UNIVERSITY OF CALGARY
O'Brien Institute for Public Health

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RESEARCH IMPACT ASSESSMENT

MAY 2017

Prepared for:

O'Brien Institute's
International Scientific Advisory Group

May 26, 2017

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INTRODUCTION

Where we come from

The O'Brien Institute for Public Health has evolved through several meaningful phases, since its conception in the early 2000s. As the University of Calgary's Faculty of Medicine was organizing its research mandate into six Institutes, based on physiological, anatomical, or developmental themes, health services and population health research were supported instead by a Centre for Health and Policy Studies and a Population Health Intervention Research Centre. At that time, Canadian health research was becoming organized with four "pillars" defined by its main funding agency, the Canadian Institutes of Health Research. By the late 2000s, health services and population health research (CIHR Pillars 3 and 4, respectively) were increasingly appreciated in Calgary as being both significantly different from basic and clinical research in scientific approach, and critically important to translating research outputs to health outcomes in society. These factors inspired the formation of a seventh Institute, which became functional in 2010.

Vision: *Better health and health care*

The 'seventh Institute' then matured through various stages and names ("Calgary Institute for Population and Public Health" and "Institute for Public Health"), with an underpinning operational definition that "Public Health" research encompasses both Pillar 3 and 4, and is especially effective at their intersection. As dedicated leadership and membership solidified around shared principles, the Institute's vision, mission, dual goals (research excellence and societal impact), and objectives were developed into a 2013 Business Plan. Advancements were made continually to the Institute's structure and function, based on advice gleaned from its Strategic Advisory Board, the first visit of its International Scientific Advisory Group, and numerous stakeholders, with resultant successes evident for the Institute and its members. To maintain this promising trajectory, a significant donation was received in 2014, yielding its final naming as the O'Brien Institute for Public Health. An analysis of the progress and outcomes to that time are compiled in a 2015 Progress Report.

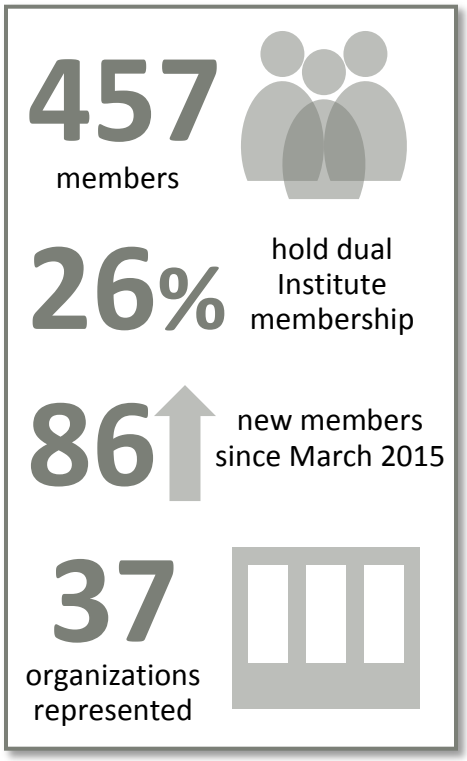
Mission: *To produce evidence that informs health policy and practice*

Where we are is the subject of the bulk of this document, with an indication of *Where we're going* in the final section. The analysis of the Institute's current status is organized according to the Research Impact Framework shown below. This approach acknowledges the internationally recognized work of previous O'Brien Institute member, Dr Cy Frank, and his colleagues at Alberta Innovates (provincial research funding agency) in the important area of Research Impact Assessment. The Framework is intended to depict at a high level the logic model of the Institute – how its resources, activities, and outputs are intended to yield societal outcomes. It is both an overview to the layout of this document, and a tool to guide the Institute's ongoing self-assessment at each of the various levels depicted. To facilitate interpretation, the colour-coding in the Framework is used throughout the document and appendices to link various research metrics or indicators of success to the five depicted levels of assessment.

Figure 1 Research Impact Framework for the O'Brien Institute for Public Health

RESOURCES

Membership



The Institute's **multidisciplinary and cross-sectoral membership** is undoubtedly its main ingredient, which the other resources, discussed below, serve to flavour or leaven. Since 2010, more than 470 researchers and research users have applied for membership, confirming their desire to contribute to and benefit from the Institute. The researchers represent disciplines from all health-relevant Faculties at the University of Calgary, and non-academic researchers and research users from outside the University make up a significant proportion of the membership.

More information on growth, primary affiliation, and dual membership is presented in Appendix 1.

The Institute is a 'virtual' entity, and **members retain their original affiliation**. Indeed, all faculty positions within the Institute (Scientific Directors, Executive Committee members, Theme Leads, and subgroup leads) are voluntary/unpaid, demonstrating the commitment of their host institutions to the vision of the Institute. This cooperative model is visualized in Figure 2: the research workforce would exist as employees of their host institutions, and would have research output and outcomes even in the absence of the Institute. The role of the Institute is to stimulate and facilitate the efforts of this workforce, to achieve greater outputs, outcomes, and impact than would otherwise be possible.

In most cases, **members self-identify** based on word-of-mouth or relatively passive invitations from the Institute, rather than being actively recruited. Recently however, a more systematic effort has been made to recruit social scientists, especially from those Faculties physically distant from the Institute's host Faculty (the Cumming School of Medicine). The goal of this effort is optimizing expertise and synergies in population health, in alignment with a key recommendation from the Institute's International Scientific Advisory Group. As a result, the ratio of non-Cumming School of Medicine faculty has increased (by 5%) among the 86 new members joining since 2015.

Figure 2 O'Brien Institute leverages members' research outputs

Environment

Aligning optimally within the Institute's particularly rich research environment allows maximal mutual benefit for both the Institute and the various elements of this environment. Along the same timelines as the Institute became an official entity, **The University of Calgary** came under new leadership and launched the inspirational "Eyes High" strategic plan. It set ambitious research goals, provided tangible support programs to help reach those goals, and acknowledged UofC as a "community" rather than "destination" institution, with a resultant new focus on engaging and serving community stakeholders. The O'Brien Institute has benefited greatly from close alignment with the Eyes High plan, contributed significantly to the institution-level metrics used to assess the success of the plan, and will maintain close alignment with the refreshed ("energized") plan being launched this year.

Although the Institute serves and benefits from members in almost all University Faculties, it was created and is hosted within the **Cumming School of Medicine**. Even before the Geoff Cumming donation that significantly increased the School's resources, the Faculty of Medicine was considered a bellwether for supporting innovative organizational structures that break researchers out of traditional disciplinary, Departmental silos and encourage cross-sectoral interactions (first with Research Groups, and later with the Institute model). As a result, the Cumming School frequently outperforms national research benchmarks, especially if the metrics account for the relatively small number of researchers. Although the Cumming donation targets themes not specifically encompassed by the O'Brien Institute, a number of highly effective School-wide research support programs have been developed since that time, and have proven very beneficial to O'Brien members within the School. In addition to the importance of the Cumming School's research focus on the O'Brien Institute, it should be noted that the School is similarly innovative in its training programs (a three-year Medical School program; a Bachelor of Health Sciences program that includes Health and Society as one of three themes; numerous relevant undergraduate, medical residency, and post-graduate medical education specialties) and service models (*eg*. an Alternate Relationship Plan (ARP) that supports clinician researchers) which indirectly facilitate the research mandate of the Institute.

As noted in Appendix 1.3, **Alberta Health Services (AHS)** accounts for approximately one third of the Institute's membership. AHS is the service arm of the province's Ministry of Health, and has an ambitious mission "to provide a patient-focused, quality health system that is accessible and sustainable for all Albertans". All physician scientists within the O'Brien Institute's membership are cross-appointed between the University and AHS. The number of additional AHS leaders and staff that self-identify as conducting or using research (through membership in the O'Brien Institute) is a testament to AHS' commitment to supporting an evidence-informed health care system. It is notable that AHS is Canada's first and largest province-wide, fully-integrated health system, serving over four million people. Moreover, an innovative organization structure (Strategic Clinical Networks) has been created to sustain that commitment to research throughout the organization. Through these attributes, and through close interactions of the Institute with AHS at all levels, the Institute benefits from a large 'living lab' in which to investigate, intervene, and have impact. As discussed on p23, the Institute has also appreciated an increasing involvement of the provincial Ministry of Health (**Alberta Health**) in its environment.

Following a significant high point in the province's resource-based economy, the Alberta Heritage Foundation for Medical Research was created by the legislature in 1980, and the Institute and its predecessors have benefited from both financial and strategic AHFMR support ever since. Currently named "**Alberta Innovates**", it has been undergoing programmatic and leadership changes, while it continues to function as the provincial research funding authority and mediator for federal opportunities. For example, one of the funding

opportunities key to CIHR's Strategy for Patient-Oriented Research (SPOR) is a network of regional "SUPPORT" platforms, and Alberta Innovates is the local organizer of Alberta's SUPPORT network, matching CIHR's $24 million commitment over five years. The SUPPORT network is becoming an important element of the Institute's environment, as it provides members (especially those in the area of Pillar 3/health services research) with relevant resource platforms, including: Career Development, Consultation & Research Services, Data, Knowledge Translation, Methods Support & Development, Patient Engagement, and Pragmatic Clinical Trials. As discussed further below, the O'Brien Institute is also strongly affected by the Canadian research funding environment.

Institute Team

The Institute's culture has been established and championed by its **Scientific Director**, who was reviewed very favourably and was approved for a second term in 2016. His strengths and Pillar 3 academic expertise have been effectively complemented by successive **Associate Scientific Directors**, both with expertise in Pillar 4 research. An **Administrative Director** operationalizes the strategic plans of the Institute, and a growing '**core team**' organizes the support programs fueled by the collegial membership, and offers expertise in topics that complement and leverage members' academic expertise.

Table 1 Changes in the Insitute team since the naming donation.

	2013/14	Post-naming	Actual	Future
Scientific Directors	2 x 0.5 FTE			
Administrative Director	1.0 FTE			
Communications Managers	0.5 FTE	1.5 FTE		**2.0 FTE ?**
Events & Communications Coordinators	1.0 FTE	2.0 FTE		**3.0 FTE ?**
Project Coordinators	0.7 FTE	1.0 FTE	1.4 FTE	**2.0 FTE ?**
Executive Assistant *(to Scientific Director)*			0.6 FTE	**1.0 FTE ?**
Theme-Specific Research Associates			1.5 FTE	**2.0 FTE ?**
TOTAL	**4.2 FTE**	**6.5 FTE**	**9.0 FTE**	**12.0 FTE?**

Voluntary leadership positions additional to the Scientific Directors include Executive Committee portfolios and lead roles in the Institute's various subgroupings. The organizational structure of the Institute's human resources is shown in Figure 3. The Institute relies on the support of two advisory groups: an International Scientific Advisory Group, and a Strategic Advisory Board, which includes leaders from the Calgary community and other agencies of the Environment outlined above. Members coalesce within a variety of theme-based groups, units, and centres, and an Executive Committee supports Institute-wide activities through function-based portfolios.

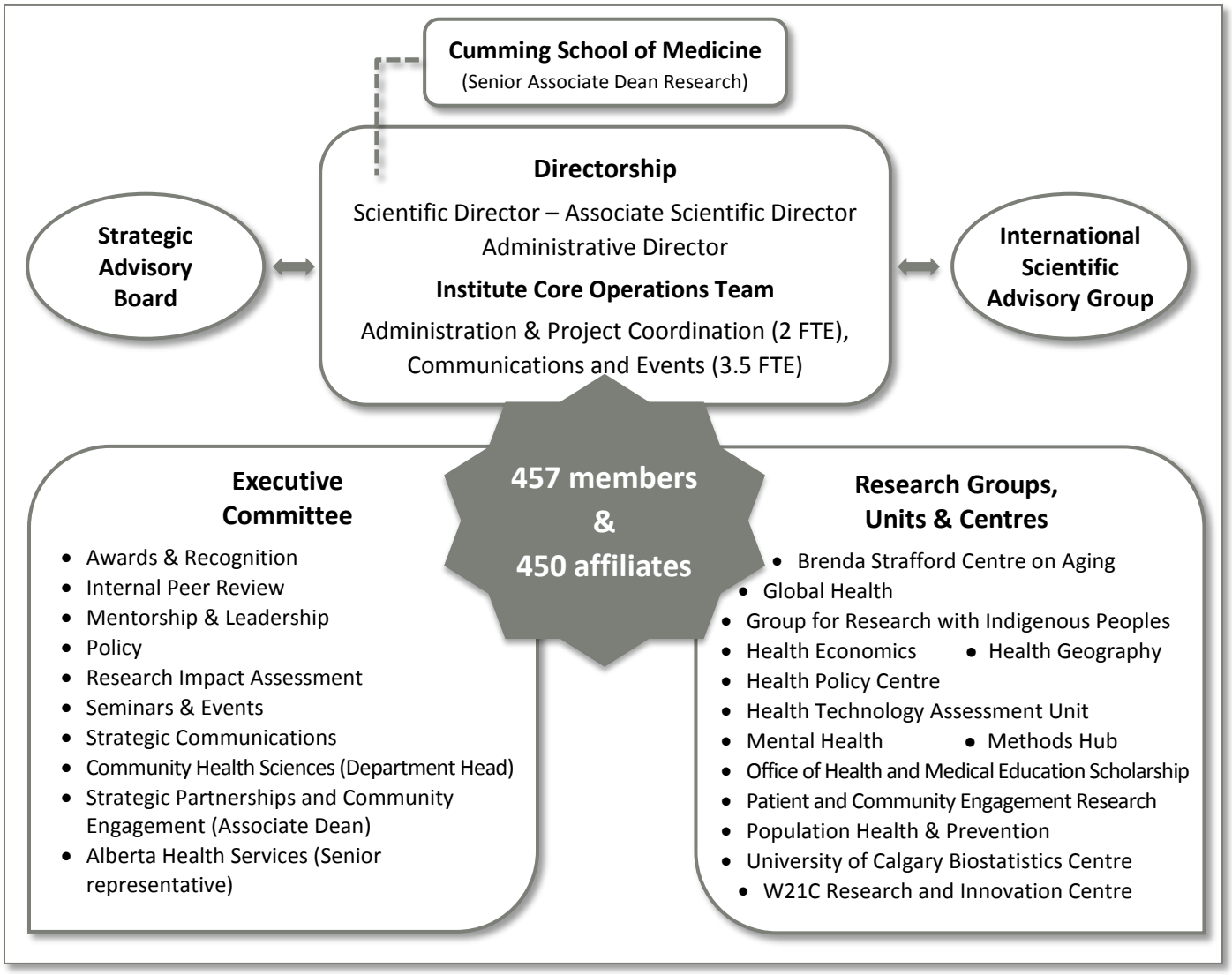


Figure 3 Organizational structure of the O'Brien Institute

Institute Operating Funding

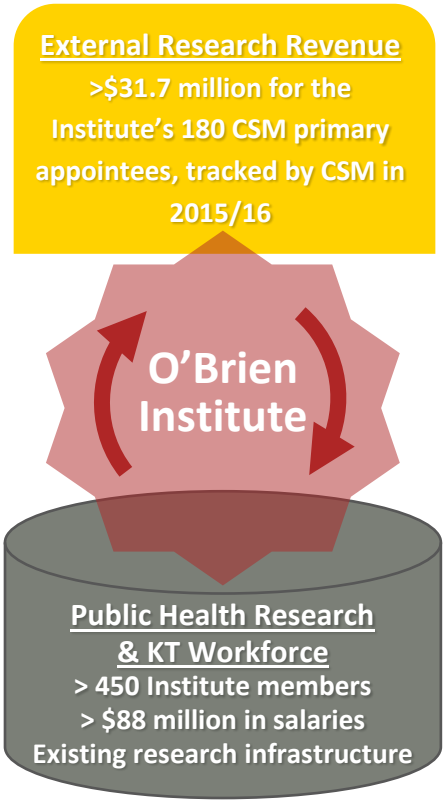
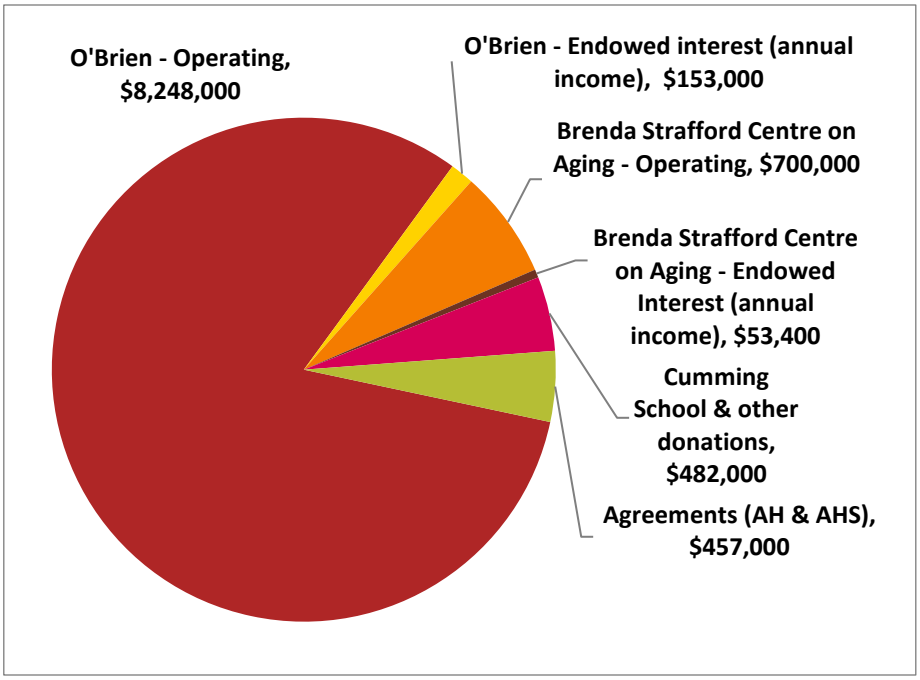


Figure 4 O'Brien Institute leverages research investments

The majority of the **financial input to the overall research endeavor** of the Institute arises from member salaries paid by their host institutions(the bottom of Figure 4). To help members operate their individual research programs, the Institute strives to increase their success in competing for peer-reviewed grants, contracts or agreements with stakeholder agencies, and philanthropic opportunities. (External research revenue to the fraction of Institute members tracked by the Cumming School of Medicine in 2015/16 is the proximal measure shown in the top of Figure 4). Members' external funding successes are discussed more thoroughly in a later section as well as Appendix 2, whereas this section outlines the funding and main categories of expenditures for the discretionary operation of the Institute core, *i.e.*, the middle of Figure 4.

The **main funder of Institute operations is the O'Brien donation**, which was made as a combination of a $4 million endowment and $8 million in spend-down funding. The understanding is that this spend-down will be used over 10 - 15 years. It is estimated that the endowment will yield approximately $160,000 interest annually, and the host Cumming School of Medicine maintains a cash commitment of $50,000 per annum. The Institute works to augment this base with additional philanthropy and funding agreements with stakeholders, to support the activities described in the next section. For example, in 2015/2016, the Institute was successful in securing two agreements with Alberta Health ($250,000) and Alberta Health Services ($200,000) supporting knowledge creation and dissemination within the province. Most recently, the Brenda Strafford Centre on Aging is now hosted within the Institute, and is supported by a $5 million gift from the Brenda Strafford Foundation, equally divided between operating and endowed funds and allocated annually until 2021. The endowed portion of the Brenda Strafford Foundation gift currently yields approximately $50,000/year. Allocation of these funds is progressing rapidly as the Institute acts as administrative and collaborative hub, supporting the University of Calgary's activities in aging research, education, community outreach and policy impact.



The **Institute's expenditures** are grouped within four main categories, as shown in Table 2. In the 2.5 years since receiving the naming donation, expenditures have ramped up significantly in most categories. Not surprisingly, *Enterprise* expenditures have increased to account for the growing core team outlined in Table 1, and their general operating costs (computers, travel, printing, *etc.*), as well as the increased costs for supporting Executive portfolio activities. The *Events* line has been separated out from the general operating expenses to highlight the significant costs of networking/knowledge translation symposia, seminars, and workshops, including many led by the Institute core team, as well as other well-aligned events that are led by members or affiliates and co-sponsored by the Institute. *Catalyst Funds* comprise both small awards to members proposing well-aligned, early phase projects expected to be competitive for external funding, and the small annual allocations to the Institute's Research Groups (included in the groupings at the bottom right of Figure 3). Outlay in the Catalyst category has increased significantly, as has that in *Investing in People*. It is notable that the Investing in People expenditures almost always leverage matching contributions from partners, toward start-up funding packages for newly recruited researchers, and to studentship and fellowship packages for members' trainees. *Specialized Infrastructure* expenditures are sporadic, and have not increased in recent years.

Naming donation

BSCoA integrated within the Institute

Table 2 O'Brien Institute expenditures

	2013/14	Post-naming estimate	2016/17 actual	Immediate future	Long-term future
Enterprise funds					
Salaries	≈ $ 250,000	≈ $ 500,000	$ 542,000	≈ $ 750,000	≈ $1,000,000
Core expenses			$ 42,000	≈ $ 65,000	↑
Events			$ 203,000	≈ $ 275,000	↑
Catalyst funds	≈ $ 50,000	↑	$ 260,000	≈ $ 300,000	↑↑
Investing in people		↑↑	$ 269,000	≈ $ 462,000	↑
Specialized infrastructure		↑	$ 3,000	≈ $ 35,000	↑
TOTAL	**≈ $ 300,000**	**≈ $1 million**	**$1,319,000**	**≈ $1,887,000**	**≈ $2.5 million**

Ongoing fund development

It should be noted that infrastructure (space and equipment) has not been a limiting resource for the Institute to date, given that laboratories and high-tech equipment are not components of most health services and population health research. Members' office spaces are managed by their host institutions, while Institute staff and shared meeting spaces are located in the Institute's most closely-aligned academic Department, Community Health Sciences. Big data computing requirements are resourced for the most part through the University or School. These include resources for : 1) high performance computing (HPC); 2) secure computing distinct from HPC; 3) analytic tools; and 4) platforms for secure remote data capture and integration.

ACTIVITIES

Knowledge Generation

Creating new knowledge for local, provincial, national, and international stakeholders is the research mandate of the Institute's members, and many Institute activities are targeted to supporting this endeavour. An active research program in the University setting requires successful competition for external research funding, so the Institute's **Internal Peer Review program** is a key activity. The current and emerita O'Brien Directors, the Executive Committee IPR lead, and the numerous members contribute their time and expertise to offer advice on draft applications, before they are submitted to external funding competitions. The basic IPR process was designed to support applicants to open operating programs of the Canadian Institutes of Health Research (CIHR), long considered the gold standard for health researchers in this country. The Institute-managed matching of applicants with appropriate peer reviewers within the Institute is also offered for other CIHR funding programs, and for other funding agencies, and it has been successfully augmented or adapted for specific situations.

Institute member IPR endorsement:
"The internal peer review process organized and facilitated by the O'Brien Institute for Public Health is extremely valuable. For my last grant submission, the reviewers made excellent comments that improved the organization, structure and clarity of our national team grant proposal. I feel that the O'Brien Institute for Public Health peer review process contributed significantly to my recent CIHR success."

2016 IPR numbers

99 Applications submitted for IPR

20 different funding opportunities

165 IPRs completed

125 Reviewers involved

An additional critical role of the Institute's four review leads is to **gather intelligence and offer advice** to the membership, through activities in the IPR program, as well as through recurring grantsmanship seminars. Their strategic advice, specific to health services and population health research funding, masterfully complements the excellent University- and School-level funding agency information available to members. Thanks to the review leads' significant experience with CIHR and other agencies, as review committee members, chairs, and advisors, they are ideally situated to lead these activities, which provide an advantage to O'Brien Institute members in adapting to the changing landscape of CIHR and Canada's two other main 'tricouncil' funding bodies, the Social Science and Humanities Research Council (SSHRC) and the Natural Sciences and Engineering Research Council (NSERC). The Institute has recently been working to encourage increased application pressure to these other two agencies, given that numerous projects within the broad scope of research topics and scientific approaches comprised within the membership can be strategically targeted to either SSHRC or NSERC. Increased success at SSHRC is a particularly important goal for the Institute, given the current emphasis on building capacity and cohesion among the membership's population health researchers. This tricouncil diversification strategy also aims to overcome a decreasing national

success rate at CIHR, while maintaining the Institute's commitment to the University's Eyes High goal of reaching top five status in national research metrics.

Augmentation of the regular IPR program continues within the Institute. Because CIHR operating grant applications are rarely successful before at least one revision/resubmission (a known peculiarity of CIHR's population health and health services committees), one important augmentation of the IPR program involves the Institute's review leads providing supplemental coaching for the revisions. At least one of the review leads is also usually involved in small bespoke committees created to help members secure salary and Chair awards, and in the multidisciplinary panels convened to emulate agency processes for large, specialty competitions. CIHR's main funding programs recently evolved to include longer-term programmatic funding through the "Foundation Scheme", and the Institute's review leads used early and iterative strategy sessions ("chalk talks") with competitive candidates to manage this significant change. Along with supporting a high success rate among O'Brien applicants (see Appendix 2.2), the strategy sessions were deemed extremely helpful toward interpreting the criteria of the funding opportunity, conceptualizing each researcher's programmatic goals, identifying the unique and compelling aspects of their work, and troubleshooting any perceived weaknesses of their project planning and execution. The benefits of the sessions extended beyond the target application for the researcher involved, as well as improving the leadership's understanding of the membership. The "chalk talks" were so well received that a new (research) Program Planning Panel ("Propel") process has been created, to offer similar strategic feedback to members. Propel sessions are independent of any particular funding application, and are currently being targeted at new investigators, and those at an important turning-point in their careers.

While the organization of these voluntary programs (members advising other members) remains the Institute's most important activity supporting knowledge generation, **financial investments of O'Brien funding to** research activities are now also possible for the Institute. Catalyst Funds are awarded as 'stimulus' packages, to members proposing innovative, feasible projects that are well aligned with the Institute's vision. The small awards, often involving matching funding from other relevant stakeholders, cover early stages of research projects that are expected to be expanded/completed with external funding. Similar "start-up" funding packages are offered by the Institute to newly recruited researchers, again often in partnership with the recruit's academic Department, Division, or another Institute in which the researcher is a dual member. These funds are intended to help launch the recruits in their first two years, as they become independent in securing external research funding.

The Institute has also been successful in **brokering the allocation of external funding** to research activities of members. One such recent example is an agreement with Alberta Health Services, which was used to fund eight subprojects of mutual importance to AHS and the O'Brien Institute. The projects were led by Institute members, and covered both knowledge generation and knowledge translation (see below) activities. Several other imminent examples arose from the Institute's ongoing fund development activities, and will yield philanthropic support for members' research programs that are particularly attractive to donors.

Knowledge Translation

KT, broadly defined, is the requisite activity to ensure that the knowledge generated from research has its desired foundational role in the Research Impact Framework depicted above (Figure 1), and the O'Brien Institute's attention to this activity is key to its success. A large proportion of the resources outlined above – notably the human resources – is therefore dedicated to **external communications with research stakeholders**:

conducting events, employing community and public outreach tools, and deploying social media campaigns to disseminate members' research, knowledge, and expertise.

In addition to the Institute's weekly seminar series (32 seminars with average in-person and online attendance of 65), **many events are carried out each year**. Recently, the Institute has focused on events that aim to bring together senior public- and private-sector decision-makers to address policy issues of importance in the healthcare system, not only in Alberta, but to all of Canada and the international community. Figure 5 highlights three 2016 events in particular, targeted at enhancing public awareness around health innovation and health systems efficiency. These exciting initiatives not only brought these important issues to the forefront, but also encouraged partnerships within the University, with local and provincial governments, and with other international healthcare organizations.

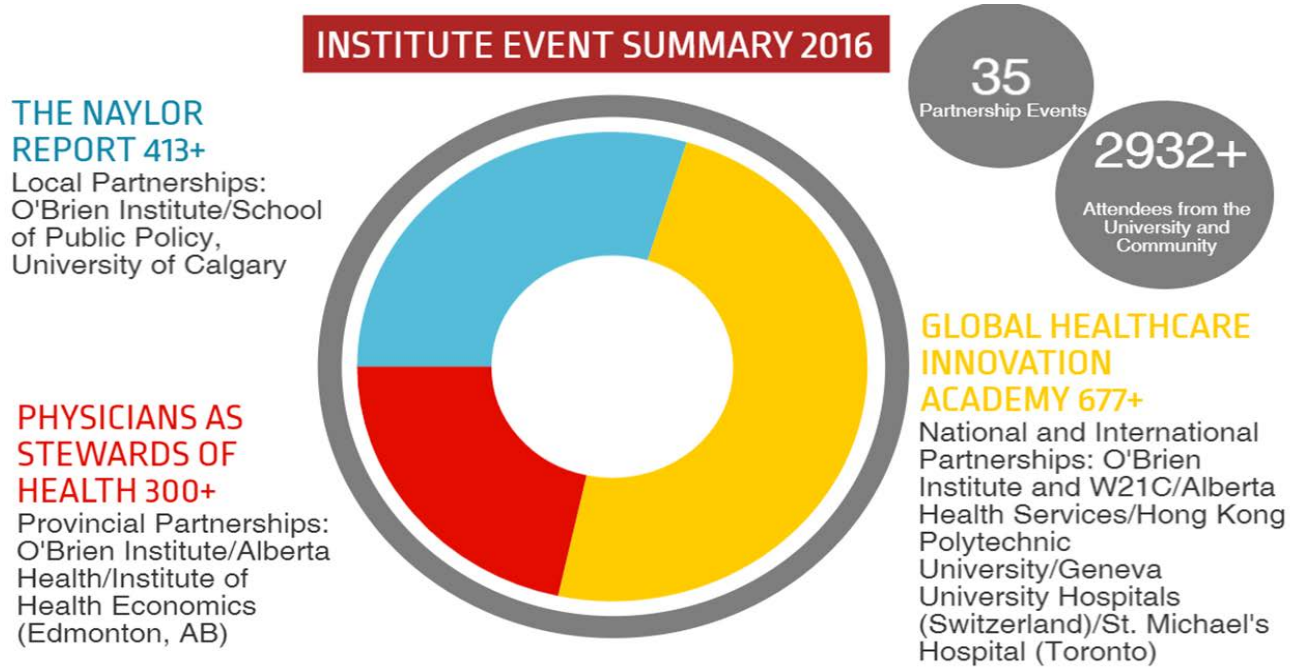


Figure 5 Internal and External Event Numbers, Attendance, and Partnerships for 2016

Through the bold use of multiple, concurrent, coordinated and reciprocal communications initiatives, the Institute strives to support members, grow awareness of their expertise, and disseminate knowledge to practitioners, policy makers and citizens. These activities are tracked, in part, by how often members or their research are featured in the University's news service, Utoday (80 times in 2016) and in the media. As shown in Figure 6, requests for interviews from media, and the number of **O'Brien Institute members cited in the popular press are increasing** each year.

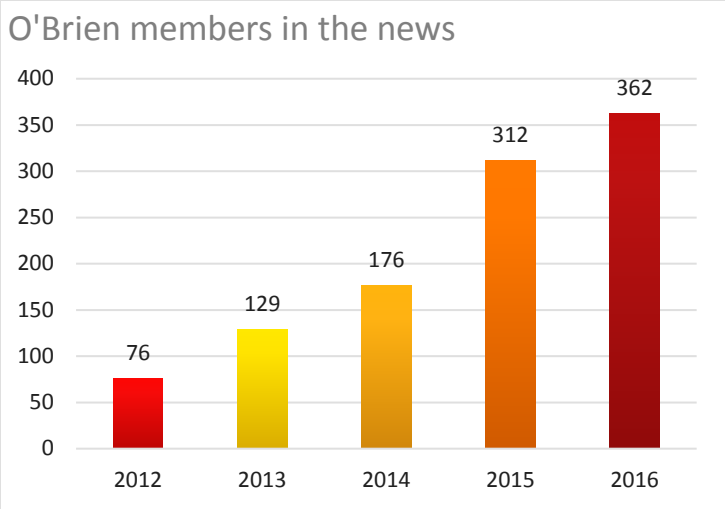


Figure 6 Number of times O'Brien Institute members were mentioned in the news (local, national, international)

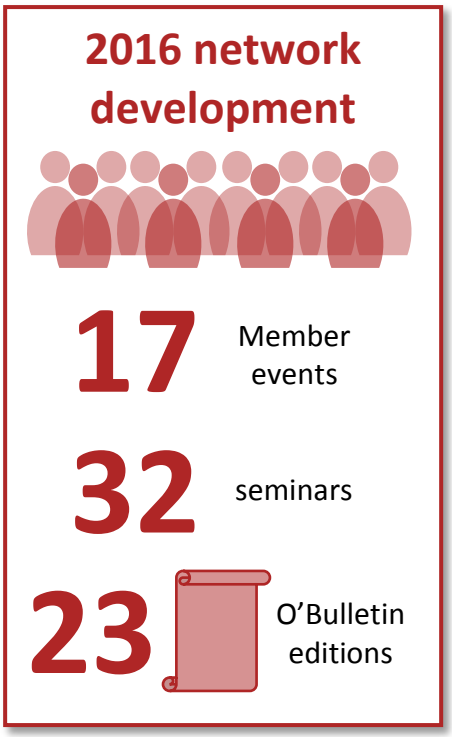
Figure 7 Growth of the O'Brien Institute's Social Media influence

Social media is an increasingly important part of global communications, and online communities can have an influential voice. These channels provide many opportunities to engage directly with local, national, and international communities to create conversations around public health issues. As shown in Figure 7 , **O'Brien Institute social media platforms have had a steady growth in followers** over the past few years. Twitter outranks other social media channels for impact, as a world-wide trend, and thus has become an essential tool for the Institute, both to provide real-time information, and to track highly relevant and geographically-focused trends and insight, including where the Institute's public health knowledge users are coming from, and what ideas and topics matter most to people right now.

As a testament to the success of the KT activities outlined above, the Institute was recipient of a funding agreement with Alberta's Ministry of Health (Alberta Health) to facilitate "public health intelligence capacity building" for the province. This award was used at the Institute's discretion, to fund many of its knowledge translation events in 2015, especially those that had a provincial reach through participation of colleagues from other Albertan universities, AHS, and Alberta Health.

Network Development

The importance of the external communication activities described above is quite apparent, as the Institute works toward its vision, but the **foundational importance of internal communications** – to ensure the broad membership is benefiting from the resources, activities, and other elements of the Institute's Research Impact Framework – cannot be overstated. The Institute's Communications & Events team thus has the dual challenge of optimizing both external and internal communications, the latter of which is a key element in the Institute's networking activity. Indeed, network development is arguably the main reason for the Institute structure, making it more than the sum of its part. The O'Brien Institute is an outlier among the seven Cumming School of Medicine research institutes, in having such a large and disparate membership. It is this breadth of disciplinary expertise, chosen health topics, methodological approaches, sectors (academic, public, private, government), and roles in the research-to-impact pipeline that enables the combined membership to generate new and meaningful knowledge that results in improved health and health care. Even before collaborations or partnerships (see below) are considered, simple familiarity – or even just awareness – of the full scope of the Institute's research environment is of great benefit to members. Indeed, rich anecdotal evidence suggests that some of the most effective collaborations arise from relatively serendipitous exposure to new colleagues or concepts, and the Institute's network development activities are therefore designed to provide this opportunity for meaningful member interaction.



Partnership Building

The Institute's activities include efforts to cultivate **important partnerships for the membership as a whole.** Obvious among these partners are the key stakeholders outlined above in the Institute's "research environment" section. The Institute's closest partnership, with AHS and its SCNs, is maintained through integration of AHS personnel throughout the membership (sharing Institute resources and opportunities), and participation of AHS leaders in key working groups and committees (including the Institute's Executive Committee and Strategic Advisory Board). Partnership with Alberta's SPOR SUPPORT platforms are maintained through the involvement of Institute leadership in the SUPPORT network's Steering Committee, as well as the activities of Institute members as leads on four of the seven platforms. Alberta Health leadership is also included on the Institute's Strategic Advisory Board, and more distant partners (from Alberta Innovates and federal funding agencies, for example) are hosted or consulted regularly, to exchange ideas with the membership and leadership.

The Institute has also taken a leading role in creating and maintaining a **partnership with provincial research counterparts**, which is similarly relevant to the entire membership. Campus Alberta Health Outcomes and Public Health serves to encourage strategic collaborations, while obviating unnecessary redundancies, among Alberta's academic and health systems partners in the area of health systems and population health research. Through allocation of human resources, and very modest financial resources, the Institute makes available to its

members provincial meeting grant opportunities, a trainee-led conference for trainees, and an annual conference – focused on networking -- on topics relevant to Alberta's public health researchers.

The Institute also encourages members to build and participate in **partnerships specific to individual or thematic research goals,** again by allocating human resources and modest financial resources to the facilitation of member-led meetings/events, funding applications, and projects. In some cases, the Institute takes a very proactive role in securing partnerships deemed to be particularly strategic for a portion of the membership. Examples of this approach include Alberta's Institute of Health Economics, the Health Quality Council of Alberta, and makeCalgary. The makeCalgary initiative is a partnership launched in 2012 by the University's Faculty of Environmental Design and the City of Calgary, on the topic of urban planning and design. The addition of the O'Brien Institute as a key member in 2013 allowed a deepened consideration of "healthy cities" by the consortium, and important new cross-campus and municipal linkages for O'Brien members in many relevant research areas. More recently, the Institute has enhanced the partnership, which was previously focused mainly on knowledge dissemination activities, by supporting primary knowledge generation. The Institute's activities in this case were to help secure competitive funding from a University research opportunity, repetitively convene relevant researchers to help them align with the opportunity, allocate the funds to the start-up phase of six meritorious sub-projects, and mentor these sub-projects.

Global Healthcare Innovation

Healthcare is one of the largest industries in the world, and rapid advances in technology are creating opportunities to revitalize and transform health systems.

Since 2012, the O'Brien Institute for Public Health's W21C Program has partnered with organizations locally, nationally, and internationally (Calgary, Toronto, United States, South Africa , Hong Kong, and Switzerland) to establish an innovation platform through a series of events focused on bringing transformative ideas into healthcare.

The W21C Innovation Academy and Global Healthcare Innovation Academy (GHIA) are two events within this platform designed to foster innovation in the health sector. These fast-paced scientific and business pitch competitions bring together academics, healthcare providers, entrepreneurs, investors, and industry, to catalyze, nurture, promote, and reward innovations that have a global, cultural, scientific, commercial or social impact.

IMAGINE-ing true patient-centred care

Launched in early 2015, IMAGINE Citizens is a group of dedicated citizen activists focused on re-shaping important discussions between patients and government decision makers, supported in partnership by the O'Brien Institute for Public Health, the Health Quality Council of Alberta, Alberta Innovates and Alberta Health. This longitudinal initiative seeks to pave the way for cultural change in health care in Alberta through research, public engagement, and policy development.

Originally launched as the IMAGINE Project, IMAGINE Citizens believes that the only reason for the existence of the health care system is the patient, and that it should function with, for, and around the patient's needs, not around its own bureaucratic, procedural or financial needs. As such, IMAGINE is producing tangible recommendations to encourage the health system to welcome the patient voice into every aspect of the care journey – from development and planning, through to delivery and impact measurement.

Now in its third year, IMAGINE continues to build a strong coalition of key stakeholders in the provincial health landscape, and to enhance conversations around better health care through strategic public engagement.

Capacity Building

Strategic activities are undertaken with the aim of optimizing the Institute's overall "toolset" for conducting research, the most recent significant example being participation of Institute leadership in a **major recruitment campaign** of the Cumming School of Medicine (CSM). The School's recent strategic plan embraces precision medicine, and the University's allocation of 25 faculty recruitments to the School have been targeted to this strategy. Input from Institute leaders was critical in addressing contentious issues related to the precision medicine concept, ensuring that the School's plan benefits from, rather than overlooks, the theoretical refinements to the concept arising from health services, population, and public health expertise. With this advanced understanding of the power and potential of *precision health*, Institute leaders took a leading role in identifying the capacity gaps to be addressed in the recruitment campaign, and were successful in having eight of the 25 positions allocated to researchers who will contribute significantly to the Institute's vision: two molecular epidemiologists, a big data scientist, a precision public health expert, a health policy researcher, a models of care scientist, a quality improvement scientist, and an implementation scientist.

In addition to these eight CSM-controlled recruitments, **numerous other hires** managed by CSM Departments are being used to more opportunistically build critical capacity within the Institute. The Institute participates in start-up funding packages for recruits whose expertise and goals are in excellent alignment with the Institute (23 over the past two years), and provides support (via the new Propel program, for example) to optimally channel their revitalizing contributions. Targeted networking beyond the School of Medicine has increased the leadership's awareness of other recruitments – as well as relevant colleagues previously untapped by the Institute – especially in the social sciences, which will help build population health research capacity within the Institute. For example, successful outreach to these recruits and their host Faculty and/or Department has brought 15 new members to the Institute over the last two years, from the Faculties of Arts, Social Work, Environmental Design, Kinesiology, Veterinary Medicine, Nursing, Science, and the Haskayne School of Business.

A set of activities is also dedicated to **increasing the toolsets available for individual members or member subgroupings**. For example, although the Institute does not participate directly in the University's training mandate, matching funding opportunities for trainees are made available to members (eight over the past two years), as a mutually beneficial way of increasing their research manpower. Of the Catalyst awards allocated thus far (25 awards totaling almost $500,000), many similarly

Walkable cities for better health

The reported benefits of walking are not new, and improved health is just one of the many gains people experience with walkable cities.

However, in a province where suburban sprawl often outranks the need for pedestrian-oriented neighborhoods, the idea of walkability is a continued challenge. To combat this, researchers from the O'Brien Institute are moving beyond traditional research and interventions to increase walkability and improve health outcomes. They are doing this by measuring the relationship between obesity and driving habits, improving the design of neighbourhoods, and exploring a one-health approach with policies on pets for healthy cities.

Through this work, along with strategic partnerships with the City of Calgary and participation in University of Calgary-led international initiatives such as Walk21, these researchers are making sure the knowledge they have gained is being shared with policy makers, transportation specialists, and urban planners to make changes to our communities both now and in the future.

increase the awardee's research capacity as a means of launching the proposed project. Because professional development and recognition are important assets toward faculty productivity and satisfaction, the Institute also provides Mentorship and Leadership programs, and Awards & Recognition opportunities.

Most capacity building opportunities are arranged as completely open to members, to maintain the inclusive ethos of the Institute, while the most financially- and human resource-intensive activities are targeted to **three priority themes**:

- Enhanced Health System Performance
- Improved Population Health
- Innovative Tools and Methods for Public Health

The targeted *Activities* of the Institute toward its three priority themes involve the identification of resources (including human resources) among the membership, the coordination of their synergistic undertakings, and the filling of gaps, to achieve critical mass and economies of scale in numerous research topics.

Between these two ends of a continuum (open-to-all *vs*. strategically targeted) are activities supporting **capacity building within the Institute's various subgroupings**, shown below in Figure 8. These groups are thematically aligned with the Institute (with topics important to public health), comprise a critical mass of dedicated members, represent an existing or emerging local research strength, and conduct targeted capacity building activities of their own. Depending on each subgroup's situation or stage of development, the Institute's support can range from a nominal allocation of annual funding and periodic core team assistance, to concentrated facilitation by Institute leadership and core team. Three subgroupings were prioritized for capacity-building activities in the past year. The **Population Health and Prevention** subgrouping is taking on the challenge of leading the Institute's Improved Population Health theme, by synergizing the existing and emerging areas of population health excellence in the membership. Institute facilitation activities included support for: a successful CIHR/PHAC (Public Health Agency of Canada) Applied Public Health Chair application; two existing and potential additional upcoming recruitments of population health researchers; two dynamic group leaders; and the planning and execution of a consensus-building symposium. The **Health Policy Centre** is being developed to provide a central hub for interdisciplinary scholarship on policies pertaining to both population health and health services, and is discussed further in the "*Where We're Going*" section. Institute support activities to date have included: a keynote speaker and panel discussion on research and advocacy; a consensus-building town hall meeting for members; convening a planning council; securing strategic advisors; and the preparation of funding applications to foundations and the University's Office of Fund Development. As mentioned before, the **Brenda Strafford Centre on Aging** recently became part of the Institute and has enormous potential for research capacity building in this critical area. Functioning of the Centre has been enhanced by its integration within the Institute's highly efficient core team operations.

Figure 8 Institute Centres, Units, and Research Groups, aligned with the three themes of the Institute

INSTITUTE PRODUCTS

Increased Knowledge Pool

Knowledge is the Institute's currency, and the members' main output is new, research-generated knowledge. Because the Institute is facilitative (rather than strictly required) for the members, it is impossible to attribute their output directly to the activities of the Institute, but traditional academic metrics are nonetheless informative. Appendix 3 details the number and categories of publications for O'Brien members over time, as determined by bibliometric analysis. Additional measures (co-authorship, publication in prestigious journals, and H-index, for example) are included in an attempt to evaluate quality as well as quantity.

Figure 9 O'Brien Institute leverages scholarly outputs

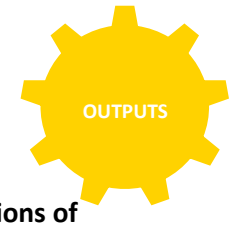
Empowered Membership

If members are considered raw material to the research enterprise, reacting with the Institute's other resources and being refined by Institute activities, a main product of the Institute is arguably a stronger, more effective membership. As a result of the capacity building activities outlined above (including strategic recruitments), the **membership as a whole** has increased in critical mass, breadth and depth of expertise, and network connectivity. Well-appreciated products of network connectivity within the Institute include: development of the fertile area of overlap between health services and population health research, facilitated by the Institute's relatively rare inclusion of both themes; the application of mixed-method approaches to topics traditionally examined more uni-dimensionally; and the redesign of research projects to include direct involvement of relevant stakeholders (including patients).

Individual members have opportunities to augment their teams through trainee funding; to follow promising new avenues of enquiry with Catalyst funding; to augment their *curricula vitae* through educational, leadership, and recognition opportunities; to be mentored and receive leadership training toward professional development; and to be more competitive in applications for external funding (see Table 3, and additional external funding metrics in Appendix 3). New members are additionally empowered by receiving financial resources to launch their independent research careers. As an early indication of how these investments have empowered individual members, five of the 23 new recruits awarded start-up funding have leveraged more than $250,000 total in external funding to date, and five of the eight trainees offered Institute awards were successful in leveraging external funding, thus only drawing a small portion of the committed funds.

Table 3 Members external research revenue / year

	Annual Research Revenue of CSM members of the O'Brien Institute
2012/13	24.91 M
2013/14	23.91 M
2014/15	34.93 M
2015/16	31.72 M



Effective Partnerships

The product of the Institute's partnership building activities is more and stronger **functional interactions of the O'Brien Institute and its members with external individuals or groups**. One indication of the Institute's success with this product is the extent to which it has been mentioned in association with various stakeholders. Table 4 shows the outcomes of a social network analysis carried out by an Institute member in collaboration with the Cumming School of Medicine's Communications Office. The exercise was undertaken to identify the programs, Institutes, and Departments within the Cumming School of Medicine that act as "bridges", connecting organizations that might not otherwise be connected. The source material was the University press, and the measure was the number of co-mentions of the potential "bridges" with various external partners, in published stories about University events, awards and recognition, funding, research, and student initiatives, between June 2014 and December 2015.

As summarized in Table 4, the network analysis indicated the **O'Brien Institute as a primary connector** for the Cumming School, both across the University and with Alberta Health Services, as well as with government and non-government partners within the Calgary community and beyond.

Table 4 Organizations with High Network Betweenness Centrality

Top Ten Connectors	Number of mentions	Betweenness	Normalized Betweenness
O'Brien Institute for Public Health	62	11846	19.62
Alberta Health Services	45	8582	14.21
Hotchkiss Brain Institute	53	7024	11.63
ACHRI	49	6802	11.27
Department of Community Health Sciences	41	5398	11.26
Libin Cardiovascular Institute	34	4368	7.24
CIHR	28	3035	5.03
Department of Clinical Neurosciences	29	2690	4.46
University of Alberta	10	2592	4.29
Alberta Innovates – Health Solution	25	2176	3.61

Presented below are two narratives of highly effective partnerships that have been produced from the Institute resources and activities described above.

Caring for Calgary's most vulnerable, and those who support them

Impassioned and altruistic, those working with Calgary's most vulnerable are trying to hold off a social and systemic tide that threatens the lives of those who fall through the cracks. In an intentional strategic step, the Institute is taking its ivory tower expertise to the dirty, hopeless streets the city's vulnerable populations inhabit – in silence and without a voice. The hope is that the support, knowledge and guidance the Institute can provide will help break a cycle that not only claims lives, but destroys people unnecessarily, and takes away care and compassion from those most in need.

There's not one faction of society that experiences the impact of the social determinants of health, or that more acutely feels the effects of meaningful, or misguided, public health practices or initiatives, than those who make up Calgary's most vulnerable populations. For those living in abject poverty, or homelessness, fighting addiction, or mental health afflictions, their reality is a web that's difficult to escape. For many, attempting to conquer just one of these conditions is an insurmountable task. For those who can't, the rest of these conditions can soon become part of their experience, pushing them further down society's rungs, and further away from the relief or salvation that starved and stretched social services can provide.

This is a space the O'Brien Institute cannot shy away from, says Scientific Director Dr. William Ghali. "This is public health at its most basic and most important. If we're not going to engage in this, then we may as well just pack up and close our doors," says Ghali. This particular endeavour, like many of the O'Brien Institute's community-based or community-focused initiatives, has societal impact as its driving focus. Thus, research becomes an enabler to the goal and, at times, a by-product, but not the purpose.

Street CCRED (Community Capacity in Research, Education and Development), an ambitious cooperation between the O'Brien Institute, Cumming School of Medicine (CSM) partners, and community organizations and practitioners, is the flagship endeavour of the Institute's and CSM's foray into this arena. It brings together homeless shelters, addiction centres, charities, and inner city and indigenous clinics, in the hopes of aligning strategies and resources. The intent is to maximize the efforts of the social workers, nurses, physicians, and paramedics currently fighting a rising tide of need, and who lack the capacity to deal with Canada's second largest homeless population, a deadly opioid crisis, and the economic pressures of an energy city caught in the middle of a global energy realignment.

Apart from working to maximize the capacity of inner city service providers, Street CCRED has shot in to fill critical service gaps by launching initiatives such as CAMPP (Calgary's Allied Mobile Palliative Program), which takes palliative care to where the city's vulnerable populations are, and where no such services exist.

"We run CAMPP with the aim of meeting people where they are. We aim to be mobile, so that we can be flexible to patients' needs and not the other way round. We… work closely with other allied medical services to enable people at the end of life to experience palliative care that should be available to all patients," says Dr. Simon Colgan, a driving force behind Street CCRED, Institute member, and the mind and soul behind CAMPP. "Dignity and compassion in health care (and especially at end of life) should be the standard for all Canadians."

A similar approach was applied to the introduction of MAPs (Managed Alcohol Programs), a collaboration that takes a harm-reduction approach to support those living with addiction and trying to navigate life in the streets. Street CCRED members were also intimately involved in the drafting of the Calgary Services Recovery Task Force final report and recommendations. The task force, made up of multiple non-profit, and government agencies serving the city's homeless population, aims to inform collaboration in the provision of effective, compassionate health care to the homeless. Finally, Institute members are helping Calgary Urban Project Society develop and implement the Coordinated Care Team Program, which sees community members act as health services navigators and advisors for the city's vulnerable populations, in an effort to break their revolving door relationship with emergency rooms.

The Institute is working on strategies that will make these initiative sustainable for members, and more impactful for those who depend on these services for their future, lives, or dignity.

The function of policy in public health and how the O'Brien Institute is reshaping it

When government officials need knowledge and guidance with which to shape policies affecting the health of millions, they turn to the O'Brien Institute for Public Health.

As healthcare costs skyrocket, new epidemics scar the landscape, alternative facts become knowledge, and an increasingly connected digital world highlights, or gives rise to, new population health challenges, health authorities find themselves in nebulous, shifting realities. In need of clarification and access to trustworthy advice and information, government is turning to the Institute for guidance.

The O'Brien Institute, "is now clearly the go-to policy centre for Alberta Health. This is a tremendously positive achievement. The progress over the last 18 months is very impressive," Chris Eagle, former CEO of Alberta Health Services, and current president of the Calgary Health Trust, says of the Institute's newfound success in this space.

The Institute has carved this niche by conducting research that directly addresses public and population health challenges, and by mobilizing that knowledge through the publication of op-eds, the hosting of large, evidence-based events, by informing decision-makers one-on-one, and by sharing knowledge through the media.

Members have moved to inform local, provincial and federal governments on everything from water fluoridation, and patient engagement, to cannabis policy, and innovation in healthcare. At the same time, and in the last year-and-a-half, health policy makers have asked the Institute to inform policy, and the public, on physician remuneration and its effect on the sustainability of the healthcare system. They have also asked the Institute for its expertise in defining what effective pharmacare looks like, how to introduce the connectivity, improved outcomes, and continuous care options that digital communications provide, and what the public health-focused implementation of cannabis legalization looks like, among others. This is a fundamental shift in that rather than conducting research and hoping it will make its way to key decision makers, as is the normal order of business, decision makers are continuously, and pre-emptively, coming to the Institute for advice and to act as honest knowledge brokers between practitioners, the public, professional associations, and the government.

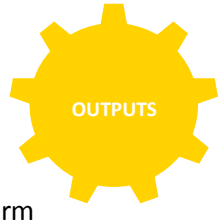
The Institute's success in this sphere stems from bold steps taken to define strategies and tactics with which to improve the public health of Albertans, while remaining unbiased, but driven to shape the discourse around conversations critical to the health of Albertans. This point was highlighted by Institute Scientific Director Dr. William Ghali during a forum looking into physician remuneration in Alberta, which hosted experts from across the continent, the media, as well as Minister of Health Sarah Hoffman, and AHS leadership.

"What we need is honest dialogue around these challenges," said Ghali during the forum. As an academic research entity, he said, the Institute is in a privileged position and it behooves members to take that mantle of responsibility and privilege, and push discourse in order to achieve societal change.

That train of thought was the underlying theme throughout the work done in the physician remuneration initiative, which looked at how physicians' pay affects outcomes, the doctor-patient dynamic, and the province's overall bottom line. Accepting to be brave and bold was also at the heart of work done surrounding the implementation of a province-wide e-Health plan. That particular initiative saw experts from all over North America inform how patient safety, outcomes, patient confidence, patient voice, and system savings can all be addressed if digital communications can be implemented system wide to ensure care providers can communicate with other care providers, and to ensure improved two-way communication between providers and patients.

"To not innovate within the health care system in the face of compelling evidence is a failure to the citizens that support and use the system," said Dr. Doreen Rabi, during the e-Health conference.

Universal pharmacare and cannabis legalization are also topics that decision makers have recently asked the Institute to investigate and inform.



Research-to-impact pipeline

An effective, accessible, and well-maintained pipeline – through which public health research can inform decision makers and guide interventions – is a product under development by the O'Brien Institute. It is well-accepted that this pipeline must facilitate flow of knowledge in both directions, with research users informing researchers at all stages of production; research knowledge will also ideally flow both by push from the researchers and pull from the research users. This pipeline analogy can be misleading, however: unlike the mechanically engineered namesake, there are very few "solid" elements – well-established processes or tools – that can be assembled to reliably provide the desired delivery and uptake of health research information. There are some success stories predating this product development, upon which to model additional efforts – contractual agreements with decision making bodies, for the express purpose of informing health system decisions (through W21C and the Health Technology Assessment Unit, for example) – but these agreements represent the distal end of the theoretical pipeline, with the proximal end being more reliant on serendipity, effective partnerships, and other less concrete assets.

Several Institute activities appear to be effective toward building the challenging distal end of the pipeline. In the case illustrated above – the Institute's recent successes in convening researchers and provincial decision makers on topics relevant to health services – the critical stimulus was the Institute leaders' cultivation of close relationships with decision-making stakeholders. When representatives of the City of Calgary invited Institute members to inform on the subjects of fluoridation, homelessness, and cannabis, the respective stimuli had been the Institute-facilitated outcomes of a member's natural experiment on Calgary fluoridation and advocacy in another jurisdiction; a community-engaged research report by a member; and publication of a member's expert opinion in local media. As these important interactions increase in frequency and effectiveness, the Institute will assess contributing factors and best practices, to further improve upon the pipeline product, and encourage the membership to make optimal use of it.

SHORT TERM OUTCOMES / INSTITUTE MISSION

Research Excellence

Research metrics can be considered proxy measures of research excellence. Many of the Figures and Tables above, as well as the exhibits in the Appendices, demonstrate the success of Institute members in securing peer-reviewed research funding and salary awards (Appendix 2), publishing prolifically and in prestigious journals (Appendix 3), and receiving recognition from peers (Appendix 4). It should be noted that the Institute's earliest declared target toward the goal of research excellence was to rank among the leading University research institutes by 2015, and among the leading national public health research organizations by 2018. As shown in Appendix 2, the O'Brien Institute has been among, or leading, the seven health Institutes in many measures of research excellence, and is among the top national achievers, especially if results are normalized to account for the size of the Institution.

It is noteworthy that the bidirectional arrows used in the Research Impact Framework (excerpt shown here) are especially descriptive for the research excellence outcome. Research excellence is a prerequisite of effective partnerships with stakeholders (partners are only interested in rigorous information from a trustworthy source) and it is also stimulated by effective partnerships (the Institute's themes, topics, programs, and projects are made relevant and innovative by virtue of strong network and partnership activities).

Presented below, and in Appendix 5, are demonstrations of research excellence yielding short term outcomes, which are anticipated to yield impacts on society that will become measurable over the longer term.

Institute researchers enlisted by WHO to assess link between antimicrobial use and antibiotic resistance

Antibiotic resistance is considered one of the biggest global public health threats today, as the number of antibiotic-resistant bacteria continue to increase at an alarming rate. While the issue has multiple contributors, the use of antibiotics in food animals, and how that can translate to antimicrobial resistance in humans, is of particular interest to an interdisciplinary team of researchers within the Institute, including Veterinary Medicine faculty members Herman Barkema, PhD, and Susan Cork, PhD.

The team, which encompasses researchers from the Cumming School of Medicine and the Faculty of Veterinary Medicine, was recently selected by the World Health Organization (WHO) in a competitive global bidding process to conduct a systematic review of the available literature on the issue, so as to inform the organization on the full scale of the challenge. The findings were presented to the WHO Advisory Group on Integrated Surveillance of Antimicrobial Resistance (AGISAR) in Raleigh, NC in October 2015. The researchers then undertook a more specific analysis, at the request of the WHO, to help inform the policies the global body is developing around antimicrobial resistance. The findings were presented in Geneva, Switzerland in March 2017.

According to Institute members leading this work, this research has been an exciting opportunity to work with the WHO and other global stakeholders on a health concern that has extremely broad and far-reaching implications, while strengthening existing collaborative linkages between the Cumming School of Medicine and the Faculty of Veterinary Medicine.

Innovative work in data science draws international attention

Through its pioneering work in data science, and its application to the International Classification of Disease (ICD), the O'Brien Institute for Public Health is enabling researchers and physicians around the world to better track and monitor disease and mortality, which in turn leads to the delivery of better care for individuals and populations both locally and globally.

The ICD, the international standard for defining and reporting diseases and health conditions, allows the world to compare and share health information using a common language.

Research led by Hude Quan, PhD, director of the O'Brien Institute's Methods Hub, improves the ability to define comorbidities in ICD administrative data. It has been cited more than 2,700 times, and has garnered international recognition. As a result, in 2015 the World Health Organization (WHO) named the Institute a WHO Collaborating Centre for Classification, Terminology and Standards.

The WHO is currently working on the 11th revision of ICD, and Institute researchers are informing the process. Work is now underway to translate the information from ICD 10 to develop a new framework for capturing healthcare-related harms and injuries in ICD-coded data, and to test the new version for usability, accuracy and reliability.

This new framework falls in line with the International Methodology Consortium for Coded Health Information (IMECCHI), an international collaboration of health services researchers aiming to promote the methodological development and use of coded health information to promote quality of care and quality health policy decisions. O'Brien Institute Scientific Director Dr. William Ghali, along with Quan, oversee the strategic direction of the organization and are leading the way in this research.

Better Informed Communities

Communities taking advantage of the Institute's research excellence are the critical intermediaries in the pipeline toward societal impact. Research peers, health and health services practitioners, the public at large, and decision makers all need to be informed (and consulted), to achieve optimal impact of the generated knowledge. Many of the metrics in this document confirm that the Institute's stakeholder communities are being *presented* with messages from the Institute, and some of the examples outlined throughout suggest that the stakeholders are also *listening* to and *using* this information. Additional recent examples are presented here, and in Appendix 5.

Baring fluoride's teeth

Water fluoridation is a contentious topic, and research conducted by O'Brien Institute members reminded everyone of that, forcing politicians in several Alberta cities to re-visit earlier fluoridation decisions.

An ambitious study on the cessation of water fluoridation and its effect on children's dental health, which made use of data from thousands of young students from Calgary, where fluoridation ceased in 2012, and Edmonton, where fluoridation continues, was able to paint a real-life picture of the effects of fluoridation in municipal water supplies. Led by O'Brien Institute member Lindsay McLaren, the research showed that although tooth decay rose in the sample groups of both cities, the increase was markedly higher in Calgary, showing for the first time the real-life ramifications of fluoride cessation.

Politicians reopened debates around fluoridation in Calgary, Okotoks, Airdrie and Grande Prairie, where they cited Institute data, or invited testimony from members, to inform their decisions.

HPV vaccine advocate makes progress in cross-Canada education effort

A public-health initiative designed to help keep children safe from some forms of cancer – which saw strong opposition from socially conservative fronts – has found a powerful advocate in O'Brien Institute bioethicist Juliet Guichon.

Starting in January 2009, human papilloma virus (HPV) vaccine bans in publicly funded Catholic schools were challenged by Guichon through correspondence, the media and presentations to 12 Canadian school districts: 10 in Alberta, and one each in Ontario and the Northwest Territories. Inspired by Guichon, more than 250 people joined the HPV Calgary and HPV Canada advocacy groups and contributed their expertise to this important public health endeavor.

Members include HPV sufferers, physicians, epidemiologists, public policy experts, communication and IT professionals as well as community leaders. Through their combined efforts, the HPV vaccine bans have been removed in all 12 school districts.

LONG-TERM OUTCOMES / INSTITUTE VISION

Given the inherent challenges of conducting excellent, meaningful research and having that research taken up by society, in combination with the expected delay between a successful intervention and being able to measure its impact, it is not surprising that the relatively young O'Brien Institute for Public Health has few tangible examples to date of demonstrated and measurable outcomes toward better health and health care. One such notable example, provided in the Appendix 5.3 Research Impact Summary, is a reduction in concussion and all-injury risk in youth hockey players, based on research excellence and better informed communties. It is anticipated that the Institute's growing profile as a trusted agent, facilitating knowledge exchanged between academics, the public, and decision makers will accelerate and increase future examples.

Indeed, the other Research Impact Summaries in Appendix 5, developed before or during the infancy of the Institute, bode well for a significant increase in the long-term outcomes possible in the future, supported by the Institute's maturing resources, activities, and products.

WHERE WE'RE GOING

Based on the Research Impact Assessment outlined above, the Institute has undertaken several strategic advances. As discussed in the Activities section, one of the most important current areas of capacity building is the development of a **Health Policy Centre**. By synergizing existing areas of policy-relevant expertise among the membership; by developing dedicated resources, support programs, and best-practices for policy impact; and by adopting a 'health in all policies' approach inclusive of health services and population health topics; the Centre is being designed to greatly enhance flow through the Research-to-Impact pipeline posited above. Strategic planning and fund development activities for the Health Policy Centre are underway to position the Institute as an asset to provincial, national, and international stakeholders.

The **Brenda Strafford Centre on Aging** has only recently joined the Institute, and it fills what had been a major thematic gap in the Institute's research groupings. Its mandate is to enhance the lives of older adults through supporting not only aging-focused research, but also interdisciplinary training, community outreach, and policy impact. Healthy aging is a priority area for many of the Institute's key stakeholders, so the environmental *pull* on the Centre is being felt very strongly. Fortunately, integration within the Institute structure has enhanced the Centre's ability to *push* its valuable activities and products at an impressive rate. For example, a recently staged Reverse Trade Show focused on cross-sectoral solutions to unmet clinical challenges for seniors. Pilot research projects are underway, both in biomedical engineering and housing solutions for seniors' health. An "aging well" symposium focused on resilience in people, care-networks, and communities is planned for Fall 2017, to officially launch the Centre on Aging within the Institute, and to further extend its benefits to and from the Calgary community. Given this timely matching of push and pull in the aging research arena, outcomes are anticipated on a relatively short timeline.

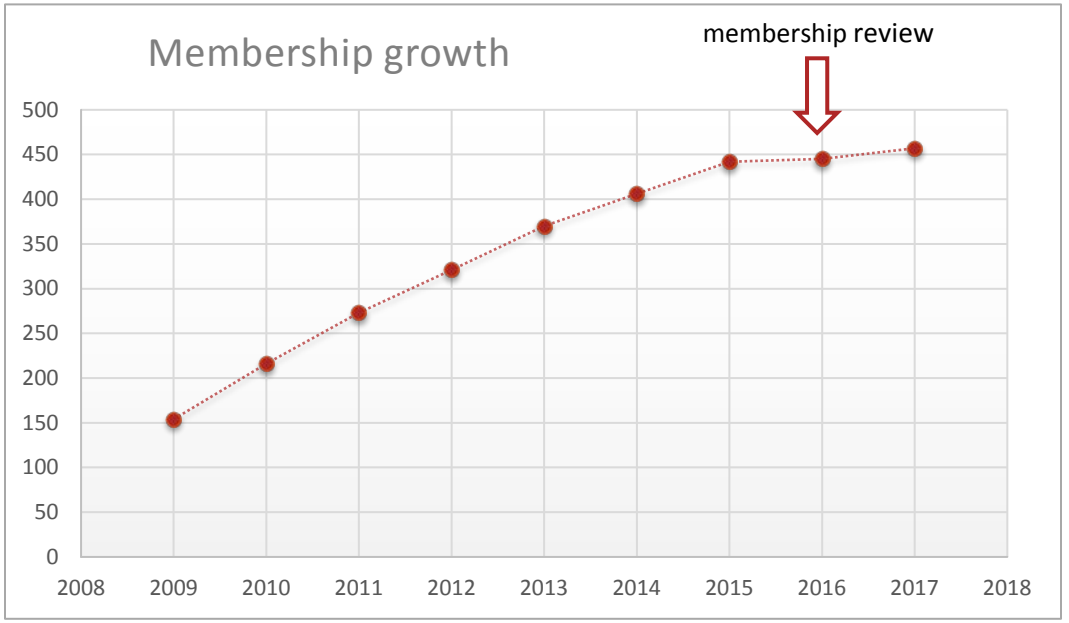
The O'Brien Institute for Public Health has advanced significantly in its short history, toward its goal of impacting health through academic excellence. It is increasingly in demand by its members and as a trusted partner, and considerations of *Where We're Going* will therefore also entail aspirations for the next five to ten years, and an examination of what changes must be made to existing structures and functions, to sustain existing excellence and achieve these evolving aspirations.

APPENDICES

Appendix 1 - Membership

Figure 1.1 (right) Growth in the number of members in the O'Brien Institute for Public Health

Since the initial membership call established the Institute in March 2009, the number of members has grown consistently, attesting to the relevance of the Institute's support programs and networking events. Since March 2015, 86 new members have joined the Institute, but the overall membership dipped slightly in 2016, after a non-exhaustive review of the membership removed those who had retired, moved to other "non-relevant" positions, or were no longer reachable.



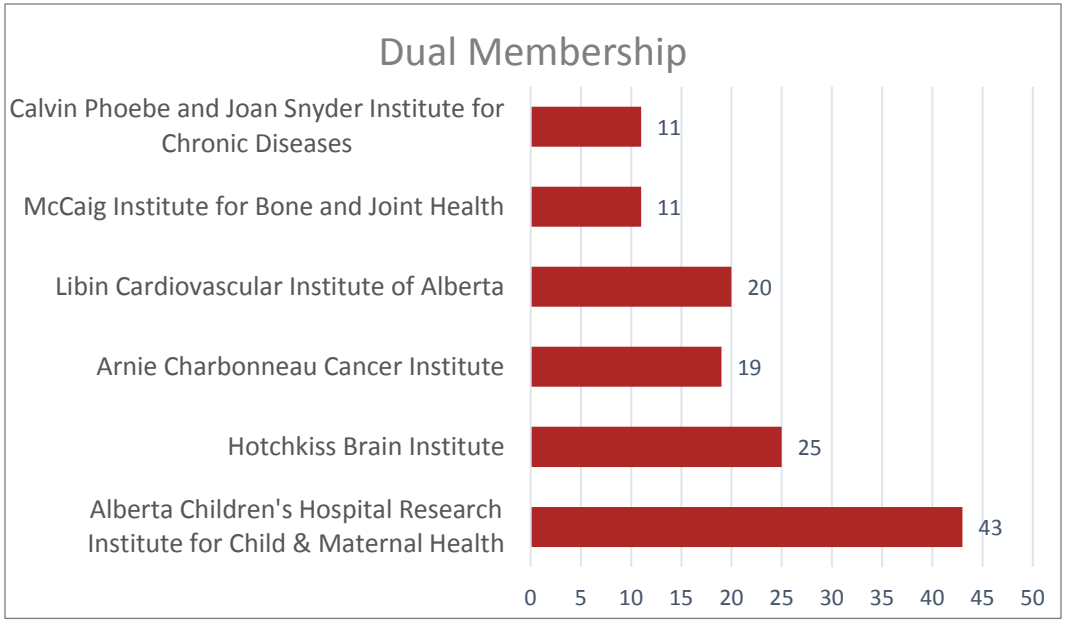


Figure 1.2 (left) Dual Institute membership

Approximately 26% of O'Brien members are also members of one of the Cumming School of Medicine's six other research institutes. Dual membership is more prevalent in the O'Brien Institute than in any other, allowing individual researchers to access expertise in both their area of physiological specialization, as well as in health services and population health research approaches.

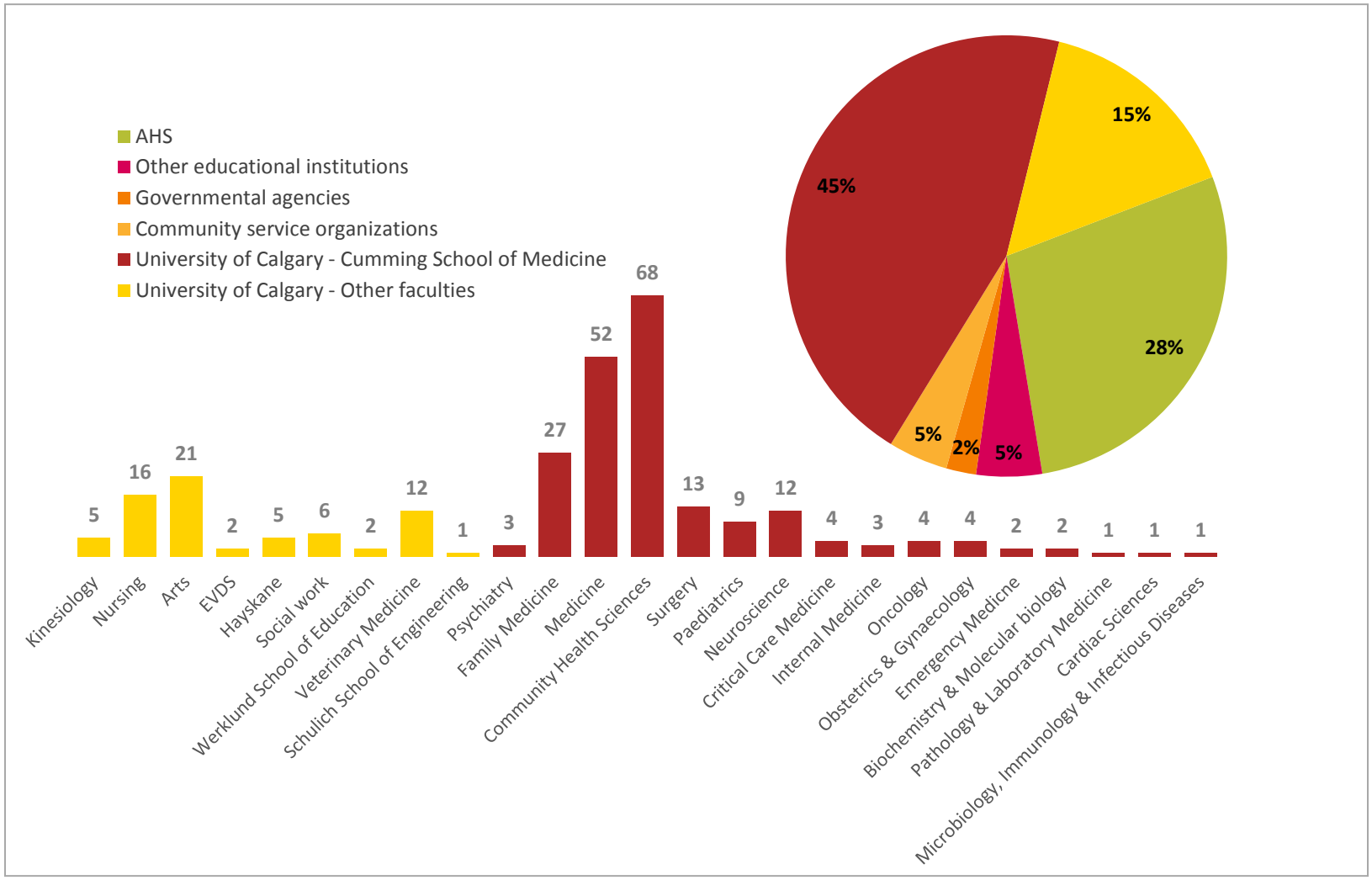


Figure 1.3 Primary affiliation of O'Brien Institute members

The O'Brien Institute membership is multidisciplinary, and includes a combination of knowledge generators (who initiate and conduct research projects) and knowledge users (who incorporate new knowledge into policy and practice). Forty-five percent of O'Brien Institute members have their appointments within 16 Departments of the Cumming School of Medicine. Another 15% are appointed within nine other University of Calgary Faculties. Alberta Health Services employees account for 28% of the membership. The remaining 12% come from municipal and provincial government agencies, community service organizations, and other educational institutions.

Appendix 2 - External Research Funding

IPR Program launch

Change to CIHR Programs

Award Year	CSM	ACHRI	HBI	Libin	McCaig	Charbonneau	Snyder	O'Brien
2010	**22**	4	10	5	1		5	**1**
2011	**29**	3	10	9		1	7	**5**
2012	**23**	3	6	4		4	5	**4**
2013	**30**	2	10	3	1	3	5	**10**
2014	**24**	4	9	4	1	3	3	**6**
2015	**34**	4	9	4	3	1	4	**10**
2016	**32**	5	14	4	1	1	8	**7**

Figure 2.1 Number of CIHR Open Operating Grant Program (OOGP), Foundation Scheme, and Project Scheme awards to O'Brien Institute and other Cumming School of Medicine institutes

The Canadian Institutes of Health Research (CIHR) is a federal agency and the main source of peer-reviewed health research funding in Canada. Successful applications for CIHR open funding are considered the benchmark for Canadian researchers. CIHR recently modified its open programs to include both a Project Scheme for short-term research projects (similar to the previous OOGP) and a new Foundation Scheme, which provides excellent researchers with longer, programmatic funding (the Foundation Scheme therefore arguably even more prestigious).

The O'Brien Institute's share of CIHR awards has risen since the Institute's official launch in 2010, and since implementation of its Internal Peer Review program, such that it is consistently among the Cumming School of Medicine's top ranked institutes.

NB:

- Successful awards for dual members are counted in the totals of both relevant institutes, such that the CSM value $\leq$ the total of the Institutes' values.
- Unless otherwise noted, external award data presented throughout this document are only for the CSM cohort (45% of the O'Brien Institute membership) from whom most of the University of Calgary's CIHR applications emanate.

Competition	Number of applications (n)	Number of successful applications (n)	Success rate (%)
National			
2014/15	1366	150	10.98
2015/16	911	120	13.2
2016/17 (stage 1*)	600	234*	39*
Cumming School of Medicine			
2014/15	48	10	20.8
2015/16	29	7	24
2016/17 (stage 1*)	16	6*	37.5*
O'Brien Institute for Public Health			
2014/15	15	4	26.67
2015/16	11	2	18.18
2016/17 (stage 1*)	5	3*	60*

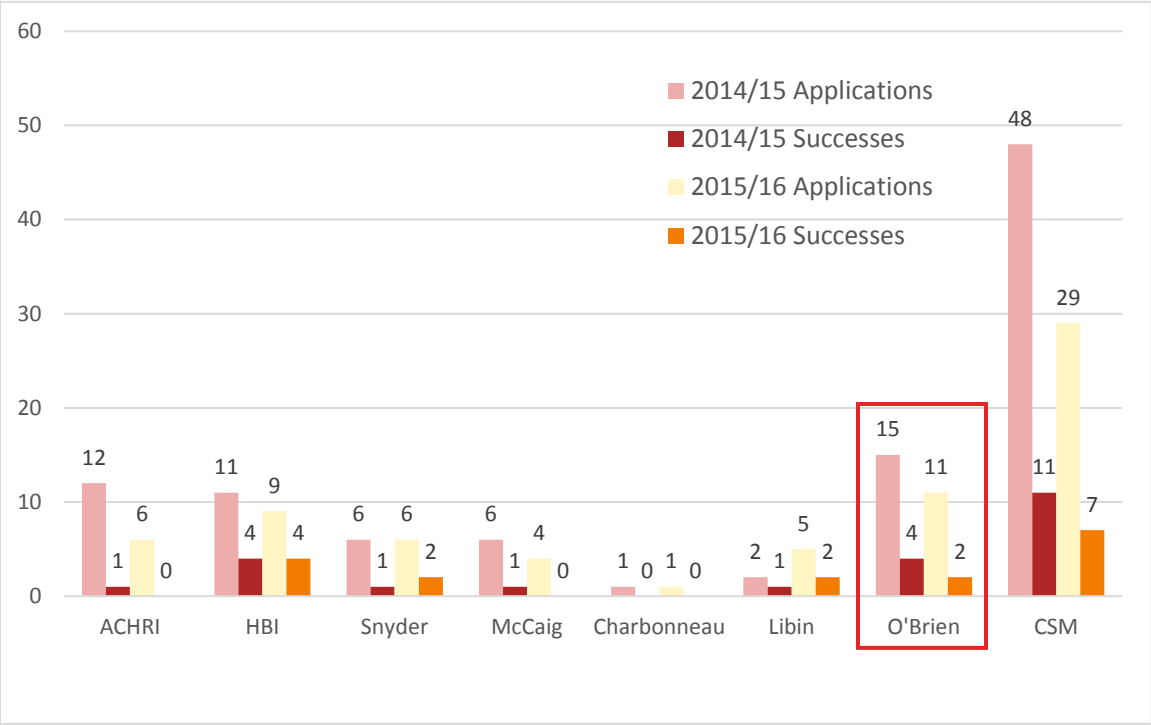


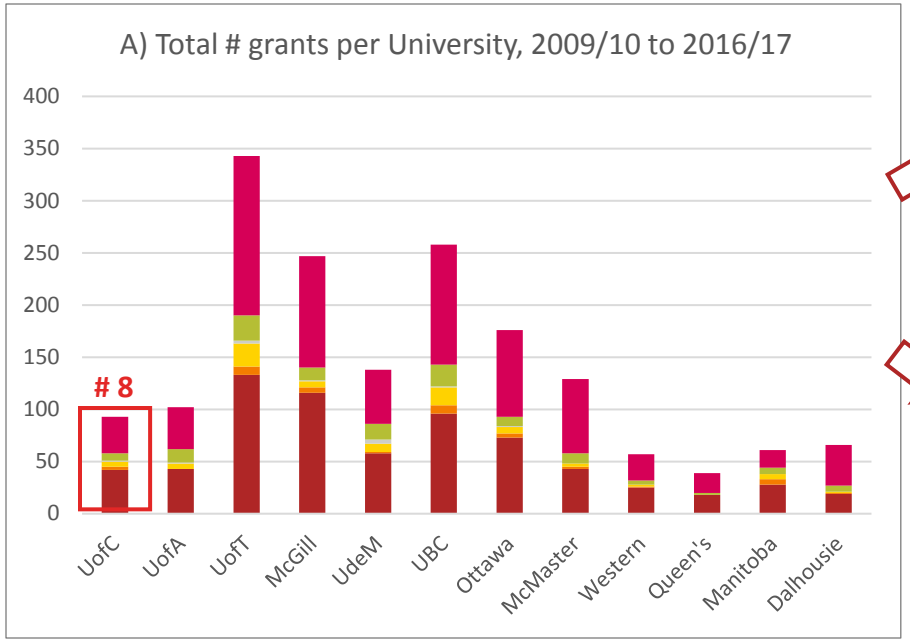
Figure 2.2 CIHR Foundation Scheme successes

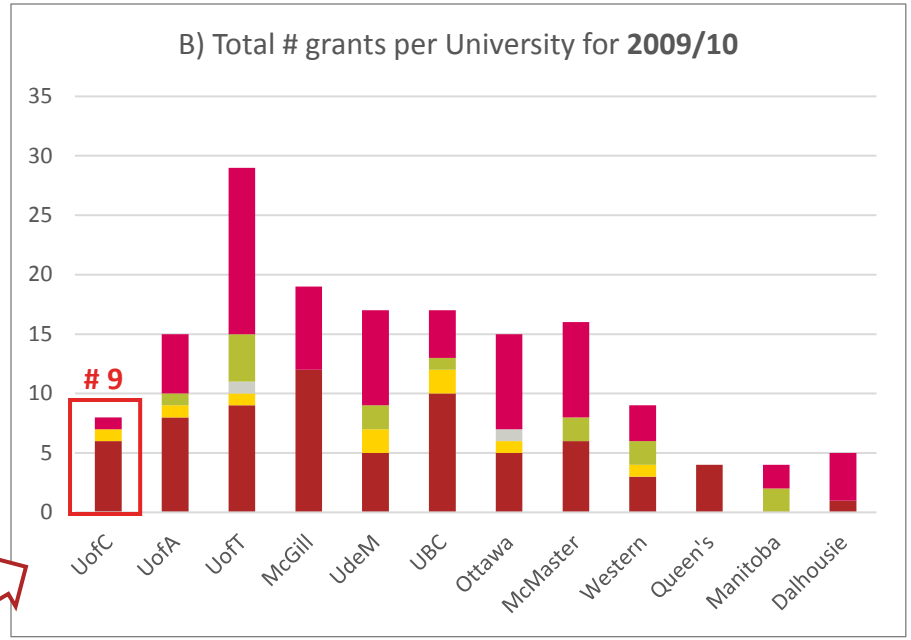
Results from the first 2.5 iterations of the Foundation Scheme competition are tabulated above, showing that Cumming School of Medicine and O'Brien Institute members compare favourably to the national average (*note that final, Stage 2 results from the 3rd iteration are pending).

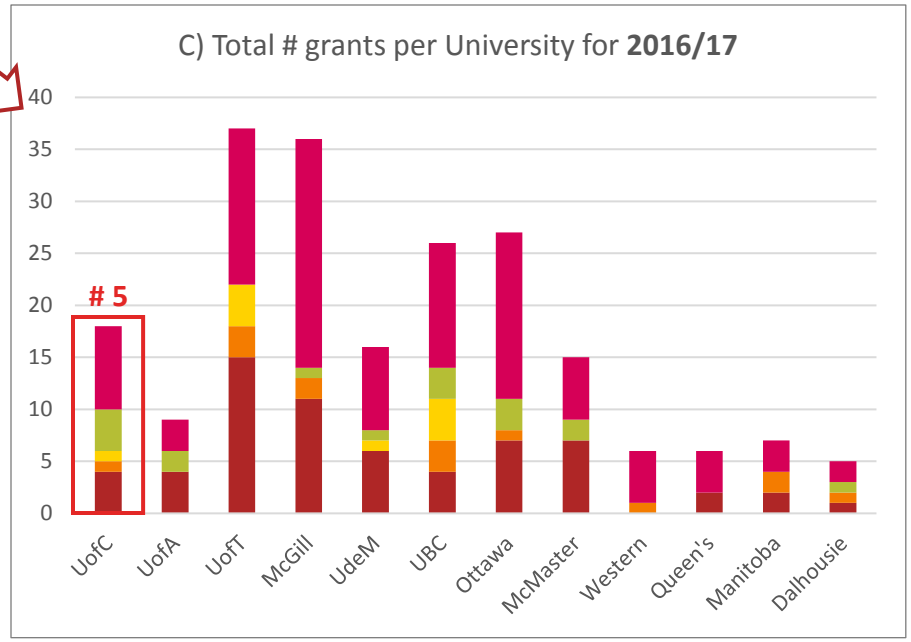
The figure compares the number of applications vs successes for CSM and each of its seven Institutes.

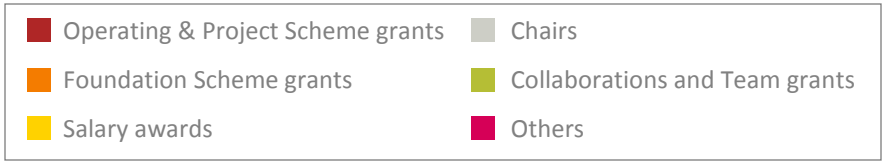
Figure 2.3 CIHR Pillar 3 and 4 Awards: University of Calgary *vs* Others

These data indicate the number of grants per University granted by the two CIHR Institutes most relevant for public health researchers: the Institute of Population and Public Health (IPPH) and the Institute of Health Services and Policy Research (IHSPR). In comparison to other Canadian Universities applying to IPPH and IHSPR, the University of Calgary's ranking (attributable almost exclusively to O'Brien members) went from # 9 in 2009/10 (fig. 7B) to #5 in 2016/17 (fig. 7C).







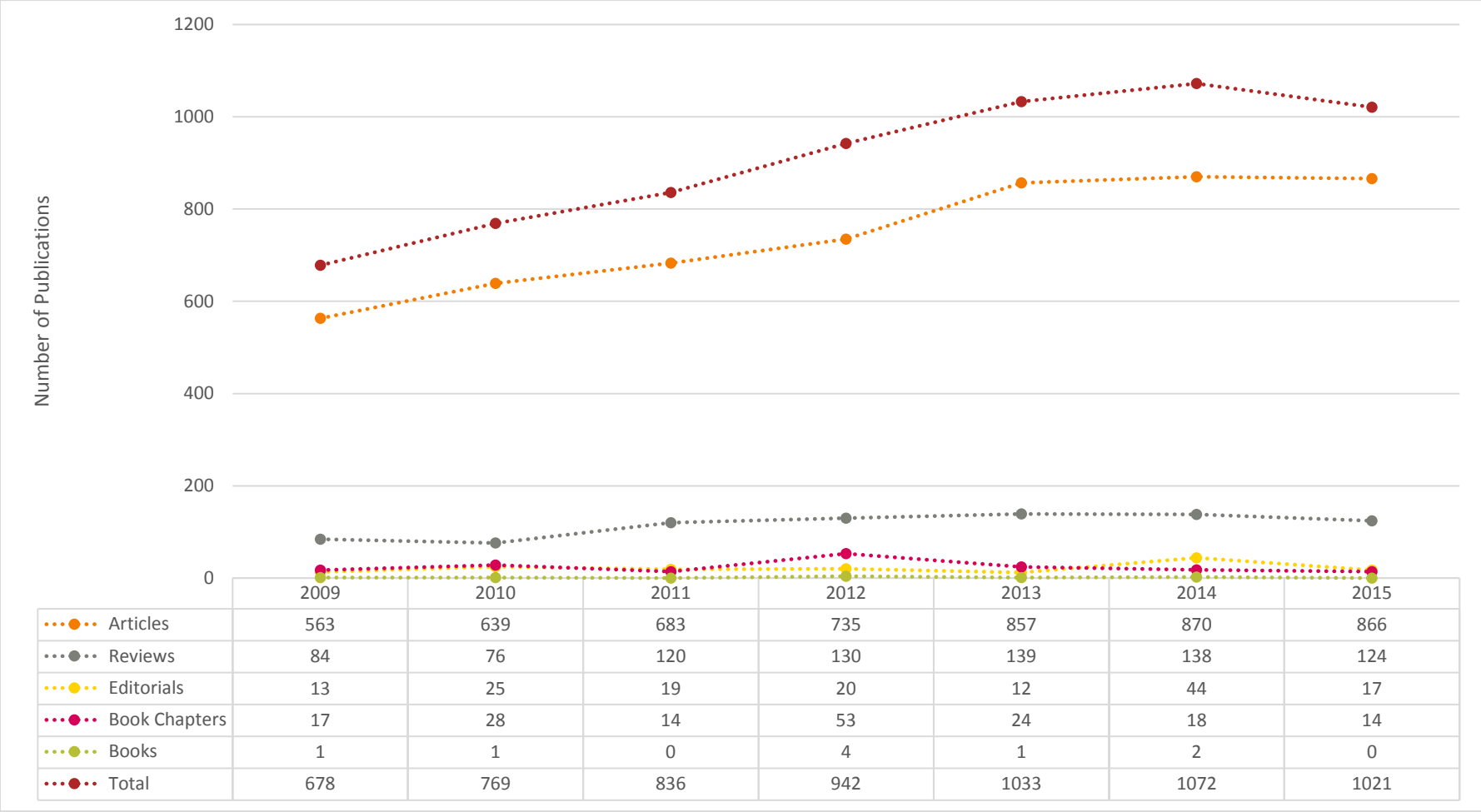


Institute	2015/16 Total Research revenue (% of CSM)
HBI	41.7 M (24.95%)
O'Brien	31.72 M (18.98%)
Snyder	31.0 M (18.55%)
ACHRI	20.62 M (12.34%)
Libin	20.38 M (12.19%)
Charbonneau	15.3 M (9.16%)
McCaig	10.36 M (6.2%)
CSM	167.11 M (100%)

Figure 2.4 External research revenue held by O'Brien Institute members within the Cumming School of Medicine

Although CIHR award successes are considered a proxy for health research excellence in Canada, CIHR funding represents < 19% of the external funding secured by O'Brien Institute members in the Cumming School of Medicine in 2015/16. Additional sources include other federal government sources (*e.g.*, Canada Research Chairs), provincial research funding agencies (*e.g.*, Alberta Innovates - Health Solutions), national and provincial not-for-profit agencies (*e.g.*, Heart and Stroke Foundation), and corporate sponsors. These research revenue values consistently rank the O'Brien Institute in the top 3 of the 7 Institutes, which is notable given the typically lower project budgets required for health services and population health research (relative to basic science research, with its greater infrastructure needs).

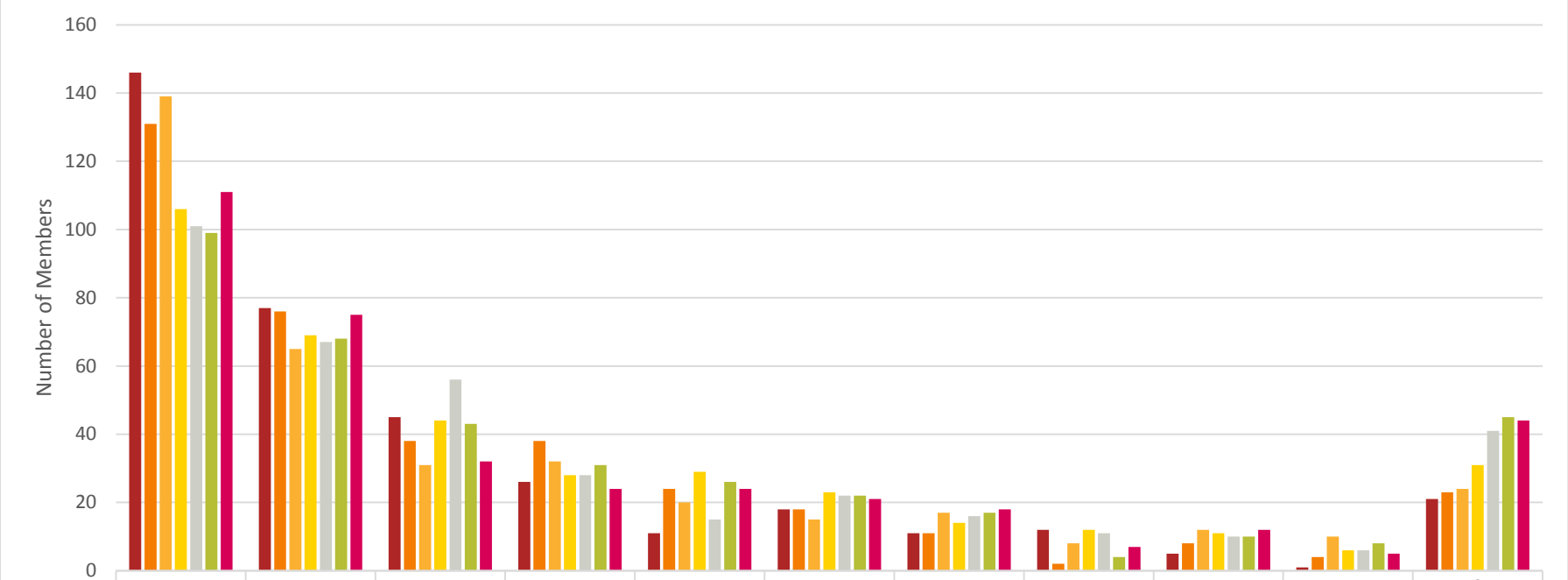
Appendix 3 - Bibliometrics



	2009	2010	2011	2012	2013	2014	2015
Articles	563	639	683	735	857	870	866
Reviews	84	76	120	130	139	138	124
Editorials	13	25	19	20	12	44	17
Book Chapters	17	28	14	53	24	18	14
Books	1	1	0	4	1	2	0
Total	678	769	836	942	1033	1072	1021

Figure 3.1 Total research publications by O'Brien Institute members

The number of research publications by O'Brien Institute members has increased substantially in the sampled period of January 2009 – December 2015. Peer-reviewed articles of independent research comprise the majority of this work. Of the 457 members (as of November 2016) tracked through Scopus, 373 members had at least one publication during this time period. Unless otherwise noted, the data from these 373 members is presented in all ensuing bibliometrics figures. Publications with more than one O'Brien Institute author are counted only once.



	0 Publications	1 Publication	2 Publications	3 Publications	4 Publications	5 Publications	6 Publications	7 Publications	8 Publications	9 Publications	10+ Publications
2009	146	77	45	26	11	18	11	12	5	1	21
2010	131	76	38	38	24	18	11	2	8	4	23
2011	139	65	31	32	20	15	17	8	12	10	24
2012	106	69	44	28	29	23	14	12	11	6	31
2013	101	67	56	28	15	22	16	11	10	6	41
2014	99	68	43	31	26	22	17	4	10	8	45
2015	111	75	32	24	24	21	18	7	12	5	44

Figure 3.2 Research publications output profile of O'Brien Institute members

Most members have two or less publications per year, which is not suprising given the large contingency of non-academic members within the Institute. A growing cadre of prolific members have greater than 10 publications per year. Publications with more than one O'Brien Institute author are counted for each author.

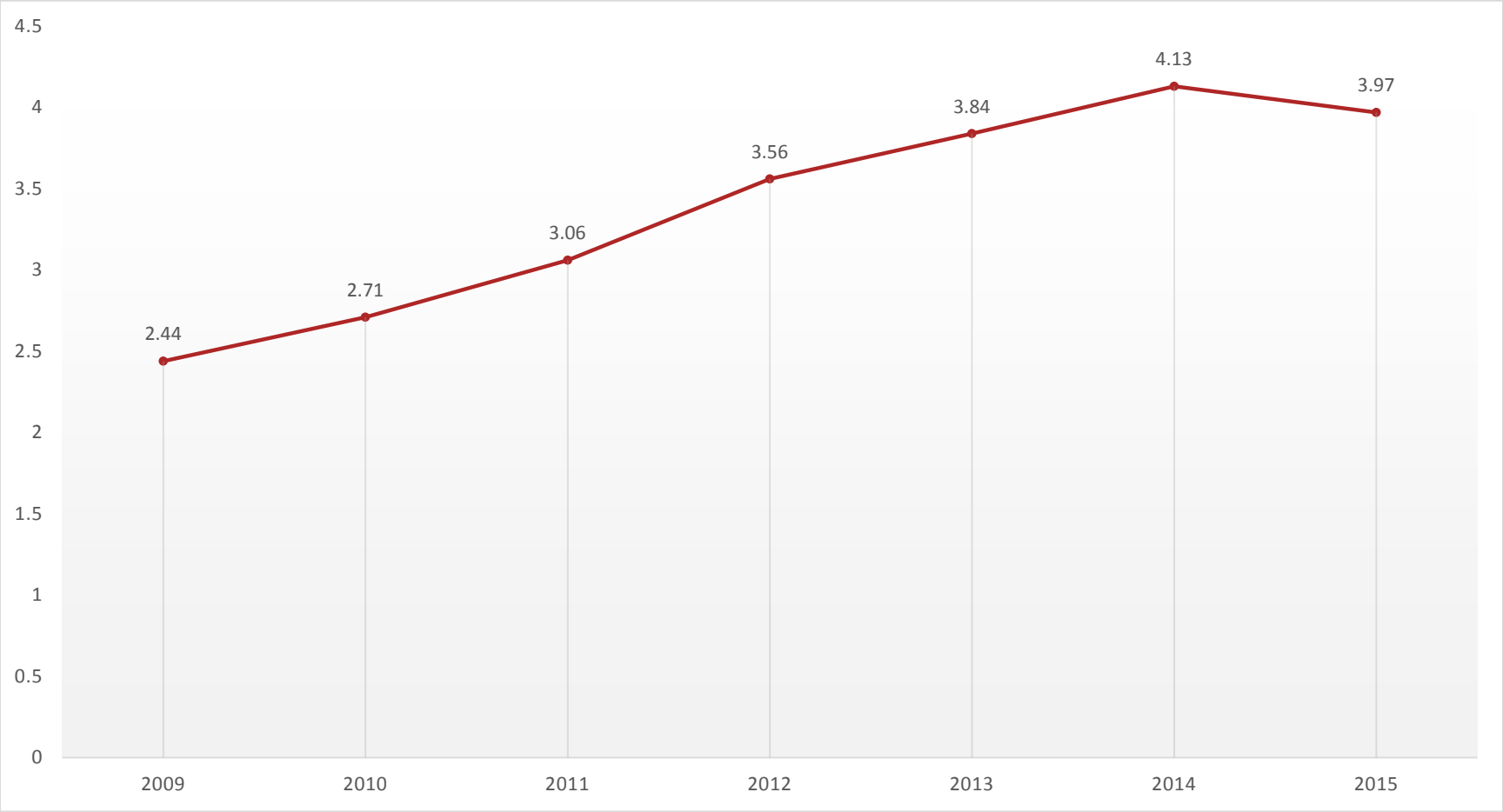
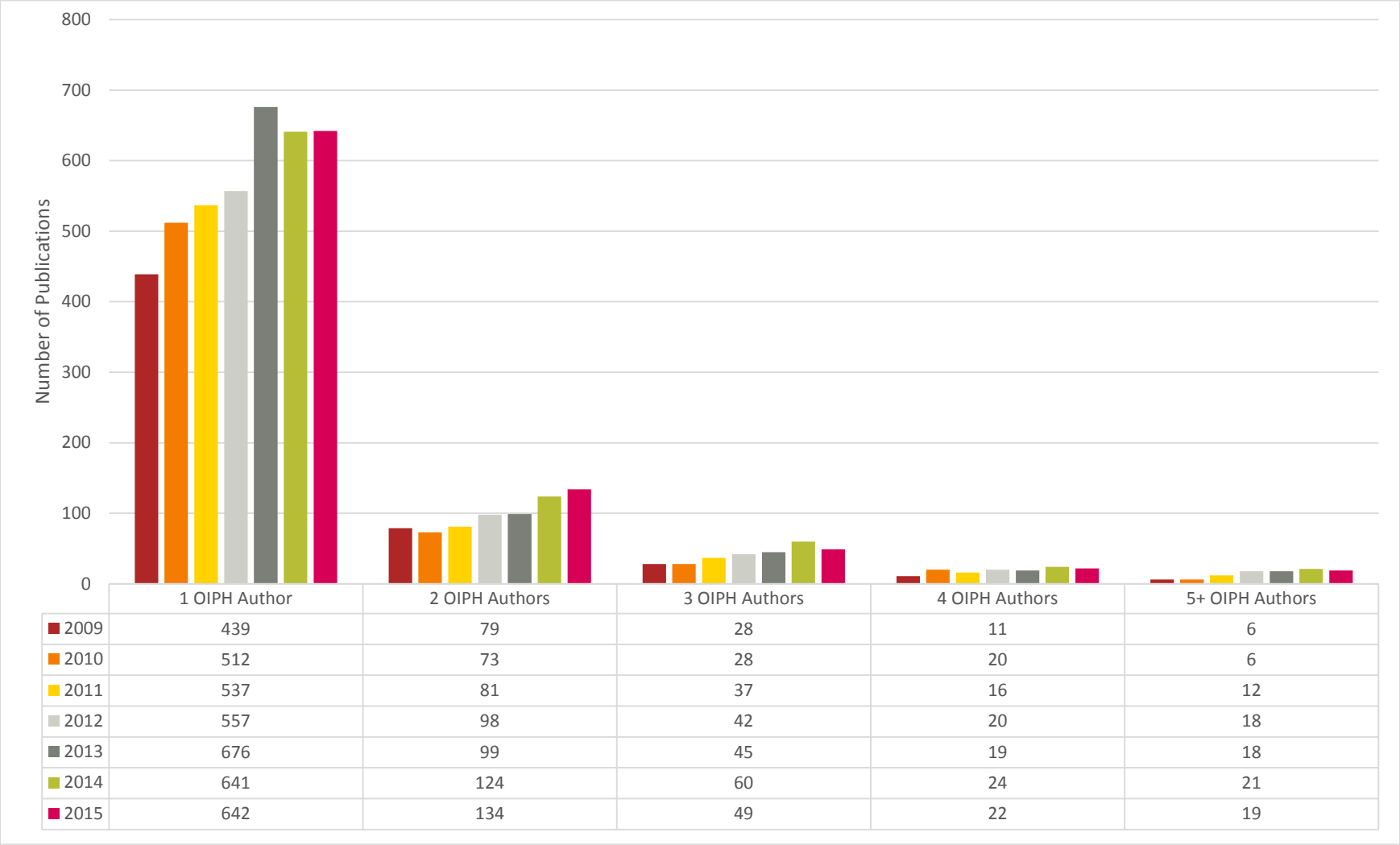


Figure 3.3 Average number of research publications per O'Brien Institute member

The average number of research publications per O'Brien Institute member has increased over time. Publications with more than one O'Brien Institute author are counted for each author.



	1 OIPH Author	2 OIPH Authors	3 OIPH Authors	4 OIPH Authors	5+ OIPH Authors
2009	439	79	28	11	6
2010	512	73	28	20	6
2011	537	81	37	16	12
2012	557	98	42	20	18
2013	676	99	45	19	18
2014	641	124	60	24	21
2015	642	134	49	22	19

Figure 3.4 Co-authorship of O'Brien Institute members

Most of the publications revealed by the Scopus exercise had one O'Brien author, although there appears to be a trend for two and possibly three O'Brien members to co-publish. Publications with more than one O'Brien Institute member are counted once. For publications with 20+ authors (approximately 5% of all publications), only the first 20 authors were counted.

	2009	2010	2011	2012	2013	2014	2015
OIPH	33.82%	33.01%	32.72%	33.55%	28.68%	31.16%	27.32%
Other U of C	15.80%	15.30%	18.61%	16.54%	18.31%	18.97%	19.15%
Other Calgary	2.96%	2.71%	2.79%	3.00%	2.83%	3.23%	2.61%
Other Alberta	6.28%	5.27%	6.04%	5.23%	5.88%	6.16%	5.88%
Other Canada	21.00%	21.84%	19.94%	22.30%	20.72%	20.22%	21.40%
International	17.60%	19.07%	16.85%	16.62%	19.95%	18.33%	21.32%
No affiliation listed	2.57%	2.81%	3.04%	2.77%	3.63%	1.94%	2.32%

Figure 3.5 Affiliations of co-authors on O'Brien Institute members' publications

International and "Other UofC" (potentially cross-disciplinary) co-authorships appear to be increasing over time on O'Brien members' publications, while the percentage of intra-Institute co-authors is decreasing (possibly in compensation?). Publications with more than one O'Brien Institute member are counted once. For publications with 20+ authors (approximately 5% of all publications), only the first 20 authors were counted.

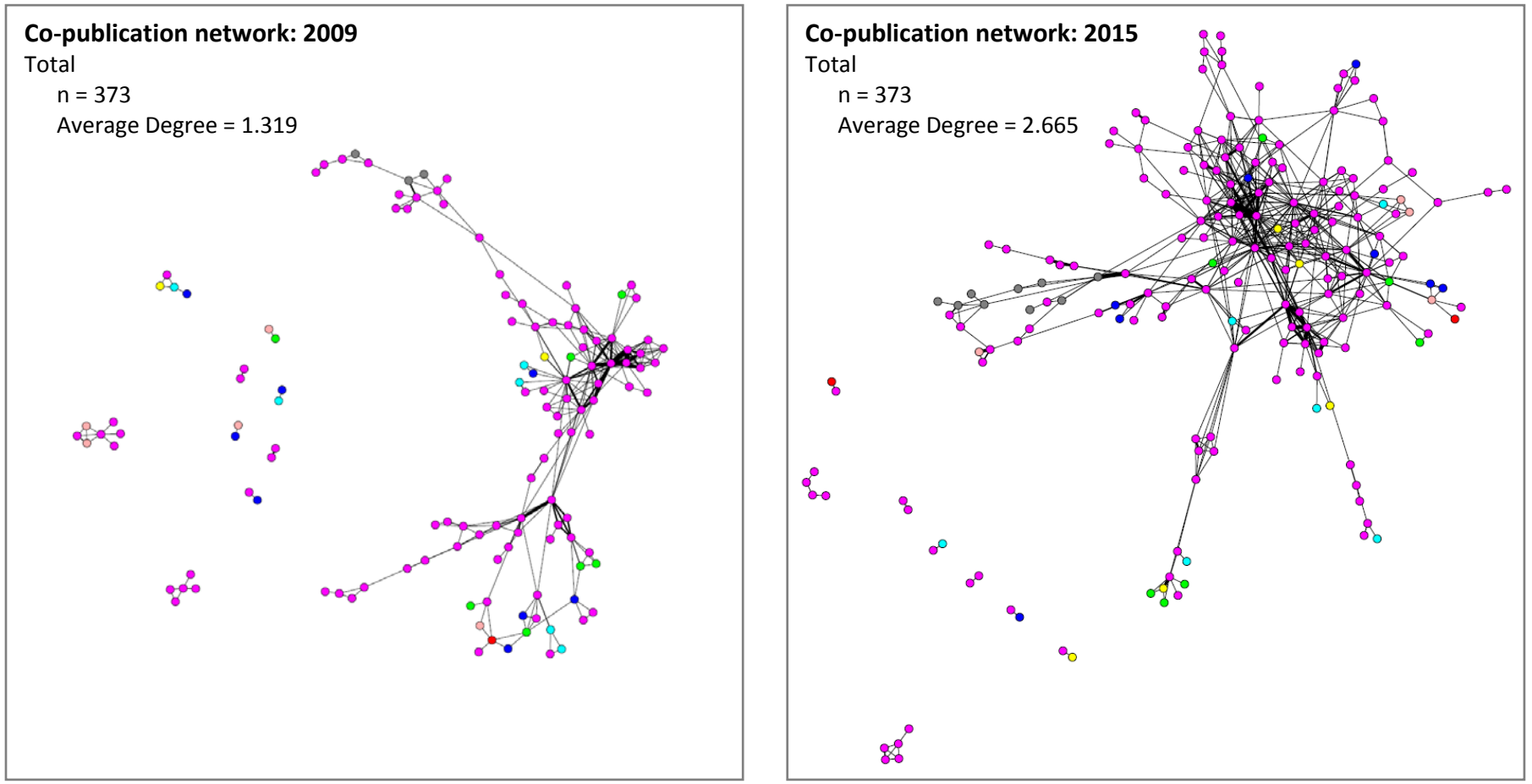


Figure 3.6 O'Brien Institute members co-publishing in 2009 vs 2015

A network analysis was conducted using the co-publication data shown in Appendices 3.4 and 3.5. Individual OIPH members are shown as dots, with the member's affiliation colour-coded. A joining line between dots indicates a co-authored publication between authors during that year. The network analysis tool (UCINET) was used to graphically represent the network, and calculate values for the Average Degree of co-authoring. The figures demonstrate a larger co-publication network developing over time in the Institute.

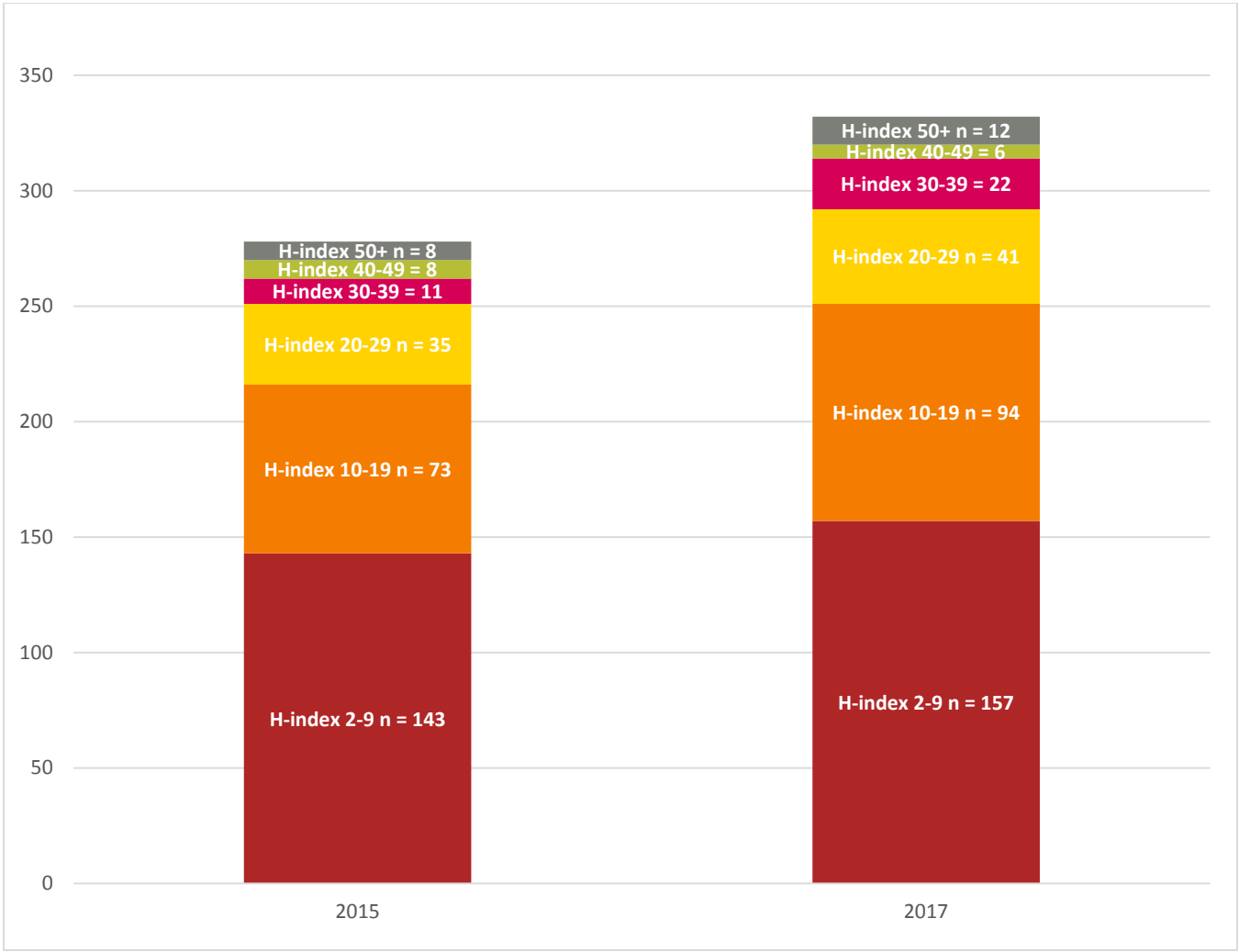


Figure 3.7 H-index distribution among O'Brien Institute members

As an indication of the quality and relevance of members' publications, 12 O'Brien Institute members currently have H-indexes ≥ 50, meaning that each of these 12 have ≥ 50 publications that have been cited ≥ 50 times. An H-index of 45 – 50 has been estimated as a maximum feasible level for researchers publishing in the social sciences, and the top H-index among Canadian researchers in the Public Health Policy category (41) was reported in March 27, 2012 by the Globe and Mail national newspaper to be that of one of the O'Brien Institute's senior researchers, depicted here in the top H-index category. Note that the 2017 H-index analysis was conducted inpedendently of the bibliometrics reported elsewhere in Appendix 3.

Journal	Impact Factor 2015	2015 Members' articles 2009-2014*	Impact Factor 2017	2016 Members' articles 2009-2015
American Journal of Epidemiology	4.975	9	5.036	13
American Journal of Public Health	4.229	4	4.138	8
Annals of Internal Medicine	16.104	6	16.593	10
British Medical Journal and its subsidiaries	16.378	44	19.697	71
Canadian Medical Association Journal	5.808	61	6.724	74
International Journal of Epidemiology	9.197	5	7.522	5
Journal of the American Medical Association	30.387	31	37.684	47
Medical Care	2.941	7	3.081	9
Nature Subsidiaries	-	13	38.138	22
New England Journal of Medicine	54.42	8	59.558	14
Social Science and Medicine	2.558	11	2.814	16
The Lancet and subsidiaries	39.207	23	44.002	34

Figure 3.8 Number of articles by O'Brien Institute members in prestigious health services and population health journals

These data are compiled as a further indication of quality and relevance of output. Data from the Institute's previous Research Impact Assessment are included in the gray columns for comparison. (*This bibliometrics exercise was conducted early in 2015, so the 2014 data may be underrepresented.)

CMAJ RESEARCH

Effect of telemedicine on glycated hemoglobin in diabetes: a systematic review and meta-analysis of randomized trials

Labib Imran Faruque MBBS MSc, Natasha Wiebe MMath PStat, Arash Ehteshami-Afshar MD MSc, Yuanchen Liu BSc, Neda Dianati-Maleki MD, Brenda R. Hemmelgarn MD PhD, Braden J. Manns MD MSc, Marcello Tonelli MD SM; for the Alberta Kidney Disease Network

Cost analysis of medical assistance in dying in Canada

Aaron J. Trachtenberg MD DPhil, Braden Manns MD MSc

Cite as: *CMAJ* 2017 January 23;189:E101-5. doi: 10.1503/cmaj.160650

See also www.cmaj.ca/lookup/doi/10.1503/cmaj.161316

Health Promotion International, 2016, 1–10
doi: 10.1093/heapro/daw019

OXFORD

Political rhetoric from Canada can inform healthy public policy argumentation

Patrick B. Patterson[1], Lynn McIntyre[1,*], Laura C. Anderson[1], and Catherine L. Mah[2]

[1]Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, AB, Canada, and [2]Division of Community Health and Humanities, Faculty of Medicine, Memorial University, St John's, NL, Canada

*Corresponding author. E-mail: lmcintyr@ucalgary.ca

AJPH RESEARCH

Global Birth Prevalence of Spina Bifida by Folic Acid Fortification Status: A Systematic Review and Meta-Analysis

Callie A. M. Atta, MSc, Kirsten M. Fiest, PhD, Alexandra D. Frolkis, BSc, Nathalie Jette, MD, MSc, FRCPC, Tamara Pringsheim, MD, MSc, FRCPC, Christine St Germaine-Smith, MSc, Thilinie Rajapakse, MD, Gilaad G. Kaplan, MD, MPH, FRCPC, and Amy Metcalfe, PhD

CRITICAL PUBLIC HEALTH, 2016
http://dx.doi.org/10.1080/09581596.2016.1258455

Taylor & Francis
Taylor & Francis Group

RESEARCH PAPER

A great or heinous idea?: Why food waste diversion renders policy discussants apoplectic

Lynn McIntyre[a], Patrick B. Patterson[a], Laura C. Anderson[a] and Catherine L. Mah[b]

[a]Department of Community Health Sciences, Cumming School of Medicine, University of Calgary, Calgary, Canada; [b]Health Policy, Division of Community Health and Humanities, Faculty of Medicine, Memorial University of Newfoundland, St. John's, Newfoundland, Canada

JECH Online First, published on May 13, 2016 as 10.1136/jech-2015-206502

Review

OPEN ACCESS

Does cessation of community water fluoridation lead to an increase in tooth decay? A systematic review of published studies

Lindsay McLaren,[1] Sonica Singhal[2]

Figure 3.9 Examples of O'Brien Institute members' articles in prestigious health services and population health journals (full .pdf available here) – pp 44 to 47

CRITICAL PUBLIC HEALTH, 2016
http://dx.doi.org/10.1080/09581596.2016.1262942

Taylor & Francis
Taylor & Francis Group

SHORT REPORT

Do apples need an Elmo sticker? Children's classification of unprocessed edibles

Charlene Elliott and Rebecca Carruthers Den Hoed

Department of Communication, Media and Film, University of Calgary, Calgary, Canada

ORIGINAL ARTICLE

Deriving ICD-10 Codes for Patient Safety Indicators for Large-scale Surveillance Using Administrative Hospital Data

Danielle A. Southern, MSc, Bernard Burnand, MD, MPH,† Saskia E. Droesler, MD,‡ Ward Flemons, MD,§ Alan J. Forster, MD, MSc,‖ Yana Gurevich, MD, MPH,¶ James Harrison, MBBS,# Hude Quan, MD, PhD,*§ Harold A. Pincus, MD,**††‡‡ Patrick S. Romano, MD, MPH,§§ Vijaya Sundararajan, MD, MPH,‖‖¶¶ Nenad Kostanjsek, MD,## and William A. Ghali, MD, MPH*§*

Cochrane Library

Cochrane Database of Systematic Reviews

Population-level interventions in government jurisdictions for dietary sodium reduction (Review)

McLaren L, Sumar N, Barberio AM, Trieu K, Lorenzetti DL, Tarasuk V, Webster J, Campbell NRC

McLaren L, Sumar N, Barberio AM, Trieu K, Lorenzetti DL, Tarasuk V, Webster J, Campbell NRC.
Population-level interventions in government jurisdictions for dietary sodium reduction.
Cochrane Database of Systematic Reviews 2016, Issue 9. Art. No.: CD010166.
DOI: 10.1002/14651858.CD010166.pub2.

www.cochranelibrary.com

CMAJ RESEARCH

Lifetime risk of diabetes among First Nations and non–First Nations people

Tanvir Chowdhury Turin MBBS PhD, Nathalie Saad MD, Min Jun PhD, Marcello Tonelli MD, Zhihai Ma MSc, Cheryl Carmelle Marie Barnabe MD, Braden Manns MD, Brenda Hemmelgarn MD

CMAJ OPEN

Research

Trends in prostate cancer incidence and mortality in Canada during the era of prostate-specific antigen screening

James Dickinson MBBS PhD, Amanda Shane MSc, Marcello Tonelli MD SM, Sarah Connor Gorber PhD, Michel Joffres MD PhD, Harminder Singh MD MPH, Neil Bell MD SM

Critical Public Health

ISSN: 0958-1596 (Print) 1469-3682 (Online) Journal homepage: http://www.tandfonline.com/loi/ccph20

Who or what is 'the public' in critical public health? Reflections on posthumanism and anthropological engagements with One Health

Melanie J. Rock

To cite this article: Melanie J. Rock (2017) Who or what is 'the public' in critical public health? Reflections on posthumanism and anthropological engagements with One Health, Critical Public Health, 27:3, 314-324, DOI: 10.1080/09581596.2017.1288287

To link to this article: http://dx.doi.org/10.1080/09581596.2017.1288287

Early release, published at www.cmaj.ca on July 4, 2016. Subject to revision.

CMAJ COMMENTARY

Intensive lowering of blood pressure: Should we SPRINT?

Doreen M. Rabi MD MSc, Raj Padwal MD MSc

CMAJ OPEN

Research

Patient, family physician and community pharmacist perspectives on expanded pharmacy scope of practice: a qualitative study

Maoliosa Donald MSc, Kathryn King-Shier PhD, Ross T. Tsuyuki BSc PharmD MSc, Yazid N. Al Hamarneh BSc PhD, Charlotte A. Jones MD PhD, Braden Manns MD MSc, Marcello Tonelli MD SM, Wendy Tink MD, Nairne Scott-Douglas MD PhD, Brenda R. Hemmelgarn MD PhD

CRITICAL PUBLIC HEALTH, 2016
http://dx.doi.org/10.1080/09581596.2016.1240356

Taylor & Francis
Taylor & Francis Group

OPEN ACCESS

Knowledge needs and the 'savvy' child: teenager perspectives on banning food marketing to children

Charlene Elliott

Food Marketing, Policy & Children's Health, Faculty of Arts, Faculty of Kinesiology, Department of Communication, Media and Film, University of Calgary, Calgary, Canada

RESEARCH

OPEN ACCESS

Methotrexate monotherapy and methotrexate combination therapy with traditional and biologic disease modifying antirheumatic drugs for rheumatoid arthritis: abridged Cochrane systematic review and network meta-analysis

Glen S Hazlewood,[1, 2, 3, 4] Cheryl Barnabe,[1, 2, 4] George Tomlinson,[5] Deborah Marshall,[2, 4] Dan Devoe,[4] Claire Bombardier[5, 6, 7]

Clinical Review & Education

Evidence to Practice

Impact of Cost-Sharing Mechanisms on Patient-Borne Medication Costs

David J. T. Campbell, MD, MSc; Lesley J. J. Soril, MSc; Fiona Clement, PhD

OPEN

International Journal of Obesity (2017), 1–7
www.nature.com/ijo

ORIGINAL ARTICLE

Dose–response effects of aerobic exercise on energy compensation in postmenopausal women: combined results from two randomized controlled trials

J McNeil[1], DR Brenner[1,2,3], KS Courneya[4] and CM Friedenreich[1,2,3]

BJSM Online First, published on March 9, 2017 as 10.1136/bjsports-2016-097392

Original article

The risk of injury associated with body checking among Pee Wee ice hockey players: an evaluation of Hockey Canada's national body checking policy change

Amanda M Black,[1,2,3] Brent E Hagel,[1,3,4,5,6] Luz Palacios-Derflingher,[1,5] Kathryn J Schneider,[1,2,3] Carolyn A Emery[1,2,3,4,5,6]

Health care experiences of Indigenous people living with type 2 diabetes in Canada

Kristen M. Jacklin PhD, Rita I. Henderson PhD, Michael E. Green MD MPH, Leah M. Walker, Betty Calam MD MClSc BA, Lynden J. Crowshoe MD

Cite as: *CMAJ* 2017 January 23;189:E106-12. doi: 10.1503/cmaj.161098

Infographic available at www.cmaj.ca/lookup/suppl/doi:10.1503/cmaj.161098/-/DC1

Viewpoint

Care of non-communicable diseases in emergencies

Slim Slama, Hyo-Jeong Kim, Gojka Roglic, Philippa Boulle, Heiko Hering, Cherian Varghese, Shahnawaz Rasheed, Marcello Tonelli

Lancet 2017; 389: 326–30

BMJ Quality & Safety Online First, published on 13 August 2015 as 10.1136/bmjqs-2015-004441

VIEWPOINT

What happens when healthcare innovations collide?

Sachin R Pendharkar,[1,2,3] Jaana Woiceshyn,[4] Giovani J C da Silveira,[4] Diane Bischak,[3,4] Ward Flemons,[1,3] Finlay McAlister,[5] William A Ghali[1,2,3]

Appendix 4 - Awards and achivements

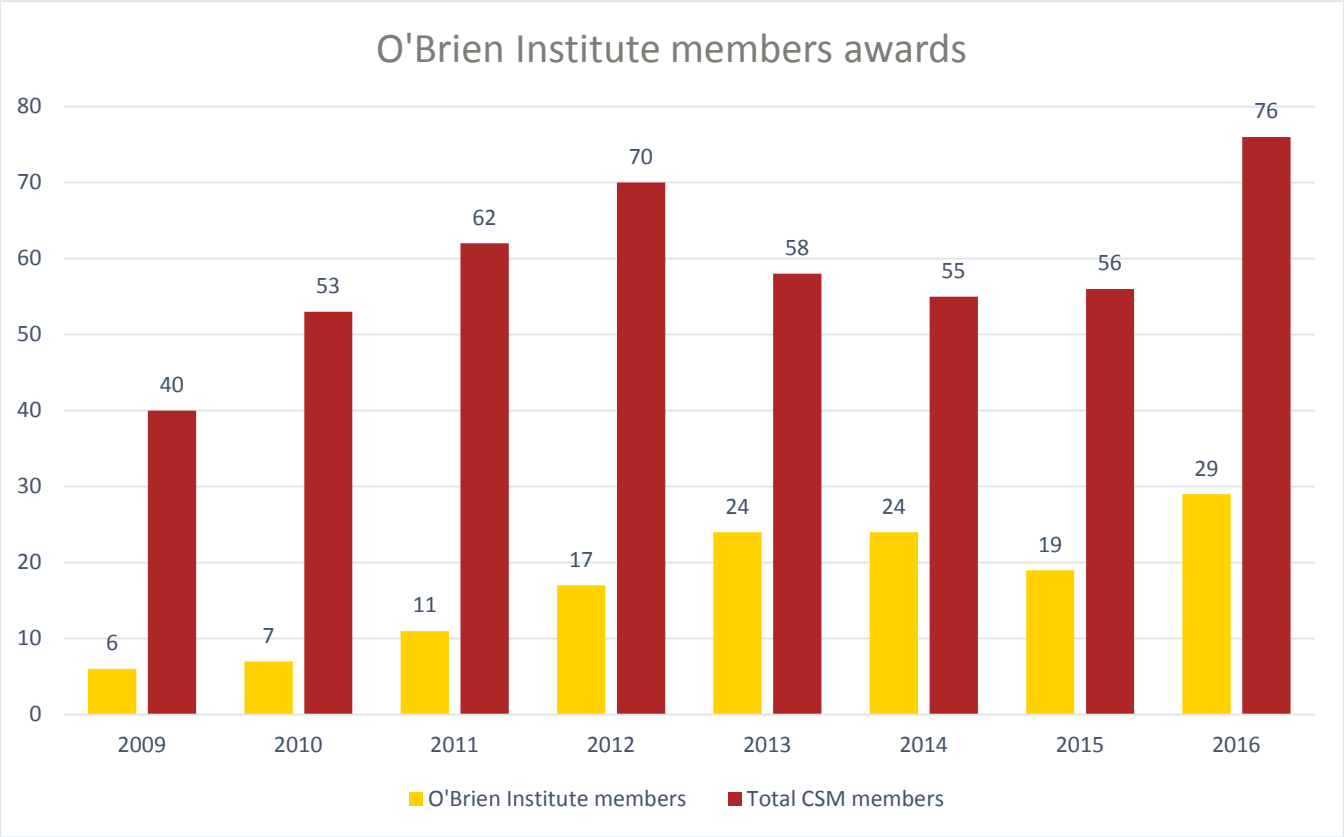


Figure 4.1 Recognition of O'Brien Institute members

Forty-five percent of O'Brien Institute members are faculty of the Cumming School of Medicine and therefore among the population whose major awards are recognized at an annual CSM Celebration of Excellence. As shown in the graph, O'Brien members' award numbers have been increasing, and recently represent more than a third of awardees recognized by CSM.

As there is no comprehensive source of awards and recognition data, the table below lists those compiled from the CSM data graphed above and the O'Brien Institute's records.

Awards received by O'Brien Institute members in 2015-2016

Award	2015 Recipient(s)	2016 Recipient (s)
Distinguished Achievement Award		
Canadian Academy of Health Science Induction	Lynn McIntyre	Carolyn Emery Christine Friedenreich Hude Quan
Royal Society of Canada College of New Scholars, Artists and Scientists		Charlene Elliott Eric Smith
Medical and Scientific Organization Awards		
Alberta Health Services President's Excellence Award for Outstanding Achievements in Research		Michael Hill (Calgary Stroke Team)
Alberta Medical Association Medal of Honor		Jocelyn Lockyer
Alberta Society of Gastroenterology Distinguished Researcher Award		Gil Kaplan
American Academy of Nursing Induction		Shahirose Premji
Associations of Faculties of Medicine of Canada John Ruedy Award for Innovation in Medical Education		Irene Ma
ASTech Societal Impact Award	Michael Hill (Calgary Stroke Team)	
Canadian Agency for Drugs and Technologies in Health Dr. Jill M. Saunders Award of Excellence in Health Technology Assessment		Tom Noseworthy
Canadian Agency for Drugs and Technologies in Health Maurice McGregor Award	Fiona Clement	
Canadian Anesthesiologists' Society award		Kaylene Duttchen
Canadian Association for Medical Education Certificate of Merit	Jesse Hendrickse	Lori Montgomery
Canadian Medical Association Dr. William Marsden Award in Medical Ethics		Christopher Doig
Canadian Medical Association Frederic Newton Gisborne Starr Award	Norm Campbell	
Canadian Medical Association Physician Misericordia Award		Jane Lemaire
Canadian Nurses Association Award		Kathryn King-Shier Shahirose Premji
Canadian Public Health Association R.D. Defries Award		Lynn McIntyre
CIHR-IHSPR Rising Star Award		Dan Niven
College of Family Physician of Canada Donald Rice Award		Doug Myhre
Fellow of the European Stroke organization		Michael Hill
Feminist Mentoring Award from the Section of Women and Psychology of the Canadian Psychological Association		Kristin von Ranson
Global Sepsis Award, Alberta Sepsis Network	Christopher Doig	
Health Research Foundation Medal of Honor	Norm Campbell	
Honorary Fellow of the UK Faculty of Public Health		Penny Hawe
Leadership Award by the Association of Chiefs in General Internal Medicine	Aleem Bharwani	
President's Award, World Congress on Brain, Behavior and Emotions	Suzanne Tough	

Award	2015 Recipient(s)	2016 Recipient (s)
Medical and Scientific Organization Awards		
Professional Association of Interns and Residents	Luanne Metz	
Ramon J.Hnatyshyn Lecturer, Canadian Stroke Congress 2015	Michael Hill	
Rhodes Trust Inspirational Educator Award		Tom Feasby
Royal College of Physicians and Surgeons of Canada Mentor of the Year		Aleem Bharwani
Society of Teachers of Family Medicine Excellence in Education Award	David Keegan	
Community & Services Awards		
Alberta Medical Association Medal of Honor for Distinguished Services	Norm Campbell Luanne Metz	Christopher Doig John Conly
Alberta's 50 Most Influencial People of 2016		
Calgary Avenue Magazine top 40 under 40	Fiona Clement Cheryl Barnabe	Gabe Fabreau
Canadian Bioethics Society Distinguished Service Award	Ian Mitchell	
Heart and Stroke Foundation Award of Merit		Michael Hill
Immigrant of Distinction Lifetime Achievement Award		Hude Quan
Citation Awards		
10,000 Citation Award	Michael Hill William Ghali	
Thomson Reuters 2016 Highly Cited Researchers		Herman Barkema Hude Quan Marcello Tonelli
University of Calgary Awards		
Killam Emerging Research Leader Award	Eric Smith	
Killam Research and Teaching Award		Julie Drolet
Killam Annual Professor	Braden Manns	Brenda Hemmelgarn
Killam Award in Undergraduate Mentorship		Guido Van Marle
Peak Scholars: Celebrating Excellence in Entrepreneurship, Innovation, and Knowledge Engagement	Norm Campbell Michael Hill Luanne Metz Tom Stelfox Carolyn Emery Brent Hagel Karen Benzies Kathryn King-Shier Deborah White Herman Barkema Sylvia Checkley	Jayna Holroyd-Leduc Nathalie Jetté Gil Kaplan Braden Manns
O'Brien Institute for Public Health Awards		
Emerging Research Leader Award	Gavin McCormack	Cheryl Barnabe
Research Excellence Award	Hude Quan	Scott Patten
Lynn McIntyre Award for Outstanding Services	Tom Feasby	Richard Musto

Appendix 5 – Research Impact Summaries

5.1 – Improving chronic disease care in Alberta: The Effect of Specialist Physician Compensation Models on Quality, Utilization and Costs

O'Brien Institute Project Lead: Braden Manns, MD MSc

BACKGROUND

- Several health system barriers, including policies related to physician compensation, contribute to gaps in chronic disease care.
- While fee-for-service accounts for 86% of specialist compensation in Alberta, this model of reimbursement is not ideal for chronic diseases care where multidisciplinary, team-based care has a central role.
- Since 2003, Alberta has experimented with alternative compensation models for specialists, including a salary-based payment model (typically called academic alternative relationship plans) currently used by over 700 Alberta medical specialists. The impact of this payment model on care, outcomes, and costs is unknown.

METHODS

- Researchers are in the process of conducting a series of quantitative and qualitative studies to assess the impact of this salary model for specialist care, including a study assessing the effect of salary compared to fee-for-service on a cohort of chronic disease patients referred to specialty care over the past five years. This study will explore variations in types of patients seen, frequency of visits, quality of care, and costs of care.
- This study is utilizing data from the ICDC Chronic Disease Repository. The ICDC includes provincial laboratory and administrative health data (including vital statistics, pharmacy claims, physician claims, hospitalizations, emergency department and outpatient visits, and all health care costs) for all Albertans since 1994.

IMPACT/KNOWLEDGE TRANSLATION

- This study will inform the future evolution of specialist compensation models that benefit all Albertans.
- This research has benefited from researchers' ongoing relationship with Alberta Health, and joint efforts to facilitate bidirectional communication to identify gaps in care, and health care policies that impact the care of people with chronic disease.
- Researchers are collaborating with, and have received methodological inputs from, the Institute of Health Economics (IHE) essential to the completion of this study.
- As they become available, study findings will be shared with Alberta Health, Alberta Health Services, Institute of Health Economics, and other Alberta policy makers at provincial health economics rounds.

STAKEHOLDERS

Alberta Health Services
Institute of Health Economics
Interdisciplinary Chronic Disease Collaboration (ICDC)
O'Brien Institute Health Economics Group

5.2 – Preventing Kidney Injury in Patients Undergoing Cardiac Catheterization

O'Brien Institute Project Lead: Matthew James, PhD MD

BACKGROUND

- Kidney injury is a common and expensive complication caused by x-ray dye used in heart procedures, including angiograms and stenting, yet identification of patients at risk of this complication and use of kidney protection strategies does not always occur.
- Implementing these steps can prevent one in every five cases of kidney injury after cardiac catheterization.

METHODS

- Researchers partnered with cardiologists, managers, educators, clinical informatics teams, and front-line multidisciplinary staff in three Alberta cardiac catheterization units to implement a precision approach to identify patients at high risk of kidney injury, and tailor protective strategies.
- Kidney injury risk prediction calculations and decision support tools that guide safe amounts of contrast use and trigger appropriate modifications in patient fluid provision are delivered through real time computerized systems that integrate information into existing care processes and workflow. Processes and outcomes are monitored and communicated to cardiologists and unit staff, allowing them to assess performance. The research team will evaluate the impact of these tools and processes on patient care, outcomes, experiences, and costs.

IMPACT/KNOWLEDGE TRANSLATION

- APPROACH (Alberta Provincial Project for Outcome Assessment in Coronary Heart Disease) is automating validated risk prediction/decision support tools in its online data collection/reporting system to bring real time information to improving care for kidney injury prevention.
- Multidisciplinary teams at the Libin Cardiovascular Institute of Alberta (Foothills Medical Centre, Calgary), CK Hui Heart Centre (Royal Alexandra Hospital, Edmonton) and Mazankowski Heart Institute (University of Alberta) are adopting site-specific protocols to tailor and implement decision support tools into current workflows, and learning from the experiences of other units. A continuous audit and feedback system will monitor performance and outcomes according to patient risk status for each physician and centre, measuring adherence to recommendations and outcomes and sustaining the process of quality improvement.

PUBLICATIONS (Select)

- Allen DW, Ma B, Leung KC, Graham MM, ... James MT. Risk Prediction Models for Contrast-Induced Acute Kidney Injury Accompanying Cardiac Catheterization: Systematic Review and Meta-analysis. Canadian Journal of Cardiology 2017 DOI: http://dx.doi.org/10.1016/j.cjca.2017.01.018.

STAKEHOLDERS

Alberta Health Services
Alberta Innovates Health Solutions
APPROACH (Alberta Provincial Project for Outcomes Assessment in Coronary Heart Disease)
Heart Health and Stroke Strategic Clinical Network
CK Hui Heart Centre (Royal Alexandra Hospital, Edmonton)
Libin Cardiovascular Institute of Alberta (University of Calgary)
Mazankowski Alberta Heart Institute (University of Alberta, Edmonton)
Kidney Health Strategic Clinical Network

5.3 – Reducing the Risk of Hockey-related Concussions

O'Brien Institute Project Lead: Carolyn Emery, PT PhD

BACKGROUND

- In Canada, as many as 50,000 young hockey players suffer a concussion on the ice every year.
- Concussions are the most frequent type of injury experienced by Pee Wee hockey (ages 11 and 12) players.
- The long-term effects of concussions in children are generally unknown. Body checking is often cited as a common cause of concussion injuries.

METHODS & FINDINGS

- Researchers conducted cohort studies exploring concussion rates and causes of concussion in Pee Wee hockey.
- They compared concussion rates in Canadian provinces where league policies allowed and disallowed body-checking.
- Researchers found that the rate of injury and concussion were threefold greater for non-elite Pee Wee ice hockey players in leagues where body checking was permitted.

IMPACT/KNOWLEDGE TRANSLATION

- In 2013, Hockey Canada decided to disallow body checking for players 11 and 12 years of age.
- In a follow up study after this change, researchers reported that this policy change resulted in a 67 per-cent reduction in concussion risk and 42 per-cent reduction in all-injury risk, translating into an estimated 581 fewer annual concussions in Alberta Peewee hockey players, and more than 4,800 concussions across Canada.
- Researchers partnered with the International Olympic Committee to develop guidelines on concussion prevention in all sports

PUBLICATIONS (Select)

- Emery CA, Kang J, Shrier I, Goulet C, Hagel BE, Benson BW, Nettel-Aguirre A, McAllister JR, Hamilton GM, Meeuwisse WH. Risk of injury associated with body checking among youth ice hockey players. JAMA. 2010 Jun 9;303(22):2265-72.
- Black A, Macpherson A, Hagel B, Romiti M, Palacios-Derflingher L, Kang J, Meeuwisse WH, Emery CA. Policy change eliminating body checking in non-elite ice hockey leads to a threefold reduction in injury and concussion risk in 11- and 12-year old players. Br J Sports Med 2016;50:55-61.

STAKEHOLDERS

Hockey Calgary
Hockey Edmonton
Hockey Canada
International Olympic Committee

5.4 – Increasing Bicycling Safety in Children

O'Brien Institute Project Lead: Brent Hagel, PhD

BACKGROUND

- Bicycling is a great form of active transportation for children and has many health and environmental benefits.
- Bicycling results in a significant number of emergency department visits and hospitalizations in this age group.
- Cycling injuries are among the most frequent unintentional causes of hospitalization in Canadian children under 15 years of age.

METHODS & FINDINGS

- Case control studies of cyclists hospitalized or discharged from one of seven hospital emergency departments in Alberta explored associations between individual and environmental risk factors (eg: helmet use/fit, visibility aids, riding on paved surfaces) and injury severity in children.
- Chart reviews of causes of fatal Alberta cycling injuries involving children
- Analyses of trends in head injuries in children after the introduction of mandatory helmet legislation in Alberta.
- Researchers found that risk factors significantly associated with severe cycling injuries included gender (men more at risk than women), collision with a motor vehicle, not wearing a helmet, and proper helmet fit. Risks of injury were lower for children cycling on paved surfaces.
- Environmental audits to assess built environment characteristics identified modifiable street-level characteristics related to injury risk.
- Researchers also demonstrated that Alberta's helmet legislation reduced serious child and adolescent head injuries by 30%.

IMPACT/KNOWLEDGE TRANSLATION

- In 2013, researchers, in partnership with the Canadian Paediatric Society and Safe Kids Canada, published a position statement calling for the need for comprehensive all-age bicycle helmet legislation in Canada.
- The findings from this research have informed a recent policy decision to increase the number of cycling tracks in the City of Calgary.

PUBLICATIONS (Select)

- Hagel BE, Romanow NT, Enns N, Williamson J, Rowe BH. Severe bicycling injury risk factors in children and adolescents: a case-control study. Accid Anal Prev. 2015 May;78:165-72.
- Embree T, Romanow NTR, Djerboua M, Morgunov N, Bourdeaux J, Hagel BE. Risk factors for bicycling injuries in children and adolescents: a systematic review. *Pediatrics* Nov 2016, 138 (5) e20160282; DOI: 10.1542/peds.2016-0282

STAKEHOLDERS

Canadian Paediatric Society Safe Kids Canada (Parachute) City of Calgary

5.5 – Changing PSA Testing Practice

O'Brien Institute Project Lead: James Dickinson, MBBS PhD

BACKGROUND

- Since PSA testing was introduced in the 1990s, there has been a significant increase in the number of patients diagnosed with and treated for this disease.
- Prostate cancer is typically slow to develop in older men in particular.
- Many agencies including the Canadian Task Force on Preventive Care have questioned the need for early and comprehensive PSA testing for all previously undiagnosed men over 50.

METHODS & FINDINGS

- Public Health Agency of Canada data for age-standardized and age-specific incidence of prostate cancer (1969-2007) and mortality (1969-2009) were analyzed to identify changes in trends prior to and after widespread adoption of PSA screening in Canada.
- Researchers concluded that reductions in mortality were only partially associated with PSA testing. Treatment changes and cause of death attribution may also have impacted reported cases of prostate-cancer mortality.

IMPACT/KNOWLEDGE TRANSLATION

- Recent guidelines by the Canadian Task Force on Preventive Health Care suggest that for some patients potential harms associated with the effects of treatment (surgery, chemotherapy, or radiation) may negate any positive effects associated with early prostate cancer detection.
- Key guideline recommendations: Eliminate PSA tests for men under 55 and over 70, and encourage family physicians to discuss the benefits and harms of screening with men aged 55–69 years.
- Findings from this study have been published in multiple media sources including the Globe and Mail and Calgary Herald.

PUBLICATIONS (Select)

- Dickinson J, Shane A, Tonelli M, Connor Gorber S, Joffres M, Singh H, Bell N. Trends in prostate cancer incidence and mortality in Canada during the era of prostate-specific antigen screening. CMAJ Open. 2016 Mar 2;4(1):E73-9.

STAKEHOLDERS

Canadian Task Force on Preventive Health Care