



CIHR IRSC

Canadian Institutes of
Health Research

Instituts de recherche
en santé du Canada

Canadian Pain Research Summit Report

Toronto ON

September 19-20, 2016

CIHR served as a convener of this event. Therefore, any opinions expressed in this document are those of Summit participants and not necessarily representative of the position of CIHR or the Institutes engaged in this process.

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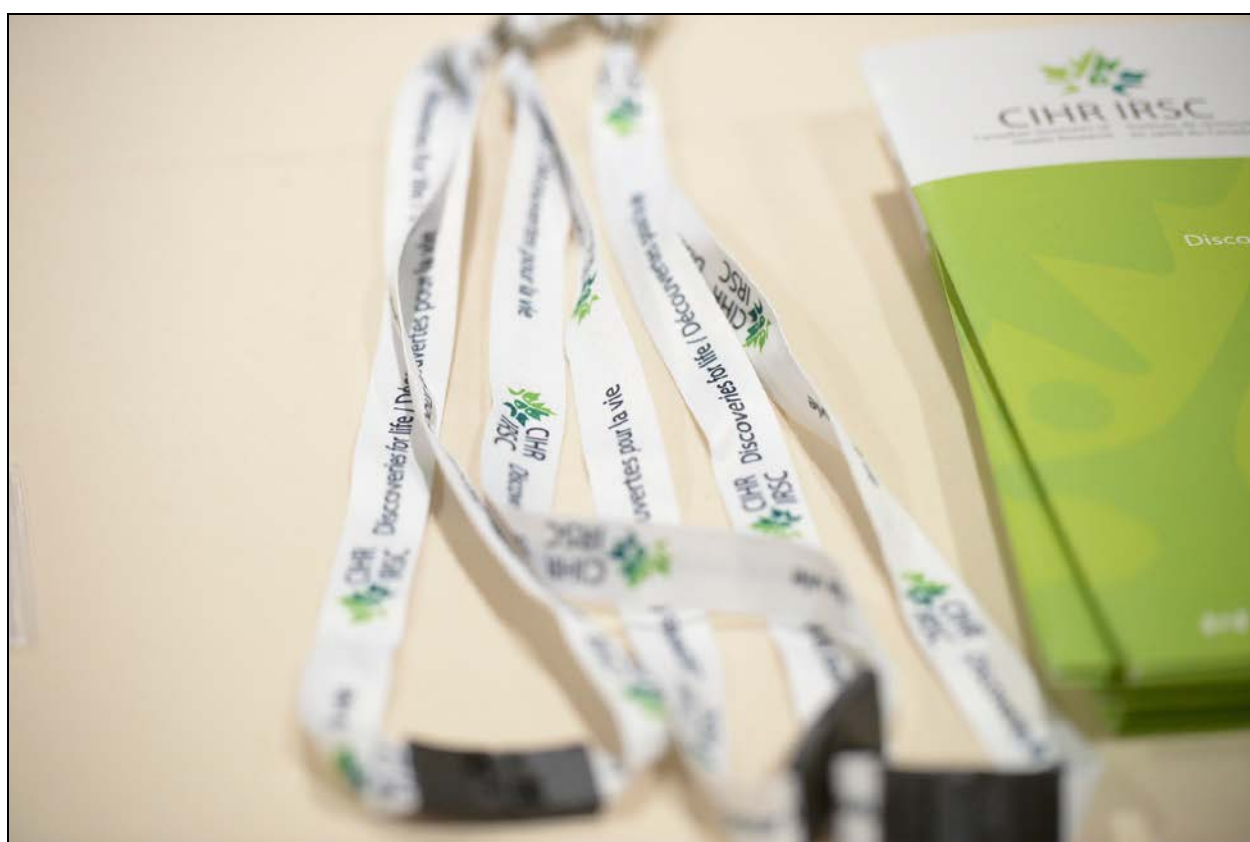
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Executive Summary

Unrelieved pain costs Canadians an estimated \$43-\$60 billion per year in health care expenditures and lost productivity, exceeding the cost of cancer, heart disease, and HIV combined [1][2][3]. Despite being the most common reason why individuals seek medical attention [2], existing therapeutics are often only partially effective [4], and pain care remains fragmented and difficult to access [1][2]. In Canada and the US alike, less than 1.5% of health research funding is typically devoted to pain research [5].

Recognizing a common interest in pain research, as well as the need for critical reflection on what funding agencies can do to better stimulate it, the Canadian Institutes of Health Research (CIHR) Institutes of Aboriginal Peoples' Health (CIHR-IAPH), Cancer Research (CIHR-ICR), Gender and Health (CIHR-IGH), Musculoskeletal Health and Arthritis (CIHR-IMHA), and Neurosciences, Mental Health, and Addictions (CIHR-INMHA) formed a Scientific Steering Committee (SSC) to:

- assess the pain research and funding landscape; and
- engage stakeholders in developing a Canadian Pain Research Agenda

The work of the SSC culminated in the Canadian Pain Research Summit, which brought together more than 125 researchers, clinicians, patients, and policy makers to identify and prioritize research gaps, opportunities to build on Canada's strengths in pain research, and encourage collaboration and networking among stakeholders. The two-day event consisted of expert presentations, panel discussions, and plenary and small-group discussions.

On both evenings of the Summit, the SSC met to synthesize the priorities and recommendations put forward by participants, and to identify possible synergies with the activities of CIHR's recently launched SPOR Chronic Pain Network. This process resulted in a short list of research focus areas related to two themes:

Theme 1: Translate basic pain research into novel targets for new diagnostics and therapeutics. Focus areas: measurement; phenotyping; sex differences; and pharmacological and non-pharmacologic methods.

Theme 2: Personalize pain medicine. Focus areas: fragmentation of care; pain across the lifespan; sex and gender in access to care and response to treatment; and Indigeneity.

Great interest was expressed in leveraging infrastructure and data sources that the SPOR Network will generate (e.g., a patient registry, Indigenous Health Advisory, and patient engagement mechanism) to accelerate clinical phenotyping, identify more clinically relevant endpoints for new therapeutics, and facilitate access to patient cohorts.

Introduction

Conference Overview

The Canadian Institutes of Health Research (CIHR) hosted the Canadian Pain Research Summit in Toronto, September 18-20, 2016. The Summit brought together more than 125 researchers, clinicians, patients, and policy makers from across Canada, and guest speakers from the United States and the United Kingdom (see Appendix 1, List of Participants). Representatives from seven CIHR institutes were also in attendance.

The Summit was organized by a Scientific Steering Committee (SSC) that consisted of pain researchers, representatives of the National Institutes of Health (NIH), the Nominated Principal Investigator of the Strategy for Patient-Oriented Research (SPOR) Chronic Pain Network, and the Scientific Directors of the CIHR Institutes of Aboriginal Peoples' Health (CIHR-IAPH), Cancer Research (CIHR-ICR), Gender and Health (CIHR-IGH), Musculoskeletal Health and Arthritis (CIHR-IMHA), and Neurosciences, Mental Health and Addiction (CIHR-INMHA) (see Appendix 2, Scientific Steering Committee).

The official objectives of the Canadian Pain Research Summit were to:

- identify opportunities to enhance the impact, coordination, and infrastructure of pain research across Canada;
- inform the development of an evidence-based Canadian pain research agenda; and
- encourage the development of new collaborations and initiatives.

The first day of the Summit featured a number of context-setting presentations, including an overview of Canada's SPOR Chronic Pain Network, summaries of the current state of basic and clinical pain research and therapeutics (with a focus on Canadian strengths and successes), lessons learned from efforts to develop pain strategies and research agendas in the United Kingdom, Europe, Australia, and the United States, and a comparative analysis from representatives of the NIH and CIHR of pain-related research funding in recent years (PowerPoint presentations available through [CIHR-IMHA](#)).



After the plenary session, participants separated into discussion groups, each of which focused on specific domains of pain research:

1. Pharmacological Management
2. Non-Pharmacological Management
3. Biopsychosocial Management
4. Sex and Gender
5. Models of Care
6. Patient Engagement in Research
7. Clinical Phenotyping



Each group began with a short presentation to provide an overview of Canada’s research and infrastructure strengths and gaps in that domain. Participants then worked to identify critical research and infrastructure priorities which they then presented in plenary for discussion. At the end of each day, the SSC reconvened to review, refine, and map these priorities to the two over-arching themes of the Summit: “Basic to Bedside – Crossing Valley 1 Successfully” and “Personalized Medicine – Treatment and Management.”

Day two of the Summit started with the SSC reporting its reflections on, and synthesis of the priorities identified on day one. Additional input was collected in plenary on what was missing from these priorities. Two expert panel discussions followed that focused on driving issues related to moving basic research results into successful clinical application, and achieving a successful personalized-medicine approach to the treatment and management of pain. The panel presentations served as the foundation for further small-group discussions in which participants identified the key implementation actions needed to ensure success in these areas 10 years from now.

The Summit concluded with a summary of the recommended implementation strategies, discussion of funding mechanisms that would be appropriate for pursuing them, and a final opportunity for participants to offer any additional suggestions. The SSC met immediately after the Summit to further synthesize and assess the priorities based on both implementation considerations and the plans of the SPOR Chronic Pain Network (see Appendix 4, Scientific Steering Committee Meeting Report).

Background

Unrelieved pain costs Canadians an estimated \$43-\$60 billion per year in health care expenditures and lost productivity, exceeding the cost of cancer, heart disease, and HIV combined [1][2][3]. Despite being the most common reason why individuals seek medical attention [2], existing therapeutics are often only partially effective [4], and pain care remains fragmented and difficult to access [1][2].

Over the past 15 years, CIHR has committed more than \$230 million to pain-related research, primarily through operating grants and initiatives aimed at capacity building. However, in Canada and the US alike, less than 1.5% of all health research funding is typically devoted to pain research [5]. Recognizing a common interest in pain research, as well as the need for critical reflection on what funding agencies can do to better stimulate it, the CIHR Institutes of Aboriginal Peoples' Health (CIHR-IAPH), Cancer Research (CIHR-ICR), Gender and Health (CIHR-IGH), Musculoskeletal Health and Arthritis (CIHR-IMHA), and Neurosciences, Mental Health, and Addictions (CIHR-INMHA) formed a Scientific Steering Committee (SSC) to: assess the research and funding landscape in the area of pain; and engage stakeholders in developing a Canadian Pain Research Agenda.

In early 2016 – not long after the SSC was formed – CIHR launched the SPOR Chronic Pain Network, committing \$12.45 million over five years to advancing research and training related to chronic pain. The SPOR Network leveraged more than twice CIHR's investment through partnerships with other stakeholders in the pain community. Conscious of the risk



Pain Summit Scientific Steering Committee (Back Row L – R): Dr. Norm Buckley (SPOR Chronic Pain Network), Dr. Hani El-Gabalawy (CIHR – IMHA), Dr. Gillian Einstein (on behalf of Dr. Cara Tannenbaum for CIHR – IGH), Dr. Mike Salter (SickKids), Dr. Mark Pitcher (NIH); (Front Row L – R): Dorothy Strachan (Strachan-Tomlinson), Dr. Anthony Phillips (CIHR – INMHA), Dr. Yves De Koninck (CRIUSMQ), Dr. Stephen Robbins (CIHR – ICR). Absent: Dr. Malcolm King (CIHR – IAPH) and Dr. Linda Porter (NIH).

of duplication of efforts, the SSC invited the SPOR Network's Principal Applicants to the Summit. Dr. Norm Buckley, the Nominated Principal Applicant, served as both a member of the SSC and a guest speaker to help identify opportunities to maximize synergies and minimize duplication of effort between the SPOR and any ground covered by the Summit.

Opening Remarks

Margaret Lavallee, Elder-in-Residence at the Centre for Aboriginal Health Education, Rady Faculty of Health Sciences, University of Manitoba, gave opening remarks on behalf of Canada's Indigenous people at the pre-summit dinner on September 18. She emphasized the importance of including First Nations people in health research processes.

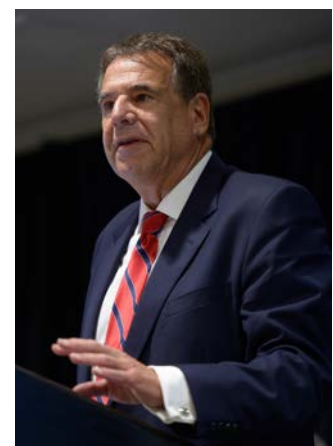


In his post-dinner talk, **Dr. William Maixner** of the Duke Centre for Translational Pain Medicine encouraged researchers to consider the spectrum of factors that play a role in how individuals experience pain, from biological and environmental to psychological. As a guiding principle for pain research, Dr. Maixner noted most acute and chronic pain conditions are manifested by a mix of phenotypes that change over time and result from genotype and environmental interactions. Barriers to moving pain research forward, he observed, could be addressed by amalgamating communities (i.e., the research community, public sector, industry, patient advocates and federal agencies) that enable data collection, sharing, and translation into patient care.

Margaret Lavallee, Elder-in-Residence at the University of Manitoba, speaks during the Summit plenary session.

On the morning of September 19, **Dr. Hani El-Gabalawy**, Scientific Director of CIHR-IMHA, welcomed participants and thanked presenters and organizers. He confirmed the host Institutes' commitment to a transparent and well-informed process for creating a Canadian pain research agenda. He stressed the importance of external partnerships to maximize funding and collaboration, and support implementing new knowledge into practice in Canada's unique healthcare landscape.

Dr. Alain Beaudet, President of CIHR, noted in his welcome that pain is a neglected topic that is too often viewed as a symptom rather than a disease—despite being the most common reason for Canadians to seek health care. He expressed pride in Canada's role as a leader in pain research, which includes having developed a pain assessment tool that remains one of the best in the world. Tackling this complex issue, he said, requires breaking down silos and strengthening collaborations, including public-private partnerships.



Dr. Alain Beaudet, President, CIHR.



*Dr. Malcolm King, Scientific Director,
CIHR – IAPH.*

Dr. Malcolm King, Scientific Director of CIHR-IAPH, extended a welcome on behalf of the Mississaugas of the New Credit First Nation. He emphasized the importance of an historical understanding in ensuring Canada’s Indigenous people are an integral part of the agenda. The issue, he said, is not just about the absence of pain and illness but also about achieving a balance of physical, mental, emotional, and spiritual health. Dr. King commented that closing gaps in health outcomes for all Canadians and combining western and Indigenous knowledge – or using “two-eyed seeing” – are key to achieving success.

Facilitator **Dorothy Strachan**, of Strachan-Tomlinson, walked participants through the Summit agenda and process including guidelines for working together such as the need for diverse perspectives and to take a “realistic stretch” in identifying research priorities. She emphasized a strong focus on implementation. Key assumptions underlying the Summit she identified were: a cross-spectrum view of pain; an outlook spanning 2016 to 2025; the need to address both gaps and opportunities; that further funding would be required; and that any resulting strategy would be a living document to be revisited and revised over time.



Session A—Maximizing the Summit: An Opportunity for Breakthrough Synergies

The Summit/SPOR Partnership

McMaster University's **Dr. Norman Buckley**, the Nominated Principal Applicant for the SPOR Chronic Pain Network, summarized its structure, key projects, and progress to date. The Network, which involves 15 principal applicants, 23 co-applicants, and over 150 participants, will focus on developing a national pain registry, training and mentoring for researchers and educating health care professionals, knowledge translation, patient engagement, and the creation of an Indigenous health research advisory.



Key Plenary Discussion Points

- **Sex and gender:** All Network projects are being reviewed to ensure inclusive patient surveys. The Network acknowledges the need to address large gaps in basic knowledge about the significance of sex and gender.
- **Network advisory committee membership:** The Network is approaching interested individuals to join its advisory committee for which two-year memberships will ensure broad engagement, productive turnover, new ideas, and knowledge translation (KT).
- **Network role in translating clinical-care delivery:** While translation from known clinical leading practices to policy and care delivery is not overtly part of the Network's structure, there is growing interest in this area with long wait times resulting from prescription issues. Therefore the Network is reviewing this with the SPOR Network in Primary Care.
- **Network patient engagement:** Engaging patients in projects is central to the Network which is working with patient engagement groups to educate patients and researchers on effective interactions.
- **Education and training initiatives:** The SPOR Network engages and supports collaborations between researchers, and has identified a need for significant lobbying of educational institutions and professional organizations to improve pain education and competencies for health care professionals. The SPOR Training and Mentoring Committee is building on existing training initiatives and embarking on an environmental scan to identify others.

Session B—Current Basic and Clinical Research: Success Now and in the Future

Drs. Yves De Koninck and Mary Lynch provided participants with an overview of the current state of basic and clinical research in Canada as a foundation for the day's discussions. The plenary discussion that followed served to identify gaps and as-yet unaddressed opportunities in pain research in Canada beyond what is covered by the SPOR Network mandate.

Basic Pain Research: Defining New Horizons

Dr. Yves De Koninck (Laval University) highlighted some of the challenges and opportunities faced by basic researchers in the study of pain, which he noted is a highly complex and emotional subject. Canada is well ahead of other countries in many sub-fields of pain and neuroscience, in part due to its strength in basic research. Challenges included determining what occurs between the point of injury and the brain, how the brain modifies the signal, and how to untangle comorbidities and model the correct pathology. Dr. De Koninck stressed the need for collaboration between the basic and clinical communities, more systematic work across labs, the identification of new pain-specific targets, improved understanding of inter-individual differences, better ways to translate the measurement of pain in animals to humans, and to link work at the cellular level to behavior. He closed noting that new technologies could give rise to innovative therapeutics.



Challenges for Clinical Pain Research and Therapeutics

Dr. Mary Lynch (Dalhousie University) identified Canada as a leader in clinical pain research, therapeutics, and clinical trials. A particular strength, she said, is in developing pain assessment tools such as the McGill Pain Questionnaire, which is widely used around the world. Areas of focus include measuring pain in infants, in children with cancer, and immunization pain. Examples of Canada's leadership in translating evidence into care include a successful social-media campaign on simple techniques to assist with children's pain, ongoing participation in the international Child Kind initiative, systematic reviews and efforts to put guidelines into clinical use, the development of a pain curriculum for schools, and hosting the first International Pain Summit in Montréal in 2010. Canada has been a leader in the clinical study of pain in the cardiovascular realm, fibromyalgia, sleep and pain, bedside interventions, waitlist



impacts, biopsychosocial aspects, transitional pain, and pain and imaging. Pain medicine, Dr. Lynch noted, is highly politicized, and the under-treatment of pain is a challenge fuelled by fear of addiction. She closed noting pain management is a fundamental human right and that a more efficient research program is needed to maximize use of the limited resources available.

Key Plenary Discussion Points

- **Basic vs. behavioural pain research:** While our affinity to address the neurobiology of interpersonal parameters of pain is important, focus should be on basic science in behavioral and social sciences and on public and population health including behavioral therapy, psychological interventions, and self-management.
- **Non-pharmacologic treatment and implementation of current knowledge:** Not enough research is focused on non-pharmacologic management. Focus is needed on ways to reduce opioid usage with other approaches, such as exercise. Treatment that is known to work should be made accessible now to those who need it. Realistic goals include continuing with critical basic science research but also translating what we know into patient care. Convincing policy makers to endorse and implement existing research findings can be a closed door but the field of pain research is very young. Technology will accelerate finding cures, but translation takes time.
- **Technology in pain research:** Technology is a useful tool for bridging basic research in animal models to behavior-oriented areas, and is needed to assess pain in normal environments, so caregivers can monitor people rehabilitating at home.
- **Collaboration between funders:** A representative of the Natural Sciences and Engineering Research Council of Canada (NSERCC) is needed to engage in this discussion. CIHR needs to collaborate more to bridge these disciplines.
- **Two-way collaboration with Indigenous people:** The ways in which scientific knowledge, research, and practice have been translated to “help” Indigenous people have been fraught with problems due to very little two-way collaboration. Western and Indigenous ways of approaching pain are totally different. Indigenous people must be included to work with scientists to bridge understanding. Knowledge Translation is not something that should be decided for Aboriginal people — it should happen in both directions.
- **Culturally diverse perspectives:** Canada is culturally diverse, but we think of pain from a white, Anglo-Saxon perspective. In some cultures (e.g. in Africa and Asia) people don’t consider being in pain because they think it is something you live with.

Session C

National Pain Research Strategies: Research Agendas, Priorities, and Funding

Three speakers delivered presentations on the status of national pain research strategies, priorities, and funding patterns in other parts of the world to provide some insight into lessons learned that could be applied to the Canadian context.

Europe, Australia, and the UK

Professor Gary Macfarlane (University of Aberdeen) reported that, while some countries in Europe and Australia had pain strategies identifying research as important, few contained specific research priorities.

United Kingdom funding is directed to an eclectic mix of research, although a specific arthritis pain research strategy is informed by consultations and evidence scans.

The Scottish Intercollegiate Guidelines Network's general research recommendations include: the timing of

intervention and referral; enhancing patient-practitioner interaction; and predicting response

to treatment. In Europe, an umbrella organization, the Societal Impact of Pain, advocates for

research on exactly that and encourages patient involvement in developing priorities. Research

is one arm of **Australia's pain strategy**, with goals ranging from the development of a research agenda for pain to the translation of evidence across the research spectrum and the

communication of findings to patients.



United States

Dr. Linda Porter (National Institute of Neurological Disorders and Stroke [NINDS], National Institutes of Health [NIH])

summarized efforts in the United States. With a national pain

strategy in place and implementation underway, the US is

working on a federal pain research strategy to optimize

scientific advances aimed at relieving the burden of pain. A

trans-agency pain research coordinating committee composed of policy makers, researchers, and advocates/people with pain

has been tasked with synthesizing an overview of current research; identifying barriers, gaps,

and opportunities from other fields; considering new technologies and approaches; and

developing a set of overarching, prioritized research recommendations. Closely aligned with the

National Pain Strategy (NPS), the federal research strategy will look at the continuum of pain

and address emerging priorities in the areas of clinical assessments, predictors, mechanisms, precision medicine,¹ self-management, and healthcare systems. Initiatives related to opioid problems in the US have helped drive both strategies forward. Lessons learned so far include the importance of community and stakeholder engagement and the critical need for more resources.

Key Plenary Discussion Points

- **Cancer pain research in the US:** Only one research study funded in the UK was on cancer pain, but we must consider pain across all specialties. Cancer pain is not specifically highlighted in the US NPS, but is contemplated. Cancer treatments can cause unremitting pain, and there are more numbers of survivors with pain due to increased survival rates.
- **Need for an NPS:** The fundamental question is whether it is possible to have a national pain **research** strategy without an NPS. Seeing what is missing and filling in gaps is important, whether it be through a defined national pain strategy or careful consideration of needs. Efforts to develop an NPS in Canada helped get the federal research strategy off the ground and brought together important voices and issues. In British Columbia, creating a pain strategy first enabled leveraging funding. Development of a pan-Canadian research strategy, could be used to leverage a broader effort.
- **Partnering with industry:** Industry can be a good source of research and knowledge for developing pain research strategies. In the US, the working groups on the NPS include an industry perspective, which is key to filling gaps and addressing needs to move pharmacologic innovations forward. In Scotland, industry is involved as a stakeholder.
- **Communicating the issue of unmet pain:** Discussing unmet pain in Canada has been a battle. US pain-strategy discussion loses focus on unmet pain when it turns to the opioid issue. No strategic approach yet addresses that messaging, although advocacy groups and professional organizations have helped convince the government to incorporate language related to pain-care needs in communications.
- **Implementation of existing data:** The sustainable implementation of integrating collected data is challenged by lack of resources. With the NPS in the US, pairs of agencies take the lead on specific objectives and pull together resources for them. Standardizing data collection across centres and trials is another challenge, even at the UK's National Health Service (NHS). Health services need to tap into expertise required for implementation science beyond skills used for simply generating information.

¹ The terms “precision” medicine and “personalized” medicine were used interchangeably throughout the Summit.

- **Government roles in pain research:** Pain and pain research are political. While an international movement claims government has too big a role, government bodies like CIHR have made most of the progress in pain research. Communities must become involved to sustain government engagement, to encourage public willingness to pay taxes and industry interest to contribute. Obamacare² resistance is a good example: the general public doesn't understand what it has done for them. People in the UK want everything from the NHS but still want to pay less tax.
- **Funding for non-pharmacologic treatment research:** The UK has taken a population perspective to see what can reasonably be delivered to patients and found a compelling case for non-pharmacologic approaches leading to more funding for research studies and evidence, for example, about the effectiveness of exercise for musculoskeletal pain. Adherence and service delivery remain a challenge but initiatives are unfolding that could help raise the profile of those therapies. US Patients are interested in these therapies. The NIH is looking at developing an evidence base for non-pharmacologic treatment.

Canada

Dr. Mark Pitcher (NIH) provided a comparison of NIH and CIHR funding trends in pain-related research, based on the average of operating grants awarded over fiscal years 2012-13 to 2014-15. He noted many similarities (e.g., peer-review processes and research themes) despite some basic differences between the two bodies. For example, pain-focused operating grants represented about 1.6 percent of CIHR's total number and 2.3 percent of NIH's. The CIHR Institutes most involved in pain-relevant research were (in order of amount of research) CIHR-INMHA, CIHR-IMHA, and the Institute of Human Development, Child and Youth Health (CIHR-IHDCYH). In the US, NINDS, the National Institute on Drug Abuse (NIDA), and the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMS) topped the list for the NIH. The research theme of biomedical/basic represented 50 and 51 percent of CIHR and NIH operating grants respectively, with clinical research representing 38 percent for both. A key-word search of abstracts revealed gaps and potential opportunities in the areas of non-pharmacological approaches and



² The Patient Protection and Affordable Care Act (PPACA), commonly called the Affordable Care Act (ACA) or Obamacare, is a United States federal statute enacted by President Barack Obama on March 23, 2010

prevention strategies, transition from acute to chronic pain, biopsychosocial comorbidities (e.g., mental health and sleep), prevalent conditions (e.g., arthritis, low back-pain), and vulnerable populations (e.g., elderly, women, Aboriginal people).

Key Plenary Discussion Points

- **Existing gaps in research:** Surgical approaches seem to be missing from these analyses and would be useful to include. Discussion of gaps should be handled with caution, as giving more to one area means giving less to another. While some highly funded areas may not seem deserving, others seem to deserve more because they hold the best opportunities.
- **What is Canada currently spending on pain?** Knowing what Canada currently spends on healthcare related to pain and what taxpayers pays toward the cost of various diseases, including chronic pain would be helpful. A University of Toronto paper estimated the incremental cost of chronic pain in Ontario at about \$1,700 per patient per year, which, extrapolated to 20 percent of the population, comes to about \$11 billion in direct medical healthcare costs.
- **Unfunded pain research applications:** Data on applications that did not receive funding would also be interesting to know, as there is a perception that pain-related proposals receive less funding than others.

Session D

Expanding Knowledge via a Canadian Pain Research Agenda

Each small group in this session focused on a key area of pain research and was asked to discuss strengths and gaps in Canada related to that area, identifying the most promising research priorities in each. After the stage was set with a short presentation given by an expert lead in each area, the groups were asked to think of gaps and opportunities arising out of a given list of criteria for selecting research priorities. A facilitator at each table kept the discussions on track, while a recorder noted the key outcomes, key points of which were then presented in plenary.

At the end of this exercise, which closed out the first day of the Summit, the SSC collated the results, including input from the day's plenary discussions, and added its own insights. The SSC's summaries of the research priorities for each area were presented to participants the following morning for discussion. These priorities and key plenary discussion points are as follows for each focus area.

Focus Area 1: Pharmacologic Management

Group Lead: Dr. Mark Ware, McGill University Health Care

Dr. Mark Ware in his presentation on "Pharmacologic Management: Opportunities and Gaps," discussed existing opportunities in Canada as including the newly funded SPOR networks, Canada's extensive health data registries, existing provincial prescription monitoring programs, strong patient engagement, and a strong basic-science network. Dr. Ware identified new approaches to cannabis that include the establishment of a Canadian National Drug Observatory, research priorities workshops, and the development of focused, formal research networks in Australia, the Czech Republic, and the US. Dr. Ware suggested that, in 10 years, we would want to have new drugs available, better use of old drugs, appropriate places for drug therapy in the broader pain management context, careful monitoring of drug use, and reduced or rationalized costs of drug therapy.

Top priorities from the Pharmacologic Management small-group discussion:

1. Improve measurements of pain in clinical, pre-clinical, and real-world settings.
2. Develop means to distinguish addiction from tolerance and dependence.
3. Evaluate the interaction between pharmacological and non-pharmacological interventions and the effectiveness of combining them.
4. Investigate opportunities to prevent the transition to chronic pain (post-operative).

5. Identify new targets that enable the development of chronic pain-specific medicines.
6. Teach old drugs new tricks.
7. Identify causes of overuse (biological to social determinants).
8. Implement the measurement of pain in clinical, pre-clinical, and real-world settings.
9. Build on the strengths of registries to inform an individualized approach.
10. Evaluate cost-effectiveness.

Key Plenary Discussion Points

NOTE: Important nuances were added to the priorities during plenary which were not captured in the original wording. As the plenary discussion progressed, additional themes arose from what collective summit participants considered to be important to this area.



Bridging Gaps: Pharmacologic and Non-Pharmacologic Methods, Basic Research, and Clinical Application

Researchers, clinicians, and healthcare practitioners tend to work exclusively in either the non-pharmacologic or pharmacologic realms, but need to collaborate on how to integrate the two methods. Not including researchers results in devising improperly informed research models. Patients likewise must be included. Excluding any of these groups will worsen the gap between basic and clinical research translation.

One solution suggested to bridge gaps was to create a national database and registry to enable many points to be looked at through long-term follow-up using outcome measures (e.g., look at pharmacologic management, then randomize anyone who wants non-pharmacological interventions as add-ons). CIHR-IMHA could support research networks to build multi-disciplinary teams.

Regarding **Priorities 5** (new targets) and **6** (teaching old drugs new tricks) above, it must be remembered that pharma does not always mean pharmaceutical: herbal and whole plant medicines must be considered at some level.

Issues of Addiction

Priority 2 (distinguish addiction from tolerance and dependence) discussion was that it should include the concept of pseudo-addiction to encompass patients who are using drugs for the intended use of pain control but behave and are treated similarly to addicts because those drugs are not meeting their pain-control needs. The word “trauma” was recommended for

Priority 4 rather than “post-op.” “Medication overuse” was specified for **Priority 7**. Policy makers are looking to the pain-research community to develop the necessary tools to determine tolerance and addiction development and behaviour.

Measurement of Pain

Participants suggested that while **Priority 1** (measurement of pain) is about identifying the causes of addictions, its subtext should be to implement solutions. The implication of measurement in **Priority 8** is to capture the full spectrum of pain and its impact on quality of life. This kind of measurement would be required to accomplish cost effectiveness (**Priority 10**). The pain measurement landscape changed dramatically with the introduction of the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) measurement approach. It was thought that cost effectiveness was already embedded in the measurement of pain, but there still is no measurement of other impacts of pain.

Pain Management

Participants discussed concerns about pain in **Priority 4** (transition to chronic pain) as beyond post-operative, requiring that both short and long-term use of medications need to be examined. People wait so long for referrals that it is not uncommon for some to deal with pain for 10 years or more before diagnosis, becoming addicted to pain medication by the time of diagnosis.

Recognized Need for Personalized Medicine

The statistical and analytic techniques used in randomized controlled trials (RCTs) means that individual differences in the efficacy of a drug are not represented. A more efficacious way must be found to meet patient needs, and that will require looking more at statistical techniques that consider the individual. There is an appreciation that nobody behaves like the “mean” in “mean response,” but this topic needs to be opened up to international collaboration to include population studies beyond those in Canada.

Bringing Knowledge to Action

A lot of the work being called for in this set of top 10 priorities was noted as already having been or in the process of being done both in basic research and clinical practice. Current needs include evaluating the effectiveness of that work and looking at other options in practice. A wealth of potential sources of research exists at the primary care level. Networks of primary-care practitioners are in place across the country using practice-based research systems. The next step is that researchers need to switch their thinking from doing what they think needs to be done to asking people what they need to improve, and to how to move in that direction.

Efforts should be made to engage the communities behind the non-traditional services that chronic pain patients are turning to (e.g., physiotherapy, massage, traditional healing), in order

to build registries that can include pharmacologic data. The challenge is to determine, in the most unbiased way possible, whether a particular strategy will be helpful for the majority of patients. The SPOR Chronic Pain Network will be having a multi-staged launch for an innovative program that will look at real-world clinical trials which may address questions being raised about applicability and feasibility.

General Comments

There needs to be more discussion about the need for integration and a comprehensive structure/conceptual model (that would include biopsychosocial) within which all of these observations could fit. It was noted that the word “acute” was not on the list, and that is also an important area of pain research to be explored. It was further observed that some objectives are much bigger and more demanding than others.

Focus Area 2: Non-Pharmacologic Management

Group Lead: Dr. Kathleen Sluka, University of Iowa

Dr. Kathleen Sluka defined non-pharmacologic treatments as active self-management (e.g., education, exercise, relaxation) and passive caregiver (e.g., mobilization, massage, acupuncture, transcranial magnetic stimulation). Sources of non-pharmacologic treatment include primary care advice, physical therapy, chiropractic, massage therapy, and consultation with psychologists. Recognized strengths of this pain management include strong evidence for the effectiveness of exercise and positive risk and cost benefits. Canadian strengths include:



rehabilitation researchers in education/self-management, exercise, and electrotherapeutic modalities; researchers with interest in non-pharmacologic therapies; and the national health care system generally. Weaknesses include limited high-quality clinical trials, poor understanding of mechanisms of action, lack of clarity in effective dosing and how treatments interact with other therapies. Dr. Sluka identified gaps including the need to determine underlying mechanisms of action to provide a mechanism-based approach to treatment; how non-pharmacologic treatments interact with pharmacologic treatments; what parameters of non-pharmacologic treatments would provide effective outcomes and good adherence; and cost-effectiveness and risk-benefit analysis for non-pharmacologic treatments.

Top priorities from the Non-Pharmacologic Management small-group discussion:

1. Identify mechanistic, phenotypic, and biopsychosocial predictors of adherence and therapeutic response.
 - a. Determine underlying mechanisms of action and predictors of effectiveness of non-pharmacologic therapy to provide a mechanism-based approach to treatment.
 - b. Consider various cultural, geographic, and institutional environments.
2. Determine the targeting and dosage of non-pharmacological interventions to improve adherence and outcomes of non-pharmacological management.
 - a. Test stratified or targeted interventions.
3. Develop innovative measures and clinical research designs that support innovation in pain research.
4. Determine the extent to which life events, cultural perspectives, trauma, values, and beliefs act as mediators to adherence and pain outcomes; test associated personalized interventions.

Key Plenary Discussion Points

NOTE: For clarity, the plenary discussion suggested refining the language of these priorities to ensure more patient- or person-centred phrasing. For example, the word “adherence” in Priorities 1 and 4 connote that the patient has to do what he or she is told.

Variety of Funding Opportunities

For both pharmacologic and non-pharmacologic approaches, it is hoped that CIHR would fund methods other than just RCTs, as there are other rigorous qualitative methods available.

Respect for and Inclusion of Indigenous Health Knowledge

Support for the Indigenous perspective is important, but researchers must come alongside Indigenous people and those using alternative medicines with “two-eyed seeing”³ rather than looking with only a western lens (“one-eyed seeing”). The point was made that there is no “alternative medicine” – there is medication and non-medication, and its use should be based on patient choice, culture, etc. There is a bias here, and we have to be careful with the words we use.

³ “Two-eyed seeing” is the guiding principle of integrative science, a traditional Mi’kmaq understanding about the gift of multiple perspectives. The term was first used by Mi’kmaq Elder Albert Marshall in the Fall of 2004. Please see: <http://www.integrativescience.ca/Principles/TwoEyedSeeing/> for more information.

Knowledge Translation and Education

Communication between patients and doctors needs to be clear and could benefit from having an intermediary attend appointments to explain medication use and assist with recall afterwards.

Prevention

Further investigation is needed into prevention and determining whether intervening in adverse life events (e.g., adverse childhood events) could prevent pain.

Rethinking the Value of Non-Pharmacologic Pain Treatment

Hierarchical views of treatments traditionally place, non-pharmacologic approaches like massage at the bottom, and pharmacologic at the top. Biopsychosocial approaches should not be separate from non-pharmacologic. It was suggested that the top pharmacologic and non-pharmacologic priorities could be integrated and all of the interventions rephrased.

A Canadian Pain Strategy vs. A Canadian Pain Research Strategy

It is important to consider whether it is best to undertake a Canadian pain strategy before or in parallel with a pain research strategy. The community has a tremendous wealth of insight, and that is part of a pain strategy but not necessarily of a pain research initiative. If we focus on the latter, we need to understand how these approaches work or come up with something that might be broadly applied to the population in a safe way.

Focus Area 3: Biopsychosocial Management

Group Lead: Dr. Ken Craig, University of British Columbia



Dr. Ken Craig's presentation for this group highlighted Canada's many strengths and successes in the area. He noted that, although the biomedical model is dominant in clinical practice, research, health care delivery and policy planning, it is largely based on a general understanding of acute pain, which excludes chronic pain. Focus on reductionist, biological mechanisms, can lead to ignoring the complexity of pain (emotional, cognitive, behavioural, social) and determinants other than tissue damage, and to downgrade the usefulness of psychosocial interventions. Because many people do not benefit from conventional pain treatment, focusing research on psychosocial processes can lead to improvement in pain

treatment. The presence of pain, its perception, expression, maintenance, exacerbation, and respite are caused to some extent by social factors. Research opportunities and gaps in this area include balancing emphasis on socio, psycho, and bio factors; pain assessment; fostering a developmental perspective on psychological and social mechanisms; more support for trials of psychosocial interventions; prevention; attention to vulnerable populations; technological advances; and interdisciplinary education.

Top priorities from the Biopsychosocial Management small-group discussion:

1. Understand, improve, and evaluate the Bio-Psychosocially-Informed Culturally Appropriate Therapeutic Encounter.
2. Evaluate the efficacy of integrated multi-disciplinary/multi-modal assessment and management of pain for people living with pain.
3. Explore means to improve access to psychosocial care.
4. Understand individualized factors related to bio, psychological, social, and cultural/lifespan and co-morbidities.

Key Plenary Discussion Points

Importance of “social” in “biopsychosocial”

Generally, it was noted that “biopsychosocial management” is a cross-cutting term that applies to a lot of different areas. It was recommended to focus more on the broader social, economic, and political contexts of pain. The front part of the term “biopsychosocial” is heard more often in grant funding, journals, conventions, and how we educate practitioners and researchers. The social part is barely there. People suffering from chronic pain are generally poorly treated by friends, family, and healthcare practitioners – the social stigma is huge and not well addressed.

Respect for Different Cultures and Patient Engagement in Research

Priority 3 (access to psychosocial care) should be improved to be safe, culturally appropriate, and respectful of spirituality and culture. The backslash in **Priority 4** (individualized factors) should be replaced by a comma, as the two are not the same. It is recommended that patients drive the research agenda in collaboration with those who provide the care.

Comparative Study

How the brain changes with regard to biopsychosocial and non-pharmacologic approaches should be studied. Non-pharmacologic treatments are not necessarily as accessible as believed and also have long waiting lists. A system-level approach can help understand the complexities of our healthcare systems and how we can modify non-pharmacologic treatments so they can be more accessible.

Research Across the Four Pillars

There does not appear to be much interest in health-service delivery research. These disciplines and scientists were not represented in any of the small groups either by theme or composition.

Focus Area 4: Sex and Gender

Group Lead: Dr. Jeffrey Mogil, McGill University

Dr. Jeffrey Mogil listed the prevalence of painful disorders with graphs showing the epidemiology of chronic pain states by sex. Women are affected more than men, and laboratory experiments confirm that they are also more sensitive to pain. Despite this evidence, most basic research on pain uses male lab rats, assuming (without evidence) that the female menstrual cycle would cause too much variability in research outcomes. Contrarily, studies have found significant differences in pain tolerance in female versus male rats, which is, according to Dr. Mogil, only the tip of the iceberg, as this evidence will impact the development of analgesic drugs. CIHR legislation and policies now expect all research applicants to integrate sex and gender considerations into their research designs, when appropriate. Dr. Mogil concluded with a reminder that gender (on a social level) apart from sex (on a biological level) also influences human behavior, including how men and women respond to pain.



Top priorities from the Sex and Gender small-group discussion:

1. Identify sex differences in the neurobiology of nociception and pain.
2. Evaluate or assess sex, drug, gene, and environment interactions in pain.
3. Understand the impact of steroid hormones on pain throughout the lifespan.
4. Improve the understanding of the effects of culture/indigeneity and sex and gender on pain and pain treatment-seeking behaviour.

Key Plenary Discussion Points

Gender in Research

Looking at gender (including the concepts of multiple gender, two spirit, and transgender) in patient-provider interactions is extremely important and should be on this list. This matters in the HIV community, as well as in different tribal communities. How to measure gender needs to

be a research priority. It is important not to conflate sex and gender with women's health, as is common, because it is also about masculinities, men, children, social circumstances, and other factors, as well as biological differences. Catalyst grants may be a vehicle for getting research to include sex and gender considerations.

Cultural Awareness beyond Ethnicity

Simply using the word "culture" is not sufficient: rather, when ethnicity is different, it should be specifically identified. The inclusion of "culture" in **Priority 4** (understanding of the effects of culture/indigeneity and sex and gender on pain) is not appropriate, because Indigenous culture is often viewed as a risk factor. It would be worth thinking about what places people at risk without pathologizing culture as risk.

Biopsychosocial Impact of Pain

Studying the impact of pain on people's lives needs to be captured in **Priority 1** (sex differences in the neurobiology of nociception and pain).

Focus Area 5: Models of Care

Group Lead: Manon Choinière, Centre de recherche du Centre hospitalier de l'Université de Montréal



Dr. Choinière defined quality of care, as per the Institute of Medicine in terms of safety, effectiveness, patient-centredness, timeliness, efficiency, and equity. Dr. Choinière's co-authored studies concluded that Canadian facilities were unable to meet clinical demands of chronic pain patients for accessibility and reasonable wait times. One successful Canadian initiative to improve models of care for chronic pain is the ECHO Ontario Pain Model, developed at the University of New Mexico, which uses telehealth technology for rural and underserved areas. Currently no formal evaluation framework exists in Canada to assess whether changes made to care actually benefit patients.

Dr. Choinière emphasized that a patient-centred approach is key to quality care and suggested the focus of research for the next five years to improve chronic pain management should be on the SPOR Chronic Pain Network Registry Working Group, whose goal is to establish a Canadian network of registries of chronic pain patients and to implement quality indicators and outcome measures in clinical settings to serve clinical, administrative, and research purposes. The CIHR-SPOR Innovative Clinical Trials Program would do comparative effectiveness research to inform health care decisions and implementation research to directly impact patient experience and care.

Top priorities from the Models of Care small-group discussion:

1. Determine the impact of the transition between care settings/systems, including evaluation of integration, uptake, and continuity of care services.
2. Understand and implement a holistic “two-eyed seeing” model of care for Indigenous populations.
3. Measure quality of care in different settings.
4. Conduct research on the right care for the right person, at the right time, by the right providers (stepped models of care).
5. Evaluate innovative funding models of care/health economics (e.g., patient care that is paid for in certain, clearly defined circumstances).

Key Plenary Discussion Points

Holistic Models and Patient-Centred Care

The plenary group agreed that **Priority 2** (understand and implement a holistic “two-eyed seeing” model of care) should be reworded to indicate that Indigenous people and their care providers are actively involved, and that notions of cultural safety and culturally appropriate care are included. Researchers’ roles should support and understand the holistic model of care. Further, little has been said about the Indigenous perspective on research methodologies, which can bring change to the relationship between patients, researchers, and communities to help shape the agenda and employ appropriate methods. Explicit mention of rural and remote settings, and addressing how to provide good care in those environments is critical.

This Models of Care list fits well with the Biopsychosocial priorities list. This topic is really about integrated, multi-disciplinary, patient-centred care. Related to that, the Choosing Wisely campaign (www.choosingwiselycanada.org) and the issue of inappropriate tests and treatments has not come through in these discussions and needs to be highlighted. A related topic is Health Literacy and Knowledge Translation where Summit participants agreed that explicit wording is needed around patient practices and getting people to use what is being prescribed.

Consideration of Treatment of Institutionalized/Incarcerated Pain Patients

Priority 1 (the impact of the transition between care settings/systems), does not contemplate pain medication-addicted individuals facing criminal justice system involvement including incarceration. This is currently a poorly handled transition affecting many people in detox heading into the criminal justice system where unusual practices are carried out regarding use of medications for pain control.

Economic Burden of Care

Regarding **Priority 5** (evaluate innovative funding models of care/health economics), non-pharmacologic treatments are often not free, and out-of-pocket expenses have to be taken into

account that are not covered by insurance. There is no funding mechanism at present for physicians at the primary care level to effectively address the economic burden of care. Good research is being done, but it takes more time to implement than the system allows in its billing structure.

General Comments

The group agreed that in **Priority 4**, “Stratified models” is preferred language over “stepped models.”

Focus Area 6: Patient Engagement in Research

Group Leads: Dr. Patricia Poulin, University of Ottawa, and Nicole Szajcz-Keller, Assistant Director, CIHR-IMHA

Dr. Poulin and **Ms. Szajcz-Keller’s** respective presentations introduced two examples of engaging patients in research. Dr. Poulin, representing the **SPOR Chronic Pain Network**, described how they engaged stakeholders with a survey to help identify a research agenda before submitting the network funding application. Lessons learned included realizing the benefit of engaging at the outset, marginalized groups (including Indigenous populations) and people with lived experience; using social media platforms to reach patients; having a plan to keep people engaged over the long-term; establishing clear roles, responsibilities and communication with stakeholders, and customizing engagement to suit the audience.

Ms. Szajcz-Keller described the CIHR-IMHA experience with a **James Lind Alliance Priority Setting Partnership (JLA PSP)** focusing on Adult Fibromyalgia. With the JLA process, equal numbers of clinicians and patients gathered to identify 10 top priorities for research related to treatment and management of the disease. The process included: steering committee development; survey and partnership development; survey promotion and distribution; data collection; analysis and question development; literature searches; expert feedback; and a priority-setting workshop with clinicians and patients. Lessons learned included: recognizing all participants are equal; effectiveness of talking circles; not rushing the process; ensuring assistance is available so everyone can participate equally; using plain language; and strategically pairing patients and clinicians.

Top priorities from the Patient Engagement in Research small-group discussion:

1. Establish best practices for addressing issues of diversity and equity in engagement practice.
2. Evaluate the role of patient engagement throughout the research continuum.
3. Develop an evaluation framework for patient engagement (e.g., including a matrix to assess the impact of patient engagement on stakeholders).

Key Plenary Discussion Points

Ethics in Patient Engagement

Ethics review processes need help understanding that patients are also people and co-researchers. SPOR is working on a few ethics matters, including a pan-Canadian working group on ethics and the development of an evaluation framework.

Patient Engagement in Disease Treatment and Management

The perspectives of all individuals are important for shaping models of care, to increase collaboration between the healthcare providers and individuals living with pain. Beyond being passive patients, such individuals should be actively involved in the dialogue of creating their own pain-care plans.

Measurement of Effective Patient-Engagement Methods

A lot is being done about patient engagement but little is being measured regarding what works, how it works, and how “patient” is defined. For example, in pediatrics, the patient is the parent or caregiver. For **Priority 2** (role of patient engagement throughout the research continuum), Summit participants discussed evaluating both the role and impact of the patient and the differing perspectives of what is meaningful to the researcher versus the patient.

Inclusive Language and Practice

Many people living with pain have experienced alienation from the healthcare system because they are considered pill seeking or there is a lack of trust. Using the term “citizen” rather than “patient” would be more inclusive. To demonstrate that patient engagement is a priority, more patients should be included at the Summit table, and discussions should be in plain language. In **Priority 1**, “good” or “wise” or “leading” is preferred over “best” practices. When this Patient Engagement discussion was conceptualized, priority setting had already been completed through the James Lind Alliance and other initiatives. Therefore, it is surprising that discussion was focused on methodologies around patient engagement rather than patient priorities in pain research.

Focus Area 7: Clinical Phenotyping

Group Lead: Dr. William Maixner, Duke Center for Translational Pain Medicine



Dr. Maixner's presentation covered challenges and needs in the area of clinical phenotyping. These include an insufficient understanding of the molecular mechanisms that mediate persistent pain conditions; environmental contributions such as physical trauma, abuse, infection and smoking; psychological life stressors; and cultural factors, such as health beliefs. Dr. Maixner offered his research in the Orofacial Pain: Prospective Evaluation and Risk Assessment (OPPERA) program as an example of how to approach clinical phenotyping in pain research. The study identified three clusters of phenotyping: Adaptive, Pain Sensitive, and Global Symptoms. He identified precision medicine as an emerging approach to disease treatment and prevention that considers individual variability in genes, environment, and lifestyle; however, this is not commonly practised.

Top priorities from the Clinical Phenotyping small-group discussion:

1. Improve phenotyping to differentiate pain from inflammation and other sources of pain (e.g., MSK and arthritis).
2. Phenotype and classify cancer pain.
3. Identify patients at risk of developing chronic pain.
4. Create the infrastructure to link big data (e.g., genetics) to phenotypes.
5. Develop bioinformatics for data processing to reveal markers that will improve prognosis and link patients to optimized care and treatment (cross-cutting initiative).

Key Plenary Discussion Points

Ethics

Ethical and legal issues (e.g., around what happens with information) need to be examined.

Cross-Cutting Themes

"Measurement" and whether we have good measures of pain is a cross-cutting theme that should be included along with brain imaging, which is a part of that. The way technology is developing, epigenetics and genetics will also become part of the phenotyping analysis.

Personalized Medicine and Clinical Practice

Phenotyping is not only for prognostics but also for diagnostics and guiding personalized treatment. A huge amount of data exists: simple, practical tools that would be useful in the

clinic can capture that data. Clinically speaking, while “adherence” is less negative than the term “compliance,” it still does not have a positive connotation.

One example raised in plenary of the role of phenotyping was of a long-term study on facial pain which identified three main “clusters,” based primarily on biopsychosocial measures, within which individuals could be grouped to help predict their risk of developing a condition as well as prevention, diagnosis/ sub-strata positioning, etc. The clusters were determined through phenotyping, clinical assessment, signs, and symptoms. The data set generated made it possible to look at the molecular sub-structure underlying these clusters and the genomic variables that differentiate them. This is a platform that could lead to new targets and discoveries for pain intervention. The results are translatable to other kinds of chronic pain, as the study was based on biopsychosocial profiles rather than anatomical conditions.

Conclusion of Day 1 of the Summit

After plenary sessions ended, the SSC synthesized the lists of top research priorities and mapped them to the two overarching themes of the Summit: Bench to Bedside – Crossing Valley 1 Successfully, and Personalized Medicine: Treatment and Management (see Appendix 3, Research Priority Groupings).

Session E Implementing a Pain Research Agenda: Challenges and Solutions

Session E started with the SSC reporting on its reflections and synthesis of the priorities identified on Day 1. Additional input was gathered in plenary on these priorities. Two expert panel discussions then focused on moving basic research results into successful clinical application and addressing personalized approaches to pain management. The panel presentations served as the foundation for further in-plenary small-group table discussions in which participants identified key implementation actions needed to ensure success in these areas 10 years from now.

E1: Bench to Bedside—Crossing Valley 1 Successfully

Panelists Drs. Mike Salter, Kathleen Sluka, and Mark Ware each spoke from a different perspective in relation to advancing translational research, after which participants divided into small groups to formulate their own suggestions for implementation actions.



L-R: Drs. Mark Ware, Mike Salter, and Kathleen Sluka take part in a panel discussion on Bench to Bedside - Crossing Valley 1 Successfully.

Panel Discussion

Dr. Mike Salter: Developing New Mechanisms and Medicines

Summary: We must think of the translation-clock as a circle with multiple entry points, one of which is identifying new therapeutic targets, which infers new molecules and interactions. Intra-individual variability that is genetically based is a good entry point because Canada has a world-leading pain genetics group. At Sick Kids, for example, genetic information is used and modeled in model organisms. As a relatively long process, part of the challenge is having an idea of what the end points will be, because new medicines need regulatory approval, and this process has to be planned for from the beginning.

Dr. Kathleen Sluka: Interventions and Measurement

Summary: There has been a lot of talk about measurement and translation, and how to do it but pain is complex and not a single entity, where acute and chronic pain have different mechanisms. Neuropathic pain is more spontaneous, for example, while osteoarthritis (OA) pain increases with movement. Translating animal models and outcomes to the clinic, requires specificity. Batteries of tests and outcomes in animal models must be indicative and predictive, while they don't have to mimic the clinical condition exactly. What may work for one outcome might not for another, therefore outcome measures should perhaps be standardized for both animals and humans to compare results. To be successful we need to combine non-pharmacologic and pharmacologic methods and build a diverse team of basic scientists, clinicians who treat people on a regular basis, and those with expertise in clinical trials.

Dr. Mark Ware: Clinical Research

Summary: To accomplish what Drs. Salter and Sluka are talking about requires infrastructure to connect and stimulate ideas, which is currently lacking. Unfortunately, patients are not being recruited for clinical trials in Canada and the pharmaceutical industry is abandoning its work here. A well-connected cross-Canada network of clinical researchers is needed and the SPOR Network is a good start. Clinical trials may not answer all questions and there may also be other longitudinal, real-world methods, but if the network is well connected, it will have sourced well-phenotyped populations that are ready for studies. The biggest struggle that holds up clinical research is recruitment for studies. To move forward, we need a national effort with well-resourced support which can be achieved by: mobilizing a network of researchers and clinicians; ensure we're measuring the right things; study mechanisms; stimulate existing innovation to facilitate cohort-sharing; gain access to regulators; and train teams to collaborate.

Panel Member Discussion Points:

Benefits of a National Pain Strategy

A national pain strategy could fill a large gap in the first “Valley of Death” (the translation gap between basic and clinical research) for new therapies and drug development. Discoveries require proof of principle to enable rapid “go” or “no go” decisions. A national strategy could help prioritize things at a network level. A model for integrating biopsychosocial interactions would help capitalize on synergies.

Better Research Measurement

Real, functional measures (e.g., walk test) or measures like pressure thresholds would move research in the right direction. One point of failure is a lack of the right animal measures. The Federal Drug Administration is now asking for functional measures and other things beyond pain intensity. Talking to patients would help identify what outcomes are important to them.

Working with the SPOR Network

Tapping into the SPOR Network on Primary Care can help overcome the problem of not having a specialized centre to have better access to patients to apply the drug-development pathway to any therapy. This would help with relatively small proof-of-concept studies fairly efficiently.

Small Group Discussions

Representatives from each table offered the following suggestions on actions needed to implement the research priorities grouped under the Bench to Bedside category (see Appendix 4: Research Priority Groupings, Priorities for “Basic to Bedside: Crossing Valley 1 Successfully”).

Multidisciplinary Networks and Registries

Networks, registries, and research structures can help identify and facilitate equal partnerships in teams that span the entire pain spectrum. Having physical space where everyone could dialogue would help move things forward. Multi-disciplinary teams can improve understanding of, for example, the role of genetics in the success of non-pharmacological interventions. A good model framework would include vision and scope, people, infrastructure, a process to bring these all together, resources and sustainability. An ideal multi-disciplinary group to set priorities and focus on measurement would be made up of policy makers, patients, and researchers. The term “trans-disciplinary teams” was used in discussion. Such teams were deemed necessary to understand mechanisms of pain and their origins in childhood (e.g., trauma) at the genetic, biological, brain, social, cultural, and other levels. Trans-disciplinary teams were contemplated as including patients as co-investigators.

Pain-patient registries and opt-in research volunteer banks that collect salient pain-related information in accordance with regulatory guidelines (e.g., Scotland’s SHARE online platform) were deemed necessary, along with promoting a balance of large, collaborative team efforts and smaller-scale and innovative research endeavors.

Tracking process, methods, patient outcomes, delivery of care (e.g., by age), randomized registry trials, and connecting registries (in Canada and beyond) would enable the use of big data methodologies that provide the appropriate power to study different conditions. Clinical and research databases need to be connected to be accessible to different stakeholders, and contain more easily accessible clinical, research, and administrative data.

Adequate Funding

A constant theme is the need for resources (i.e., adequate funding). CIHR support for multiple levels of research funding mandated through the political process (as was done for HIV) would help support chronic pain research. Investment in structures to facilitate research such as centralized data infrastructure, a common framework for data, and access to and funding for non-pharmacologic approaches were identified as priority investments. The economic impact of funding these essential components of research must be identified early in discussions, so policy makers know what is being brought to the table.

Patient Advocacy and Engagement, Inclusion of Indigenous People and New Immigrants

Stigma around pain, and racism against Indigenous people and new immigrants was identified

as a problem that must be eradicated. To assist with accessibility and inclusion, advocates and translators can help explain concepts and obtain informed consent on behalf of patients. Greater interaction between scientists and patients including empathy in scientists towards patients would be a step in the right direction. Indigenous people need to take a leadership role and can both benefit from and contribute to pain-management research in a process of engagement that is multi-directional, multi-lateral, and in the absolute spirit of multi-engagement.

Greater engagement of patients as participants and as research partners ensures evidence is informed by consumers and gives patients a choice in the care they receive. More effective lobbying on the important impacts of basic science can help understanding in the broader population. A culture shift will bring together researchers and patient communities, industry, and clinicians as part of a translational circle for both pharmacologic and non-pharmacologic approaches. Evidence in a variety of different circumstances including consideration of case studies will help inform models of care.

Clinical and Translational Research

For researchers to base models on real-life problems and learn translational research would greatly benefit clinical applications and outcomes. Real-world settings e.g., through pragmatic trials in a real-world environment, would encourage re-thinking clinical trial design and interventions for pain, and promote development of new technologies that could be used in everyday life (e.g., apps and wearables for research purposes and to disseminate information on pain and self-management strategies). Accessible tools for people with pain would help them understand conditions, treatments, and research outcomes (plain language summaries). Improved brokering of the relationships between basic science researchers and industry (e.g., the pharmaceutical industry) would move innovations into randomized clinical trials.

Need for a Focused National Strategy

Determination of Canada's place in the research ecosystem around pain would help build on our strengths rather than scattering our efforts without focus. Synchronized efforts from both political and research standpoints would help create a focused strategy.

Measurement

Genomics, imaging, patient-reported outcomes, more objective functional measures, and phenotyping of people and their environments are required. Pragmatic trials would help to assess interventions for pain. Outcome measurement tools should be researched – perhaps through the use of wearable devices that can measure various patient responses in a ubiquitous and continuous way.

Models of Care and Personalized Medicine

Teams of clinicians, researchers, patients, and policy makers working together would better inform the models of care being used. Applying knowledge of risk factors/response to treatment predictors (e.g., genetics) would help employ appropriate models of care early on. Large-scale data collection and phenotyping infrastructure can link to individual pain treatment effectiveness, where a balanced, whole-person assessment would be used.

Non-Pharmacologic Treatment

Available non-pharmacologic approaches/modalities should be funded as core, first-line interventions in the treatment of acute and chronic pain. Multidisciplinary research teams will help to clarify the role of genetics in the success of non-pharmacologic interventions. Basic scientists and scientists developing non-pharmacologic treatments, need to interact in order to accelerate proof-of-principle development in animal models, parallel to what is happening with the SPOR Network.

Need for a Paradigm Shift

Research needs to be recognized as a long-term process. This would involve attracting, retaining, and encouraging graduate students to pursue gaps and invest their careers in necessary areas.

Personalized Medicine: Treatment and Management

Panelists Drs. Manon Choinère, Gilles Lavigne, and Muhammad Mamdani offered their perspectives on challenges related to the translation of research on personalized medicine into the effective treatment and management of pain. Participants then broke into small groups to formulate their own suggestions for implementation.



Drs. Gilles Lavigne, Muhammad Mamdani, Manon Choinère, and discuss personalized medicine in pain treatment and management.

Panel Discussion

Dr. Manon Choinière

Summary: Personalized medicine is about providing the right patient with the right treatment at the right time by the right care providers. Available evidence is based on results averaged over time, but numbers do not indicate which patient would benefit from which treatment. The traditional method for analyzing data is not sufficient; new statistical methods need to be explored. Other disciplines can inform identifying responders and looking at trajectories. Considering efficacy and effectiveness in everyday, real-world clinical practice and developing infrastructure to monitor the quality of care based on data can assist clinicians and other decision makers with their treatment choices. Clinical research infrastructure for observational and registry-based studies, would include rapid studies and epidemiological research. Qualitative research can be highly rigorous and should be used to complement clinical and effectiveness trials.

Dr. Gilles Lavigne

Summary: You don't treat pain, you manage it. The social aspect cannot always be treated, but clinicians can give advice about lifestyle and family interactions, and refer patients to professionals who can help them rebuild that social aspect. Clinicians forget to listen to the patient and try to understand his or her background and history to get a clearer picture before making decisions. The spiritual aspect is also very important. A large percentage of people in emergency who do not respond to treatment still have pain, even when they use morphine, so these tools have limited efficacy. Poor responders in RCTs, tend to get eliminated before the trial starts. The reality is that not everyone responds the same way. Personalized medicine requires listening to patients and being sensitive to their history and social context. The end goal is to have all the tools and information to assess the risk relative to the diagnosis, estimate a prognosis, and decide on the best treatment.

Dr. Muhammad Mamdani

Summary: A good framework should have vision and scope, and a process to tie it to people, resources, infrastructure, and sustainability. Clinicians in busy clinics have many considerations –e.g., CT scans, lab values, diagnostics, past history, genotypes, relevant trials, guidelines – and relatively little time. Imagine if, in 10 years, there was a way to process all of this information in a few seconds and obtain recommendations to aid in decision making. This is happening now in the United States – the question is how to get there. The technology is there, as is the will to collaborate (e.g. Google, Microsoft, etc.). A multidisciplinary network of people can make this happen, with collaborators, tangible deliverables, and investment in infrastructure. Look beyond the public-health mindset and learn from others in areas such as econometrics, computer science, engineering, data science, finance, sociology, and anthropology.

Small Group Discussions

Representatives from each table offered the following suggestions for actions needed to implement research priorities under the Personalized Medicine category.

Paradigm Shift

Chronic pain needs to be destigmatized which includes reducing physicians' fear of it. Pain research should be reframed to focus on wellness rather than pain, and fiscally, effective treatments need to be linked to cost savings.



Small group discussions working out suggested action needed to implement research priorities. (L-R: Lynn Cooper, Janice Sumpton, Elizabeth Drake)

Cross-Cutting Methods

Pharmacologic and non-pharmacologic methods should be used together. Qualitative studies involving sociologists, anthropologists, and others would support this. An example of a good practice would be sound coordination with multiple health care providers helping a particular patient with adequate technological and human-resource coordination. Healthcare interactions should be subjected to research supported by integrated electronic medical records across different healthcare settings.

Measurement

Currently pain measurement could benefit from: a better understanding of measures/predictors in personalized medicine and development of a system for active feedback/validation/re-evaluation; data collection and analysis that result in new discoveries and inform treatment; and exploration of standardized and reliable phenotypic outcomes. Consideration of phenotype assessment across the lifespan or disorder and integration of information regarding responders and non-responders (risk and protective factors) are part of this.

The PROMIS scales (Patient-Reported Outcomes Measurement Information System) initiative is a good resource but collection of data on such details as intensity of pain, functional outcomes, and investigation of historical and complexity factors would further benefit research. Disease-specific scales vs. generic overlap and adaptive testing have yet to be investigated. Agreement is needed on key metrics to enable characterization of health that considers heredity, behavior, the brain, and the environment. Pain prevention has to take place at a population-level both within and beyond the confines of the hospital system.

Personalized Medicine

Movement towards patient-centred personalized medicine was generally agreed upon as

necessary. Right now there is a gap in knowing what kind of data is required to move “personal” to “individual” medicine, and to understand how people are matched to appropriate providers. Increased focus on research and training can further the human side of pain management, while genotyping, phenotyping, and developing guidelines for evidence-based medicine can produce the best options for each patient. Recognizing medicine as an art is important: the use of both sophisticated machines and narrative approaches link quantitative and qualitative research, always emphasizing patient preference and personality.

Equitable care in rural, urban, and remote areas is essential but centralized clinics where patient history and baseline measures are recorded only once would be efficient. From there, patients can be referred to the most appropriate and cost-effective health team member for a treatment plan in which patients have some choice in approach to care (passive, active, pharmacologic, non-pharmacologic).

Feasibility and acceptability of integration of the “new world order” (i.e., automated data systems) with person-doctor communication requires research. Personalized medicine through interdisciplinary care can be optimally implemented if infrastructure is developed to accommodate it.

Networks and Databases

Network capacity for big data, and more tangible and consistent rules regarding privacy, security and data sharing can be achieved through collaboration with governments, privacy officers, and lessons learned from others (e.g., Kaiser Permanente, a US-based integrated managed care consortium). If health privacy legislation at the provincial or national levels is improved, it can enable the integration and sharing of data beyond its custodians’ environment to allow analysis by a wider range of groups. Leveraging linking Statistics Canada data to datasets is an option to consider. More knowledge of what databases already exist and improved communication between different database operators will benefit researchers. National, provincial, and cross-institutional solutions can address the challenge of sufficiently maintaining the privacy and dignity of healthcare consumers, while facilitating the collection of longitudinal data.

Further, a better understanding and application of effective biopsychosocial approaches through the collection of more and better data, and big data (e.g., the [Ontario Health Study, Emerald](#)) can help identify geographical, racial, ethnic, and cultural impacts, demographics, and how people respond differently to treatment. Partnerships built in this area can facilitate network and data development. Good-quality data will result from clinicians having a better understanding of how researchers are analyzing it. Debunking myths around data privacy, security, and information sharing may encourage more research in this area.

Infrastructure for databases for clinicians and researchers should be accessible to primary caregivers and coordinated between different conditions while accounting for comorbidities. Databases to identify new hypotheses and treatments for testing in animals (and eventually humans) would help to create a perpetual “basic to bedside” group.

Patient Advocacy, Engagement, and Education

Empowered patients are better able to self-manage and self-monitor their care and provide data to physicians using existing technologies (e.g., mobile applications). Maintaining public interest will ensure continued inclusivity given the digital divide. A de-monopolized patient-oriented approach will put knowledge in the hands of patients in a multi-modal and creative way (e.g., words, images). Information and education will increase overall pain-care contact time, such as investigating the effectiveness of multi-disciplinary teams, developing pain curricula, and encouraging more discussion about pain. Developing and improving relationships with provincial, territorial, and federal governments will effect legislative changes at those levels. Pain research should be co-designed with public interest at the forefront.

Development of Technology

Continued use of electronic information systems and development of an electronic triage tool through the active involvement of mathematicians, engineers (perhaps, new “health engineers”), and computer scientists is important. In addition to these, it would be useful to create and evaluate mobile applications and self-assessment technologies.

Technology (e.g., via a partnership with STEM research) can enable big data to be collected (treatment success is feedback-driven) and care services to be shared (e.g., videoconferencing platforms, telehealth). Technical efficiencies would optimize the therapeutic encounter in triage. New technology can help analyze multimodal interventions in clinical trials. The value of more adaptive designs vs. RCTs (i.e., time-series, qualitative) needs to be recognized.



For the Future: A Canadian Pain Research Agenda

During the Summit, participants were encouraged to meet at lunch periods to network and discuss ideas. Several groups met including representatives from the Indigenous health research community, and groups such as Pain BC and The Arthritis Society (TAS).

Representatives of the latter two groups took the opportunity to provide a report of their discussions to the plenary group following lunch on the Summit's second day. **Maria Hudspith**, Executive Director of the Pain BC and a principal applicant of the SPOR Chronic Pain Network, and **Janet Yale**, President and CEO of The Arthritis Society (TAS), reported on their groups' discussions regarding the benefits and challenges of developing a national pain strategy for Canada. They noted that the International Pain Summit in Montréal in 2010 helped build momentum for such a strategy, but it ultimately did not gain political traction. Ms. Hudspith and Ms. Yale expressed hope that the efforts of the SPOR Network and the Summit discussions will revive efforts to establish a national pain strategy and that the outcomes of this Summit will feed into a pre-budget federal submission for the development of a national pain strategy.



*Maria Hudspith, Executive
Director of Pain BC.*

Summit Summary

A panel consisting of Dr. Anthony Phillips (Scientific Director of CIHR – INMHA), Dr. Buckley, Dr. King and Dr. El-Gabalawy, led the final session's discussion with summary remarks on the Summit's outcomes. Dr. Phillips thanked the speakers for reminding people of the impact of pain on a large number of patients and their families. He noted that a national pain strategy and national pain research strategy are different but complementary entities. He commented that, while CIHR's focus is very much on research, it also recognizes the need to translate new insights into practice. He reiterated that basic research in Canada had made major inroads in terms of new knowledge about the nature of acute and chronic pain, and new ways of thinking about the causes of pain and targets for its treatment. He noted that baseline testing is needed to determine the impact of Canada becoming the first large country to legalize cannabis, citing the serious social problems that had been created by the misuse of prescription opiates as "the dark side" of the pain issue.

These and other converging themes, said Dr. Phillips, were the initial reason why CIHR-IMHA and CIHR-INMHA decided to launch a request to government for funds in the 2018 budget. While these two CIHR institutes at first agreed to submit an application to the CIHR Roadmap

Accelerator Fund (RAF) for money with the intention of rounding out the pain research agenda, it became clear that finding more funding partners would be necessary to achieve the ultimate goal of making Canada a world leader in pain research and treatment. Dr. Phillips pointed out that, even if it is possible to secure \$20 million over four to five years, it is necessary to shape expectations and identify achievable objectives by developing a plan that identifies the best options for investment. In closing, Dr. Phillips emphasized the importance of identifying goals that could be achieved in the short term, while also focusing on the previously-mentioned ultimate longer-term goal.



Dr. Buckley remarked that part of the SPOR proposal was a systematic approach to informing legislative or policy action with best evidence. One way in which the Network could contribute cumulatively to [furthering a national pain agenda/ or to achieving the long-term goal mentioned by Dr. Phillips] was by putting in place a research system and structures that would enable other goals to be achieved: for example, a registry that could be rolled out across the country, a clinical research network that would support trials to be done more rapidly, and infrastructure and administrative support for a secretariat. He noted that a message he had heard from others was the need to approach funders as a collective with a common goal.

Dr. King said he appreciated that the SPOR Network was inclusive of Indigenous approaches to pain and that the Summit had extended this inclusivity even further. He stressed that Indigenous knowledge needs to be part of innovative thinking, as it adds value to the treatment of pain and associated co-morbidities, for Aboriginal people and all Canadians.

Dr. El-Gabalawy commented that CIHR had a number of existing and imminent initiatives relevant to pain research (e.g., clinical trials, catalyst grants through the SPOR Network, RAF initiative on personalized medicine) and encouraged people to engage with them and with efforts to develop and implement a national pain research strategy. He closed by asking participants for comments about who and what was missing from the discussion.

Key Plenary Discussion Points

Voices not heard: Perspectives/voices identified as missing from Summit discussions included the elderly; pediatric patients; new immigrants; people with intellectual disabilities, significant brain damage, dementia, communication limitations, and severe mental health disorders; the families of those who can't speak for themselves; people who affect other areas of healthcare spending (e.g., the Workplace Safety and Insurance Board, insurance companies, judges, lawyers); ethics experts; provincial and federal policy makers; private sector industry; the Natural Sciences and Engineering Research Council of Canada (NSERC); and the Social Sciences and Humanities Research Council (SSHRC).

The disenfranchised: Summit participants raised that there is systematic racism, ethnocentrism, ageism, and other “isms” affecting the delivery of and access to care. Many voices are quiet, and we have not sought out people who could advocate for them.

Terminology: A final note made was that the term “personalized medicine” should be changed to “personalized health care.”

Concluding Remarks

Dr. Salter closed the main part of the Summit by commenting that, for a long time, efforts in pain research had focused on infiltrating pain into areas such as neurobiology, psychology, and internal medicine. For things to evolve to the point that such a passionate group of individuals would come together for the Pain Summit, he said, was amazing – and just one of many indicators that the timing was right for a large initiative on pain. Pain is a major health, economic, and social problem across the country and around the world, he noted, and Canada is in a unique position to move this research forward. He thanked participants for their ideas and perspectives and the respect shown for one another throughout the two days.

Dr. Phillips highlighted next steps, the first of which would be for the SSC to meet immediately after closing remarks to identify high-level themes that arose out of the Summit discussions. He thanked everyone for coming – especially guests from other countries and the Institute scientific directors, without whose understanding and ability to mobilize resources, this effort would not be able to move ahead. Finally, he expressed his sincere appreciation on behalf of the host Institutes to the organizers and facilitator for making the event run so smoothly.

Scientific Steering Committee Deliberations

As a critical and final step in the Summit process, the SSC met immediately following the conclusion of the Summit to identify the high-level themes that emerged from the considerable input and ideas provided by participants on the subject of pain research priorities.

Bench to Bedside Research Priorities

Committee members agreed that the following four themes stood out among the priorities identified as relating to “Bench to Bedside.” (Please note that the numbers and titles cited refer to specific numbers in Appendix 3, *Research Priority Groupings, Bench to Bedside.*)

Measurement

Research is needed to improve assessment of pain, response to treatment, and translation of basic research to patient care. This includes biomarkers that are not necessarily markers of pain but also of vulnerability or resilience. This leads into the whole area of personalized medicine.

Pharmacological and Non-Pharmacological Methods

We need to understand the interactions between these two methods and bring all of the complex variables to bear (e.g., effects of meditation in combination with drug therapy for pain management in cancer patients).

Phenotyping

There are different levels of phenotyping (stratification). Research falling under these priorities should be anything that helps predict risk or protection. Dr. Buckley advised that SPOR is not working on phenotypes but is doing some work on big data.

Sex Differences

Identifying sex differences in the neurobiology of nociception and pain could subsume **14** (assess interactions) and **15** (impact of steroids). The translation piece of this theme is fundamental to moving forward, and emphasis should be placed on the importance of including both sexes of animal models. On the human side, a lot of work is being done in Quebec (e.g., empathy).

Key Committee Discussion Points on Bench to Bedside Priorities:

Areas Covered by the SPOR Network:

Dr. Buckley advised that SPOR proposals cover or can cover **Priorities 2** (distinguishing addiction from tolerance and dependence), **4** (prevention of transition to post-op chronic pain), **17** (best practices for diversity and equity in engagement), **18** (role of patient engagement throughout research continuum), **22** (linking big data to phenotypes), and **23** (develop bioinformatics for data processing to reveal markers to improve prognosis and link patients to optimized care/treatment).

Conclusions:

A national pain research strategy would need to have a SPOR component and a RAF component, with interfaces at different points and along different trajectories. This would involve the bi-directional exchange of information and would also feed into priorities under the Personalized Medicine category.

Personalized Medicine Research Priorities

Committee members identified the following high-level themes in the research priorities grouped under the “**Personalized Medicine**” category. (Please note that the numbers and titles cited refer to specific numbers in Appendix 4, *Research Priority Groupings, Personalized Medicine.*)

Fragmentation of Care

Fragmentation of care is a bigger issue than the impact of transition between care settings/systems, which is just a part of this. Nowhere is care more fragmented than for people with chronic pain. There is opportunity for a comparative study here: how many specialists, on average, do patients with chronic pain see before getting into a pain clinic?

Pain Across the Lifespan

This should include early life events and their impact, as well as end-of-life care.

Sex and Gender in Access to Care and Response to Treatment

The sex and gender perspective from the “Bench to Bedside” theme can be overlaid and informed by the Indigenous committee but it needs to be augmented. Many pain patients are women, but there’s much stigma associated with pain for men, as well. Gender in terms of patient-provider interaction is also important. One example is a study that found discrimination against women for joint arthroplasty.

Key Committee Discussion Points

Priorities covered by the SPOR Network:

Priority 2 (build on strengths of registries to inform individualized approach) is covered by SPOR, which will definitely be involved in **Priorities 15** and **16** (patient engagement), as well as **19** (big data and phenotyping) and **20** (informatics to reveal markers), which are part of the SPOR grant. SPOR may get at parts of **8** (individualized factors) and may cover some of **13** (stepped models of care). **Priority 18** (identification of patients at risk) may come out of some of the registry work; however, this could be generalized and connected to themes of Measurement and Phenotyping in the “**Bench to Bedside**” category.

Priorities not covered by the SPOR Network:

Priority 1 (implement pain measurement in pre-clinical and real-world) is a major theme that needs to happen under Basic to Bedside first. It is a good area for flow-through but is not specific to SPOR. **Priorities 3** (evaluate cost effectiveness), **4** (causes of overuse), **5** (mediators to adherence), and **6** (biopsychosocial and cultural therapeutics), are not part of SPOR. SPOR is not involved in **Priority 12** (quality of care in different settings), **14** (innovative funding models), or **17** (phenotyping/classification of cancer pain). While **Priority 7** (access to care) will not be covered in first two years of SPOR, it may be included in years three or five and may be better suited to a national pain strategy or Health Canada. **Priority 10** (impact of transitions in care) is not specifically built into SPOR, which is not involved in quality of care in different settings.

Priority 11 (understand and implement holistic two-eyed-seeing model of care) is not SPOR-specific, although its Indigenous Advisory Committee might have the capacity to implement the two-eyed seeing model. For the purposes of a national pain research strategy, it is strategic to highlight two-eyed seeing, as it would speak to a Canadian strength. This priority is aimed at improving models of care for Indigenous people. **Priority 11** is parallel to “**Bench to Bedside**” **Priority 3** (interaction between pharmacological and non-pharmacological methods) but with an Indigenous perspective. In this context, “non-pharmacological” will have to be defined very broadly and could be framed under Indigenous models of care. SSC members noted that this priority cannot be dissected and chopped up, as it is a holistic approach. This priority is important, as there is a prescription epidemic in First Nations communities. While it is not pain-specific, it needs to be either a part of a larger SPOR project or all the SPOR networks need to get together with their Indigenous advisory groups and consider this research priority. Dr. Buckley advised that one of the discussions around the SPOR Summit is about the value of having a SPOR-wide Aboriginal advisory council.

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Appendices

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Appendix 2: Scientific Steering Committee



Norman Buckley
Principal Investigator
SPOR Chronic Pain Network



Steve Robbins
Scientific Director
CIHR – ICR



Hani El-Gabalawy
Scientific Director
CIHR – IMHA



Mike Salter
Chief of Research
The Hospital for Sick Children



Malcolm King
Scientific Director
CIHR – IAPH



Dorothy Strachan
Partner
Strachan-Tomlinson



Tony Phillips
Scientific Director
CIHR – INHMA



Cara Tannenbaum
Scientific Director
CIHR – IGH



Mark Pitcher
Visiting Fellow
NCCIH/NIH



Linda Porter
Policy Advisor for Pain
NIH/NIBDS

Event Organizing Committee

Evelyn Boland, Program Manager, CIHR – ICR

Jodi Cullum, Project Coordinator, CIHR – ICR

Johanne Fillion, Administrative Coordinator, CIHR – ICR

Peter Maitland, Public Affairs Officer, CIHR

Eric Marcotte, Associate Director, CIHR – INMHA

Nicole Mardis, Project Officer, CIHR – IMHA

Christine Mazur, Communications Project Officer, CIHR – IMHA

Rachel Syme, Assistant Director, CIHR – ICR

Nicole Szajcz-Keller, Assistant Director, CIHR – IMHA

Michelina Violi, Project and Finance Officer, CIHR – IMHA

Patrice Voss, Project Manager CIHR – IGH

Appendix 3: Summit Agenda

Sunday, September 18th

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| 4:30pm | Registration and Reception |
| 6:00pm | <p>Opening Remarks:</p> <p>Hani El-Gabalawy, Scientific Director, CIHR Institute of Musculoskeletal Health and Arthritis (CIHR – IMHA)</p> <p>Margaret Lavallee, Elder-in-Residence, Centre for Aboriginal Health Education, Rady Faculty of Health Sciences, University of Manitoba</p> |
| 6:30pm | Dinner / Guest Speaker: William Maixner , Duke Center for Translational Pain Medicine |

Monday, September 19th

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| 7:00am | Breakfast |
| 8:00am | Challenge Address: Hani El-Gabalawy |
| 8:10am | <p>Welcome: Alain Beaudet, President, Canadian Institutes of Health Research</p> <p>Welcome: Malcolm King, Scientific Director, Institute of Aboriginal Peoples' Health, Simon Fraser University</p> |
| 8:20am | <p>Summit Process: agenda, process, guidelines and supportive documents</p> <p>Dorothy Strachan, Facilitator</p> |
| 8:55am | <p>Session A: Maximizing the Summit: An Opportunity for Breakthrough Synergies</p> <p><u>The Summit/SPOR Partnership</u>: Norman Buckley, McMaster University; SPOR Chronic Pain Network</p> |
| 9:20am | Plenary Discussion |
| 9:45am | Break |
| 10:05am | <p>Session B: Current Basic and Clinical Research – Success Now and For the Future</p> <ol style="list-style-type: none"> 1. <u>Pain Research: Defining New Horizons</u>: Yves De Koninck, Laval University 2. <u>Challenges for Clinical Research and Therapeutics</u>: Mary Lynch, Dalhousie University |
| 11:00am | Plenary Discussion |

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| 11:15am | Session C: National Pain Research Strategies: Research Agendas / Priorities <ol style="list-style-type: none"> 1. <u>Europe and Australia</u>: Gary MacFarlane, University of Aberdeen 2. <u>United States</u>: Linda Porter, National Institute of Neurological Disorders and Stroke (NINDS) at the National Institutes of Health (NIH) 3. <u>Canada</u>: Mark Pitcher, National Institutes of Health (NIH) |
| 12:10pm | Plenary Discussion |
| 12:30pm | Lunch / Networking |
| 1:30pm | Session D: Expanding Knowledge via a Canadian Pain Research Agenda – Group work in concurrent sessions <ol style="list-style-type: none"> 1. <u>Pharmacologic Management</u> : Mark Ware, McGill University Health Centre 2. <u>Non-pharmacologic Management</u>: Kathleen Sluka, University of Iowa 3. <u>Biopsychosocial Management</u>: Kenneth Craig, University of British Columbia 4. <u>Sex and Gender</u>: Jeffrey Mogil, McGill University 5. <u>Models of Care</u>: Manon Choinière, Centre de recherche du Centre hospitalier de l'Université de Montréal 6. <u>Patient Engagement in Research</u>: Patricia Poulin, University of Ottawa; and Nicole Szajcz-Keller, CIHR – IMHA 7. <u>Clinical Phenotyping</u>: William Maixner, Duke Center for Translational Pain Medicine |
| 3:00pm | Break |
| 3:20pm | Small group reports and plenary discussion |
| 5:20pm | Feedback |
| 5:30pm | Closing |

Tuesday, September 20th

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| 7:00am | Breakfast |
| 8:00am | Agenda Review/Preview: Dorothy Strachan Report on feedback from yesterday |

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| 8:10am | Steering Committee presentation: a Canadian Pain Research Agenda – Part 1 Presentation of conclusions from yesterday; discussion and feedback in plenary |
| 9:50am | Break |
| 10:10am | Session E: Implementing a Canadian Pain Research Agenda: Challenges and Solutions <u>E1: Basic to Bedside – Crossing Valley 1 Successfully</u> Panel: Mike Salter, Kathleen Sluka, Mark Ware Plenary and Table Discussions and Reports |
| 10:40am | |
| 12:30pm | Lunch |
| 1:30pm | <u>E2: Personalized Medicine - Treatment and Management</u> Panel: Manon Choinière, Gilles Lavigne, Muhammad Mamdani |
| 2:00pm | Plenary and Table Discussions and Reports |
| 3:00pm | Break |
| 3:20pm | Summary – A Canadian Pain Research Agenda, Part 2 Hani El-Gabalawy, Malcolm King, Norm Buckley Presentation and plenary discussion on the results of Sessions E1 and E2: recommended implementation strategies |
| 4:30pm | Closing Remarks / Next Steps: Mike Salter |
| 4:45pm | Feedback |
| 5:00pm | Closing |
| 5:20pm | Steering Committee Meeting to finalize recommendations from Day 1 and summarize recommendations and insights from Day 2 |
| 6:30pm | End |

Appendix 4: Research Priority Groupings

Priorities for “Basic to Bedside: Crossing Valley 1 Successfully”

1. Improve measurements of pain in clinical, pre-clinical, and real world situations.
2. Develop means to distinguish addiction from tolerance and dependence.
3. Evaluate the interaction between pharmacological and non-pharmacological interventions and the effectiveness of combining them.
4. Investigate the opportunities for prevention of transition to chronic pain (post-op).
5. Identify new targets which will allow development of chronic pain specific medicines.
6. Teach old drugs new tricks.
7. Identify causes of overuse, from biological to social determinants.
8. Identify mechanistic, phenotypic and biopsychosocial predictors of adherence and therapeutic response:
 - a. Determine underlying mechanisms of action and predictors of effectiveness of non-pharmacologic therapy to provide a mechanism-based approach to treatment.
 - b. Cultural, geographic and institutional environments.
9. Determine the targeting and dosage of non-pharmacological interventions to improve adherence and outcomes of non-pharmacological management.
 - a. Test stratified or targeted interventions.
10. Develop innovative measures and clinical research designs that support innovation in pain research.
11. Understand and improve the Bio-Psychosocially-Informed Culturally Appropriate Therapeutic Encounter.
12. Evaluate the efficacy of integrated multi-disciplinary/multi-modal assessment and management of pain for people living with pain.
13. Identify sex differences in the neurobiology of nociception and pain.
14. Evaluate or assess sex, drug, gene, and environment interactions in pain.
15. Understand the impact of steroid hormones on pain throughout the lifespan.
16. Improve the understanding of the effects of culture / indigeneity and sex and gender on pain and pain treatment seeking behaviour and response to treatment.
17. Establish best practices for addressing issues of diversity and equity in engagement practice.
18. Evaluate the role of patient engagement throughout the research continuum.
19. Improve phenotyping to differentiate pain from inflammation and other sources of pain (e.g., MSK and arthritis).
20. Advance phenotyping and classification of cancer pain.

21. Explore identification of patients at risk of developing chronic pain.
22. Create the infrastructure to link big data (e.g., genetics) to phenotypes.
23. Develop bioinformatics for data processing to reveal markers that will improve prognosis and link patients to optimize care and treatment (cross-cutting initiative).

Priorities for “Personalized Medicine – Treatment and Management”

1. Implement the measurement of pain in clinical, pre-clinical, and real world situations.
2. Build on the strengths of the registries to inform an individualized approach.
3. Evaluate cost-effectiveness of
4. Identify causes of overuse, from biological to social determinants.
5. Determine the extent to which life events, cultural perspectives, trauma, values and beliefs act as mediators to adherence and pain outcomes; and test associated personalized interventions.
6. Evaluate the Bio-Psychosocially-Informed Culturally Appropriate Therapeutic Encounter.
7. Explore means to improve access to psychosocial care.
8. Understand individualized factors related to bio, psychological, social, and cultural/lifespan and co-morbidities.
9. Improve the understanding of the effects of culture / indigeneity and sex and gender on pain and pain treatment-seeking behavior and response to treatment.
10. Determine the impact of transition between care settings/systems, including evaluation of integration, uptake, and continuity of care services.
11. Understand and implement a holistic two-eyed seeing model of care for Indigenous populations.
12. Measure quality of care in various settings.
13. Research on the right care, for the right person, at the right time, by the right providers (stepped models of care.)
14. Evaluation of innovative funding models of care/health economics, e.g., patient care that is paid for in certain clearly defined circumstances.
15. Evaluate the role of patient engagement throughout the research continuum.
16. Describe an evaluation framework for patient engagement. What is the matrix to evaluate patient engagement and the impact of patient engagement (on all stakeholders)?
17. Phenotyping and classification of cancer pain.
18. Identification of patients at risk of developing chronic pain.
19. Create the infrastructure to link big data (e.g., genetics) to phenotypes.
20. Develop bioinformatics for data processing to reveal markers that will improve prognosis and link patient to optimize care and treatment (cross-cutting initiative).