and the Advisory Panel on Healthcare Innovation defines it as activities that "generate value in terms of quality and safety of care, administrative efficiency, the patient experience, and patient outcomes."(70) Figure 5 highlights five distinct domains (types) of health service and policy innovation in which decisions influenced by research can play an important role. Four of the domains (policies, practices, processes, and behaviours) were discussed, although not defined, in the CAHS Impact Framework.(13) The IAWG defines these four domains as well as "products and services":

- **Policies:** HSPR has influenced the "set of rules, directives and guidelines" (e.g., legislation, regulation, public reporting) developed and implemented by a government, organization, agency or institution.(71)
- **Practices:** HSPR has influenced providers' care practices (e.g., prevention and management, diagnosis, treatment, post-treatment) directly or, for example, through the development, revision, or implementation of clinical practice guidelines, competencies, standards, incentives, or other means.
- **Processes:** HSPR has influenced the work flow processes of care production and/or delivery, including processes in service delivery models (e.g., integrated models of care), resource allocation processes (including the process of de-adoption, the reduction and/or elimination of unsafe, low quality, low value care, etc.), and more (e.g., involvement of new techniques, equipment or software in the care delivery process.(72)
- **Products and services** (includes technologies, devices, treatments): HSPR has influenced the development of new or improved products, services, devices or treatments. Examples include technologies (e.g., eHealth technologies), pharmaceuticals, personalized medicine, diagnostic equipment and more.
- **Behaviours:** HSPR has influenced the behaviour (or change in behaviour) of a policy/decision-maker, healthcare provider, patient or other.

3iii) Health Services and Policy Target Sectors

The multiple sectors in which health services and policy decision-making occurs and in which HSPR can have an impact are highlighted in Figure 5.* Table 1 provides definitions and illustrative examples for each target sector as appropriate to HSPR. The Framework recognizes that decision-making can occur within individual sectors and also collectively across sectors and audiences. Collective action across multiple sectors can arise when they are each affected by or committed to a common problem. For example, pharmaceutical companies and social services (both within the 'other industry' sector) may contribute alongside researchers, health system decision-makers, healthcare professions, and government policy-makers to address pressing public health issues (e.g., opioid crisis) through timely and relevant research. This is consistent with dialogue addressing the need for greater public engagement in research and innovation policy-making.(73)

* *The Framework modified the CAHS Impact Framework (13) slightly and identifies government; healthcare and related organizations; the research and development (R&D) community; the public and patients; healthcare providers; and industry as key sectors directly or indirectly involved in the health services and policy enterprise and whose decision-making can inform and be informed by HSPR.*

TABLE 1
Health services and policy target sectors and audiences

Sector	Definition	Examples of Research Use
Government	Includes federal, provincial, regional (e.g., health authorities), and municipal governments responsible for planning and funding the public healthcare system and other government departments that are involved in and/or affected by policies and programs that affect the health of individuals, populations, and/or systems (e.g., education, social services, housing, justice, public health).	Research can inform all PDSA stages related to strategic directions, programs and policies, resource allocation decisions (investment and disinvestment), governance and delivery arrangements, accountability and performance measurement frameworks, performance management and improvement tools (e.g., legislation, regulation, standards, financial incentives), funding models, and more.
Healthcare and related organizations	Includes organizations at the local, regional, provincial and/or national level with mandates related to direct service delivery (across the care continuum – e.g., public health through to and including end-of-life care); health system performance monitoring & reporting; philanthropy and social well-being (e.g., health charities); the development, provision, and evaluations of spread and scale of health services and policy innovations; improving health system performance (e.g., safety, quality, efficiency, access).	Research can inform all PDSA stages related to the financing, organization, delivery, performance and assessment of healthcare. It can also inform PDSA decisions about the performance of delivery systems, organizations and providers (e.g., with respect to the quadruple aim of better health for the population, better care for individuals, lower cost, and improved provider satisfaction,(74) as well as other important measures like equity).
R&D	Includes organizations at federal, provincial, and local levels that fund research and develop human capital (e.g., research funding organizations, academic institutions).	Research can inform PDSA stages related to funding priorities, training/capacity needs, program design, peer review practices, research impact evaluation methods, and more.
Public and patients	The public (citizens) and patients are intimately connected to healthcare as funders (tax payers), users (of services), caregivers, and, increasingly, as partners that contribute to multiple facets of care (self-management, personal care decisions, improved understanding of patient preferences and their value, governance, and more). The media and advocacy groups help maintain connections to inform the public.	Research can inform public perception, awareness, opinion, and attention on key issues; empower citizens and patients with knowledge to make informed decisions and be partners in their own health, care, and caregiving decisions; help ensure the public and patients are engaged in setting the direction of HSPR to improve its relevance and importance; inform optimal methods and processes for meaningful public and patient engagement in research; and more.
Providers*	Providers of healthcare in a clinical setting, including (but not exclusive to) physicians, nurses, physician assistants, rehabilitative professionals, pharmacists, mental healthcare providers, complementary and alternative healthcare providers, and professional societies serving clinicians. Lay health providers are also included. †	Research can inform decisions made by providers through the development of clinical guidelines. Research use in practice decision-making can occur at the individual or organizational levels. Research can also inform strategies to influence provider satisfaction with provision of services.
Industry (private sector)	Includes private sector organizations and entrepreneurs that develop, produce, evaluate, innovate, and/or commercialize health technologies, products, and/or services (e.g., pharmaceutical companies, medical technology companies, consulting firms, etc.)	Research ideas can inform the design, integration (adoption), and evaluation of new products/processes/practices as they apply to the built environment, working conditions, and safety. Health insurance companies can also be influenced by research findings.

* *Note that providers were added to the Pathways to Impact in response to feedback from the Indicator Review Panel on February 28, 2018.*

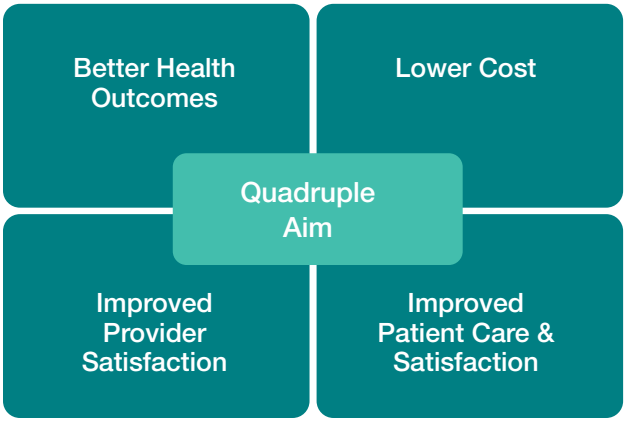
† *The definition for providers is informed by the description provided by the Patient-Centered Outcomes Research Institute (PCORI) (75) and the work of the Patient-Oriented Research Working Group. The Patient-Oriented Research Working Group is chaired by Alberta Innovates and includes international stakeholders representing PCORI, CIHR, the University of Alberta, and ÜberResearch.*

Long-Term: Improved Health Impacts and System Performance

Evidence-informed decisions regarding health policies, practices, processes, and products are intermediate impacts that can generate longer-term health and system performance impacts. The widely recognized and adopted IHI Triple Aim framework for health system performance that has evolved into a Quadruple Aim framework (Figure 6) is incorporated within the Framework to provide an organizing compass for assessing health services and policy impacts, which is an update to the CAHS Impact Framework. The Quadruple Aim hypothesizes that improved population health outcomes, improved care and patient experience, improved provider satisfaction, and lower costs lead to optimized healthcare performance.(74)

FIGURE 6

The Quadruple Aim framework



Informed decision-making can generate improvements in one or more of the Quadruple Aim outcome dimensions. The Triple/Quadruple Aim framework recognizes that to achieve all four dimensions of the Quadruple Aim simultaneously, collective action at multiple levels and with multiple sectors and audiences is needed since no one organization or sector is accountable for all of the outcome dimensions, as many contribute.(76) The Quadruple Aim outcomes are broadly compatible with those identified in other research impact frameworks, including the CAHS Impact Framework (13) and the Payback Framework.(14)

Context

The context in which policies and decisions are made exerts a powerful force on decision-making processes and outcomes and is important to capture in planning research and collective action as well as in knowledge exchange efforts and research impact assessments.(19, 25, 26, 31, 32, 36, 41, 42, 54, 77) Context is generally acknowledged to comprise individual/organization, sector, and macro/system elements. Individual context reflects the beliefs, norms, and values of the decision-maker and/or the organizational culture (e.g., willingness and capacity for change) in which the decision-maker resides. Macro/system context reflects a myriad of factors such as the legislative infrastructure, fiscal climate, political priorities, and public values faced by the decision-maker. Sector context reflects the characteristics of the sector or region, such as sociodemographic characteristics, disease prevalence, community engagement, availability of health and social services, environmental determinants, market characteristics and more. The literature is consistent in acknowledging that regardless of the level or type of stakeholder(s) making a decision (e.g., individual-level, organization-level, system-level), the decision-making process, impacts can be affected by the internal and external contexts, which exert influence through predisposing and enabling factors at the system, organizational, clinical, and/or individual levels.(12, 19, 36, 78)

While the literature reflects growing interest to understand the role and influence of context, there are very few indicators to capture it. Due to the specificity of any given context, the Framework does not identify measures of context and acknowledges this as an area in need of research attention.* Rather, the Framework recommends that salient factors related to context are documented according to their level of influence: individual/organization, sector, and macro/system. Consideration of these levels has been included in the indicator table, though case study method or impact narratives are recommended to fulsomely address the influence of the context on informing decision-making.

* *Note that Box 5 outlines example indicators for context.*

From Pathways to Impact to Impact Assessment: Key Questions for Assessment

Research impact assessment considers general and specific questions as key to comprehensive assessment. The Framework provides a structure for assessing informing decision-making impact, and therefore for determining assessment questions. Assessment questions address both the purpose of the assessment and the Framework's outcome pathways. There are four main purposes for assessing impact, referred to as "the 4A's": **A**ccountability, **A**dvocacy, **A**llocation and **A**nalysis (& learning).(24) Once stakeholders have agreed on the purpose(s) of the assessment,* questions of interest need to be defined and prioritized in order to focus the assessment. The Pathways to Impact (see Figure 5) are then used as a roadmap to determine where to look for impact categories (and subcategories) of interest. Impacts are at various levels (e.g., individual, program, institutional, provincial, national, or international). See Box 4 for an example of general and specific questions.

It is important to note that regardless of the assessment purpose(s), questions will always flow from the Pathways to Impact (e.g., problem and priority co-identification, receptor capacity to use and implement). The purpose(s) of the assessment will direct questions that address the pathways. For example, the first 'specific question' in Box 4 – "to what extent was stakeholders' involvement in co-identifying HSPR problems and priorities a key contributor to informing policies and practices" – could be directed to address accountability with these questions: "what decisions were made regarding HSPR problems and priorities?" and "how did the decisions demonstrate accountability for public dollars spent?"

Component 2: Informing Decision-Making Indicators, Methods, and Data Collection Tools

Recommending a preferred menu of impact indicators for the Framework and providing guidance on how to use them is a part of the IAWG's mandate to develop a practial framework for measuring the impacts of HSPR on informing decision-making. Component 2, which was developed in Phase 3, outlines the recommended indicators and the associated methods and tools for measurement.

2i) Indicators

The decision-making process is often the result of many competing factors, of which research findings is typically only one. Research evidence is often considered alongside other sources of information and experience and is situated within a context that affects the interpretation of evidence and information, the decision-making process, and the ultimate decision. Since decisions are influenced by many factors and given the difficulty identifying said factors, measuring the inputs to and impacts of the decision-making is inherently challenging. With these challenges in mind, the proposed Framework was used to guide the selection of a core set of indicators. The Framework identifies the research-to-impact pathway and key impact domains along the pathway, thus helping to inform the selection of indicators required for measurement and assessment. (13) The Framework recognizes the multi-dimensional and complex nature of decision-making and the time lags between knowledge production and informing decision-making impact. Considering these factors, it is important to note that no single indicator or suite of indicators is sufficient to capture and demonstrate overall impact.

* *A comprehensive approach using all four purposes can be used, however this will impact the amount of resources required to operationalize.*

BOX 4

Examples of questions for HSPR informing decision-making impact assessment*

Examples General Question(s)

1. Is the program/project/policy/practice producing the outcomes/impacts that are expected? What has happened in the short, intermediate, and longer term (depending on timing of the monitoring and assessment)?
2. What factors led to achievement (or lack of achievement) of these outcomes/impacts? Why did it happen (including attribution or contribution of the research and contextual influences)? Were there any unanticipated outcomes/impacts?

Example of Specific Questions(s) across the Pathways to Impact

1. To what extent was stakeholders' involvement in co-identifying HSPR problems and priorities a key contributor to informing policies and practices?
   a. What approach was used to engage diverse stakeholders in co-identifying and prioritizing questions?
   b. What happened/has been observed?
   c. Why and what factors influenced the observed outcomes?
   d. What decisions were made regarding HSPR problems and priorities and why?

2. Targeted HSPR and capacity building
   a. Are we developing and retaining highly qualified research personnel in our province and Canada?
   b. What is the career trajectory of HSPR trainees in Canada?

3. Translatable HSPR finding
   a. What type of knowledge products were used to inform decision-makers?
   b. How have these knowledge products been used by decision-makers?

4. Have receptor capacity building efforts (such as new training programs) resulted in HSPR evidence being used to inform policy and practice decision-making?
   a. Has there been a change in decision-makers attitude toward use of evidence as a result of capacity building efforts
   b. What happened/has been observed?
   c. Why and what factors influenced the observed outcomes?
   d. What decisions were made regarding capacity building efforts and why?

5. What factors facilitated or hindered the program achieving its anticipated informing decision-making impacts – and how did they interact? For example, in the:
   a. Spread and scale of innovations in the health system?
   b. Introduction of new HSPR policies?
   c. Commercialization of products and services?
   d. Public and patient benefits?

6. What other contextual and external factors contributed to or impeded achieving the impacts?

7. What are the lessons learnt to improve the likelihood of achieving health outcomes and systems performance on a go forward basis (what worked, did not work, under what conditions)?

* *Dr. Gretchen Jordan contributed to the general questions and specific question / sub-questions in her review dated April 27, 2018.*

That is, *indicators provide signals of impact but do not provide comprehensive assessment of the full range or the many factors that contributed to those impacts.* As was noted in a recent "metrics tide" report on the role of metrics in research assessment by the Higher Education Funding Council for England, "Carefully selected indicators can complement decision-making, but a 'variable geometry' of expert judgement, quantitative indicators and qualitative measures that respect research diversity will be required.... In assessing research outputs in the REF [Research Excellence Framework], it is not currently feasible to assess research outputs or impacts in the REF using quantitative indicators alone."(79) Consistent with the metrics tide report as well as other literature,(24, 80) CHSPRA members and external reviewers have provided feedback on the need to maintain a balance between quantitative and qualitative assessment of the non-linear decision-making process in health services and policy, cautioning against an over-emphasis on metrics. Considering these sentiments, the IAWG recommends impact assessment that includes an appropriate mix of quantitative indicators and qualitative assessment.

Considering the noted concerns, the IAWG completed a systematic process to select a core set of indicators as a starting point to assess the impact of HSPR on a pan-Canadian scale. This process included the generation of an initial menu of indicators by a task force, followed by further refinement and vetting by the IAWG, and ending with a 3-round modified Delphi process carried out by the Indicator Review Panel. Details of each aspect of this process are outlined in Figure 7. Each of the three groups had a unique role in formulating the core set of indicators: the task force used practice knowledge and the literature to generate a fulsome initial pool of indicators to populate all impact categories/ sub-categories; the IAWG reviewed, refined and vetted the initial pool of indicators based on clarity, importance, and feasibility; and the Indicator Review Panel used a systematic approach to validate a core set of indicators. This difference in roles explains the different criteria used and varying experience and contexts of the participants involved at each stage of indicator development and selection process.

FIGURE 7

Description of the indicator selection process

Indicator Task Force

- 7 members
- Informed by: Framework categories and sub-categories; systematized literature review; and practitioner experience and perspectives with impact assessment
- Indicator identification based on assessment practitioner experience and discussion of face validity, importance and feasibility
- Identified the initial menu of **67 indicators**

IAWG

- 4 members of the IAWG and the Chair of the Indicator Review Panel
- Refined and vetted the 67 indicators prior to the Indicator Review Panel
- Based on discussion of clarity, validity, and feasibility.
- Eliminated 21 indicators resulting in **46 indicators** going to the Indicator Review Panel for assessment

Indicator Review Panel

- 15 members
- Pan-Canadian representation of funders, academic administration, researchers, government, patient/public, and research management
- 3-round modified Delphi process (2 online surveys and an in-person meeting)
- Rated **23 indicators** valid, reliable, feasible, important, and actionable; prioritized by ranking **core set of 12 indicators**

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When evidence for indicators is lacking in the literature, it is common to leverage expert and stakeholder expertise (24) through a consensus approach such as the modified Delphi.(81-83) The modified Delphi combines surveys with in-person discussion to reach consensus on, in this situation, indicators.(84) This indicator selection process used in the modified Delphi consisted of two online surveys and one in-person meeting, which also included a paper survey. This modified Delphi process and associated activities is illustrated in Figure 8. Indicators were assessed on five criteria: validity, reliability, importance, feasibility, and actionability.

This modified Delphi process resulted in a total of twenty-three indicators being accepted as valid, reliable, feasible, important, and actionable. Of these, the twelve ranked most important to pursue for pan-Canadian assessment at this time, the 'core set' of indicators, are found in Table 2.

FIGURE 8

Structure and associated activites of the 3-round modified Delphi process

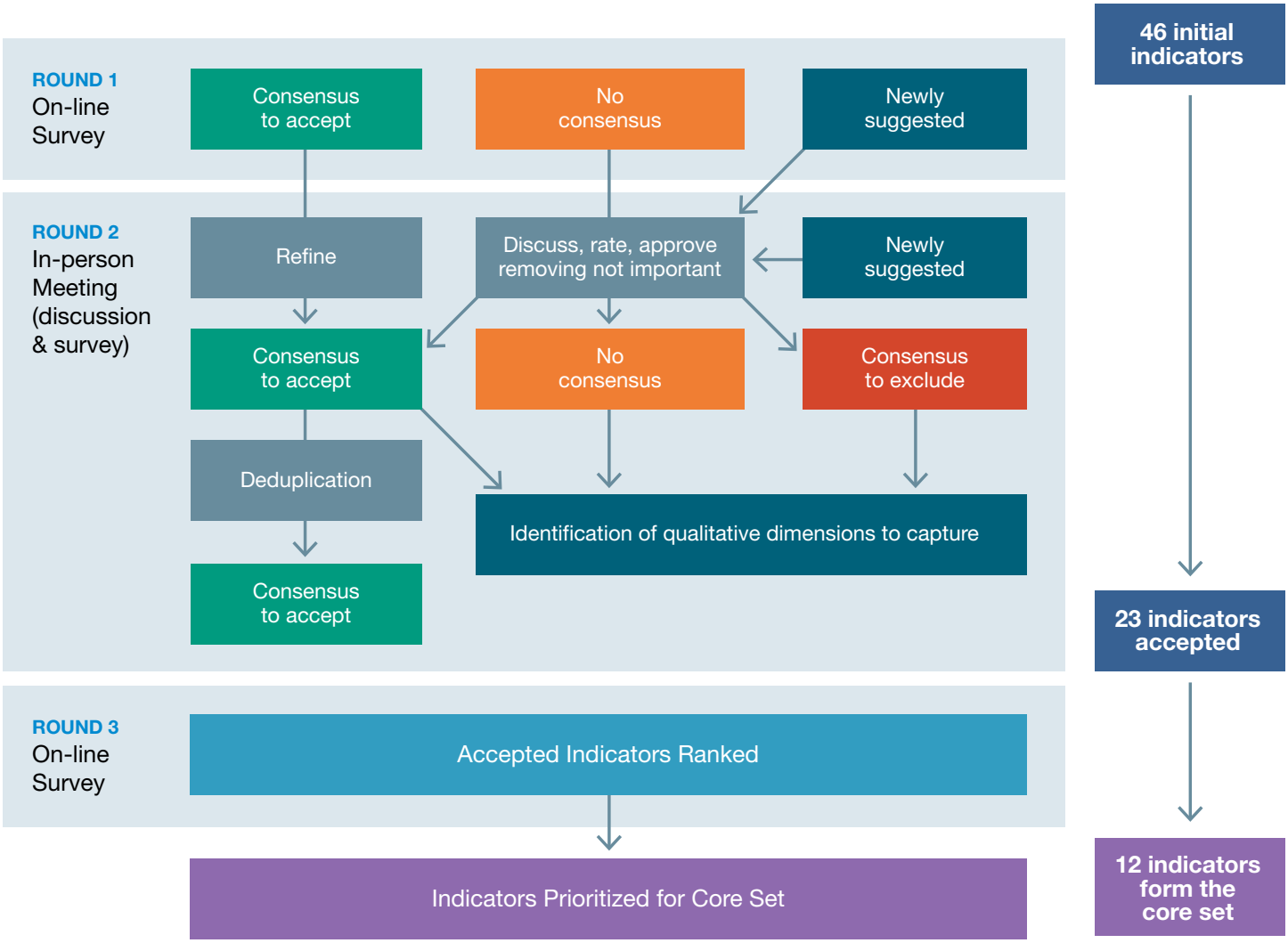

TABLE 2

Core set of 12 indicators prioritized by the Indicator Review Panel

(listed by their ranking within each section of the Informing Decision-Making Pathways to Impact)

SECTION 1: Collective Action to Co-Identify and Support HSPR Focus Area *Short Term*	Data Sources and Collection Methods / Tools
• Important problems warranting HSPR attention are co-identified with decision-makers [number (#) and description of type of problems].	Survey decision-makers, researchers; Document review (e.g., strategic plans); Stakeholder interviews; Data validation exercise – annual keyword validation; End of Grant Reports
• Number (#) and type of HSPR funding programs/ projects according to HSPR priority theme areas	Survey decision-makers, researchers; Document review; Stakeholder interviews; NAPHRO; CIHR Electronic Information System (EIS)
• Trend in funding investments over time for HSPR [per cent (%) growth of HSPR funding over time, open and strategic, and by HSPR priority theme areas].	
SECTION 2: Produce Conditions and Evidence for Translation *Short Term*	Data Sources and Collection Methods / Tools
• Number (#) of HSPR projects that include meaningful participation of patients or members of the public as appropriate.	Survey patients, public, researchers; Document review (e.g., funder progress reports); Interviews with patients, public, researchers
• Number (#) and per cent (%) of policies that cite research evidence	Survey policy/decision-makers, researchers; Document review; Potential Bibliometric Analysis; Altmetrics (e.g., Google Scholar) (emerging)
• Number (#) of HSPR researchers engaged in capacity development with end user audiences.	Survey end users*, researchers; Document review (e.g., funder progress reports); Interviews with end users, researchers; Progress reporting for a select number of CIHR strategic initiatives (e.g., SPOR)

* *The definition for 'end users' is as follows: "an individual, community or organisation external to academia that will directly use or directly benefit from the output, outcome or result of the research."(85)*

SECTION 3: Inform Decisions about Health Services and Policy Innovations *Medium Term*	Data Sources and Collection Methods / Tools
• Research evidence directly informed agenda setting, priority-setting, policy debates, briefings: e.g., invited policy papers and consultancies, information requests by decision-makers, invited meetings, and interactions with decision-makers.	Survey policy/decision-makers, researchers; Document review (e.g., funder progress reports); Interviews with policy/decision-makers, researchers; Altmetrics (e.g., Google Scholar) (emerging); Research Reporting System (RRS)
• Research directly underpinned policy decision (e.g., legislation, regulation, program, practice, behaviour, service delivery).	Survey policy/decision-makers, researchers; Document review; Interviews with policy/decision-makers, researchers
• Evidence of participation of researchers in process of making decisions (e.g., participation in policy networks, boards, advisory groups).	
SECTION 4: Inter-mediate by Target Sectors *Medium Term*	Data Sources and Collection Methods / Tools
• Number (#) and per cent (%) of policies with use of HSPR evidence in their development.	Survey end users, researchers; policy/decision-makers; Document review; Interview end users, policy/decision-makers; Drug Effectiveness Safety Network (DSEN)
• Number (#) and per cent (%) of end users that reported HSPR evidence was useful.	
• Number (#) of public service and broader public sector organizations formally requiring use of research to inform health services and policy (over time).	Survey public service and broader public sector organizations; Interview public service and broader public sector organization; Altmetrics (e.g., Google Scholar) (emerging); Environmental scan of government/ organizations

While the twelve indicators in Table 2 are a prioritized set based on a ranking of importance within each section of the Informing Decision-Making Pathways to Impact, the remaining eleven indicators (see Table 3) were also accepted by consensus. Those who choose to use these indicators can be confident they have gone through thorough assessment process.

TABLE 3
Remaining 11 indicators accepted by consensus

SECTION 1: Collective Action to Co-Identify and Support HSPR Focus Area *Short Term*	Data Sources and Collection Methods / Tools
• Partnered (co-invested) funding investments [name of organization, investment dollar ($) amount and per cent (%) total, area of research]	Survey decision-makers, researchers; Document review; Stakeholder interviews NAPHRO; EIS
• Trend in number (#) and per cent (%) growth of HSPR applicants and funded researchers at all career stages (e.g., masters, doctoral, post-doctoral, new investigator, mid-career, clinician scientist, embedded researcher).	Survey decision-makers, researchers (e.g., CIHR Career Trajectory Survey); Document review (e.g., funder progress reports); NAPHRO data; Statistics Canada National Graduate Survey; EIS (self-declared by applicant)
SECTION 2: Produce Conditions and Evidence for Translation *Short Term*	Data Sources and Collection Methods / Tools
• Number (#) of end users satisfied with engagement with researchers.	Survey decision-makers, researchers Progress reporting for a select number of CIHR strategic initiatives (e.g., SPOR)
• Number (#) of organizations whose primary purpose is not scholarship or education that support health services and policy researchers and/or trainees (over time).	Survey decision-makers/organizations, researchers, graduates from HSPR training programs; Document review; Interviews with decision-makers/organizations, researchers, graduates from HSPR training; Application data/annual reporting
SECTION 3: Inform Decisions about Health Services and Policy Innovations *Short Term*	Data Sources and Collection Methods / Tools
• Number (#) and per cent (%) of policy/ decision-makers' self-reported use of research.	Survey policy/decision-makers, researchers; Document review (e.g., funder progress reports); Interviews with policy/decision-makers, researchers; Altmetrics (e.g., Google Scholar) (emerging); RRS

SECTION 4: Inter-mediate by Target Sectors *Medium Term*	Data Sources and Collection Methods / Tools
• Leveraged funding from follow-on funding.	Document review; NAPHRO description and calculation; NAPHRO data
• Number (#), per cent (%), and type of HSPR trainees (e.g., PhD, etc.). • Number (#) of HSPR trainees graduated.	Survey universities, graduates, researchers; Interview universities, graduates; Document review; Statistics Canada National Graduate Survey; HSPR asset map
• Trend in number (#) and per cent (%) of health services and policy researchers working in healthcare delivery, coordination, or policy organizations.	Survey organizations involved in healthcare delivery, coordination or policy, researchers; Document review; Statistics Canada survey; Data from CIHR Training Programs (Vanier, Banting, etc.)
• Number (#), per cent (%) and type of HSPR trained staff (e.g., trainees, others) in healthcare delivery, coordination, or policy organizations.	Survey organizations involved in healthcare delivery, coordination or policy, researchers; Document review; Statistics Canada survey HSPR asset map; EIS; RRS
• Number (#) of health services and policy researcher and NGO (non-governmental organization) collaborations.	Survey researchers, NGO's; Document review; Interview researcher, NGO's; EIS

The indicators in Tables 2 and 3 include a balance between proximal (e.g., measuring attribution by linking the research with translation activities in the short term) and distal impacts (e.g., measuring contribution from many players in influencing the impact such as improved care in the long term). A mix of quantitative metrics (e.g., number of evidence requests from decision-makers) and qualitative measures (e.g., decision-makers' attitudes towards the value of research evidence) are recommended. Qualitative measures are particularly useful for capturing how and why impacts occurred (or did not occur) and contextual factors that may have exerted an influence. Even though context indicators were not specifically identified, Box 5* provides examples that could be considered when assessing in the three context areas.

* *Dr. Gretchen Jordan provided the example indicators to monitor and assess context found in Box 5 in her review dated April 27, 2018.*

Data sources (see Tables 2 and 3 and Appendix A) are also relevant when considering selection of indicators. Data sources are influenced by factors such as the level of aggregation (e.g., individual, organization, provincial, national), available resources, and the qualitative or quantitative nature of the indicator, and therefore may not be appropriate in certain circumstances. Additionally, monitoring activities must be integrated into assessment processes. Monitoring data provides feedback on progress toward short and medium-term impacts and can also be used to make program course corrections. Knowledge gained from monitoring activities can improve efficiency (e.g., cost-effectiveness) of and contribute to in-depth impact assessments (e.g., contribution analysis). Monitoring data can be rolled out into communication mechanisms, such as interim or annual reports and dashboards.

The Indicator Review Panel also provided written comment during online surveys and had fulsome discussion during the in-person meeting. In sum, their remarks focused on ways of refining indicators as well as their implementation and future development. Of particular interest were Panelists' comments during the in-person meeting that focused on: issues and challenges with assessing HSPR innovation; capturing complexity; system transformation; organizational culture and use of research; and implementation strategies and methods. Specific to capturing complexity, Panelists felt some indicators were qualitative in nature, requiring more refinement and assessment than quantitative metrics could provide, such as with end users' use of research and the use of linked data.

The IAWG recommends that users of the Framework select indicator sets from Tables 2 and 3 based on their assessment question(s). Users need to be as specific as possible about where impacts are expected to occur (e.g., policies, practices, products, etc.) and at what level (e.g., individual, group, institution, provincial, federal) as well as be aware of the availability and sources of data (see Appendix A). Users can choose (or develop) indicators and measures that are appropriate and conform to criteria such as FABRIC (Box 6).(86)

BOX 5

Example of indicators to monitor and assess the context

Individual/organization (micro)

- Research team characteristics (e.g., includes downstream users)
- Patient characteristics (e.g., family support)
- Organization characteristics (e.g., readiness to change)

Sector (meso)

- Aspect of healthcare targeted (e.g., accessibility)
- Characteristics of medical issue targeted (e.g., prevalence, mortality)
- Competing priorities
- Characteristics of targeted users (e.g., skill levels, workload, pay)
- Characteristics of industry (e.g., competitive, high capital costs)

System (macro)

- Economic uncertainty; Fiscal constraints
- Social/cultural norms (e.g., public support of health system, distrust)
- Legal/regulatory environment
- Technical infrastructure

BOX 6

FABRIC criteria for groups of indicators (13, 86)

Focused on the organization's aims and objectives

Appropriate to, and useful for, the stakeholders who are likely to use it

Balanced, giving a picture of what the organization is doing, covering all significant areas of work

Robust in order to withstand organizational changes or individuals leaving

Integrated into the organization, being part of the business planning and management processes

Cost effective, balancing the benefits of the information against the costs

When used together in sets, indicators can help to create focused, appropriate, balanced, robust, integrated, and cost effective evaluations.(86) If assessors of Canadian HSPR use these recommended indicators, then the Canadian HSPR community can begin to create a menu and a reporting repository that can be used to establish baseline and benchmark HSPR performance. These tools can then be used for purposes of accountability, resource allocation decisions, analysis, and advocacy (communicating impact). The community can also provide a quality assurance role to avoid inappropriate uses such as double counting and the 'halo effect' (choosing only positive impact indicators). Identifying said indicators requires knowledge regarding the level(s) of aggregation at which the indicator can be assessed. Not all indicators can be used at all levels of aggregation. A comprehensive description for all twenty-three indicators is found in Appendix A, with three illustrated in Table 4.

Indicator monitoring data can be collected in various ways including surveys, document reviews, management databases, and interviews (see Table 5). Examples of data sources include grant and financial management databases and information collected through evaluations, as well as documents including research proposals, progress reports, and organizational strategy documents (e.g., strategic plans). Monitoring indicators is valuable for informing both progress toward targets and the iterative process of making program adjustments in real-time.

2ii) Methods

It is generally acknowledged that a mixed methods approach using a combination of quantitative and qualitative methods (as dictated by the assessment questions) and multiple data sources is required for impact assessment.(24) Indeed, a number of different methods can be used and triangulated for purposes of robustness and to cover the full range of impacts that HSPR can have.(4, 87) The most common quantitative methods used in impact assessment are: bibliometrics, quantitative surveys, economic evaluation, and quantitative scoring (i.e., expert scoring) of research applications and impacts. The three main qualitative methods used in health research evaluations are: case studies, peer review, and surveys.(88) Considering the challenges with establishing and acquiring baseline data on informing decision-making, development of a pan-Canadian survey could become a cornerstone data collection strategy. The Indicator Review Panel's findings were clear - metrics were not sufficient for all indicators, especially given the complexity of decision-making process and the multiple influencing contextual factors. It is therefore paramount that organizations completing impact assessments diligently consider the methods needed to appropriately and fulsomely address the assessment purpose and questions.

TABLE 4
Examples of indicators and associated levels of aggregation

Indicator	Level of Aggregation
Trend in funding investments over time for HSPR [per cent (%) growth of HSPR funding over time, open and strategic, and by HSPR priority theme areas].	Not recommended at individual level Not recommended at group/department levels Institution/Funding agency Provincial/National
Number (#), per cent (%) and type of HSPR trained staff (e.g., trainees, others) in healthcare delivery, coordination or policy organizations.	Not recommended at individual level Group/Department Institution/Funding agency Provincial/National
Number of HSPR researchers engaged in capacity development with end user audiences	Individual Group/Department Institution/Funding agency Provincial/National

Methods for monitoring and assessing research impact have been evolving and the toolbox is expanding. Emerging methods and analytic tools, such as altmetrics, text mining, and network analysis that can better link research and innovation processes are important advancements to the toolbox. However, rigour is a concern with emerging methods. For example, altmetrics requires more robust testing to reach the degree of trust that has been established with bibliometrics. Therefore, caution is warranted with their use and subsequent interpretation of results. Consideration of longitudinal studies of organizations and collectives such as CHSPRA, in addition to evaluation synthesis studies, can provide valuable inputs into policy and practice decisions. Some methods are more resource and time intensive than others, and the IAWG acknowledges that the robustness of the impact assessment must be balanced with feasibility considerations, including the ability to answer stakeholders' questions in a timely manner. To this end, the Framework presents a novel opportunity to incorporate methodological experimentation and innovation for assessing informing decision-making impact.

Table 5 outlines strengths and weaknesses of common practices and emerging methods and tools for assessing informing decision-making impact. The IAWG recommends choosing methods that answer the stakeholder assessment questions (e.g., see Box 4) and help to understand the context, as well as selecting sets of indicators that relate to impact categories and subcategories of interest to the stakeholders. Often, research impact assessments investigate an instance of success (or not) and include both qualitative and quantitative data. If the emphasis is primarily quantitative data analysis, the IAWG also recommends complementing quantitative methods and measures with impact case studies in order to allow for nuanced understanding of all the factors involved in impacts.(15) Importantly, some of the methods and tools highlighted in Table 5 are more resource intensive than others, and the IAWG acknowledges that each impact assessment will need to consider the appropriate balance between rigour/comprehensiveness with feasibility/time and cost.

TABLE 5
Common impact assessment methods and tools*

Method/ Tool	Description	Strengths	Weaknesses	Application to HSPR and tools
Bibliometrics and patent analysis	*Range of techniques for assessing quantity, dissemination, and content of publications and patents. Uses quantitative analysis to measure patterns of publication and citation, typically focusing on journal papers.*	• Well established impact approach • Measures volume and quality of output • Citation analysis is used as proxy for quality of research • Can map collaboration and interdisciplinarity • Enables analysis of global trends • Suited to repeated analyses • Can be applied to patents (technometrics) • No burden on researchers • Established data sources	• Can be seen as reductive • Identifying author affiliations • Publishing and citation patterns differ across fields of research • Analysis complicated by the introduction of electronic publications and open and public access journals • Requires specialized expertise and can be expensive to collect data and analyze • Only able to investigate peer-review publications and does not cover wider impacts • English language bias	• Bibliometrics can be useful for analyzing publications and citations, however, peer reviewed publications in scholarly journal are not all that counts, so this method should not be used alone. Altmetrics is another alternative although should be used with caution as the method requires more robust testing and is more susceptible to being gamed.
Altmetrics	*Focus is on the "re-use" of research and includes non-traditional forms of research and dissemination products. Include all research products.*	• Broader research productions • Useful in monitoring research reuse • More timely than citations • Broader impact than citations (i.e., broader impact than citations alone	• Emerging practice with little evidence supporting it • Requires dissemination to have occurred • Potentially more amenable to gaming by researchers	• This is an emerging method that maybe useful for HSPR. • Requires practical applications and more robust testing.
Surveys	*Provide a broad overview of the current status of a particular program or body of research and are widely used in research impact to provide comparable data across a range of researchers and/or grants which are easy to analyse.*	• Can cover a large sample • Can accommodate comparison groups and counterfactuals • Generally cost effective • Can capture outputs, outcomes and impacts • Provides understandable and credible results • Allows statistical analysis	• Questions can be misunderstood • Can miss context relevant information • Dependent on contact details being available Poor response rates can lead to biased responses	• Widely used and feasible. Useful for surveying researchers, users and beneficiaries. • Numerous off the shelf survey tools (e.g., Snap, Fluid Survey).

* *Content in this table has been reproduced from the UK Evaluation Forum,(88) CAHS Impact Framework,(13) and Guthrie, et al.(89) Reprinted with permission from the Academy of Medical Sciences, London, UK; the Canadian Academy of Health Sciences, Ottawa, ON; and the RAND Corporation, Santa Monica, CA.*

Method/ Tool	Description	Strengths	Weaknesses	Application to HSPR and tools
Policy Delphi	*Policy Delphis use a pre-delphi survey or brainstorming exercise to expose the full range of approaches to a particular problem or question.*	• Can be useful in formulating the research question • Provides opinions on policy options from participating experts • Highlights agreements and disagreements • Provides rankings for the policy options • Builds consensus	• Relies on opinion • Can be relatively expensive to conduct pending experts required • Can be time consuming to reach consensus	• Could be useful method for co-identifying problems and issues. • The traditional Delphi method can be used to rank indicators across different criteria.
Economic evaluation	*Economic studies seek to inform choices that must be made by policy-makers or decision-makers. Assesses whether benefits outweigh opportunity costs and whether efficiency is achieved. Three types: cost benefit analysis (CBA), cost effectiveness analysis (CEA) and cost-utility analysis (CUA).*	• Can be applied to variety of sectors • Systematic way of producing comparisons • Quantitative • Provides big picture and context • Potentially powerful political tool	• Involves subjective decisions of what is involved and therefore what to "cost" • Difficult to value many influences involved • Heavily depend on monetary valuation of nonmonetary goods (e.g., quality of life) • Difficult to identify contribution of individual funder/sector/country	• Method can be useful for assessing whether the benefits of policies and practices are greater than the opportunity costs compared with alternative uses of resources. • Can be used to monetize the returns of funded HSPR.
Case Studies	*Can be used to explore the detail versus high level overview, can use mixed methods. Key considerations are the unit of analysis and the sample selection for multiple case studies.*	• Provides in-depth analysis of context and describes the "how" and the why" • Can demonstrate pathways from research to application and impact • Information useful for a range of purposes (e.g., reporting to stakeholders, media) • Easy for policy-makers to read and understand	• Potential selection bias as cases chosen may not be representative • Conclusions may not be transferable • Problems of recall bias • Method can be highly resource intensive • Qualitative evidence generally considered less persuasive than quantitative evidence	• Commonly used in impact assessment in combination with quantification methods.
Interviews	*Used to obtain extra information on areas of interest, generally to access personal perspectives on a topic, or more detailed contextual information.*	• Detailed contextualized information • Flexible • Can cover a wide range of factors • Engage key stakeholders in assessment	• Interviewers need to be skilled or can result in bias • Time consuming • May not be generalizable if small sample size • Consistency may be a challenge if unstructured and open ended	• Often used as a method for triangulating findings (confirming findings using other methods).

Method/ Tool	Description	Strengths	Weaknesses	Application to HSPR and tools
Text Mining	*Is the process of deriving information from machine read material. It works by copying large quantities of material, extracting the data and recombining it to identify patterns.*	• Reduce data collection burden on researchers by using secondary data • Ability to analyze large text data sources • Easy to understand outputs	• Developing effective data mining processes might be complex and time consuming • Key limitation is reliance on availability and quality of existing data.	• Emerging method used in mining impact case studies, useful for visualization and classifying HSPR.
Document Review	*Review of existing documentation and reports on a topic. Gives a broad overview of an issue; identifies 'what is known'.*	• Feasible to use • Reduce data collection burden on researchers by using secondary data • Referenced	• Can be subjective • Labor intensive searching for evidence • May miss information	• Often used as a method for triangulating findings.
Peer Review/ Merit Review	*Review by peers, typically other academics in the same or a similar field, of outputs of research. Rationale is that subject experts are uniquely qualified to assess the quality of the work of others.*	• Well understood and widely accepted by the community • Group review allows discussion and gives opportunity to reach consensus	• Time consuming for experts • Concerns about objectivity and variability of judgements and lack of transparency • Can be costly and requires effective facilitation	• Can be problematic for highly innovative and interdisciplinary HSPR.
Network analysis	*Ability to assess structure, patterns of interactions, integration, relationships and communication patterns.*	• Different and complementary perspective • High comparability • Visualizations can be useful in communicating complex interactions	• Theoretical paucity • Largely descriptive • It maybe time limited requiring repetition over time	• Can be an emerging tool for HSPR given the importance of relationships and engagement.

As described in Table 5, there are various methods and tools, both established and emerging, that can be used in impact assessments depending on the assessment purpose and questions. However, case studies warrant special attention. Case studies are a flexible method that generate rich information, as demonstrated in the literature (e.g., Project Retrosight (43)). They use research techniques to provide qualitative detailed information about a focused topic or context. Case studies do not aim for generalizability of findings; rather, they generate deep, rich, context-specific knowledge. They are flexible enough to capture a wide variety of impact, including the unexpected, and are useful in providing the full context around a particular piece of research, researcher, or research impact. Case studies are attractive in that they can be used to assess impact at a variety of levels, including at the level of individual researcher or research project, teams, networks and areas of research (e.g., Project Retrosight, which examined the impact of cardiovascular and stroke research in three countries over a five-year period (43)). They are, however, resource intensive.

CIHR is an example of a funder that has invested resources into case studies. In November of 2016, CIHR conducted a comparative analysis of five case studies from the Evidence-Informed Healthcare Renewal (EIHR) initiative. This initiative aims to support researchers and decision-makers to work together to advance the current state of knowledge, generate novel and creative solutions, and translate evidence for uptake into policy and practice to inform decision-making and strengthen Canada's healthcare systems. Each case study included interviews with three to five key informants per funded grant - including researchers, partners, and knowledge users - as well as a review of project documentation and other outputs. The five cases were then compared on key success drivers, challenges, lessons learned, best/promising practices, and contribution to achieving EIHR objectives.

The findings provided keen insight into the process of using research to inform decision-making in healthcare policy. All five case studies demonstrated efforts to translate the research evidence to government officials and showed that research where decision-makers/ knowledge users are involved from the outset have a significant advantage in informing immediate and long-term impact discussions. Outcomes from the study highlight the importance of building relationships with decision-makers on an ongoing basis and how the use of roundtable meetings was a resounding success. Overall the case studies helped increase capacity to conduct responsive and solutions-focused research, inform decision-making for CIHR, and support evidence-informed policy-making in the EIHR priority areas (governance and accountability, health financing, and sustainability).

2iii) Data Collection Tools – An Opportunity for Collective Impact

The Framework presents an important opportunity for collective action and impact to harmonize and standardize data collection tools and platforms. Standardized tools will enable comparative analyses of HSPR impacts and the factors that enable and hinder impact across organizations and over time.

Canada is fortunate to have comprehensive, world-class national and provincial data resources and emerging initiatives, such as the Pan-Canadian Real-world Health Data Network (PRHDN). These initiatives hold great promise for multi-province, pan-Canadian, and comparative analyses. However, a number of the indicators recommended in this report require qualitative assessments and efforts are needed to develop standardized tools (e.g., interview/survey protocols). In terms of standardization, challenges exist given there are various end users of HSPR, including decision/ policy-makers in government, industry, and healthcare organizations as well as patients and healthcare providers. This diversity creates issues with systematic assessment across end user groups to achieve accurate and meaningful results. Surveys are an efficient data collection strategy (24) and are often used, however the process and results can be complicated by factors that affect systematic sampling, such as who is administering the survey (and therefore, who is defining user groups) and who is being surveyed (e.g., policy-makers, healthcare providers within a provincial healthcare system). In this case, indicators that rely on the calculation of percentage (e.g., per cent of policies, per cent of users) become difficult to calculate and interpret. Additionally, more work is needed to align the research classification schemes of federal, provincial, and other funders.

The foundational work of the nineteen organizations who collaborated to produce Canada's first-ever asset map of HSPR in 2014 (1) provides a starting point to align definitions, classification systems, and data collection tools. The asset map represented a collective effort among federal and provincial funders, health charities, ministries, and other organizations that invest in HSPR to document and understand the state of total HSPR investment in Canada, and what this investment had created in terms of assets, resources, strengths, opportunities, and gaps upon which to build moving forward. Refinement of the asset map's research classification categories and priority theme areas is needed to reflect recent advancements and current practices of funding organizations in Canada but, nevertheless, the asset map provides a valuable baseline upon which to assess change over time.

In addition to the HSPR asset map, which was modelled on an initiative initially spearheaded by the Canadian Cancer Research Alliance (CCRA), the last 10 years have included notable advancements in automated data capture tools. Off the shelf tools from suppliers such as Elsevier, Thomson Reuters, ÜberResearch, and the UK's online Health Research Classification System (HRCS) provide potential opportunities for standardizing HSPR classification and, ultimately, standardized data collection.

Other groups in Canada have also turned their attention to harmonizing research classification in various areas. The CCRA, for example, pioneered the asset map approach with their Cancer Research Investment Survey. Federal and provincial funders are currently working together to define and classify patient-oriented research in order to establish baseline for assessing impact. Additionally, over the past decade NAPHRO has worked to harmonize impact data across all of the provinces.

The introduction of impact reporting tools such as Researchfish have standardized questions on informing decision-making impact and provide an opportunity for funders and organizations to report on the collective impact of HSPR investments during and after the program. Finally, Open Researcher and Contributor ID (ORCID) is a promising tool that provides researchers with a unique identifier that enhances the capability of linking researchers to their research activities and outputs.

Phase 4 entailed developing an impact narrative template for standardized reporting of impact assessments.

Component 3: Communicating Impact

Communication is an essential component of any evaluation framework. Providing the right information to the right decision-maker at the right time via appropriate communication formats and platforms can be a key link between research production and research use in policy and practice. Additionally, the nature of the information communicated is a consideration given that quantitative indicators alone are rarely sufficient to capture the full range of impacts and factors that enable or hinder the uptake and use of HSPR for decision-making. This is due to a variety of factors, including the complex and "messy" nature of decision-making, contextual factors that exert influence, the challenge of capturing the various ways research can impact decision-making (i.e., conceptual, symbolic, instrumental), and understanding why research did not have the intended impact. Considering these factors, the IAWG recommends two communication tools: impact narratives and scorecards and dashboards.

> According to Greenhalgh et al., "a nuanced narrative may be essential to depict the non-linear links between upstream research and distal outcomes and/ or help explain why research findings were not taken up and implemented despite investment in knowledge translation efforts." (15)

Impact Narratives

Clearly communicating research impact can provide opportunity to cultivate relationships with stakeholders, including decision/ policy-makers.(33) The impact narrative is a tool designed for communicating key research contributions that have occurred along the pathways to impact. *An impact narrative is not considered as a design or a method, it is a communication product* that uses a narrative approach to 'tell the story' of what and how impacts were generated. In other words, while a case study provides a methodologically systematic approach to assessing impact, the impact narrative would provide focused communication of the case study findings. Impact narratives rely on summarizing what research results were achieved (or not) along the pathways to impact and may not be related to a case study. Rigour is addressed by using a guiding template, providing corroborating sources, and integrating indicators and metrics into the narrative, as well as through document review and stakeholder interviews as needed. The impact story highlights the 'most significant change' along the pathway (e.g., attracting investments to the province) while making connections to downstream implications (e.g., engaging beneficiaries to change healthcare delivery practices). Impact narratives are brief, ranging from 2-4 pages in length depending on the audience. Because impact narratives are audience driven, they are written in plain English with a public audience in mind.

The design and purpose of impact narratives are informed by the impact case studies of the REF.(6, 15) Although REF impact case studies are used to assess research institutions for the purpose of funding allocation, they also provide a 4-page description of the non-linear pathways to impact, are structured in a template format, and include corroborating sources.(6, 15) The Framework uses the terminology 'impact narrative' to: avoid confusion between the primary purpose of the REF impact case study (assessment for funding allocation) and the CHSPRA impact narrative (communication tool); and distinguish impact narratives from case study methodology in research and clinical practice. Examples of the REF impact case studies can be found online at their publicly available case study repository.*

* *The REF publicly available case study repository can be found at http://impact.ref.ac.uk/CaseStudies/*

The IAWG proposes that impact narratives would be a valuable mechanism for applying the proposed Framework to real HSPR examples and testing and validating the Framework's applicability (adapting and refining if needed). The IAWG developed a draft impact narrative template according to the logic of the HSPR Informing Decision-Making Pathways to Impact (see Appendix B). A corresponding guideline that accompanies the template and plans for an impact narrative repository to store and make the narratives publicly available are in development.

Scorecards and Dashboards

Scorecards and dashboards are useful tools for graphically displaying data to monitor progress to and achievement of impact. Scorecards are typically linked to the organization's strategic objectives while dashboards are used at an operational level to monitor key performance indicators. The scorecard results are both qualitative and quantitative and follow the structure of the pathways to impact. Scorecards and dashboards can be easily updated and therefore used to present the most critical impact results making them useful to stakeholders, such as researchers and decision-makers. Also, their parsimonious visual presentation makes them easily digestible, which can be very appealing to decision-makers who benefit from the translation of complex information to direct messaging.

Practical guidance for operationalization is needed to ensure the uptake of the Framework and its consistent and appropriate use.

Implementing the Framework

CHSPRA's aim in supporting the pan-Canadian vision and strategy is to assess the impact of HSPR at a national scale. Implementing the CHSPRA Informing Decision-Making Impact Framework provides a unique opportunity to engage various stakeholders from across Canada to assess the impact of HSPR at this level. To make this a reality, an implementation team will be convened to refine guiding principles and begin implementing recommendations.

Steps for Implementing the Framework

The Framework is a tool for assessing the impact of HSPR on informing decision-making. As illustrated in Figure 5, the Framework explicitly outlines hypothesized research-to-impact pathways and the core categories of each pathway. Pending stakeholder choice of impact categories and subcategories of interest, recommended indicators and metrics can be selected along the pathway to answer their questions using the core set of indicators and others. Accordingly, the Framework can be considered a tool for planning and assessment, as well as collecting data and analyzing impact in a systematic, consistent, and replicable manner that will eventually allow for rich, comparative analyses of the factors that enable and hinder informing decision-making impact. It was developed with a view to widespread application across the diverse array of organizations that comprise the HSPR enterprise, and for use at multiple levels, ranging from the level of individual research projects to large-scale collective action initiatives. Consistent the CAHS Impact Framework, it is intended to be used to assess retrospectively (what impacts did and did not occur and why), monitor performance during the research program, and prospectively plan where impacts are likely to occur.(13)

Recommendations from the literature and best practices are used to inform the process for making choices and decisions for monitoring and evaluation as well as assessing outcomes and impacts.(13, 24, 89-91) The implementation team will use a modified version of International School on Research Impact Assessment's (ISRIA) 6-block protocol (91) (see Appendix C) to ensure the recommendations are operationalized in a manner that is 'fit-to-purpose' for organizations willing to participate in the initial implementation. The protocol has been modified to guide the implementation of the Framework.

The CAHS Impact Framework includes a helpful and detailed overview of inappropriate uses ('misuse') of the framework, all of which are relevant to this Framework. Readers are encouraged to review section 3.1.a of the CAHS Impact Framework report (p. 67).(13) In brief, it is important that impact assessments are conducted ethically and with integrity. Impact assessments should be transparent in all aspects, including the framework used, the indicators selected, and the communication of the findings. It is equally important to report non-impacts. Transparency will help mitigate the challenges of double counting of impacts and the halo effect (i.e., focusing on impacts that show research in a positive light).

What the Framework Does Not Do

The Framework does not resolve the inherent challenges and complexity in assessing informing decision-making in health services and policy, therefore implementation will require users to tailor, test, and apply the Framework, which will take time. The Framework can help guide assessments, but it does not provide (or refine) the questions. Those doing assessments must generate specific questions related to their own assessment needs. Ultimately, impact assessment is only as good as the selection of impact categories, indicator sets, and available data. The menu of indicators is only a start; implementation may require developing more specific indicators.

Conclusion

The rationale for striving to inform decision-making with research evidence is the proposition that assessing and measuring the impact of policy, practice, resource allocation, and service delivery will ultimately improve patient and population health outcomes.(3, 4, 13, 62) It is often lamented, however, that research evidence is under-utilized by decision-makers.(52, 77) Whether or not HSPR is under-utilized and why, and what this means for decision-making processes and impacts, is not yet well understood empirically. The Framework outlined in this report aims to address this important gap.

There is growing interest in understanding and demonstrating the value (the "returns") and impact of research beyond academia. This report contributes to advancing the science and practice of health research impact assessment ("research on research"). Building on the widely recognized and used CAHS Impact Framework, this report proposes a new framework and menu of indicators for assessing the impact of research on informing decision-making – a domain of particular relevance to HSPR given the field's strong connection to the healthcare system, the increasingly mainstream practice of researchers and decision-makers working together to tackle complex challenges, and the rise of learning health systems. The Framework was developed through a collective action approach and reflects CHSPRA member organizations' shared goal to work together to better capture, understand, and convey the full value of HSPR.

CHSPRA is a relatively new alliance and its establishment in 2014 marked an important point in the trajectory of Canada's HSPR enterprise's evolution. Its establishment signaled a maturation of the community, evidenced in the interest to work together to achieve common goals. CHSPRA identified HSPR impact assessment as one of its two inaugural priorities and, given current emphasis on evidence-informed decision-making and the lack of a practical framework for assessing research impact in this domain, its member organizations recognized that such a framework would be an important and timely contribution to the field. Accordingly, the IAWG was established and set to work developing an evidence-informed, externally reviewed, practical framework for HSPR informing decision-making impact assessment.

The framework outlined in this report provides the basis for individuals, teams, organizations and alliances across the country (and in other countries) to undertake assessments of the impact of HSPR on informing decision-making and readily understand:

- Where and what kinds of impacts to anticipate (the Informing Decision-Making Pathways to Impact in Figure 5);
- Which indicators to use to capture impacts (and where there are gaps and opportunities for indicator development);
- What methods, tools, and data sources can be chosen for impact assessments;
- How to apply the Framework to "real world" assessments of HSPR impact; and
- The value that using standardized approaches to impact assessment has for comparability and generalizable lessons learned.

The Framework does not, however, provide a step-by-step instruction manual for users to follow verbatim. Depending upon the reason for evaluating HSPR impacts (be it accountability, advocacy, allocation, analysis), there are different sets of evaluation questions that will warrant consideration. Each impact assessment will need to consider the mandate of the organization/institution requesting the assessment, the specific evaluation/assessment question at hand, the stakeholders involved and their respective needs and goals, and the timeframe and cost of the evaluation. The present framework leaves these important questions to its users and recognizes that each impact assessment will, therefore, differ. This type of customization within a common framework and menu of recommended indicators will foster continuous learning and valuable comparisons of what works, why, and under which circumstances.

The ultimate utility of the Framework depends in part on the quality of the underlying data, and its contribution towards collective impact assessment depends on the development of common data collection platforms. Canada is rich in administrative data, but assessing the impact of HSPR on informing decision-making will also entail substantial investment in qualitative data collection.

CHSPRA envisions that its member organizations and others will use the Framework and indicators to assess the informing decision-making impact of the research they support and produce. It is hoped that as the Framework's use increases, and as assessments of HSPR impact on informing decision-making become increasingly sophisticated and widespread, the Framework's hypotheses of the pathways to impact will be further tested with a wider array of HSPR examples, and the "indicator menu," data sources, and data collection tools will evolve. As a starting point, the Framework will generate greater insight and knowledge regarding the nature and scope of impacts that HSPR has on informing decision-making and the methods, tools and techniques that can be harnessed to optimize its impact. It may also help inform research funding allocation decisions and program design to ensure optimal effectives and efficiency of investments, and help answer important questions, such as whether current HSPR investment levels are sufficient to meet the Quadruple Aim goals of improved population health, better patient and provider experience, and lower (or maintained) cost.

Recommendations

In order to implement the Framework, the IAWG recommends:

1.

The Framework and its corresponding core set of indicators should be endorsed and tested by CHSPRA member organizations and key partners.

The Framework is evidence-informed, incorporates international leading practices, and was developed through a collective action approach involving diverse organizations with a shared commitment to advancing the science and practice of HSPR impact assessment. The Framework provides a clear illustration and logic for the hypothesized HSPR-to-impact pathways, beginning with co-identification of target areas for research and progressing through to longer-term health and health system impacts. It places the decision-making PDSA cycle at its centre and recognizes the diverse sectors that influence and are influenced by HSPR. CHSPRA members should also acknowledge that the Framework and the recommended indicators are developmental. The process of validating the Framework, which includes testing the indicators, should move forward thoughtfully and in a way that facilitates continued learning and refinement. More specifically, the IAWG recommends that:

1.1 CHSPRA begin testing the Framework with demonstration projects in organizations with capacity to implement (e.g., evaluation resources, program that is assessable). This will promote efficiencies in implementation as well as refinement of the Framework and implementation process prior to further scale-up.

1.2 Organizations implementing demonstration projects develop 'fit-for-purpose' impact assessment plans using the modified ISRIA protocol outlined in Appendix C.

1.3 1.3 CHSPRA test the Framework and the recommended core set of indicators for collective impact initiatives (e.g., the Training Modernization Health System Impact Fellowships) and that CHSPRA member organizations test the Framework and indicators with their respective HSPR initiatives. Additionally, while the PDSA cycle is generally accepted in healthcare as a method for structuring quality improvement initiatives, consistent reporting of its application and adherence to principles is limited.(68) Testing the Framework provides opportunity to assess whether the PDSA cycle provides appropriate operational characteristics of the policy/decision-making process or whether further refinement is necessary. Alternatively, policy-making cycles could be substituted for the PDSA, with the similar intention to test and refine as appropriate.

1.4 That research organizations, including universities and funders, collaborate by sharing indicator data and benchmarking. However, careful consideration must be given to ensure standardized application so that the end comparison is 'apples to apples'.

1.5 That data collection is done carefully, with an approach that encourages critique of the data and integrates indicator data with qualitative narratives on impact as well as a formative approach to evaluating the data.

1.6 That sets of indicators rather than single indicators are used for impact assessments, recognizing that different combinations (sets) will be required based on the question being addressed.

1.7 That impact assessments are reported using the impact narrative template, with transparent reporting of the indicators used, and shared with the IAWG for analysis of the Framework's use and relevance.

2.

That CHSPRA strike a formal impact assessment secretariat to lead the pan-Canadian implementation of the Framework, monitoring of its use, and development of common platforms and tools for more robust and comparable impact assessments. This will provide the backbone infrastructure required for successful uptake, use, and ongoing improvement of the Framework. The IAWG recommends the secretariat:

2.1 Lead the development of common data collection and sharing strategies, commencing with standardized instruments for the qualitative indicators identified in the starting menu. Specifically, it is recommended that an informing decision-making impact stakeholder survey be developed to capture how research was used and to what effect. The survey should include standard questions (e.g., Researchfish questions) on informing decision-making to enable international comparisons.

2.2 Develop an indicator repository that uses the menu in this report as a starting point, and is available through an online open-source platform (similar to the RAND Online Measure Repository*).

2.3 Develop, test, and validate a core set of context indicators for use in all informing-decision-making impact assessments.

2.4 2.4 Develop a common HSPR classification scheme that harnesses work already commenced through the asset map, NAPHRO program mapping, and use of tools such as Researchfish and/or ÜberResearch.

2.5 Develop an online impact assessment repository for the impact narratives and case studies that use the Framework. Enhance and standardize the impact narrative template and guidelines for communicating impact.

3.

As recommended by the Indicator Review Panel, future development of the Framework and indicators should appropriately and thoughtfully address equity and inclusivity across a broad spectrum of communities (e.g., Indigenous peoples, LGBTTIQ+, rural/ remote communities, gender).

A first step in this regard could be to address the Truth and Reconciliation Commission of Canada's clear call to consult with Indigenous peoples on how best to address health inequities in their communities, which includes consultation on goals and assessing progress. With this in mind, CHSPRA would collaborate with Indigenous peoples on refining and developing the Framework and indicators to best capture impact of HSPR on decision-making. It would also be incumbent upon CHSPRA to broaden the scope of data collection sources and methods (e.g., community based approaches, indigenous methods, two-eyed seeing approaches).

There has already been grass roots uptake of the Framework in Saskatchewan with work between Indigenous peoples and the Saskatchewan Health Research Foundation (SHRF). The Indigenous Peoples' Health Research Centre (IPHRC) and SHRF are collaborating on a project examining how effective Indigenous community engagement and knowledge exchange can ensure the use of reliable quality evidence to achieve meaningful impact on the public health system on behalf of First Nations, Metis, and Inuit peoples in Saskatchewan. They intend to address the multi-faceted and structural issues underpinning Indigenous health and strengthen the links between evidence, knowledge, practice and policy in support of the public health goals of Indigenous peoples.

* *The RAND Online Measure Repository can be accessed at https://www.rand.org/nsrd/ndri/centers/frp/innovative-practices/measure.html*

The first two pathways in the Framework describe the co-identification of Indigenous health research problems and priorities, the conditions and evidence for translation and acceptance of research findings, guided evidence gathering, literature review, and interviews for this paper. SHRF and IPHRC have grounded this work in the Indigenous Cultural Responsiveness Theory (ICRT) (92) developed by Indigenous peoples in Saskatchewan. ICRT validates and supports Indigenous histories and inherent rights, and reframes, renames, reclaims, and restores Indigenous approaches to health and well-being. Three main concepts in the ICRT model guided understanding of the process: (1) restoration of Indigenous community-based health and wellness systems; (2) establishment of a "middle-ground" for engagement between mainstream and Indigenous systems and worldviews to support a mutually beneficial co-existence and foundation for reconciliation and respectful engagement; and (3) transformation of mainstream service delivery to become culturally responsive by guiding research that continuously improves the health, education, governance, and policies of Indigenous peoples. Synergies between ICRT and the work of CHSPRA will be explored.

4.

As recommended by the Indicator Review Panel, future development of the Framework and indicators should include the promotion, development, and strengthening of a learning health system in Canada.

Ensuring HSPR is a catalyst for health system transformation requires research and impact assessment be embedded within system processes. It is recommended that future work include refining and developing the Framework and indicators to reflect a robust characterization of the Canadian health system. Multiple methods should be used to address complexity, capturing stories of impact. Collaboration between the IAWG and the forthcoming Learning Health Systems Working Group will be key to furthering work in this emerging area.

5.

CHSPRA collaborate with others nationally and internationally to continue to advance the science and tools for HSPR impact assessment.

Countries worldwide are challenged with how to assess, measure, and communicate the true returns and impact of HSPR investments and much can be learned through international collaborations. Additionally, Canadian research funders are increasingly recognizing the value of international collaborations as a core element of funding programs, such as with the European Commission's Transfer of Organizational Innovations for Resilient, Effective, equitable, Accessible, sustainable and Comprehensive Health. This collaboration includes Canada, the United States, and over 25 European countries.(93) International collaboration to assess the impacts of these multi-country initiatives will be essential. A potential initial area for international collaboration is validating the Framework by piloting in the UK and Europe. Longer-term projects could build upon the Framework to develop a model to assess return on investment.

The Framework presented in this report is an important starting point for improving our collective knowledge of the impacts of HSPR. If Canada can implement these recommendations and begin to routinely collect data on and assess HSPR impacts, the potential benefits will be substantial. Some of these potential benefits include: improving the science and practice of HSPR impact assessment and leading internationally in "research on research"; improving our knowledge of key enablers and barriers to impact and whether they vary by context, which can be harnessed for improved design of research funding programs; conveying the importance and value of HSPR investments to the public, decision-makers and others; and, ultimately, improving the health and health system impacts that stem from HSPR-informed decision-making. In a time of economic uncertainty and scarce resources, evidence on how to fund impact-generating research can give Canada a significant edge in health services and policy R&D.

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Appendices

Appendix A

Twenty-three indicators accepted by the Indicator Review Panel, including a description of key factors to consider when selecting indicators for use*

Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Short Term: Collective Action to Co-Identify and Support HSPR Focus Area					
Problem and Priority Co-identification		• Important problems warranting HSPR attention are co-identified with decision-makers [number (#) and description of type of problems]	No	• Survey decision-makers, researchers • Document review (e.g., strategic plans) • Stakeholder interviews • Data validation exercise – annual keyword validation • End of Grant Reports	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
Targeted HSPR & Capacity Building	**Funding investments in programs and projects**	• Number (#) and type of HSPR funding programs/ projects according to HSPR priority theme areas • Trend in funding investments over time for HSPR [per cent (%) growth of HSPR funding over time, open and strategic, and by HSPR priority theme areas] • Partnered (co-invested) funding investments [name of organization, investment dollar ($) amount and per cent (%) total, area of research]	Yes	• Survey decision-makers, researchers • Document review • Stakeholder interviews • NAPHRO • CIHR Electronic Information System (EIS)	• Not recommended at individual level • Not recommended at group/department levels • Institution/Funding agency • Provincial/National
	Data Infrastructure	To be developed	To be determined	To be determined	To be determined

* *The indicators rated and ranked in the online surveys were presented as they mapped to the overarching theory of change sections (i.e., indicators were not displayed with their associated impact category/sub-category). As part of implementation, we will continue to identify the best indicators for each sub-categories as appropriate (i.e., sub-categories that do not currently have an accepted indicator), in conjunction with refinement and possible expansion of some subcategories.*

Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Short Term: Collective Action to Co-Identify and Support HSPR Focus Area					
Targeted HSPR & Capacity Building	**People**	• Trend in number (#) and per cent (%) growth of HSPR applicants and funded researchers at all career stages (e.g., masters, doctoral, post-doctoral, new investigator, mid-career, clinician scientist, embedded researcher)	Yes* **Availability is specific to CIHR funded data*	• Survey decision-makers, researchers (e.g., CIHR Career Trajectory Survey) • Document review (e.g., funder progress reports) • NAPHRO data • Statistics Canada National Graduate Survey • EIS (self-declared by applicant)	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Training	To be developed	Yes* **Numbers can be pulled from RRS*	To be determined	To be determined
Short-Term: Produce Conditions and Evidence for Translation					
Translatable HSPR Findings	**Nature of the research findings**	• Number of HSPR projects that include meaningful participation of patients or members of the public as appropriate	No	• Survey patients, public, researchers • Document review (e.g., funder progress reports) • Interviews with patients, public, researchers	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Communication of research findings	• Number (#) of end users satisfied with engagement with researchers	No* **Some of CIHR's initiatives have data in this area, including the Drug Effectiveness Safety Network (DSEN)*	• Survey decision-makers, researchers • Progress reporting for a select number of CIHR strategic initiatives (e.g., SPOR)	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
Receptor Capacity to Implement	**Individual**	• Number (#) of HSPR researchers engaged in capacity development with end user audiences	Yes	• Survey end users, researchers • Document review (e.g., funder progress reports) • Interviews with end users, researchers • Progress reporting for a select number of CIHR strategic initiatives (e.g., SPOR)	• Individual • Group/Department • Institution/Funding agency • Provincial/National

Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Short-Term: Produce Conditions and Evidence for Translation					
Receptor Capacity to Implement	**Organization**	• Number (#) of organizations whose primary purpose is not scholarship or education that support health services and policy researchers and/or trainees (over time)	Yes* **CIHR can use RRS and Application Data, however some limitations apply*	• Survey decision-makers/organizations, researchers, graduates from HSPR training programs • Document review • Interviews with decision-makers/ organizations, researchers, graduates from HSPR training • Application data/ annual reporting	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	System	• Number (#) and per cent (%) of policies that cite research evidence	No	• Survey policy/ decision-makers, researchers • Document review • Potential Bibliometric Analysis • Altmetrics (e.g., Google Scholar) (emerging)	• Not recommended at individual level • Not recommended at group/department levels • Institution/Funding agency • Provincial/National level
Intermediate: Inform Decisions about Health Services and Policy Innovations					
Plan	**Plan for decision(s)**	• Research evidence directly informed agenda setting, priority-setting, policy debates, briefings: e.g., invited policy papers and consultancies, information requests by decision-makers, invited meetings and interactions with decision-makers • Number (#) and per cent (%) of policy/ decision-makers' self-reported use of research	Yes	• Survey policy/ decision-makers, researchers • Document review (e.g., funder progress reports) • Interviews with policy/ decision-makers, researchers • Altmetrics (e.g., Google Scholar) (emerging) • RRS	• Individual (possibly) • Group/Department • Institution/Funding agency
Do	**Make decision(s)**	• Evidence of participation of researchers in process of making decisions (e.g., participation in policy networks, boards, advisory groups) • Research directly underpinned policy decision (e.g., legislation, regulation, program, practice, behaviour, service delivery)	Yes* **No (for second bullet)*	• Survey policy/ decision-makers, researchers • Document review • Interviews with policy/ decision-makers, researchers	• Individual (possibly) • Group/Department • Institution/Funding agency • Provincial/National

Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Intermediate: Inform Decisions about Health Services and Policy Innovations					
Study	**Assess and monitor decision(s)**	To be developed	Yes in future, not readily available	Special studies for CIHR supported research	To be determined
Act	**Act on assessment results**	To be developed	To be determined	To be determined	To be determined
Intermediate by Target Sectors					
R&D Community **Decisions involving: policies, practices, products, processes, behaviours**	**Funding**	• Leveraged funding from follow-on funding	Yes* **Data is self-reported*	• Document review • NAPHRO description and calculation • NAPHRO data	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Policy, Practice Process	To be developed	To be determined	To be determined	To be determined
	Training	• Number (#), per cent (%) and type of HSPR trainees (e.g., PhD, etc.) • Number (#) of HSPR trainees graduated	Yes	• Survey universities, graduates, researchers • Interview universities, graduates • Document review • Statistics Canada National Graduate Survey • HSPR asset map • Application data/ annual reporting • EIS, RRS	• Not recommended at individual level • Group/department levels • Institution/Funding agency • Provincial/National
Healthcare and Related Organizations **Decisions involving: policies, practices, products, processes, behaviours**		• Number (#) and per cent (%) of end users that reported HSPR evidence was useful • Number (#) and per cent (%) of policies with use of HSPR evidence in their development	Yes* **Some of CIHR's initiatives have data in this area, including the Drug Effectiveness Safety Network (DSEN)*	• Survey end users, researchers, policy/ decision-makers • Document review • Interview end users, policy/decision-makers • DSEN	• Not recommended at individual level • Not recommended at group/department levels • Institution/Funding agency • Provincial/National
	Data Infrastructure	To be developed	To be determined	To be determined	To be determined

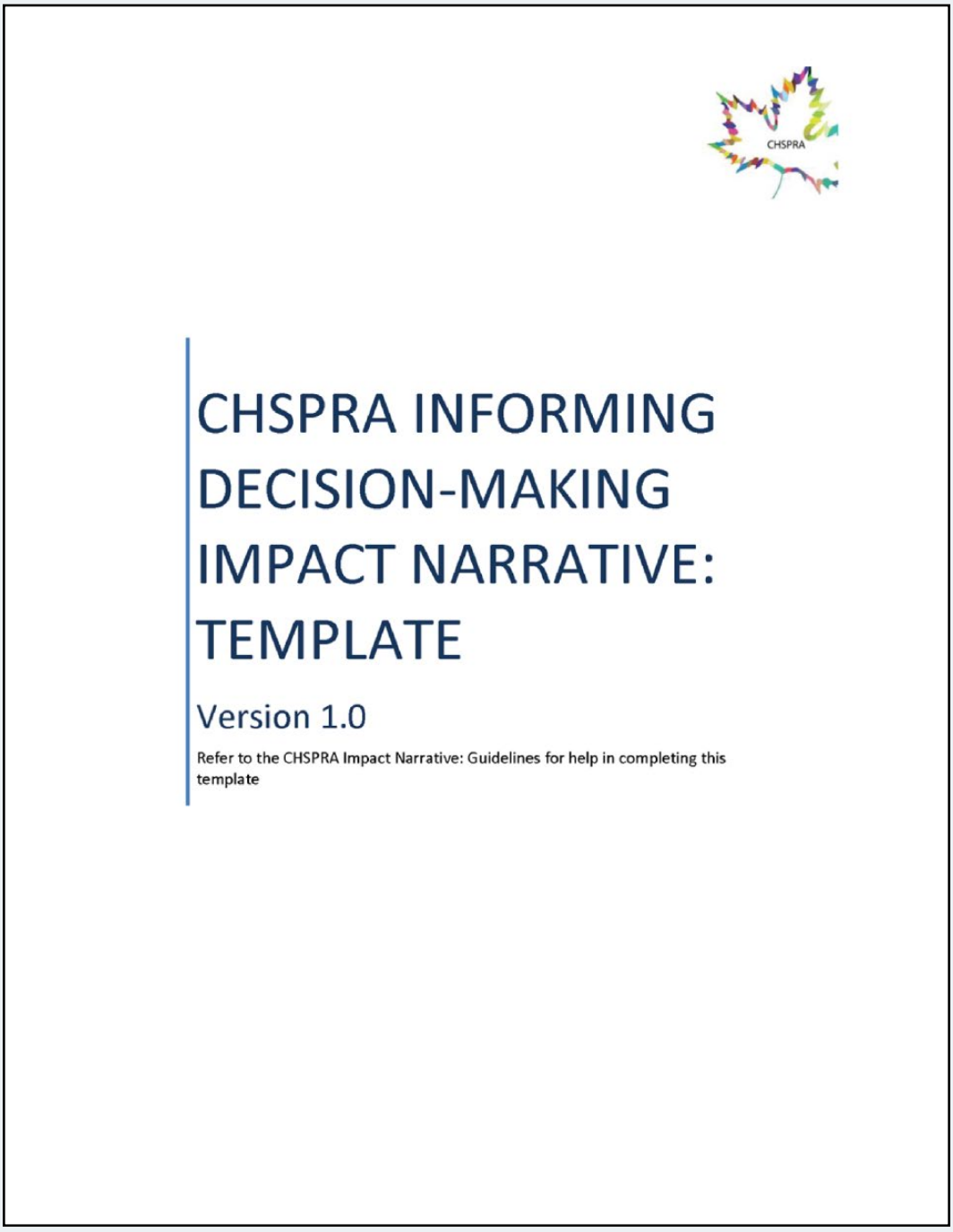
Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Intermediate by Target Sectors					
Healthcare and Related Organizations **Decisions involving: policies, practices, products, processes, behaviours**	**People**	• Trend in number (#) and per cent (%) of health services and policy researchers working in healthcare delivery, coordination or policy organizations	Yes	• Survey organizations involved in healthcare delivery, coordination or policy, researchers • Document review • Statistics Canada survey • Data from CIHR Training Programs (Vanier, Banting, etc.)	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Training	• Number (#), per cent (%) and type of HSPR trained staff (e.g., trainees, others) in healthcare delivery, coordination or policy organizations	Yes	• Survey organizations involved in healthcare delivery, coordination or policy, researchers • Document review • Statistics Canada survey • HSPR asset map • EIS, RRS	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Public Health	To be developed	To be completed	To be determined	To be completed
Industry	**Products/ Practices/ Processes**	To be developed	To be determined	To be determined	To be determined
Providers*		To be developed	To be determined	To be determined	To be determined
Public	**Advocacy group**	• Number (#) of health services and policy researcher and NGO collaborations	Yes	• Survey researchers, NGOs • Document review; • Interview researcher, NGO's • EIS	• Not recommended at individual level • Group/Department • Institution/Funding agency • Provincial/National
	Public literacy	To be developed	To be determined	To be determined	To be determined
Patient HSPR Literacy		To be developed	To be determined	To be determined	To be determined

* *Providers were added to the Pathways to Impact and indicator table as a target sector upon recommendation from the Indicator Review Panel at the in-person meeting on February 28th, 2018. This addition is also consistent with the Quadruple Aim framework.*

Impact Categories	Impact Sub Categories	Indicators and Metrics (revised)	Availability of Data	Data Sources and Collection Strategies / Tools	Level of Aggregation
Intermediate by Target Sectors					
Aspirational Indicators	**Public policy use**	To be developed	To be determined	To be determined	To be determined
	Media	To be developed	To be determined	To be determined	To be determined
Government **Decisions involving: policies, practices, products, processes, behaviours**	**Policy (tax, regulation, etc.)**	• Number (#) of public service and broader public sector organizations formally requiring use of research to inform health services and policy (over time)	No	• Survey public service and broader public sector organizations • Interview public service and broader public sector organization • Altmetrics (e.g., Google Scholar) (emerging) • Environmental scan of government/ organizations	• Not recommended at individual level • Not recommended at group/department levels • Institution/Funding agency • Provincial/National

Appendix B

CHSPRA informing decision-making impact narrative template*



* *Adapted from Alberta Innovates Impact Narrative Template (94)*

CHSPRA IMPACT NARRATIVE

Organization/Agency/Unit etc.

Click here to enter text.

Title of Research Project/Program/Policy etc.

Click here to enter text.

Name of Lead /Administrative Lead

Click here to enter text.

Contact Information

Click here to enter text.

Date

Click here to enter text.

1

Impact Summary

Click here to enter text.

Policy/Services Issue and Context

Click here to enter text.

Collective Action to Co-identify and Support HSPR Focus Areas

(Problem & Priority Co-identification; Targeted HSPR and Capacity Building)

Click here to enter text.

Conditions and Evidence for Translation

(Translatable Research Findings; Receptor Capacity to Use and Implement Research)

Click here to enter text.

Informs Decisions about HSP Innovations

(The Decision-Making Cycle; Health Services and Policy Innovation Domains; Health Services and Policy Target Sectors)

Click here to enter text.

References to Corroborate Impacts

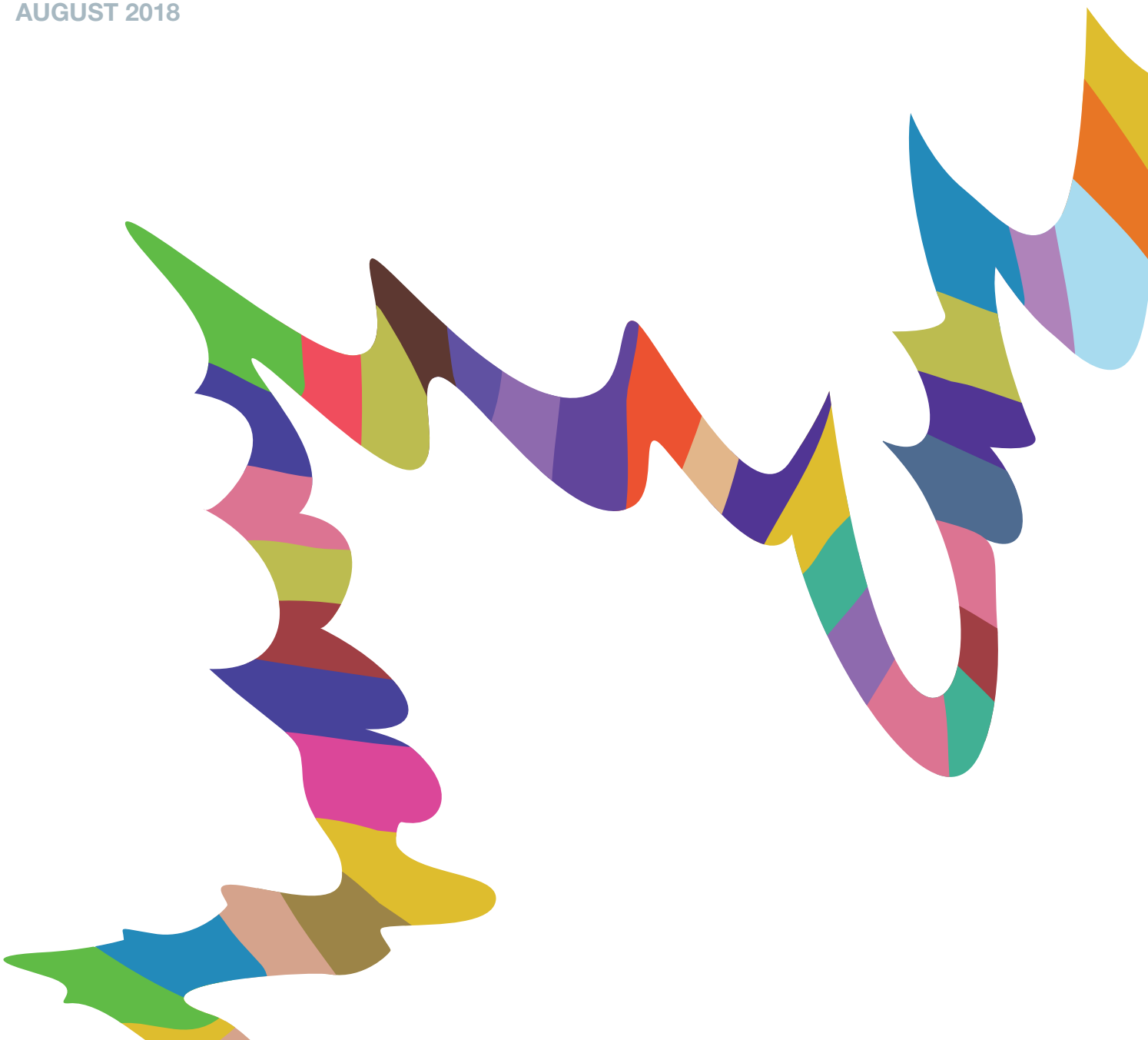
Click here to enter text.

Appendix C

Modified ISRIA protocol for developing and implementing the Framework*

Block	Definition
1. Understand the context	1.1 Describe the HSPR context, including the unit of analysis and document the relevant contextual and external factors that could influence or mediate the impacts. 1.2 Describe the requirements of the assessment 1.3 Develop a figure and text that expands on the context for the Pathways to Impact of interest to stakeholders
2. Identify the assessment purpose	2.1 Agree on the purpose(s) of the assessment with stakeholders (i.e., the 4As) 2.2 Define and prioritize general and specific impact assessment question(s) of interest to your stakeholders. This requires considering the appropriate balance between the assessment's rigor/comprehensiveness, timing/feasibility and cost (i.e., resource intensiveness, cost of data collection)
3. Define indicators of success	3.1 Based on the question(s), choose the impact categories (and subcategories) of interest to your stakeholders. Use the Pathways to Impact to inform where to look for impact (and sub impact categories) and the type of impacts anticipated (i.e., instrumental, conceptual, symbolic, imposed) 3.2 Be as specific as possible about what level being assessed (e.g., individual, group, institution, provincial, federal, international) 3.3 Choose from the twenty-three accepted indicators (or develop) a set of indicators and metrics that address the appropriate impact/ sub-categories categories (e.g., problem and priority co-identification; plan; do; policies; practices; products; etc.) that will address the assessment questions at the right level
4. Develop the design, methods and data collection	4.1 Develop the assessment design and choose appropriate methods and data sources to answer stakeholders questions at the right level 4.2 Analyze and manage the data
5. Communicate and use findings for improvement	5.1 Conduct the impact assessment and report the results to stakeholders with actionable recommendations to improve funding, planning and program design decisions 5.2 Communicate the results using multiple channels. An impact narrative can be written based on the results and intended audiences 5.2 Publish and share the impact assessment (including assessments that identified limited or no impacts), including lessons learned about the applicability and utility of the Framework

* *Table adapted from the ISRIA 6-block protocol for developing research impact assessment plans.(91)*

PREPARED BY THE IMPACT ANALYSIS WORKING GROUP OF THE CANADIAN HEALTH SERVICES AND POLICY RESEARCH ALLIANCE (CHSPRA)

AUGUST 2018