

FISCAL YEAR 2018–19

# PHSA RESEARCH AND STUDENT EDUCATION METRICS

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PHSA Research Committee

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# ACKNOWLEDGEMENTS

The following report is prepared for the Provincial Health Services Authority (PHSA) Board of Directors on an annual basis to present data related to the Framework for PHSA Research Metrics (see Appendix 1) and the Framework for PHSA Student Education Metrics (see Appendix 3). As an academic health sciences organization, PHSA works in close partnership with the University of British Columbia, BC Institute of Technology, Simon Fraser University, University of Victoria, University of Northern BC, and other BC educational institutions. BC Emergency Health Services works closely with the Justice Institute of BC.

The research and student education activities described in this report are made possible only through the collaboration and partnership of PHSA, its agencies, program and research entities, and its academic and health authority partners.

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# MEASURING PHSA'S COMMITMENT TO RESEARCH & EDUCATION

## INTRODUCTION TO PHSA'S 2<sup>ND</sup> CONSOLIDATED SUMMARY REPORT

*Research & Academic Services is pleased to present its second annual consolidated summary of PHSA research and student education metrics. It includes:*

- A narrative that highlights PHSA-wide strengths and key developments in research and student education, and synthesizes research impacts and outcomes.
- PHSA and program level infographics that present high level inputs and outputs for research and student education.
- Top 3 Accomplishments by research entity that communicate important achievements which may not be well reflected through quantitative metrics.
- A detailed listing of research outcomes identified by PHSA research entities, and;
- Examples of important research questions that are being answered through the rich data assets available in PHSA registries.

This consolidated and integrated reporting approach better communicates how research is driving health system benefits, and how student education is preparing a high performance health workforce for the future. While research and inquiry take place across PHSA, this report relates activities associated with PHSA's five primary research entities: BC Cancer, BC Children's Hospital Research Institute, Women's Health Research Institute, BC Mental Health & Substance Use Research, and the BC Centre for Disease Control. BC Emergency Health Services plays an important role in field data collection in collaboration with non-PHSA researchers, and through its participation in the Canadian Resuscitation Outcomes Consortium (CANROC) contributes to major advances in care.

Six of PHSA's programs play a vital role in providing students with clinical practice education. Collectively, BC Children's Hospital and SunnyHill Health Centre, BC Women's Hospital & Health Centre, BC Cancer, BC Mental Health & Substance Use Services, BC Centre for Disease Control and BC Emergency Health Services provided training to 1,723 students, 493 medical undergraduates and 805 medical post graduates in 2018/19.

Detailed data for the PHSA Board-approved frameworks for research and student education metrics continue to be reported in the related supplementary reports that support operational decision-making and are available on the PHSA website.

PHSA is one of Canada's largest academic health science organizations – organizations with an integrated mandate to deliver care, conduct research and train students. PHSA's recently expanded provincial mandate strongly reinforces that role, specifying PHSA is "expected to conduct world-class research, and deliver excellence in education and training ... to support and underpin its ability to develop evidence-informed clinical policy and to deliver high quality provincial clinical services."

The following report reflects PHSA's commitment to this critical role.

# WORLD-CLASS RESEARCH

## PHSA'S RESEARCH ENTERPRISE CONTINUES TO STRENGTHEN

*Annual metrics reflect the continued strength of PHSA's research enterprise over the past fiscal year.*

With total external funding of more than \$134 million, PHSA continues to be one of Canada's largest academic health science organizations. While PHSA's overall external funding is down approximately \$18K in comparison to last year, PHSA again surpassed the national average success rate in the last two CIHR operating project grant competitions. This metric reflects the positive performance of PHSA researchers compared with peers, suggesting reduced external revenues likely reflect fewer net dollars being available in both infrastructure and operating grant competitions. CIHR's decision to cut the budgets of successful project grant applicants last year by 24 per cent reflects continuing pressure on external funding sources. No PHSA researchers were successful in CIHR's final Foundation Grant competition. With the myriad issues associated with that funding scheme, which has now been discontinued by CIHR, considerably fewer PHSA researchers submitted applications to this scheme in comparison with previous years. While the number of researchers is down from 807 to 788, largely as a result of retirements, the vibrancy of the enterprise is reflected in the increase of research trainees, from 1,970 to 2,315 and several key strategic recruitments. PHSA researchers continue to publish prolifically, with total number of publications up at BC Cancer, Women's Health Research Institute (WHRI), and BC Centre for Disease Control (BCCDC).

PHSA continues to actively advance commercialization of research discoveries. IP related revenue totalled \$512,574. While the number of new patents filed and issued was down this year, there were increased numbers of invention disclosures, provisional patent applications, and PCT applications – all earlier stage activities that set the stage for future patents. Two new companies were spun out of research activities at BC Cancer. CUPROUS Pharmaceuticals Inc. (CPI) was established to advance development of copper-activated drugs for the treatment of aggressive cancers that are resistant to existing standard of care therapeutics. Copper- complexes have shown therapeutic potential to treat a variety of clinical conditions including bacterial infections, inflammatory diseases, and neurological disorders as well as cancers. Few metal complex drugs are available for human use and there is a large gap between the chemistry creating these new drug candidates and their pre-clinical and clinical development. CPI has created a platform technology that enables the development of pharmaceutically viable formulations suitable for pre-clinical and clinical development.

ARTMS™ Products has spun out of research conducted at BC Cancer, TRIUMF and the Lawson Health Research Institute, to develop novel technologies that enable the production of the world's most-used diagnostic imaging isotopes. Its primary product is the QUANTM99, a hardware and consumable system for producing Tc-99m on medical cyclotrons to enable cost-effective, decentralized, and local production of medical isotopes.

Clinical trial activity has increased across PHSA, from 561 active trials last year to 619 active trials in FY 2018/19. The reduction in subject enrollment reflects the completion of the Community Level Interventions for Pre-eclampsia (CLIP) study in 2018.

While these quantitative metrics reflect PHSA's strength as one of Canada's largest academic health

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science organizations, they tell only part of PHSA's success story. The impacts resulting from PHSA-led research are further illuminated through the top accomplishments and outcomes identified by each research entity in this report, and through the studies generated using PHSA's rich registry data sets.

## IMPACTS AND OUTCOMES

### PHSA-LED RESEARCH IS MAKING A DIFFERENCE FOR PATIENTS

*For the second year, PHSA research entities were asked to identify their top three accomplishments, giving them an opportunity to highlight key successes relevant to their differing foci, strengths and size. The results are impressive, reflecting provincial, national and international-level contributions.*

Detailed in this report's program specific sections, key accomplishments range from international clinical trials that are improving cancer treatments, to identification of developmental impacts on children whose mothers took antidepressants during pregnancy, to epidemiology that helped manage BC's measles outbreak, to creating new roles to champion digital and virtual health research, to prestigious teaching and leadership awards.

As in past years, PHSA research entities were asked to identify any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/19 as a result of research driven by PHSA researchers, or collaborative research in which PHSA researchers were key participants, as well as the benefits resulting from those initiatives.

The resulting outcomes, detailed in this report, clearly demonstrate that PHSA research is being applied to improve the health of British Columbian, Canadian and international populations. Evidence generated by PHSA research is leading to system adoption of innovations and policy guidance that are improving diagnosis and treatment, as well as promoting health and preventing illness and injury.

Many of the identified outcomes represent evidence-based innovations that are improving the care of PHSA and other patient populations. Examples of high impact innovations include the following.

- A new prostate cancer implant and procedure that reduces long term bowel side effects up to 71% for men following radiotherapy.
- FDA approval of a drug that shrinks many types of cancer tumours, 20 years after the initial discoveries by a PHSA researcher that led to its invention.
- Launch of an updated Concussion Awareness Training Tool for Medical Professional, a free e-learning course accredited by the Royal College of Physicians and Surgeons of Canada that helps standardize diagnosis and treatment of concussion.
- Creation of Allergy Check, a new assessment tool available free online and as a mobile app, that guides users through the likelihood their symptoms result from a food allergy.

- A new open version of HEARTSMAP, a tool designed to help clinicians in emergency departments assess children and youth with mental health concerns and connect them to appropriate resources, is now available to emergency physicians outside of BC and health care workers in community settings.
- Launch of Active & Safe, a new website that gives parents, kids, coaches and teachers easy access to evidence-based injury prevention information for more than 50 popular sports and recreational activities.
- Provision of virtual reality headsets and related training to care teams across BC Children's Hospital based on research showing they distract children under treatment, lessening pain and anxiety.
- Introduction of a peer-to-peer support website to meet the needs of children undergoing limb lengthening and reconstruction surgery.
- Amalgamation of two genetic tests (the OncoPanel and the Hereditary Cancer Program panel) into a single workflow, allowing clinicians to request a single test to assess patients for two gene sets.
- Development of a psychological assessment tool to understand somatization (experience of medical symptoms with no underlying cause) among youth and parents, enabling better alignment of treatment with patients' readiness for change.
- Free distribution of a metacognitive training treatment program that helps individuals living with psychosis increase insight into their delusional beliefs.

While development of new technologies is a core output of research, generating evidence to guide policy decisions for application of those technologies into the health system is an equally important function of PHSA research. Following are examples of how evidence generated by PHSA researchers in FY 2018/19 is informing and guiding challenging policy decisions.

- BCCDC research, part of a multicenter randomized control trial in latent tuberculosis (TB) prevention, has led to adoption of a shorter and safer treatment regimen across BC and Canada.
- Canada has adopted a new latent TB screening policy for high-risk migrants developed by BCCDC researchers, in consultation with federal and provincial partners.
- BCCDC research knowledge on evidence-based interventions for vulnerable populations during extreme heat and wildfire events has been shared with and changed the practice of front-line support workers in non-profit housing, improving their ability to prevent and respond to extreme heat, poor air quality, and related illnesses.
- Researchers at the BC Injury Research and Prevention Unit worked with the Richmond School District to develop and implement a district-wide concussion education and awareness plan based on the Concussion Awareness Training Tool.
- BCCDC research informed BC's public health management of lead poisoning and exposure, which particularly impacts young children.

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- The Canada Council of Chief Medical Officers of Health officially endorsed the Position Statement co-authored by a BC Injury Research and Prevention Unit researcher that reiterates access to active play in nature and outdoors is essential for healthy child development.
- BCCDC research utilizing linked laboratory and administrative data informed the development of the Blueprint to Inform Hepatitis C Elimination Efforts in Canada, a tool provinces and territories are using to develop action plans to meet World Health Organization Hep C elimination targets.
- Research at BC Children's & BC Women's shows four doses of a drug to protect children with congenital heart disease from a respiratory virus is as effective as a five dose regime, reducing costs by \$10K per child per year and reducing the burden on families who must travel to hospital to receive the drug.
- Based on research demonstrating its effectiveness, a virtual health pilot project that enabled 10 oncologists to deliver specialized care to cancer patients in their home through an online virtual portal will be made available to all oncologists on Vancouver Island.
- BC Cancer researchers, participating in a Canadian multicenter trial, have helped establish that patients with large breast size should receive radiation therapy in a prone versus supine position.
- Economic evidence comparing two chemotherapy drugs informed BC Cancer's decision regarding first-line treatment for metastatic castration-resistant prostate cancer, resulting in health system cost savings.

Using evidence to identify optimum pathways for diagnosing and treating health conditions is another critical application of health research, and one in which PHSA researchers play a key role. PHSA-led research contributed to development of the following clinical guidelines in the past fiscal year.

- The BCCDC's BC-Hepatitis Testers Cohort, a database containing anonymized medical information on testing, healthcare utilization and outcomes dating back to 1990 informed BC's Hepatitis Testing Guideline.
- BC Children's Hospital researchers helped author the new Canadian Paediatric Society guidelines that recommend infants at high risk for food allergies be exposed to allergenic foods when they are ready for solid food to reduce risk of food allergies.
- BC Children's Hospital researchers developed a new paediatric-specific guideline for collecting and testing for serious infections. Adoption of the guideline has increased successful diagnosis of dangerous infections at BC Children's Hospital, enabling appropriate treatment.
- Two WHRI and BCCHR researchers co-authored national clinical practice guidelines on antenatal corticosteroid therapy for improving neonatal outcomes.
- A WHRI researcher was the lead author of a national clinical practice on prevention of early-onset neonatal Group B streptococcal disease.
- Four WHRI researchers co-authored a provincial clinical practice guideline on use of dolutegravir, a new class of antiretroviral medication, for HIV positive pregnant women that will improve fetal outcomes.



- WHRI researchers co-authored national clinical practice guidelines on universal cervical length screening, three national clinical practice guidelines relating to fetal health surveillance, consensus guidelines for management of chronic pelvic pain, and a guideline on antibiotic prophylaxis in gynaecologic procedures.
- WHRI researchers co-authored international clinical practice guidelines for intraoperative care in caesarean delivery, and an international clinical practice consensus statement on supporting safer conception and pregnancy for men and women living with and affected by HIV.
- A WHRI/BCCHR researcher co-authored a national clinical practice guideline on cervical insufficiency and cervical cerclage.
- A WHRI researcher created an evidence-informed algorithm for treating pelvic floor mesh complications.
- A WHRI researcher co-authored a joint Society for Obstetricians and Gynaecologists of Canada and Canadian Association of Radiologists Policy Statement on non-medical use of fetal ultrasound.
- A WHRI researcher's meta-analysis was included in the World Health Organization's guidelines as evidence for exercise as a strategy for reducing cognitive decline and dementia risk.
- BC Children's Hospital researchers developed pre-printed post-op admission orders for children undergoing limb lengthening surgery based on guidelines developed through several years of research.
- A BCMHSUS researcher updated guidelines for group treatment for somatization.

PHSA's large number of provincial registries and longitudinal data sets on services provided to specific populations is a major asset of PHSA. These rich data resources, unique in Canada, include a wealth of information that can be studied to gain insights on clinical outcomes and health system design. A survey of PHSA's registry data stewards identified many research questions currently being addressed through registry data. The following examples highlight the high research value of these datasets, which are being used to support studies aimed at directly improving health outcomes and evaluating optimum care delivery models. A full listing of registry research questions is available in PHSA's supplementary research metrics report.

- Data from the Screening Mammography Database are being used to build a predictive model of risk of breast cancer development and prognostication that incorporates well-known risk factors (such as age, breast density, BMI, and family history) and mammographic features from previous mammograms.
- The Tumour Tissue Repository is being used to develop a next generation sequencing assay that can detect all classes of genetic variant in a single diagnostic test.
- Data about pregnant women with cancer from the Perinatal Services BC Registry is being studied to estimate the proportion of adverse child health outcomes that can be attributed to the cancer, treatment with chemotherapy, and provider-initiated preterm birth.

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- The BC Emergency Health Services administrative database is being used to evaluate whether a community-based resuscitation program (involving volunteers trained in CPR and use of an automated external defibrillator, integrated with local paramedic services) is a feasible method to reduce delay to high quality CPR and defibrillation compared with standard paramedic services.
- BC Trauma Registry data is being used to evaluate the clinical utilization of tranexamic acid (TXA) by paramedics for patients with major trauma in BC. Administration of TXA, a drug used to stop heavy bleeding, was added to the scope of paramedics' practice approximately three years ago.
- BC Cancer Registry data is being used to examine epidemiology, treatment, and survival in young-onset colorectal cancer patients.
- Data from the PROMIS–Transplant Registry are being used to assess the impact of long intermittent dialysis compared to conventional dialysis in delayed kidney transplant function.
- PROMIS –Renal Registry data are being used to describe the current utilization of nutritional supplements in all chronic kidney disease populations, and the relationship to outcomes.
- Data from the BC Cardiac Registry, linked with data from PROMIS-Renal Registry, are being used to validate predictive models of decision making for management of coronary artery disease in patients with chronic kidney disease.
- BC Cardiac Registry data are being used to evaluate the effect of waiting time on outcomes in patients undergoing transcatheter aortic valve implantation (TAVR).
- The Endometriosis and Pelvic Pain Interdisciplinary Cohort (EPPIC) database is being used to determine the impact of surgical management on pelvic pain and quality of life variables.

## **PRECISION MEDICINE, DIGITAL HEALTH, DATA/INFORMATICS**

### **KEY AREAS OF STRENGTH AND DEVELOPMENT AT PHSA**

*While it's impossible to convey the multitude of exciting discoveries being made by PHSA researchers, three key areas of strength and development merit specific focus.*

PHSA researchers are recognized world-class leaders in precision medicine. This is reflected in PHSA's unprecedented success in Genome Canada's 2017 Large-Scale Applied Research Project (LSARP) and Technology Platform competitions. PHSA and BC led the country in the competition. Six of the 15 projects funded by Genome Canada are based in BC, and five of those projects, totaling approximately \$47M, are led by PHSA researchers. In addition, two of three projects led from outside BC with substantive involvement by PHSA researchers were funded. In comparison, Genome Canada funded one project led by Alberta, and four projects each led by Ontario and Quebec.

These LSARP projects are well under way and will begin reporting findings next year – bringing genomic diagnosis to Indigenous children with suspected genetic disorders, reducing adverse drug reactions through genomic markers, identifying new treatments for relapsed lymphoid cancer patients, improving identification and treatment of children with asthma, and optimizing use of genetic counselling to support clinical implementation of genomics. This latter project, the largest genetic counselling research award ever granted worldwide, is already having a translational impact. This award signals the validity and importance of genetic counselling as an academic discipline in its own right, and this is already increasing interest among members of this traditionally clinical profession in engaging in research. This project, led by a researcher who is a member of both BC Children’s Hospital Research Institute and Women’s Health Research Institute, is consolidating BC’s position as a true epicentre of genetic counseling research, not just in Canada, but in the world.

BC Children’s Hospital Research Institute (BCCHR), whose researchers are leading four of the five LSARPs, has identified precision medicine as one of three strategic initiatives and is seeking external funding to establish a stem cell/tissue modelling core to support genomics and other research. It’s also exploring an important trend in genomics to assess use of exome sequencing versus whole genome sequencing, finding through a study of 100 families that exome sequencing was 25 per cent more successful identifying difficult to diagnose conditions in children.

BC Cancer, whose Genome Sciences Centre, an international leader in genomics, was first to apply genomics to real-time treatment planning through the Personalized Onco-Genomics Program (POG), is now becoming a world leader in single cell genomics. Instead of sequencing multiple cells, individual cells are isolated and amplified through this approach. While the individual cells are not sequenced as deeply, this approach presents a view of the diversity of cells pre and post cancer treatment informing the best treatment path. Novel research utilizing fine needle breast biopsy is improving the understanding of particular cancers at play, again helping to determine best treatment. Translation of genomic research to advance precision medicine is already taking place at BC Cancer, with new diagnostic tests in clinical use for prostate and other cancers.

The BC Centre for Disease Control (BCCDC) is also a national leader in genomics, using it to improve identification and management of TB and other disease outbreaks, and, more recently, demonstrating whole genome sequencing of foodborne isolates can reduce food and water born disease.

PHSA’s success in precision medicine extends well beyond any of its individual research entities, and is marked by internal collaboration that achieves broader impacts.

Digital health is another key area of growing strength for PHSA. Digital health offers innovative solutions to improving patient-focused diagnosis and treatment, and PHSA research entities have growing strength – and a growing focus – on digital health. BCCDC was an early adopter of digital health, using it to increase accessibility for marginalized populations including online sexual health services such as Get Checked Online and Smart Sex Resource, and continues to build on these strengths. In the past year, BCCDC partnered with BC Cancer and WHRI to test use of a similar online service for cervical cancer screening.

Both BCCHR and WHRI have identified digital health as a key strategic priority, and have recruited key people to strategically advance digital health. WHRI is evaluating digital health needs in women’s health research both on campus as well as more broadly throughout the province to identify opportunities for support and capacity building. BCCHR is supporting eight to 10 catalyst projects in digital health as well as considering the potential for larger scale projects.

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As PHSA's digital and virtual health mandates further evolve, there is strong potential for increasing engagement between the research and clinical communities in order to advance digital innovations that respond to the health needs of British Columbians.

Similar opportunities exist in the arena of **data and informatics**, another critical area of expertise and growth within PHSA's research enterprise. From major national collaborations aimed at establishing national cancer networks and platforms to support data sharing, to digitization of clinical tools that streamline mental health patient assessments while creating a data set for future research, to operational initiatives to improve data management and streamline privacy and legal requirements, collecting, curating, linking and sharing data is a strategic cornerstone of research at PHSA.

As a result of its provincial role, PHSA has unique and rich clinical data assets, and its research enterprise is being shaped by increasingly sophisticated informatics expertise.

A prime example is the research leadership provided by BCCDC researchers that has helped shape the Blueprint to Inform Hepatitis C Elimination Efforts in Canada. The BCCDC's BC-Hepatitis Testers Cohort, a database containing anonymized medical information on testing, healthcare utilization and outcomes dating back to 1990, has become internationally recognized for its comprehensive and population-level information. Like other PHSA datasets which provide comprehensive disease specific data on cancer, renal disease, transplants, cardiac disease, and public health, the Hep C cohort enables researchers to follow the effectiveness of interventions and evaluate prevention and treatment strategies, helping to inform policy and care not just in BC but within Canada and internationally.

Progress continues to be made in improving and expanding availability of data management platforms such as REDCap across all PHSA programs, as well as creating new multidisciplinary committees that can help find solutions to the complex issues that often arise related to data. With the establishment of a chief executive role advancing PHSA's data strategy, new collaborations and partnerships are forming that offer exciting opportunities to utilize data to advance research and care.

While precision medicine, digital health, and data/informatics are key areas of strength within PHSA's research enterprise, the paradigm shift to considering patient priorities and engagement as foundational to research activities continues to strengthen. So, too, does explicit support for inclusion, equity and diversity in the research enterprise, undertaken in collaboration with UBC and other academic partners.

Intra-PHSA collaboration is strong across the PHSA research enterprise. For example, national leaders in health economics, located at BC Cancer, are key participants on several of the LSARP projects. Another compelling example of PHSA collaboration is the ground-breaking research that has established HPV vaccine as the best – and most cost effective – mechanism for preventing cervical cancer.

Researchers at BCCDC, Women's Health Research Institute (WHRI), BC Cancer, and BC Children's Hospital all played key roles in evaluating the vaccine for HPV, demonstrating its efficacy against specific genomic variants, and the efficacy of two versus three doses, which benefits not only patients but the health system. This fiscal year, PHSA researchers demonstrated HPV testing surpassed PAP tests at preventing high-grade cervical pre-cancer. Supported through recently announced major funding, this vital research area will continue with PHSA researchers leading efforts to develop more effective screening tools for marginalized populations and, ultimately, to eradicate cervical cancer.

At a fundamental level, connections between researchers and the clinical community continue to strengthen. The breadth of the PHSA research enterprise, from discovery focused on the

most minute understanding of cell biology, to clinical trials and research, to commercialization, to economic evaluation, is increasingly being applied to health and health system priorities. With a mandate to advance provincial clinical policy and population health improvements based on evidence, PHSA is poised to strengthen this collaboration even further in the years to come.

## STUDENT EDUCATION AT PHSA

### PREPARING A HIGH PERFORMANCE WORKFORCE FOR TOMORROW

*As a key activity in PHSA's tri-partite mandate of research, education and care, PHSA is committed to providing quality student education experiences across its services and programs.*

With a unique role in health care in British Columbia, PHSA has an important contribution to make in supporting student education in its specialized services - experiences students are not able to attain anywhere else. PHSA was proud to welcome approximately 3000 students this year across the organization, from 36 different post-secondary institutes, enrolled in a wide range of programs that mirror the diversity of expertise of our staff. Student education includes the learning activities occurring across the organization for individuals who are enrolled in a recognized academic institution, who have a practical component as part of the requirements for program completion.

When areas welcome students as part of their care team, the benefits extend beyond the student to the whole team. It strengthens a learning culture, fosters continuous critical engagement with both theory and practice, and promotes a reciprocal exchange amongst students, instructors, and members of the team.

Student education at PHSA contributes to the development of a prepared workforce across the health system, supports an essential aspect of students' learning and preparation, strives to provide students with a positive experience while they are here, and aims to encourage students to consider joining PHSA's teams when they graduate.

An overview of some of the 2018-2019 highlights of PHSA's commitment to student education across programs in the organization is demonstrated in the following metrics. A total of 3011 students had placements at PHSA; of these students, 493 were medical undergraduates (MDUG), 805 were enrolled in Post-Graduate Medical Education (PGME) or residency, 833 were nursing students, and 879 were all other members of the interprofessional team. PHSA accepted 1061 placement requests (86%) and declined 145 placement requests (14%) made by academic partners for all disciplines, excluding medicine. There were 333 preceptors actively supporting students this year, for a cost of staff time of \$5 Million, with 357 preceptors who participated in training. PHSA has Education Affiliation Agreements with 68 academic partners, and 36 of these institutes had students on-site this year. The top five partners for student placement hours are BC Institute of Technology (BCIT), Justice Institute of BC (JIBC), University of British Columbia (UBC), Langara College and Douglas College. Survey results indicate that 504 of our new employees hired this year have had a previous placement at PHSA.

This year, PHSA published a new policy and procedure to support Observation and Supervised Practice, and collaborated with Vancouver Coastal Health and Providence Health Care to draft shared policies for both Student Education and Educational Affiliation Agreements that are now in final review.

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**PHSA has been tracking the trends of student activity for the last six years.**

Clinical teams balance their ability to focus on both the continued delivery of excellent care in the complex and dynamic health care environment and on their support for students - our future workforce and prospective team members. Many factors are involved in determining the capacity of an area or team to support students including their current staff competencies, experience, turn-over and readiness, preceptor development and support, clinical and operational requirements, and provincial and organizational initiatives. Despite these pressures, together PHSA programs collectively have a responsibility to be active partners with academic institutions and find ways to provide positive learning experiences for students.

While there are no established provincial benchmarks for student education metrics, PHSA has been tracking the trends of student activity for the last six years. The data available makes it possible to examine the alignment of student education with workforce planning and post-secondary program seat allocations both locally and provincially. The data repository for student education allows PHSA to monitor student activity by discipline, academic partner, and PHSA program, in order to support informed and strategic decisions.

## **PARTNERSHIPS AND INNOVATIONS**

### **A FOCUS ON CROSS-SECTOR COLLABORATION**

*This year has seen a renewed emphasis on collaborative planning for student education with multiple stakeholder groups including health organization clinical teams, education departments, student education leads, academic partners, professional associations and regulatory bodies, and government leaders.*

The examples below demonstrate the value of bringing people with diverse perspectives, ideas and responsibilities together to envision a desired future and a roadmap for reaching it.

The Ministry of Health's Nursing Policy Secretariat advanced the progress on the Priority Recommendations in the Nursing Policy Consultation Report authored by Chief Nurse Executive, David Byers, in 2018, including the establishment of the Nurse Education Planning Council. The council identified three work-streams to take a closer look at new graduates, educators, and student practice education models. PHSA participated in these work-streams, engaging in review of the evidence, widespread consultation, and the development of a report and action plan to be presented to the Health and Medical Education Planning Board, a joint board of the Ministry of Health and Ministry of Advanced Education, Skills and Training. The report had input from a wide range of participants including current students and recent graduates, academic institutions, health organizations, union, professional association, regulatory body, industry experts, Chief Nursing Officers' Council, and government leaders and outlines a transformative approach to nursing education in British Columbia.

The collaborative process in developing the report was widely identified as an example of what is needed for the future of innovative, responsive, and quality education in British Columbia.



A response from the Health and Medical Education Planning Board to address specific items in the plan, including student placement models and learning environments is anticipated for the next fiscal year.

Sonographers have been identified as one of the priority professions in the health care workforce in British Columbia. Expanding training opportunities for sonographers within the province is one strategy being used to increase the local workforce. In order to properly plan for future training expansions, working groups have been established by the provincial government. Sonography Education Working Group (SEWG) is co-chaired by the Ministry of Advanced Education, Skills and Training (AEST) and the Ministry of Health (HLTH). The purpose of the SEWG is to provide oversight to ensure that proposed sonography seat expansion and concomitant clinical placement requirements is collaborative, coordinated and sustainable. To achieve this, two sub-working groups have been established: the sonography curriculum working group and the sonography clinical placement working group.

PHSA participated in these working groups, along with health authority representatives from medical imaging and student education departments, academic institutions, and government leaders. With the input of all stakeholders, PHSA played a key role in providing data on clinical capacity from the Health Sciences Placement Network (HSPNet) – an online national platform for coordinating student placements operated by PHSA, and in establishing a provincial process for coordinating sonography student placements that will be implemented in 2019-2020.

UBC Health continues to partner with PHSA on a UBC Teaching and Learning Enhancement Fund (TLEF) grant to advance interprofessional collaborative practice learning opportunities for students. This initiative builds upon a previous TLEF grant which explored key elements for providing successful inter-professional collaborative practice learning experiences for health profession students.

The current grant involves BC Children’s Hospital and BC Women’s Hospital and Health Centre and is intended to provide students with an opportunity to participate in interprofessional learning; to provide education for staff on collaborative practice competencies, tools and resources; and to grow existing awareness and hands-on experience of collaborative practice in the delivery of patient-centered care. This initiative will run during the 2019-2020 fiscal year.

As student numbers increase, evidence emerges, pedagogies evolve, and clinical teams are stretched, there is increasing interest in examining the role of simulation as a learning modality to foster clinical excellence in both pre and post licensure health care professionals.

The Simulation Centre on the BC Children’s and Women’s campus has been running since 2012, with steadily expanding numbers of participants, professions and scenarios. Last year, over 3000 people participated in simulation learning events, with scenarios such as mock pediatric code blue, emergency department mock trauma, First 5 Minutes (for patients who require escalation of care and resuscitation), mock newborn code, maternal emergencies, surgical simulations, scenarios in support of nursing orientation and residency. Over 40% of the learning sessions involve interprofessional teams who are actively engaging in building their collaborative practice competencies. Students on campus are invited to participate in simulation learning events, and there is greater opportunity to develop further strategies for supporting students’ learning through the use of simulation.

Building upon the success of the Simulation Centre at BC Children’s Hospital, the potential role of simulation for students on practicum with other programs across PHSA, the possibilities of further collaboration with academic partners and the use of their own simulation spaces, and an organizational or provincial approach to simulation all warrant future consideration.

**UBC Health continues to partner with PHSA on a UBC Teaching and Learning Enhancement Fund (TLEF) grant to advance interprofessional collaborative practice learning opportunities for students.**



As student numbers increase, evidence emerges, pedagogies evolve, and clinical teams are stretched, there is increasing interest in examining the role of simulation as a learning modality.

There have been some preliminary conversations with leads in the province for both simulation and student education regarding the unique nature of simulation learning events (e.g. expertise, equipment, supplies, learning objectives) and the potential opportunities, agreements, funding models, approaches, governance and partnerships that will be required to realize increased use of simulation to support learning for both students and staff.

## SPOTLIGHTS ON STUDENT EDUCATION

### PHSA WELCOMING STUDENTS AS VALUED MEMBERS OF THE TEAM

*Programs across PHSA are doing an excellent job of welcoming students onto their teams, supporting their learning, and encouraging them to consider working here upon graduation.*

Examples that highlight some of the innovative and exemplary support for student education happening throughout PHSA are presented in the following spotlights:

#### Spotlight on a Profession: Master of Public Health



PHSA hosts students who are enrolled in Population and Public Health programs each year. These graduate students are actively engaged in a range of activities that contribute to creating safe and healthy workplaces and cities, preventing and controlling the rapid spread of infectious diseases, understanding the health needs of communities, and investigating and improving the effectiveness of health systems.

Charito Gailling and Svetlana Ristovski-Slijepcevic, Project Managers with BC Centre for Disease Control, were preceptors this year for a Master in Public Health student.

The student was welcomed as an integral member of the team throughout their 12-week practicum. The learning activities included conducting a scoping review of

research and practice documents, participating in community engagement sessions, and contributing to the development of a conceptual framework that has province-wide application.

The student shared feedback that they felt encouraged, supported, and valued; that the whole team and both preceptors provided a great learning environment; and, that they had an opportunity to enhance their competencies in conceptual, analytical and systems thinking. The preceptors noticed that they recognized the value of having students on their project team; the importance of matching the learning environment with the student; and the welcome surprise of the level of competence and leadership that the student brought with them and demonstrated throughout the practicum experience.

## Spotlight on a Practice Setting: Forensic Psychiatric Hospital at Colony Farm



This year, for the first time, UBC Nursing students had a clinical placement at the Forensic Psychiatric Hospital. It proved to be an opportunity for the nursing team to shine, for students to participate in a valuable and rare practice setting, and for patients to bring their individual stories and experiences to shaping the understanding of what is needed to provide care to this complex and vulnerable group of people. The nursing students learned about providing patient-centred, recovery-focused and trauma-informed care as part of a collaborative,

interprofessional care team. Students commented on how positive their learning experience was, particularly noting the team approach, supportive environment, focus on safety, calibre of care and the overall atmosphere of respect.

This learning experience is one way of reducing the stigma often associated with people who have a mental illness and have come into conflict with the law. It also helps to increase the understanding of people's journey at the Forensic Psychiatric Hospital.

## Spotlight on Preceptors



Preceptors are PHSA staff who support the learning experiences of students while they are on placements at PHSA sites. Preceptors make a key contribution to PHSA by sharing their expertise, knowledge, skills and values with students. They model the delivery of excellent care and welcome the newest members into their profession.

BC Children's Hospital and BC Women's Health Centre offer a strong program of supporting preceptors to excel in their role. They host a one-day classroom session for preceptors six times a year, have e-learning and online resources, a discussion forum, roving

in-the-moment learning sessions, and a toolkit for leaders to recognize and celebrate the preceptors on their team.

Khirsty Macarthur, Leader Clinical Education and Special Projects is inspired by working with preceptors and their commitment to creating learning partnerships where new people feel welcomed and are supported to build competencies to transition into complex and specialized roles. She feels fortunate to work alongside passionate and skilled preceptors who consistently strive for the best care for patients and their families.

PHSA plays an important role in British Columbia in providing students with educational opportunities as part of their program with an academic institution. The experiences students have throughout our specialized services and programs cannot be attained anywhere else. PHSA and all its programs have much to be proud of in the past commitments to student education. Looking ahead, there is opportunity for further development of the approaches to student education including planning and capacity, support for preceptors, monitoring and evaluating the learning activities and environments, and advancing education models and designs through innovations and partnerships – all with a goal of ensuring a high performance workforce is in place to meet the health needs of British Columbians in the future.

# RESEARCH METRICS

## PHSA OVERALL



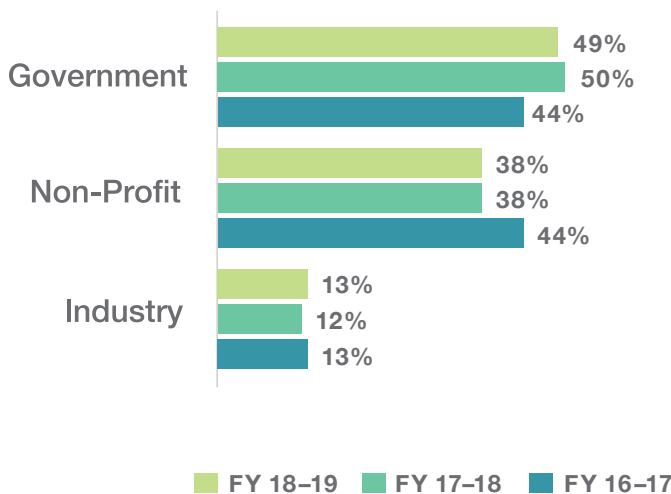
PRODUCING AND ADVANCING KNOWLEDGE

# \$134 Million ↓

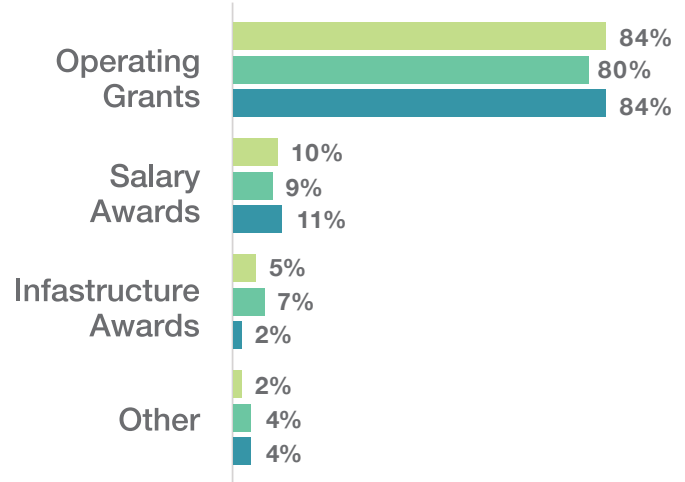
in TOTAL GRANTS AWARDED in FY 18-19

\$152 Million in FY 17-18

\$ BY SECTOR



\$ BY AWARD TYPE



### PUBLICATIONS

BCCHR	858 ↓
BC CANCER	655 ↑
WHRI	670 ↑
BCCDC	305 ↑
BCMHSUS	61 ↓



# 66%

% of CIHR competitions above National AVG SUCCESS RATE in FY 18-19

33% in FY 17-18

ECONOMIC BENEFITS & INNOVATION

**\$513K↑**  
of REALIZED REVENUE  
in FY 18-19  
\$326K in FY 17-18



**12** patents filed  
**17** patents issued  
in FY 18-19  
18 Filed / 30 Issued in FY 17-18



**18 new↑**  
ACTIVE LICENSES  
in FY 18-19  
13 new in FY 17-18

**14** spin-offs (2 new)  
# of ACTIVE SPIN-OFFS in FY 18-19  
12 (2 new) in FY 17-18

BUILDING RESEARCH CAPACITY

**788↓**  
# OF RESEARCHERS  
in FY 18-19  
807 in FY 17-18



**2,315↑**  
# OF TRAINEES  
in FY 18-19  
1,970 in FY 17-18

**\$4.1 Million↑**  
RESEARCH SUPPORT  
FUND GRANTS  
in FY 18-19  
\$3.9 Million in FY 17-18

HEALTH & POLICY BENEFITS



**619↑**  
# OF CLINICAL TRIALS  
in FY 18-19  
561 in FY 17-18

**47,600↓**  
TOTAL CUMULATIVE  
SUBJECT ENROLLMENT  
at the end of FY 18-19  
149,773 at the end of FY 17-18



**34.1%↓**  
% INDUSTRY FUNDED  
TRIALS in FY 18-19  
34.8% in FY 17-18

**240** requests ↑  
**227** approved ↑  
REGISTRY ACCESS REQUESTS/  
APPROVALS in FY 18-19  
211 requests / 200 approvals in FY 17-18

# RESEARCH METRICS

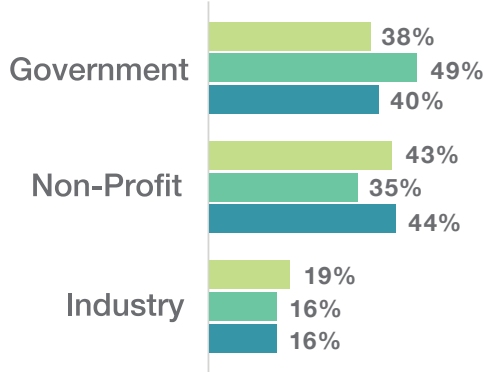
## BC CANCER

### PRODUCING AND ADVANCING KNOWLEDGE

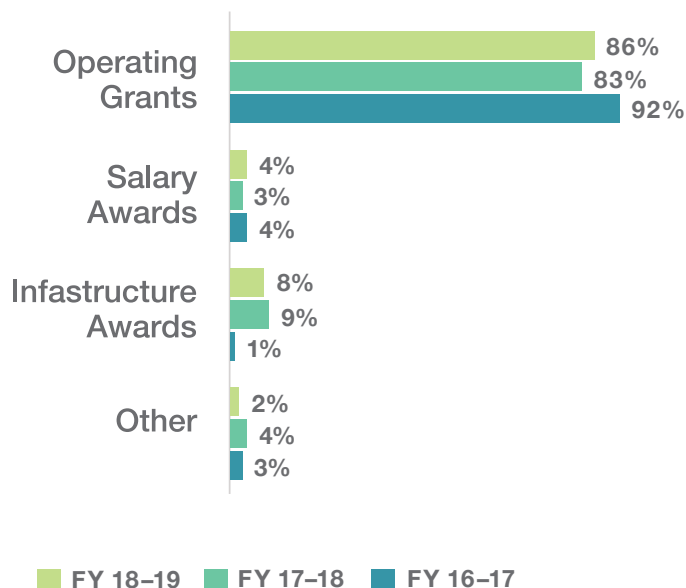
# \$70 Million ↓

in TOTAL GRANTS AWARDED in FY 18–19  
\$86 Million in FY 17–18

#### \$ BY SECTOR



#### \$ BY AWARD TYPE



# 655

TOTAL  
# OF PUBLICATIONS  
in FY 18–19  
524 in FY 17–18

# 556

JOURNAL ARTICLES  
in FY 18–19  
443 in FY 17–18

# 99.4%

PEER REVIEWED  
in FY 18–19  
95% in FY 17–18



# 34%

% of CIHR competitions  
above National AVG  
SUCCESS RATE  
in FY 18–19  
34% in FY 17–18

ECONOMIC BENEFITS & INNOVATION

**\$445K↑**  
of REALIZED REVENUE  
in FY 18-19  
\$285K in FY 17-18


 **8 patents filed**  
**17 patents issued**  
in FY 18-19  
10 filed / 26 issued in FY 17-18

 **37**  
ACTIVE LICENSES  
(5 new) in FY 18-19  
1 new in FY 17-18

**11 spin-offs (2 new)**  
# of ACTIVE SPIN-OFFS in FY 18-19  
10 (1 new) in FY 17-18


BUILDING RESEARCH CAPACITY

**302↓**  
# OF RESEARCHERS\*  
in FY 18-19  
342 in FY 17-18


 **612↑**  
# OF TRAINEES  
in FY 18-19  
580 in FY 17-18


**\$1.7 Million↑**  
RESEARCH SUPPORT  
FUND GRANTS  
in FY 18-19  
\$1.6 Million in FY 17-18

HEALTH & POLICY BENEFITS

 **337↑**  
# OF CLINICAL TRIALS  
in FY 18-19  
309 in FY 17-18

**34,341↔**  
TOTAL CUMULATIVE  
SUBJECT ENROLLMENT  
at the end of FY 18-19  
34,573 at the end of FY 17-18



 **43%↑**  
% INDUSTRY FUNDED  
TRIALS in FY 18-19  
43% in FY 17-18

\*excluding affiliate investigators

# TOP 3 ACHIEVEMENTS BC CANCER

Details available in Supplementary Report



1

## Clinical Trial for New Therapy Shows Superior Efficacy over Standard Regime in Hodgkin Lymphoma Treatment

The BC Cancer Centre for Lymphoid Cancer (CLC) is committed to improve the outcomes and quality of life of patients suffering from lymphoid cancers through clinical and translational research. Drs. Connors and Savage of the CLC led an international clinical trial involving multiple cancer centers to investigate the efficacy of a new combination therapy in patients with advanced stage Hodgkin lymphoma. This new therapy combines the standard chemotherapy with a newly developed antibody-drug which specifically targets cancer cells in Hodgkin lymphoma. The data generated by the CLC team and its collaborators significantly contributed to outcomes research and continue to impact clinical practice and management of lymphoma around the world. Their results were published in New England Journal of Medicine.

2

## Establishment of a new Molecular Imaging and Therapeutics Program

An \$18 million-dollar anonymous donation establishes a new Molecular Imaging and Therapeutics Program. The establishment of the Program means that a new form of cancer treatment – radioligand therapy (RLT) will soon be available to cancer patients in BC. A Molecular Imaging and Therapeutics program at BC Cancer will allow the research and development of cutting-edge radiopharmaceuticals through to clinical trials. The first trials will focus on RLT for men with incurable, metastatic prostate cancer. Early research results indicate great promise for the treatment of other common cancers, including metastatic melanoma, breast, ovarian, pancreatic and blood cancers. The targeted RLT compounds are developed at BC Cancer and in partnership with TRIUMF.

3

## PACER Research Lab Receives International Recognition

Dr. Dean Regier's Research Lab, PACER (patient-centred, accessible, and efficient applications of precision medicine) has increased its national and international impact with team members presenting at seven health economics, health services research and oncology conferences, four of which were at International conferences. PACER published 10 peer-reviewed manuscripts in leading academic health journals, with seven manuscripts currently under review and two in press. Dr. Regier was awarded \$500,000 in grant funding from Genome BC to conduct health economic analyses in context to precision medicine implementation for rare diseases in B.C. and England. PACER's ongoing research in precision medicine sustainability includes international collaborations with health economics and clinical leaders from Oxford and Manchester Universities, and the Universities of Washington and Alabama.



**TABLE 1 BC Cancer Outcomes**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSAs researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
Cancer patients are receiving specialized care through online virtual portals at home.	Virtual care provides patients with the ability to consult with a healthcare provider through digital means. This may include live video, audio conferencing, and synchronous or asynchronous messaging. The program, which saw 10 oncologists partake in virtual health (VH) visits with approximately 100 patients in their homes, and was targeted at follow-up appointments (replacing visits conducted at telemedicine sites). Patient enrollment in the program was at the discretion of the treating oncologist. After generating positive responses and results among patients and their providers, BC Cancer is actively seeking to scale this program to all oncologists on Vancouver Island. Among their 50 oncologists, 48 are interested in providing VH visits to their patients. 64% of patients chose VH Visits because it saved them from travelling. 75% of these patients experienced savings on bus fares or fuel. 79% of patients rated their VH visits as successful. The average overall VH visit experience was 8/10, indicating high satisfaction.	<p><b>Patient: Access to new treatment/ technology</b></p> <p> Yes <b>Office of Virtual Health</b></p>
Prostate gland fiducial gold seed implant and Rectal Gel Spacer Procedure	Prostate gland fiducial gold seed implant and Rectal Gel Spacer Procedure under Local anesthesia was approved for routine use at BC Cancer - Victoria in 2018. SpaceOAR Hydrogel is injected into the space between the rectum and prostate gland forming a gel which pushes the prostate gland away from the rectum. A pilot study in 13 patients, published this year in J Appl Clin Med Phys showed that treatment plans using rectal wall optimization structure offered the lowest rectal dose while VMAT treatment technique offered the lowest bladder and penile bulb dose. The SpaceOAR team won the BCC innovation & discovery award in 2018 for this work. This has been shown to reduce long term bowel side effects significantly (up to 71%) and help men maintain normal bowel-related quality of life after radiotherapy.	<p><b>Patient: Access to new treatment/ technology</b></p> <p><b>No</b></p>
The Prone vs Supine trial was a Canadian multicenter to evaluate acute skin toxicity in patients with large breasts (bra size 40D or greater) undergoing adjuvant whole breast radiation therapy.	Data analysis, presented at the ESTRO 2019 meeting in Milan, found that patients positioned in the prone breast board had significantly lower rates of moist desquamation and grade 3 acute toxicity. These findings have provided Level I evidence leading to a change in practice to adopt prone breast radiation as a standard of care option for patients with large breasts.	<p><b>Patient: Protocols and Guidelines</b></p> <p><b>No</b></p>

**TABLE 1 BC Cancer Outcomes (continued)**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>BC Cancer researcher’s research leads to FDA approval of Larotrectinib, demonstrating actual bench-to-bedside application of his translational research program.</p>	<p>What makes Larotrectinib’s approval so noteworthy is that it applies to a wide array of tumours, many of which would seem to have nothing in common except the mutation that spawned them. The approval of Larotrectinib represents a new approach to cancer drugs and their regulation – one drug that is intended and approved for a wide variety of cancers, with the common link being their genetic driver. It is estimated that the neurotrophin receptor tyrosine kinase (NTRK) 1, 2, and 3 fusions occur in ~1% of human cancers, leading to a new classification of “NTRK fusion cancers”, and directly prompting the pharmaceutical industry to develop NTRK inhibitors.</p>	<p><b>Patient: Access to new treatment/ technology</b></p> <p>No</p>
<p>Guideline - economic evidence to BC Cancer Executive on first-line abiraterone acetate v. docetaxel for managing metastatic castration-resistant prostate cancer.</p>	<p>This model informed the non-adoption of abiraterone acetate as first-line treatment, thus saving the healthcare system, by utilizing health resources while improving patient and population health.</p>	<p><b>System: Efficiency, cost/benefits or sustainability</b></p> <p>No</p>
<p>A BC Cancer researcher and the Centre for Clinical Genomics at BC Cancer were involved in the development and implementation of a capture method for targeted genomic sequencing within the accredited workflows</p>	<p>This work resulted in the amalgamation of both the OncoPanel and the Hereditary Cancer Program panel into a single workflow for increased efficiency in delivery of patient care. Clinicians are now able to request a single test to assess patients for both gene sets rather than requiring multiple tests.</p>	<p><b>Patient: Improvements in timely access to care</b></p> <p>No</p>

# RESEARCH METRICS

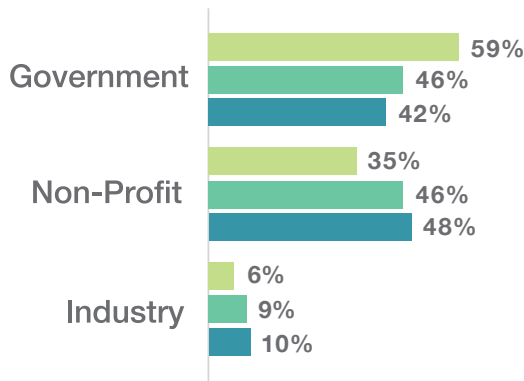
## BC CHILDREN'S HOSPITAL RESEARCH

PRODUCING AND ADVANCING KNOWLEDGE

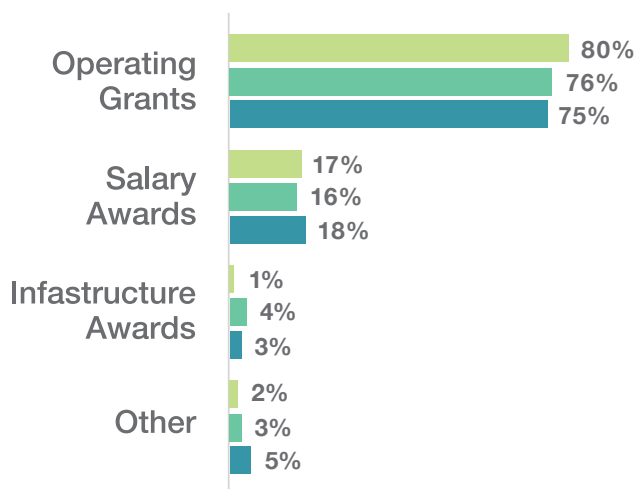
# \$56.6 Million ↓

in TOTAL GRANTS AWARDED in FY 18-19  
\$57.8 Million in FY 17-18

### \$ BY SECTOR



### \$ BY AWARD TYPE



■ FY 18-19 ■ FY 17-18 ■ FY 16-17



# 858

TOTAL  
# OF PUBLICATIONS  
in FY 18-19  
943 in FY 17-18

# 759

JOURNAL ARTICLES  
in FY 18-19  
792 in FY 17-18

# 98.7%

PEER REVIEWED  
in FY 18-19  
98% in FY 17-18



# 33%

% of CIHR competitions  
above National AVG  
SUCCESS RATE  
in FY 18-19  
100% in FY 17-18

ECONOMIC BENEFITS & INNOVATION

**\$66K↑**  
of REALIZED REVENUE  
in FY 18-19  
\$40K in FY 17-18



**4** patents filed  
**0** patents issued  
in FY 18-19  
7 filed, 4 issued in FY 17-18



**65**  
ACTIVE LICENSES  
(13 new) in FY 18-19  
9 new in FY 17-18

**3** spin-offs (0 new)  
# of ACTIVE SPIN-OFFS in FY 18-19  
3 (1 new) in FY 17-18

BUILDING RESEARCH CAPACITY

**283↓**  
# OF RESEARCHERS\*  
in FY 18-19  
296 in FY 17-18



**709↑**  
# OF TRAINEES  
in FY 18-19  
678 in FY 17-18

**\$1.9 Million ↔**  
RESEARCH SUPPORT  
FUND GRANTS  
in FY 18-19  
\$1.9 Million in FY 17-18

HEALTH & POLICY BENEFITS



**212↑**  
# OF CLINICAL TRIALS  
in FY 18-19  
195 in FY 17-18

**6,564↓**  
TOTAL CUMULATIVE  
SUBJECT ENROLLMENT  
at the end of FY 18-19  
108,720 in FY 17-18



**27% ↔**  
% INDUSTRY FUNDED  
TRIALS in FY 18-19  
27% in FY 17-18



\*Excluding affiliate investigators

# TOP 3 ACHIEVEMENTS BC CHILDREN'S HOSPITAL RESEARCH

Details available in Supplementary Report



1

## Rare DNA mutation identified as the cause of a genetic metabolic disorder: A first from BC Children's Hospital and an international team of researchers

A New England Journal of Medicine study is the first to identify a repeat expansion of DNA – where the gene does not function because the DNA adjacent to it has extended several hundred times its normal length – as the cause of an inherited metabolic disorder. In inherited metabolic disorders the body can't break down specific nutrients from food leading to a range of serious health problems. For children with these often unexplained, degenerative conditions, a diagnosis is the first step towards identifying interventions that could slow the progression of damaging symptoms and improve their quality of life.

2

## New research sheds light on link between exposure to anti-depressants before birth and brain activity in newborns

Roughly one in ten pregnant women experience depression and, while many benefit from anti-depressants, there are unanswered questions about how these drugs affect a baby's development. A BC Children's Hospital study in Biological Psychiatry: Cognitive Neuroscience and Neuroimaging reported that newborns who were exposed to selective serotonin reuptake inhibitors (SSRIs) during pregnancy showed changes in brain activity in areas of the brain believed to be associated with early auditory processing and language development. This paper could contribute to new approaches for managing depression that give mothers and babies the best possible chance for a long-term health.

3

## Research into improving and personalizing care for kids with immune disorders gets a boost with new methodology

BC Children's Hospital researchers are helping to improve diagnosis and care for kids who have immune-related diseases or have undergone a cell or tissue transplant with a new easy-to-replicate protocol, published in JCI Insight, that speeds the discovery and validation of new biomarkers. Biomarkers can provide personalized and accurate insight into how a disease is progressing and whether treatment is working as expected. In the case of kids who have undergone transplantation, biomarkers could help doctors catch the earliest signs of transplant rejection, greatly improving a child's chance at avoiding serious complications like diabetes and heart disease.

**TABLE 2 BCCHR Outcomes**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>BCCHR Researchers at the BC Injury Research and Prevention Unit at BC Children's Hospital worked with the Richmond School District to develop and implement a district-wide education and awareness plan based on the Concussion Awareness Training Tool. The Concussion Awareness Training Tool is a series of research-based online modules developed by the BC Injury Research and Prevention Unit with information about how to prevent, recognize, and treat concussions. The collaboration resulted in the development of a district-wide concussion protocol, the creation of a concussion response poster specifically tailored for the school district, the distribution of printed materials about the Concussion Awareness Training Tool across the district, and two professional development sessions that delivered the Concussion Awareness Training Tool for School Professionals followed by a question period.</p>	<p>Because children's brains are still developing, they are particularly vulnerable to suffering long-term complications from head injuries. The resources provided to the Richmond School District through this project will help educators prevent, recognize and respond appropriately to concussions, ensuring children receive timely care and minimizing the long-term consequences of these injuries.</p>	<p><b>System: Knowledge dissemination</b></p> <p><b>No</b></p>
<p>The Concussion Awareness Training Tool for Medical Professionals was updated and re-launched in June 2018. The new update incorporates recommendations from the 2017 Consensus statement of Concussion in Sport, the Canadian Guidelines for Concussion in Sport and other recent evidence-based resources. This e-learning course is available free-of-charge, available in both English and French, and is eligible for credits with the Maintenance of Certification program through the Royal College of Physicians and Surgeons of Canada. The course, which was re-developed by researchers at the BC Injury Research and Prevention Unit, BC Children's Hospital and in partnership with Parachute and the Public Health Agency of Canada, has been extensively reviewed at a national level and is a product of the federally funded National Concussion Protocol Harmonization Project.</p>	<p>As a standard clinical practice guideline for concussion in BC does not exist, this tool aims to help standardize diagnosis and treatment of concussion. The course covers how to effectively assess a patient's concussion within the initial hours post-injury, how to optimally manage concussion care during the first 2-4 weeks post-injury, and how to identify when referral to specialty care is required.</p>	<p><b>System: Knowledge dissemination</b></p> <p><b>No</b></p>
<p>Active &amp; Safe Central, a new website developed by the BC Injury Research &amp; Prevention Unit at BC Children's Hospital in partnership with injury prevention experts, sport injury specialists and sport organizations across Canada, launched in May 2018. Active &amp; Safe Central gives parents, kids, coaches and teachers easy access to evidence-based injury prevention information for over 50 popular sports and recreational activities. Informed by international injury prevention research, the activity-specific information on the site includes common injuries, risk factors and strategies for injury prevention.</p>	<p>Active &amp; Safe Central helps children and families stay active and take part in physical activities while minimizing the risk of preventable injuries. Over 900 BC children and teens are hospitalized each year due to sports-related injuries, and less serious injuries may prevent kids and teens from being physically active. Active &amp; Safe Central was designed to have a maximum impact on child health by featuring activities that promote healthy lifestyles, those that are likely to be offered or supported in schools and community organizations, and activities that have higher rates of injury.</p>	<p><b>Patient: Other type (please specify below):</b></p> <p><b>Knowledge dissemination</b></p> <p><b>No</b></p>

**TABLE 2 BCCHR Outcomes (continued)**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>The Canada Council of Chief Medical Officers of Health officially endorsed the Position Statement on Active Outdoor Play co-authored by a BC Injury Research and Prevention Unit researcher. This position statement reiterates that “access to active play in nature and outdoors – with its risks – is essential for healthy child development” and encourages educators to seek opportunities to support children’s outdoor play.</p>	<p>This endorsement by the national council of Chief Medical Officers of Health emphasizes the physical, social, and emotional benefits of active outdoor play, and offers recommendations to governments, health care, citizens, educators, and sport and recreation professionals on how they can implement outdoor play in their communities.</p>	<p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
<p>Researchers at the Digital Lab at BC Children’s Hospital and the University of British Columbia collaborated to create Allergy Check, a new assessment tool that guides users through the likelihood of having a food allergy. Allergy Check prompts users for the symptoms they’re experiencing and then gives them a personalized result to help them determine whether they’ve experienced an allergic reaction and whether they need to seek further medical attention. The tool also has a resources section where users can learn more about food allergies and intolerances and what they can do to avoid symptoms. The tool is available for free both online and as a mobile app. Allergy Check was developed using the latest research on food allergies and food intolerances.</p>	<p>Clinician researchers developed Allergy Check after seeing an increase in patients who were confused about the difference between symptoms of a food intolerance and symptoms of a potentially life-threatening allergic reaction. Allergy Check provides a credible source of information to help users determine if they need to seek further medical care. In addition to helping ensure those with potentially serious reactions get the care they need, Allergy Check helps prevent people from seeking care from allergists when it’s not necessary, reducing wait times and freeing up resources within the health care system. Allergy Check can also be used by primary care physicians to support decisions about whether or not to refer a patient to a specialist.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>Patient: Other type (please specify below): Knowledge dissemination</b></p> <p>No</p>
<p>BC Children’s Hospital researchers were among the authors of new Canadian Paediatric Society (CPS) guidelines that recommend infants at high-risk for food allergies are exposed to allergenic foods when they are ready for solid food around six months of age. Infants are considered high-risk if they have eczema or other food allergies, or if they have a parent or sibling with eczema, asthma, food allergies or allergic rhinitis. These updated recommendations are the culmination of many years of research undertaken at BC Children’s and centres around the world showing that exposure to allergenic food, rather than avoidance, helps prevent food allergies.</p>	<p>Food allergies affect five to eight per cent of the population. These allergies can cause major disruptions to every day life, make it difficult for children to participate in school and social activities, and be life-threatening in severe cases. For many years, doctors and scientists believed that parents should avoid giving infants allergenic foods to reduce the risk of food allergies, but a robust body of research has shown that in fact the opposite is true and early exposure is key to allergy reduction. These guidelines will help bring clinical practice in line with the latest research and help physicians, pediatricians and other health care professionals work with families to support the early introduction of allergenic foods.</p>	<p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>



**TABLE 2 BCCHR Outcomes (continued)**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>BC Children’s Hospital researchers developed and launched Open HEARTSMAP, a publicly accessible version of the HEARTSMAP psychosocial assessment tool. HEARTSMAP is designed to help clinicians in emergency departments assess children and youth with mental health concerns and connect them to appropriate resources. With Open HEARTSMAP, this innovative tool is now available to emergency department physicians outside of BC and health care workers in community settings. To access Open HEARTSMAP, users must register and provide information about their credentials and where they work, and then complete an online training module.</p>	<p>HEARTSMAP was designed and validated in the BC Children’s Hospital Emergency Department to improve and standardize care for children and youth who seek care for mental health concerns, ensuring they receive fast and accurate assessments and get treatment they need. Open HEARTSMAP makes HEARTSMAP available to a broader group of clinicians and helps frontline health care workers, allowing them to quickly and accurately evaluate patients and refer them to further care if necessary.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>Patient: Improvements in timely access to care</b></p> <p><b>System: Process of care-standardization</b></p> <p><b>System: Process of care-protocol Implementation</b></p> <p>No</p>
<p>A new pediatric-specific guideline for blood cultures was develop by researchers at BC Children’s Hospital. The researchers evaluated how blood was being collected and tested for serious infections at BC Children’s, identified areas for improvement and used their findings to create the new guideline. They developed an education campaign, training sessions and materials to facilitate the implementation and uptake of the new guideline. It is now in use at BC Children’s. The guideline was also presented at the 2018 Pediatric Academic Society Annual meeting, which may lead to it being introduced at other hospitals.</p>	<p>Blood cultures are used to diagnose potentially life-threatening infections, so patients can receive timely, targeted care. Researchers evaluated the impact of the new blood culture guideline at BC Children’s Hospital a year after it’s implementation. They found that the yield of blood culture testing increase 22% across the hospital and by 44% for oncology patients. This shows the new guideline is successfully helping clinicians diagnose dangerous infections and provide treatment.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Process of care-protocol implementation</b></p> <p>No</p>
<p>Virtual reality headsets are used to facilitate care across BC Children’s Hospital and health care workers received training on how to integrate these headsets into patient care. In total about 20 headsets are now available throughout the hospital, and every hospital department now has access to one. The headsets were introduced based on research conducted at BC Children’s Hospital and elsewhere showing they provide a distraction to children being treated in the hospital, lessening pain and anxiety.</p>	<p>A randomized control trial conducted on patients treated in the BC Children’s Hospital Emergency Department by the Innovative VR Pain Lab in the Research Institute showed children who used virtual reality headsets had less anxiety during medical procedures than children who didn’t. This adds to a growing body of research showing virtual reality can help manage pain and reduce anxiety children, without the potential risks and side effects of medications.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>System: Process of care-protocol implementation</b></p> <p>No</p>
<p>SmartMom, Canada’s first parental education program delivered via text message, launched in the Interior Health Authority. SmartMom was developed by researchers at BC Children’s Hospital and Women’s Health Research Institute through the Optimal Birth BC program in partnership with the Northern Health Authority, First Nations Health Authority, BC Ministry of Health and Child Health BC. The service delivers targeted text messages based on gestational age and individual interest in reducing smoking, drugs, or alcohol. The texts are developed in line with professional practice standards and include links to evidence-based web sources and local community resources.</p>	<p>SmartMom’s innovative text-based format delivers valuable prenatal education to mothers who may be less likely to attend traditional prenatal classes including young mothers and those who live rural and remote locations. With the expansion to Interior Health, SmartMom will now be available in a large geographic area that includes many women who may have difficulty attending prenatal classes because they live in rural communities or face other barriers to health care access. By delivering evidence-based health information and connecting women to community resources, SmartMom supports women across BC in having healthy pregnancies so babies can get the best possible start in life.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p> <b>Yes, PHSA Collaborator: WHRI, Child Health BC</b></p>

**TABLE 2 BCCHR Outcomes (continued)**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>Research shows four doses of the preventative drug palivizumab protects children with congenital heart disease from respiratory syncytial virus as well as five doses. This supports the continued use of a four-dose schedule of palivizumab in BC and may contribute to other jurisdictions moving to a reduced dosing schedule.</p> <p>Respiratory syncytial virus is a common virus that infects the lungs and respiratory track. The virus typically only causes minor symptoms in adults and healthy children, but in vulnerable infants, including those born prematurely and those with serious health conditions like congenital heart disease, RSV can lead to bronchiolitis, an inflammation of the lungs and respiratory tract that often requires hospitalization and can be life-threatening.</p> <p>The drug palivizumab can reduce a baby's chance of contracting RSV and in BC, high-risk babies receive the drug through the British Columbia RSV Immunoprophylaxis Program. Based on success treating premature babies with a reduced schedule of the drug, BC Children's Hospital and BC Women's Hospital + Health Centre clinicians piloted a four-dose schedule in babies with congenital heart disease. Now that research has shown that four doses of the drug are effective in babies with congenital heart disease, children across BC will continue to receive the reduced schedule.</p>	<p>The reduced schedule lessens the burden on families, who are already facing the challenges of caring for a medically complex child, and must travel to a hospital or health centre to receive palivizumab injections. Also a five-dose schedule of palivizumab costs approximately \$10,000 per child, per year. Moving to a four-dose schedule for children with congenital heart disease results in significant savings to the health care system.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Efficiency, cost/benefits or sustainability</b></p> <p> <b>Yes, PHSA Collaborator: WHRI</b></p>
<p>In 2018 researchers and clinicians with the Limb Lengthening and Reconstruction Program at BC Children's Hospital introduced new peer-to-peer support initiatives through Upopolis. Upopolis connects Canada's kids and teens with hospital experience or chronic medical conditions with one another, friends and family.</p> <p>These initiatives resulted from 2015-2017 research that included qualitative interviews and a survey of patients and their families to understand the impact of limb problems on their quality of life and to find out specific areas where they need more support.</p>	<p>The Upopolis space is monitored by certified Child Life specialists. This safe and secure online social support network connects patients from the Limb Lengthening and Reconstruction Program at BC Children's Hospital with other children across Canada with hospital experiences. Currently there are 17 patients recruited which provides a great opportunity for these patients to share experiences related to their diagnoses and treatment. There is currently no support group specific to limb problems.</p>	<p><b>Patient: access to new treatment/technology</b></p> <p><b>No</b></p>
<p>In 2018 the Limb Lengthening and Reconstruction Program at BC Children's Hospital introduced new 'ORTHO Limb Lengthening Post-Op Admission' pre-printed orders. These guidelines resulted from several 2015-2019 research projects undertaken by the program.</p> <p>These orders are based on guidelines for pain management, pin site care, neurovascular assessments and assessment of mobilisation milestones. They are a great resource for the clinical team to ensure that the clinical care guidelines are met consistently in this patient population. These orders were reviewed and approved by the Pharmacy Therapeutics and Nutrition team. Multimodal anaesthesia guidelines were implemented for all patients undergoing limb lengthening surgery.</p>	<p>A retrospective review and a prospective study have shown improvements in pain management and overall recovery post-operatively following the multimodal pain management guidelines. The pre-printed orders are very well received by the clinical team leading to an improvement in patient care post-operatively on the in-patient surgical ward.</p>	<p><b>System: Process of care-standardization</b></p> <p><b>No</b></p>

# RESEARCH METRICS

## BC MENTAL HEALTH & SUBSTANCE USE SERVICES



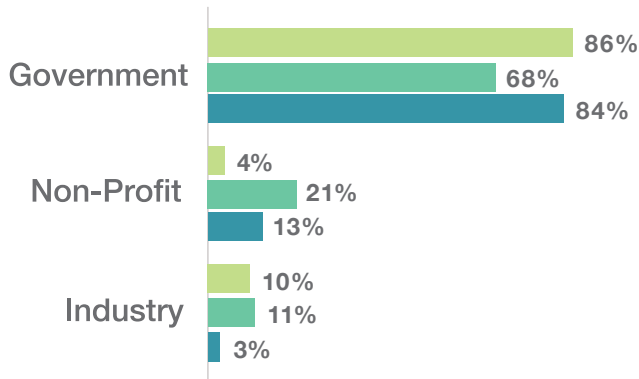
BC MENTAL HEALTH  
& SUBSTANCE USE SERVICES  
*An agency of the Provincial Health Services Authority*

PRODUCING AND ADVANCING KNOWLEDGE

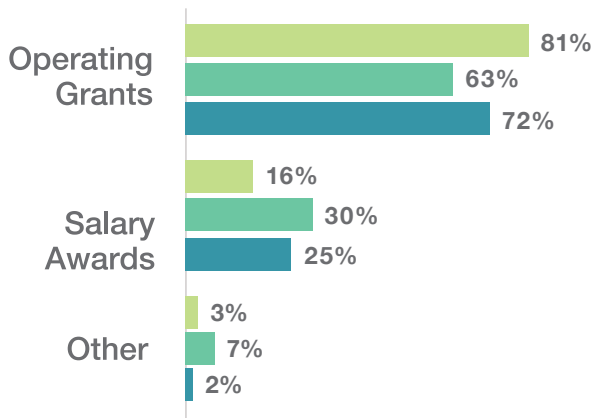
# \$1.49 Million

in TOTAL GRANTS AWARDED in FY 18-19  
\$1.99 Million in FY 17-18

### \$ BY SECTOR



### \$ BY AWARD TYPE



■ FY 18-19 ■ FY 17-18 ■ FY 16-17



**61** TOTAL  
# OF PUBLICATIONS  
in FY 18-19  
82 in FY 17-18

**60**  
JOURNAL ARTICLES  
in FY 18-19  
73 in FY 17-18

**98.4%**  
PEER REVIEWED  
in FY 18-19  
93% in FY 17-18



**0%**  
% of CIHR competitions  
above National AVG  
SUCCESS RATE  
in FY 18-19  
34% in FY 17-18



··· BUILDING RESEARCH CAPACITY ···

18 ↔

# OF RESEARCHERS\*  
in FY 18-19  
19 in FY 17-18

 191 ↑


# OF TRAINEES  
in FY 18-19  
125 in FY 17-18

\$ 182K ↑


RESEARCH SUPPORT  
FUND GRANTS  
in FY 18-19  
\$179K in FY 17-18

excluding affiliate investigators\*


··· HEALTH & POLICY BENEFITS ···

 7 ↑

# OF CLINICAL TRIALS  
in FY 18-9  
5 in FY 17-18

465 ↑ 

TOTAL CUMULATIVE  
SUBJECT ENROLLMENT  
at the end of FY 18-19  
423 at the end of FY 17-18

 0% ↔

% INDUSTRY FUNDED  
TRIALS in FY 18-19  
0% in FY 17-18

··· ECONOMIC BENEFITS & INNOVATION ···

 7

ACTIVE LICENSES  
(0 new) in FY 18-19

*Note: 1st year reporting separately from BCCHR*

# TOP 3 ACHIEVEMENTS BCMHSUS

Details available in Supplementary Report



1

## Dr. Austin Recipient of the 2017-18 UBC Killam Teaching Prize

BC Mental Health and Substance Use Services Research Institute's executive director Dr. Jehannine Austin is the recipient of the 2017-2018 UBC Killam Teaching Prize, which was announced on May 10, 2018. This honour recognizes her outstanding achievement as a teacher. In Canada, the Killam name is synonymous with financial support for advanced studies. The Killam Trusts, established by Dorothy Johnston Killam and Izaak Walton Killam, benefit The University of British Columbia, The Canada Council for the Arts, Dalhousie University, Montreal Neurological Institute of McGill University, University of Alberta and The University of Calgary.

2

## Dr. Honer Recipient of the Canadian Psychiatric Association J.M. Cleghorn Award of Excellence and Leadership in Clinical Research


Dr. William Honer received the Canadian Psychiatric Association (CPA) 2018 J.M. Cleghorn Award for Excellence and Leadership in Clinical Research. The J.M. Cleghorn Award is dedicated to the memory of Dr. John Cleghorn and is presented annually to a CPA member for excellence in clinical psychiatric research or leadership in advancing clinical psychiatric research in Canada. The Research Committee believed that Dr. Honer's outstanding and impactful contributions to the basic and clinical research of schizophrenia reflect the high standards set by Dr. John M. Cleghorn. Dr. Honer's research has established the effectiveness of medication treatment of first-episode psychosis in mitigating symptoms and relapse.

3

## BCMHSUS PhD Receives CIHR Doctoral Research Award

Ms. Amanda Butler who works with BCMHSUS Distinguished Scientist, Dr. Tonia Nicholls, received a CIHR Doctoral Research Award, the Frederick Banting and Charles Best Canada Graduate Scholarship (CGS-D) - 3 years \$30,000/ annum plus 5,000 research funding. She was rated 4.55 overall, putting her application in the outstanding range. Particularly noteworthy, she was ranked 20th out of 592 applications (top 3.38%).

**TABLE 3 BCMHSUS Outcomes**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>A BCMHSUS researcher made updates to the group treatment for somatization that has been adopted into clinical practice at BC Children’s Hospital.</p>	<p>This work focused on increasing access to psychological care for youth affected by somatic symptoms.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>No</b></p>
<p>A BCMHSUS researcher, through a CIHR grant, was able to distribute free-of-charge MCT/MCT+ treatment program for increasing insight into delusions by experiencing the thinking patterns underlying delusions (<a href="http://clinical-neuropsychology.de/metacognitive_training-psychosis.html">http://clinical-neuropsychology.de/metacognitive_training-psychosis.html</a>; <a href="http://clinical-neuropsychology.de/metacognitive-therapy-plus-individualized-mct-for-psychosis.html">http://clinical-neuropsychology.de/metacognitive-therapy-plus-individualized-mct-for-psychosis.html</a>)</p>	<p>This metacognitive training (MCT) treatment program helped increase insight for individuals living with psychosis, particularly into their delusional beliefs.</p>	<p><b>Patient: Access to new treatment/technology</b></p> <p><b>No</b></p>



# RESEARCH METRICS

## BC CENTRE FOR DISEASE CONTROL



BC Centre for Disease Control  
An agency of the Provincial Health Services Authority

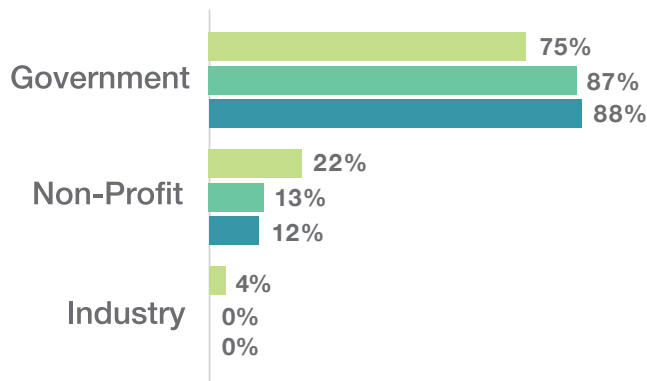
PRODUCING AND ADVANCING KNOWLEDGE

# \$2.8 Million ↓

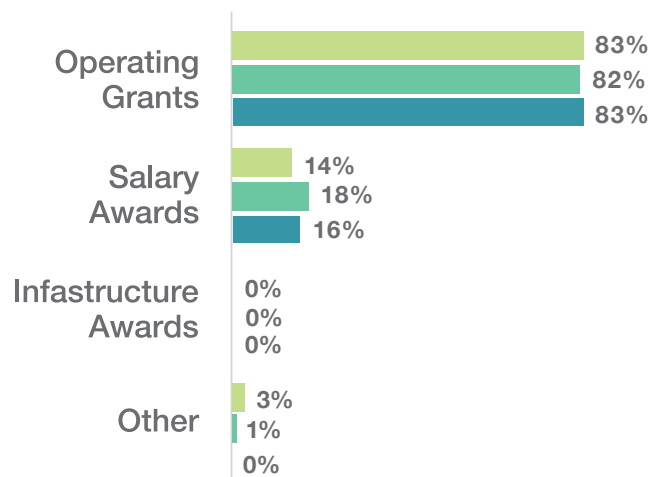
in TOTAL GRANTS AWARDED in FY 18-19

\$3.6 Million in FY 17-18

### \$ BY SECTOR



### \$ BY AWARD TYPE



■ FY 18-19 ■ FY 17-18 ■ FY 16-17



# 305

TOTAL  
# OF PUBLICATIONS  
in FY 18-19

215 in FY 17-18

# 166

JOURNAL ARTICLES  
in FY 18-19

112 in FY 17-18

# 81%

PEER REVIEWED  
in FY 18-19

80% in FY 17-18



# 50%

% of CIHR competitions  
above National AVG  
SUCCESS RATE  
in FY 18-19

100% in FY 17-18

... BUILDING RESEARCH CAPACITY ...

**35** ↔

# OF RESEARCHERS\*  
 in FY 18-19  
 34 in FY 17-18



**113** ↓

# OF TRAINEES  
 in FY 18-19  
 139 in FY 17-18

**\$89K** ↑

RESEARCH SUPPORT  
 FUND GRANTS  
 in FY 18-19  
 \$82K in FY 17-18

\*Excluding affiliate investigators

... HEALTH & POLICY BENEFITS ...



**9** ↑

# OF CLINICAL TRIALS  
 in FY 18-19  
 5 in FY 17-18

**2,707** ↑

TOTAL SUBJECT  
 ENROLLMENT  
 in FY 18-19  
 1,639 in FY 17-18



**0%** ↓

% INDUSTRY FUNDED  
 TRIALS in FY 18-19  
 20% in FY 17-18

... ECONOMIC BENEFITS & INNOVATION ...

**No activity in FY 18-19**

# TOP 3 ACHIEVEMENTS BCCDC



Details available in Supplementary Report

1

## Measles Outbreak Communications Strategy

Measles was on the increase in BC in the first quarter of 2019 due to multiple importations, some of which led to transmissions including a school-based outbreak in Vancouver. BCCDC laboratory performed timely measles diagnostic testing including on weekends. Weekly epidemiological summaries were posted online providing up to date information to the public health community, healthcare providers, the Ministry of Health, media and the public. Information about settings where the public could have been exposed to measles were issued and included up to date information on appropriate actions to take. Many media interviews were provided. BCCDC secured and distributed 67,000 doses of measles-containing vaccines during February and March to facilitate immunization of under-vaccinated children and adults.

2

## BCCDC Leads Provincial Effort to Reduce Public Health Impacts of Wildfire Smoke


BCCDC is leading provincial efforts to understand and reduce the public health impacts of wildfire smoke. The extreme 2017 and 2018 seasons exposed most of the BC population to heavy smoke, leading to increased respiratory symptoms, asthma exacerbations, cardiovascular outcomes, and mortality. BCCDC has responded with a three-pronged approach. For knowledge translation, a series of evidence-based fact sheets on Wildfire Smoke and Your Health has been developed in partnership with other agencies ([bccdc.ca/wildfiresmoke](http://bccdc.ca/wildfiresmoke)). For surveillance, work is underway to make the award-winning BC Asthma Prediction System (BCAPS) publicly available online. For research, the groundwork has been laid for priority studies on (1) infants exposed in utero and (2) the long-term effects of severe and repeated exposures in children and adults.

3

## BCCDC Reports Health Trends Utilizing Interactive Dashboards

BCCDC reports on health trends with interactive dashboards that present data visually. The antibiotic utilization and antimicrobial resistance dashboards present trends in prescribing and resistance in B.C., and have been valuable knowledge translation tools for practitioners, researchers and the general public. BCCDC also developed and recently updated the Community Health Data website, a public resource with local data related to demographics, health status and factors that affect health. It is used by local governments, school boards and non-governmental organizations in planning community health initiatives.

**TABLE 4 BCCDC Outcomes**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
The adoption of Rifampin 4-month regimen as first line therapy in latent TB prevention in BC guidelines and across Canada. This was the direct result of research performed at the BCCDC as part of a multicentre randomized control trial in latent TB prevention.	Improved latent TB treatment outcomes with safer and shorter treatment regimen.	<b>Patient: Delay of disease progression/survival</b>  No
In consultation with federal and provincial partners, BCCDC researchers helped develop the new Immigration, Refugees and Citizenship Canada latent tuberculosis screening policy. New high-risk migrants to Canada will be screened according to this new policy.	Improved TB screening in migrants, moving towards TB prevention in immigration screening to reduce TB rates in this high-risk population.	<b>Patient: Delay of disease progression/survival</b>  No
BCCDC research informed the provincial program for evidence-based public health management of lead poisoning and exposures.	Case-finding and early intervention for lead exposure and poisoning, a cause of neurological harm (particularly to young children).	<b>System: Knowledge dissemination-new policy</b>  No
BCCDC research informed the development of the Blueprint to Inform Hepatitis C Elimination Efforts in Canada. BCCDC was an important Blueprint contributor as it has been at the forefront of using linked laboratory and administrative data to understand the role of vulnerability on health outcomes.	This blueprint helps provinces and territories develop their own HCV action plans to ensure we meet the World Health Organisation HCV elimination targets.	<b>Patient: Improvements in timely access to care</b>   <b>Yes, Decision Support at PHSA</b>
The BCCDC's BC-Hepatitis Testers Cohort, a database containing anonymized medical information on testing, healthcare utilization and outcomes dating back to 1990, has become internationally recognized for its comprehensive and population-level information. The BCCDC's BC-Hepatitis Testers Cohort informed BC's Hepatitis Testing Guideline which is managed by the Guidelines and Protocols Advisory Committee.	Knowledge gained from BCCDC's BC-Hepatitis Testers Cohort helps us understand how to tailor health services to the needs of individuals and the various affected populations. BC's Hepatitis Testing Guideline improves reach and access to services.	<b>Patient: Delay of disease progression/survival</b>   <b>Yes, PHSA Laboratories</b>

# RESEARCH METRICS

## WOMEN'S HEALTH RESEARCH INSTITUTE

WOMEN'S HEALTH  
RESEARCH INSTITUTE  
AT BC WOMEN'S



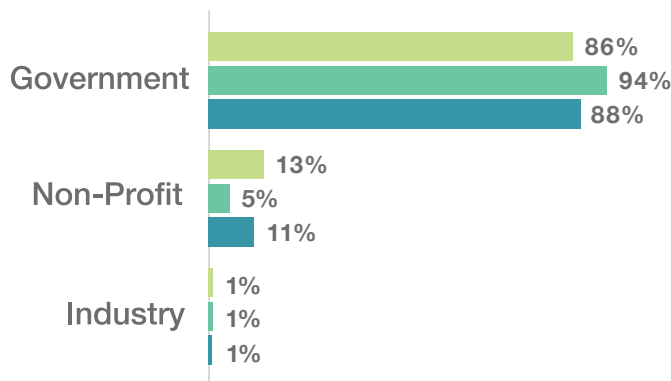
PRODUCING AND ADVANCING KNOWLEDGE

# \$2.9 Million ↔

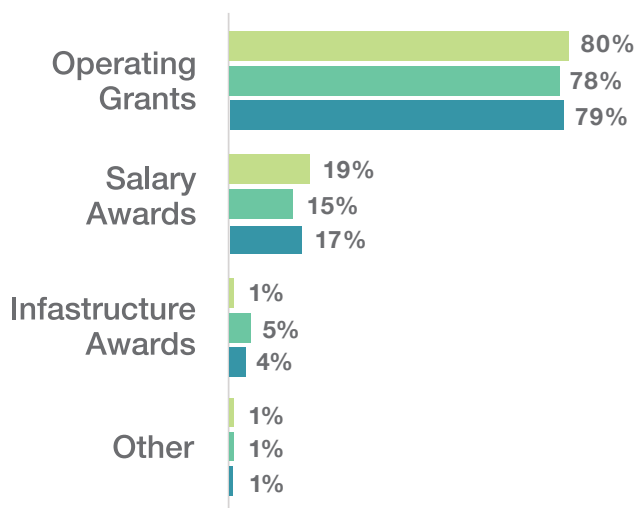
in TOTAL GRANTS AWARDED in FY 18-19

\$2.9 Million in FY 17-18

### \$ BY SECTOR



### \$ BY AWARD TYPE



■ FY 18-19 ■ FY 17-18 ■ FY 16-17



# 670

TOTAL  
# OF PUBLICATIONS  
in FY 18-19

585 in FY 17-18

# 466

JOURNAL ARTICLES  
in FY 18-19

353 in FY 17-18

# 96.4%

PEER REVIEWED  
in FY 18-19

94% in FY 17-18



# 67%

% of CIHR competitions  
above National AVG  
SUCCESS RATE  
in FY 18-19

50% in FY 17-18

BUILDING RESEARCH CAPACITY

265↑

WHRI MEMBERSHIP  
in FY 18–19  
220 in FY 17–18



690↑

# OF TRAINEES  
in FY 18–19  
448 in FY 17–18

\$165K↑

RESEARCH SUPPORT  
FUND GRANTS  
in FY 18–19  
\$160K in FY 17–18

HEALTH & POLICY BENEFITS



38↑

# OF CLINICAL TRIALS  
in FY 18–19  
31 in FY 17–18

3,160↑

TOTAL CUMULATIVE  
SUBJECT ENROLLMENT  
at the end of FY 18–19  
3,092 at the end of FY 17–18



13%↓

% INDUSTRY FUNDED  
TRIALS in FY 18–19  
23% in FY 17–18

ECONOMIC BENEFITS & INNOVATION

No activity in FY 18–19

# TOP 3 ACHIEVEMENTS WHRI



Details available in Supplementary Report

1

## WHRI champions new digital and virtual health portfolio specific to women's and newborn's health research

Recognizing the rapid advances within the technology and digital health sector, the WHRI has created the new role of "Research Manager, Digital Health" in order to build in-house expertise in this area. The deliverables for this role are to build capacity for a women's and newborn's health focused digital strategy within the WHRI and BC Women's Hospital + Health Centre, to conduct an environmental scan to better understand the current landscape of digital research across women's and newborn's health research in BC, and to identify priorities to enhance digital health research initiatives for the institute.

2

## WHRI Investigator to lead \$20M national research strategy aimed at the elimination of cervical cancer

WHRI Investigator, Dr. Gina Ogilvie, to lead \$20M national research strategy aimed at the elimination of cervical cancer. Both the Federal Government and BC Women's Health Foundation will invest \$10 million over 5 years to support Dr. Ogilvie's program of research which will explore new strategies to better prevent and treat cervical cancer. About 1,550 women across Canada are diagnosed each year with cervical cancer and nearly 400 die from the disease. This new funding will be used by Dr. Ogilvie's team to study things like HPV vaccination and other methods to prevent cervical cancer and increase cervical cancer screening rates. This work will contribute to the global call for action toward the elimination of cervical cancer.

3

## WHRI launches knowledge translation consulting for research teams to move evidence into practice

Knowledge translation activities aim to close the gap between research and the implementation by improving the integration of research evidence into practice. The WHRI provides leadership in this area by establishing dedicated knowledge translation supports for researchers, including partnering with the Michael Smith Foundation for Health Research to host various workshops on knowledge translation and Implementation Science for researchers and by hiring a new knowledge translation specialist to give women's and newborn health researchers the support they need to increase the impact of their research. The WHRI's Knowledge Translation Manager acts as an expert resource by providing leadership and consultation to WHRI researchers and other stakeholders on translation research projects.



**TABLE 5 WHRI Outcomes**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
WHRI researcher was the lead author of a national clinical practice guideline: The Prevention of Early-Onset Neonatal Group B Streptococcal Disease	WHRI researcher was the lead author of a national clinical practice guideline: Improved maternal and perinatal outcomes due to optimized management of pregnant women in labour for the prevention of early-onset neonatal group B streptococcal disease. Reduced risk of pregnancy and labour complications related to more targeted use of antibiotics.	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
Two WHRI/BCCHR researchers were co-authors of a national clinical practice guideline: Antenatal Corticosteroid Therapy for Improving Neonatal Outcomes	Improved maternal and fetal health due to evidence-based recommendations for appropriate timing of antenatal corticosteroid therapy for women at risk of preterm birth or undergoing pre-labour Caesarean section at term that optimize neonatal and long-term outcomes.	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p> Yes WHRI and BCCHR</p>
Four WHRI researchers were co-authors of a provincial clinical practice guideline: Dolutegravir use in pregnancy	Improved fetal outcomes for pregnant HIV positive women who are taking dolutegravir (new class of antiretroviral medication) due to closer monitoring by their HIV and pregnancy care providers and the possible change to a non-dolutegravir regimen. These recommendations were released in response to global concern after a Botswana surveillance project showed higher incidence of neural tube defects in infants exposed to dolutegravir antenatally.	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
WHRI researcher was one of the co-authors of a national clinical practice guideline: Universal Cervical Length Screening	Improved maternal and fetal outcomes through the adoption of universal cervical length screening in Canada to prevent preterm birth. Cost savings due to early intervention that will prevent cases of preterm birth and its associated morbidity.	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability</b></p> <p> Yes WHRI and BCCHR</p>
WHRI researcher was one of the co-authors of an international clinical practice guideline: Guidelines for intraoperative care in caesarean delivery: Enhanced Recovery After Surgery Society Recommendations	Improved maternal outcomes due to implementation of a guideline for intraoperative care in caesarean delivery that provides best practice, evidenced-based, recommendations for intraoperative care with primarily a maternal focus.	<p><b>Patient:</b> Access to new treatment Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p> <p>No</p>

**TABLE 5 WHRI Outcomes (continued)**

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>WHRI researcher was one of the co-authors of three national clinical practice guidelines relating to the Fetal Health Surveillance: 1) Antepartum Consensus Guideline; 2) Intrapartum Consensus Guideline and 3) Maintaining Standards in Antenatal and Intrapartum Fetal Surveillance: Quality Improvement and Risk Management</p>	<p>Improved maternal and fetal outcomes due to new recommendations pertaining to the application and documentation of fetal surveillance in the antepartum period, which will result in decreased incidence of birth asphyxia while maintaining the lowest possible rate of obstetrical intervention.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
<p>WHRI/BCCHR researcher was one of the co-authors of a national clinical practice guideline: Cervical Insufficiency and Cervical Cerclage</p>	<p>Improved maternal and fetal outcomes through the adoption of a new framework that clinicians can use to determine which women are at greatest risk of having cervical insufficiency and in which set of circumstances a cerclage is of potential value.</p>	<p><b>Patient: Access to new treatment or technology</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p> Yes WHRI and BCCHR</p>
<p>WHRI researcher created an evidence-informed algorithm for treating pelvic floor mesh complications (published internationally in the British Journal of Obstetrics and Gynecology). Derived through evidence review and the recommendations of a panel of experts the algorithm has been integrated into clinical practice in British Columbia and may soon be adopted more widely.</p>	<p>Improved outcomes for women who develop mesh complications after having pelvic floor surgery by providing an evidence-based framework for planning diagnosis and management of mesh-related complications.</p>	<p><b>Patient: Access to new treatment or technology</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
<p>WHRI researcher was one of the co-authors of a national clinical practice guideline: Consensus Guidelines for the Management of Chronic Pelvic Pain</p>	<p>Improved outcomes for women experiencing chronic pelvic pain due to improved understanding of the condition and the recommended development of evidence-based guidelines of value to primary care health professionals, general obstetricians and gynaecologists, and those who specialize in chronic pain. Cost savings due to reduced health care expenditure for interventions, including multiple consultations and medical and surgical therapies for women with this condition through improved management.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability</b></p> <p>No</p>
<p>WHRI researcher was one of the co-authors of an international clinical practice consensus statement: Supporting Safer Conception and Pregnancy For Men And Women Living with and Affected by HIV. The researcher's findings on safer conception for HIV-affected couples with fertility desire been incorporated into the consensus statement.</p>	<p>Improved outcomes for couples living with and affected by HIV due to recommendations to promote the integration of safer conception counselling and care within HIV programming. Safer conception interventions will reduce HIV incidence while supporting the reproductive goals of people living with or affected by HIV.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>

**TABLE 5 WHRI Outcomes (continued)**


Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes  )
<p>WHRI researcher was one of the co-authors of a joint Society for Obstetricians and Gynaecologists of Canada (SOGC) and Canadian Association of Radiologists (CAR) Policy Statement: Non-medical Use of Fetal Ultrasound</p>	<p>Improved maternal and fetal outcomes due to recommendation that ultrasound during pregnancy be used prudently and only by qualified health professionals and that energy exposure in such scans be limited to the minimum that is medically necessary. Cost savings due to restricted use of ultrasound assessment for approved medical indications only.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability</b></p> <p> Yes WHRI and BCCHR</p>
<p>WHRI researcher's meta-analysis was included in the World Health Organization's guidelines as evidence for exercise as a strategy for reducing cognitive decline and dementia risk: WHO's Global action plan for the public health response to dementia</p>	<p>Improved public health by providing the knowledge base for health-care providers to advise patients on what they can do to help prevent cognitive decline and dementia. These guidelines will also be useful for governments, policy-makers and planning authorities to guide them in developing policy and designing programs that encourage healthy lifestyles.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy</b></p> <p>No</p>
<p>WHRI researcher was the co-author of a national clinical practice guideline: Antibiotic Prophylaxis in Gynaecologic Procedures</p>	<p>Improved outcomes for women undergoing gynaecologic procedures due to the correct use of antibiotic prophylaxis for the prevention of surgical infections. Reduced cost and related harm of administering antibiotics when not required and a reduction of infection and related morbidities when antibiotics have demonstrated a proven benefit.</p>	<p><b>Patient: Protocols and guidelines</b></p> <p><b>System: Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability</b></p> <p>No</p>

# RESEARCH METRICS

## REGISTRIES & DATASETS


*“Registries are the result of significant infrastructure investment in the collection of longitudinal data that are regional, provincial or national in scope regarding provision of services to specific population(s), maintained for the purposes of undertaking analysis, surveillance and/or research.”*

REGISTRY/DATASET DESCRIBED




**15**  
REGISTRIES & DATASETS

representing



**9**  
PHSA PROGRAMS


REGISTRY/DATASET USES



**93%** (14)  
USED FOR RESEARCH


**TOP 3** RESEARCH SUPPORT ACTIVITIES

1. Managing & Linking Data
2. Design of Research Studies
3. Identifying Knowledge Gaps & Improvement Needs




**12 of 15**  
REGISTRY/DATASETS submit to Provincial, Federal or International datasets for purposed of research

NATURE OF RESEARCH ACTIVITIES



**1,969/1,690**  
DATA ACCESS requests/approvals over a 10 year period

**240/227**  
DATA ACCESS requests/approvals in FY 18–19



**9/14** registries ranked  
CLINICAL & HEALTH SERVICES RESEARCH as predominant types of research in FY 18–19

**TABLE 6** Example Research Questions by Registry/Dataset

<b>Screening Mammography Database</b>	Build a predictive model for risk of breast cancer development and prognostication that incorporates well-known risk factors (age, breast density, BMI, family history, etc.) and mammographic features from previous mammograms.
	Economic analysis of the use of Digital Breast Tomosynthesis in Breast Cancer Screening in British Columbia
	Is screening for breast cancer with tomosynthesis mammography better than with digital mammography.
<b>Cervical Cancer Screening Database</b>	Ecological analysis of CIN rates in the province
<b>Tumour Tissue Repository</b>	Atypical glycan based liquid biopsy for risk stratification in early breast cancer
	Development of a next generation sequencing assay to detect all classes of genetic variant in a single diagnostic test
	Functional and Molecular Characterization of a Novel Variant of Ovarian Cancer
	Multidisciplinary Ovarian Cancer Outcomes Group (MOCOG) study of tumor infiltrating lymphocytes in ovarian cancer tissues
<b>PSBC</b>	1: To determine survival and cancer recurrence rates in women diagnosed with cancer during pregnancy or within 365 days after delivery. 2: To assess whether induced abortion is associated with greater survival following a diagnosis of cancer within pregnancy, up to 20 weeks' gestation. 3: To evaluate the health status of children born to women with cancer who were, or were not, treated with chemotherapy during pregnancy, each compared to a) children who were not exposed to cancer in utero and b) its sibling born when the mother did not have cancer (unexposed). 4: Among pregnant women with cancer (with or without chemotherapy), to estimate the proportion of adverse child health outcomes that can be attributed to the cancer, treatment with chemotherapy, and provider-initiated preterm birth. 5: To determine whether the time interval between a pre-pregnancy diagnosis of cancer and estimated date of conception is associated with risk of adverse obstetrical and perinatal outcomes.
	"Our goal is to establish estimates of the incidence of adverse perinatal and child outcomes following select abnormal ultrasound findings to assist in counselling of families. The conditions of interest are: – ventriculomegaly – congenital anomalies of the kidney and genitourinary tract – single umbilical artery – agenesis of the corpus callosum – congenital heart defects"
	"Primary Objective: To develop a risk prediction model that estimates the 5-year risk of incident CVD among recently post-partum women, accounting for obstetrical history and complications of pregnancy. Secondary Objectives: a. To examine the potential mediating roles of predictors in order to inform the inclusion of interaction terms in our prediction models. b. To develop a simplified risk prediction model that estimates the 5-year risk of incident CVD among recently post-partum women. c. To externally validate the risk prediction models developed in objectives 1 and 2a."

**TABLE 6 Example Research Questions by Registry/Dataset (continued)**

<p><b>PSBC (continued)</b></p>	<p>1) Instrument development: compile items based on preliminary phase that includes comprehensive literature reviews and feedback from 6 experts via content validity index, and conduct face validity assessment – were targeted in PHASE I of the project 2) Item reduction: perform factor analysis of the PSAS to determine final items and dimensions and associative/predictive analysis of PSAS prior behavior/attitudinal/background info and future birth outcomes – were targeted in Phase II of the project (current application) 3) Psychometric evaluation: conduct psychometric testing of the PSAS to establish its reliability, validity, sensitivity, specificity, and predictive values and to determine its clinical cut offs – will be targeted in Phase III of the project. Present DAR application targets SPECIFIC OBJECTIVE #2 that is to perform factor analysis of the PSAS to determine final items and dimensions and to examine associations between maternal mental health and pregnancy outcomes"</p> <p>1. To demonstrate the feasibility of linking the Panorama Public Health Information System and the Perinatal Data Registry and abstracting all necessary data for research into HPV vaccination and preterm birth. 2: To collect pilot data comparing the odds of preterm birth in women who have been vaccinated against HPV versus those who have not."</p> <p>1. To identify whether exposure to natural environments (NE) is positively associated with early childhood development and health. 2. To identify whether exposure to traffic related air pollution (TRAP) and noise are negatively associated with children's early childhood development. 3. To identify whether areas of high NE are associated with reduced negative effects on early development of TRAP or noise exposures. 4. To identify if exposure to NE moderates the effect of poor SES on early childhood development."</p> <p>1. Does the age at receipt of immunization in BC's routine immunization schedule differ among infants whose mothers had midwives compared to those who had other types of maternity HCPs? 2. Do the proportions of infants who had documented refusals to routine immunizations (one or more routine immunization; all routine immunizations) differ among infants whose mothers had midwives compared to those who had other types of maternity HCPs differ? 3. Do the proportions of infants who are unimmunized by the second birthday differ between infants whose mothers had midwives compared to those who had other types of maternity HCPs? 4. Do the proportions of infants who received all routine immunizations by the second birthday differ among infants whose mothers had midwives compared to those who had other types of maternity HCPs? 5. Does adherence to the BC routine immunization schedule differ among infants whose mothers had midwives compared to those who had other types of maternity HCPs?"</p> <p>To identify the number of children and young people 0-25 years of age living with life-limiting or life-threatening conditions in British Columbia between April 1, 2008 and March 31, 2018. 2. To describe this population in terms of their ages, conditions/diagnoses, and geographical locations."</p> <p>The overall aim of this project is to determine if there is an association between antenatal corticosteroid administration and child neurodevelopment.</p> <p>Questions to be addressed for women diagnosed with IHCP in British Columbia since the introduction of routine maternal serum bile acid level to confirm the diagnosis: 1. Does the highest level of maternal serum bile acid (&gt; 10 micromoles/L for diagnosis) obtained in the pregnancy correlate with selected maternal and neonatal outcomes? 2. Is there an association between the highest level of maternal serum bile acid measured in the pregnancy and the incidence or severity of neonatal respiratory complications or other common complications of neonatal care (such as hypoglycemia or hyperbilirubinemia), accounting for gestational age at birth?</p>
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**TABLE 6 Example Research Questions by Registry/Dataset (continued)**

<p><b>BCEHS administrative databases</b></p>	<p>Reviews conducted to-date on naloxone dosing have excluded data from ultra-potent opioid toxicity. The purpose of this study is to analyze the most current clinical data available in BC on empiric naloxone dosing in opioid toxicity due to ultra-potent opioids. This information is needed to inform clinical guidelines and practice recommendations for community, ambulance and in-hospital naloxone administration.</p>
	<p>The BC Emergency Health Services (BCEHS) provides paramedic services to all citizens and residents of BC and is the sole pan-provincial provider of EMS. Approximately 2-3 years ago, tranexamic acid (TXA) was added to the scope of practice of specific levels of paramedics in BC - Primary Care Paramedics with IV endorsement (PCP IV), Critical Care Paramedics (CCP), and Advanced Care Paramedics (ACP). With a retrospective review of BCEHS patient charts, we aim to examine pre-hospital TXA utilization across the entire province to better characterize how TXA has been used after its implementation into standard of practice.</p>
	<p>We hypothesize that a community-based resuscitation program involving volunteers trained in cardiopulmonary resuscitation (CPR) and the use of an automated external defibrillator (AED) integrated with local paramedic services is a feasible method to reduce the delay to high-quality cardiopulmonary resuscitation and defibrillation compared with standard paramedic services dispatch alone for out-of-hospital cardiac arrest (OHCA) victims in a Canadian setting.</p>
	<p>Ambulance telecommunication-assisted CPR instructions to 9-1-1 callers (previously CPR trained or not) have been shown to improve bystander CPR and survival rates for prehospital sudden cardiac death (SCD). Unfortunately, agonal breathing is initially present in as much as 25% of all SCD, often misleading 9-1-1 callers and telecommunicators into thinking a victim is still alive, and results in delayed or no CPR instructions to callers. The overall aim of this research program is to improve the ability and speed with which ambulance telecommunicators can recognize SCD over the phone, initiate timely CPR instructions, and improve survival for prehospital SCD.</p>
	<p>Attitudes and beliefs contain an affective component that impacts our emotional reaction to different situations. Attitudes which facilitate positive emotional reactions when interacting with drug users (ex. empathy, patience vs. frustration, anger) may contribute to healthier work experiences for paramedics. In order to reinforce healthy attitudes and beliefs we first need to understand what current beliefs are, and how they intersect with paramedic experiences. How do paramedics who work within Vancouver's DTES experience overdose response?</p>
	<p>Violence at work is one of the most challenging issues that staff in Emergency Health Services encounter. It is estimated to affect 95% of workers and presents an enormous risk for workers and organisations alike. The aim of this pilot project is to investigate violence against emergency health care workers: 1. insight into worker's perception of reporting of violent incidents and of perpetrators of violence 2. summary characteristics of patients and organisation elements related to reported violent incidents. The ultimate aim of our research program is to design and implement a novel intervention, with a focus on the perpetrator, to reduce violence against health care workers. In the short term, the focus groups will be the start of a conversation in the organisation among health care workers on violence, reporting, and the perpetrator.</p>
<p><b>BC Trauma Registry</b></p>	<p>The Cost of Burns among Young Children in British Columbia</p> <p>Evaluating clinical utilization of tranexamic acid (TXA) by paramedics for patients with major trauma in British Columbia</p>



**TABLE 6** Example Research Questions by Registry/Dataset

<b>BC Trauma Registry (continued)</b>	Incidence and predictive value of computed tomography scans in pancreatic injury in blunt and penetrating trauma when compared to MRCP/ERCP; CT findings correlation with surgical findings and patient outcomes in whole body polytrauma CT scan.
	Vascular Imaging with Computer Tomography for Emergency Management
<b>BC Cancer Registry</b>	Examining the epidemiology, treatment, and survival in young-onset colorectal cancer (EXPLAIN-yCRC).
	Maternal and child outcomes after pregnancy-associated and postpartum cancer.
	A Prospective Cohort of Substance Users in British Columbia: Tracking Health Outcomes & Health Care Utilization Among Patients Evaluated for Addiction Care (The OPAC Study).
	Assessing variations in radiotherapy utilization and shortfalls across Canada.
	Association Between CT Morphology of Liver Metastases with Genetic Profile in Colorectal Cancer Received Systemic Treatment.
	Post prostatectomy radiation therapy at BC Cancer- patient characteristics, radiation therapy volumes, doses and patient outcomes.
	Outcomes of gynecological cancer patients treated with radiotherapy for brain metastases: The British Columbia experience.
	Breast cancer incidence by country of birth among immigrant women in British Columbia, Canada.
	Blood transfusion history and risk of non-Hodgkin lymphoma: an InterLymph pooled analysis.
	Deep Learning Applications in Oncology for CT Scan Segmentation.
<b>PROMIS - Transplant Registry</b>	Assessing the Vitamin D status of Renal Post Tx patients at SPH.
	Impact of Long Intermittent Dialysis Compared to Conventional Dialysis in Delayed Graft Function: A Pilot Randomized Controlled Trial
	Research study looking at serious infections in liver transplant recipients
	Prevalence of Dyslipidemia - Dietetic Student Research Project
	"Canadian experience in donation after MAiD Canada's MAiD Donation Experience: A Case Series"
	HEARTBit - A Multi-Marker Blood Test for Acute Cardiac Transplant Rejection
<b>BC Cardiac Registry</b>	Effect of waiting time on outcomes in patients undergoing Transcatheter aortic valve implantation (TAVR)
	Long-term Clinical Outcomes following Surgical Mitral Valve Repair or Replacement
	Efficacy, health care utilization rates and safety of a same-day discharge protocol for AF Ablations
	Use of Registry Data to Evaluate Patient-reported Outcome Measures in the Management of Atrial Fibrillation
	Motor vehicle crash risk after pacemaker or cardioverter-defibrillator implantation: A population-based analysis
	Changes in Patient-reported outcomes after Transcatheter Aortic Valve Implantation
	hsTnT versus conventional TnT for ED chest pain patients.
	Identifying Predictors of Cumulative Health Care Costs Associated with Trans-Catheter aortic valve implantation (TAVI) in severe aortic stenosis
	Decision Making for Management of Coronary Artery Disease in Patients with Chronic Kidney Disease: Validation of predictive models through BC Cardiac Registry and BC Renal Agency PROMIS Linkage

**TABLE 6** Example Research Questions by Registry/Dataset

<b>Surgical Patient Registry</b>	SPR is not currently listed as a data set with POP data (we would like to change this). Since the inception of the program the MOH has managed all data requests from the monthly snapshot they receive from the SPR. SPR does not typically receive requests for research and when we do, they are referred on to the MOH.
<b>EPPIC</b>	<p>Examine heritable genetic risk associated with endometriosis and compare genetic risk factors with those linked to cancer and other chronic diseases.</p> <p>What is the incidence of adenomyosis in the pelvic pain population, looking at ultrasound and MRI diagnosed adenomyosis in addition to histologically diagnosed adenomyosis?</p> <p>Is retroverted uterus associated with severity of endometriosis pain?</p> <p>To what extent is degree of posterior compartment disease (complete vs. partial pouch of Douglas obliteration) associated with deep dyspareunia among women with endometriosis based on histopathological confirmation between December 2013 and December 2017?</p> <p>What is the impact of surgical management on pelvic pain and quality of life variables at the BC Women's Centre for Pelvic Pain and Endometriosis?</p> <p>1. To validate whether activating KRAS mutations, affecting codon 12, (or other somatic mutations) are associated with DIE. 2. To determine the relationship between activating KRAS mutations (or other somatic mutations) and severity of deep dyspareunia in women with endometriosis.</p>
<b>PROMIS-Renal</b>	<p>What is the current practice of intravenous iron utilization in the Hemodialysis patients and its relationship to use of ESA and hemoglobin?</p> <p>Describing the current utilization of nutritional supplements in all CKD populations, and the relationship to outcomes</p> <p>What are the outcomes of patients over time with exposure to different anemia protocols over the last 15 years, where changes in Hb targets, and use of supplements has changed?</p> <p>Geographic distribution of rare kidney conditions (Glomerulonephritis): implications for future research and care paradigms</p> <p>Outcomes of patients with non dialysis CKD: progression rates, outcomes for the purposes of planning future needs for transplantation and dialysis</p> <p>Infection trends in kidney transplant patients by different eras of immunosuppression regimens?</p> <p>Costs and outcomes of the Glomerulonephritis Network?</p> <p>TB screening and outcomes in dialysis patients in BC (joint with BCCDC and BC Renal)</p> <p>Current description of population with Polycystic Kidney Disease to appreciate the distribution, location and current clinical condition of patients, including trajectories of decline</p>
<b>Lung Cancer Screening Program</b>	<p>Screening to detect lung cancer</p> <p>Quality of Life</p>

# STUDENT EDUCATION METRICS

## PHSA OVERALL



··· BUILD PRACTICE EDUCATION CAPACITY ···



**272,052**↑

STUDENT HOURS  
in FY 18–19  
255,382 in FY 17–18



**1,723**

TOTAL # OF STUDENTS\*  
in FY 18–19

*\*Excludes undergraduate and postgraduate medical students*



**\$5 Million**↑

cost of STUDENT SUPERVISION  
in FY 18–19  
\$4M in FY 17–18



**493**

Medical Doctor  
Undergraduate Students  
in FY 18–19  
454 in FY 17–18



**333 of 829**

PRECEPTORS had an active  
placement in FY 18–19  
347/647 in FY 17–18



**805**

Postgraduate Medical  
Education Residents  
in FY 18–19  
793 in FY 17–18

BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



TOP EDUCATION INSTITUTIONS BY PLACEMENT HOURS in FY 18-19

1. BC Institute of Technology (64,813)
2. Justice Institute of BC (53,980)
3. University of BC (45,251)
4. Langara College (20,387)
5. Douglas College (19,631)



**31%**

in ambulatory or mixed  
**PLACEMENT SETTING**  
in FY 18-19  
28.3% in FY 17-18



**36 / 68**

# of **ACADEMIC PARTNERS**  
WITH AN ACTIVE  
**PLACEMENT** in FY 18-19

QUALITY OF CLINICAL LEARNING ENVIRONMENT & RESULTS



**20%**

of new hires with a  
**PHSA PLACEMENT**  
in FY 18-19

20% in FY 17-18

LEARNING  
ENVIRONMENT  
QUALITY SURVEY TOOL  
**DEVELOPED**



STUDENT  
READINESS  
SURVEY PILOT

**DEVELOPED**

# STUDENT EDUCATION METRICS

## BC CANCER

### BUILD PRACTICE EDUCATION CAPACITY



**26,241** ↑

STUDENT HOURS  
in FY 18–19  
17,145 in FY 17–18



**95**

TOTAL # OF STUDENTS\*  
in FY 18–19

*\*Excludes undergraduate and  
postgraduate medical students*



**\$367,873** ↑

cost of STUDENT SUPERVISION  
in FY 18–19  
\$167,876 in FY 17–18



**126**

Medical Doctor  
Undergraduate Students  
in FY 18–19



**21 of 65**

PRECEPTORS had an active  
placement in FY 18–19



**198**

Postgraduate Medical  
Education Residents  
in FY 18–19

··· BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION ···



**TOP**

**TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19**

1. BC Institute of Technology (19,281)
2. University of BC (3,026)
3. Vancouver Community College (1,540)
4. Vancouver Art Therapy Institute (850)
5. Kwantlen Polytechnic University (594)



**9**

**# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19**

# STUDENT EDUCATION METRICS

## BC CHILDREN'S HOSPITAL AND SUNNYHILL HEALTH CENTRE



··· BUILD PRACTICE EDUCATION CAPACITY ···



**110,979**↑

STUDENT HOURS  
in FY 18-19  
98,889 in FY 17-18



**681**

TOTAL # OF STUDENTS\*  
in FY 18-19

*\*Excludes undergraduate and postgraduate medical students*



**\$1,437,216**↑

cost of STUDENT SUPERVISION  
in FY 18-19  
\$762,190 in FY 17-18



**413**

Medical Doctor  
Undergraduate Students  
in FY 18-19



**268 of 641**

PRECEPTORS had an active  
placement in FY 18-19



**602**

Postgraduate Medical  
Education Residents  
in FY 18-19



···· BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION ·····



**TOP**

**TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19**

1. University of BC (25,859)
2. BC Institute of Technology (25,572)
3. Thompson Rivers University (17,827)
4. Douglas College (13,988)
5. Langara College (10,019)



**21**

**# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19**

# STUDENT EDUCATION METRICS

## BC MENTAL HEALTH & SUBSTANCE USE SERVICES



BC MENTAL HEALTH  
& SUBSTANCE USE SERVICES  
*An agency of the Provincial Health Services Authority*

### BUILD PRACTICE EDUCATION CAPACITY



**31,436**↑

STUDENT HOURS  
in FY 18–19  
29,029 in FY 17–18



**207**

TOTAL # OF STUDENTS\*  
in FY 18–19

*\*Excludes undergraduate and postgraduate medical students*



**\$370,102**↑

cost of STUDENT SUPERVISION  
in FY 18–19  
\$203,635 in FY 17–18



**7**

Medical Doctor  
Undergraduate Students  
in FY 18–19



**42 of 115**

PRECEPTORS had an active  
placement in FY 18–19



**19**

Postgraduate Medical  
Education Residents  
in FY 18–19



··· BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION ···



**TOP**

**TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19**

1. University of BC (8,467)
2. Langara College (5,088)
3. Douglas College (4,743)
4. Kwantlen Polytechnic University (4,408)
5. University of Victoria (1,676)



**19**

**# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19**

# STUDENT EDUCATION METRICS

## BC WOMEN'S HOSPITAL & HEALTH CENTRE

### BUILD PRACTICE EDUCATION CAPACITY



**38,418**↑

STUDENT HOURS  
in FY 18–19  
38,029 in FY 17–18



**319**

TOTAL # OF STUDENTS\*  
in FY 18–19

*\*Excludes undergraduate and postgraduate medical students*



**\$419,089**↑

cost of STUDENT SUPERVISION  
in FY 18–19  
\$214,994 in FY 17–18



**170**

Medical Doctor  
Undergraduate Students  
in FY 18–19



**268 of 641**

PRECEPTORS had an active  
placement in FY 18–19



**243**

Postgraduate Medical  
Education Residents  
in FY 18–19

···· BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION ·····



**TOP**

**TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19**

1. BC Institute of Technology (19,370)
2. University of BC (6,299)
3. Langara College (4,920)
4. Kwantlen Polytechnic University (2,328)
5. Vancouver Community College (2,012)



**11**

**# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19**

# STUDENT EDUCATION METRICS

## BC CENTRE FOR DISEASE CONTROL



BC Centre for Disease Control  
An agency of the Provincial Health Services Authority

### BUILD PRACTICE EDUCATION CAPACITY



**5,020**↑

STUDENT HOURS  
in FY 18–19  
323 in FY 17–18



**15**

TOTAL # OF STUDENTS\*  
in FY 18–19

*\*Excludes undergraduate and postgraduate medical students*



**\$69,067**↑

cost of STUDENT SUPERVISION  
in FY 18–19  
\$2,584 in FY 17–18



**3**

Medical Doctor  
Undergraduate Students  
in FY 18–19



**2 of 5**

PRECEPTORS had an active  
placement in FY 18–19



**19**

Postgraduate Medical  
Education Residents  
in FY 18–19

···· BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION ·····



**TOP**

**TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19**

1. Simon Fraser University (1,680)
2. University of BC (1,600)
3. University of Toronto (560)
4. University of Alberta (520)
5. Vancouver Community College (480)



**6**

**# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19**

# STUDENT EDUCATION METRICS

## BC EMERGENCY HEALTH SERVICES

### BUILD PRACTICE EDUCATION CAPACITY



**59,103**↓

STUDENT HOURS  
in FY 18–19  
70,939 in FY 17–18



**402**

TOTAL # OF STUDENTS  
in FY 18–19



**\$2.4 Million**↓

cost of STUDENT SUPERVISION  
in FY 18–19  
\$2.8 Million in FY 17–18



**143 of 177**

PRECEPTORS had an active  
placement in FY 18–19

### BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



**TOP**

TOP EDUCATION INSTITUTIONS BY  
PLACEMENT HOURS in FY 18–19

1. Justice Institute of BC (53,980)
2. Academy of Emergency Training (2,672)
3. Heartsafe (2,523)



**3**

# of ACADEMIC PARTNERS  
WITH AN ACTIVE PLACEMENT  
in FY 18–19



# APPENDIX 1

## FRAMEWORK FOR PHSA RESEARCH METRICS

### 1. Indicator: Producing and Advancing Knowledge

This category includes measures reflecting discoveries/new knowledge, and contributions to scientific literature.

- a. Total annual grant awards by agency/research entity and PHSA
- b. Total annual external grant awards by agency/research entity, identified by major funding categories  
(e.g., tri-council, provincial, Genome Canada/BC, international, private sector, etc.)
- c. Annual grant application success rate by agency/research entity and PHSA
- d. Total # Publications
- e. Citations

### 2. Indicator: Building Research Capacity

This category includes measures reflecting enhancements to both human resource and infrastructure capacity.

- a. Total # trainees by agency/research entity
- b. Scholarships/fellowships by agency/research entity
- c. Total # researchers by agency/research entity
- d. Infrastructure investments
  - i. E.g. – hospital research fund, BCCHR, capital projects etc.
  - ii. Databases (patient, tissue) etc
- e. Research Support Fund grants

### 3. Indicator: Achieving Economic Benefits and Innovation

This category includes measures reflecting commercialization of discoveries, revenues and other economic benefits resulting from discoveries, and general impacts on the BC economy.

- a. # Intellectual property disclosures, patents by agency/research entity
- b. Licenses, royalty income, spin-off companies
- c. New research hires to agency/research entity - job creation
- d. Policy initiatives

### 4. Indicator: Advancing Health and Policy Benefits

This category includes measures reflecting individual and population health impacts of research in prevention, diagnosis and treatment.

- a. Clinical trials (translational research)/patient outcome data
- b. New clinical guidelines/patient outcome data
- c. New drugs funded/patient outcome data
- d. Policy initiatives/patient outcome data

# APPENDIX 2

## RESEARCH METRICS WORKING GROUP MEMBERSHIP\*

**Ellen Chesney**

Chief Administrative Officer - Research, PHSA

**Kathryn Dewar, PhD**

Senior Research Manager, Women's Health Research Institute (WHRI)

**Ognjenka Djurdjev**

Corporate Director, Performance Measurement & Reporting, PHSA

**Nur Eisma**

UBC/C&W Coordinator Pre & Post Awards

**Deborah Ross**

Director, Research and Knowledge Exchange  
BC Mental Health & Substance Use Services

**Karen Hagan**

Grants Officer, Office of Research Facilitation, BC Cancer Agency

**Phoebe Lu**

Director, Research Services, BC Children's Hospital Research Institute

**Beth Palacios**

Consultant, Performance Measurement & Reporting, PHSA

**Priscilla Vuong**

Research Development Unit Manager, BC/UBC Centre for Disease Control

**Julie Wei**

BC Emergency Health Services

*\*As of September, 2018*

# APPENDIX 3

## FRAMEWORK FOR PHSA STUDENT EDUCATION METRICS\*

### 1. Indicator: Build Practice Education Capacity

This category includes measures reflecting the optimal use of practice education capacity and readiness in specialized care.

- a. # of Student Hours by Receiving Agency, Discipline, and Sub-Discipline
- b. # of medical school students (undergrads & post-grads) by specialty (UBC provided)
- c. No longer reported—Removed FY 16–17
- d. No longer reported—Removed FY 14–15
- e. Estimated Cost of Staff Time by Encounter Type
- f. # of confirmed placement requests by month
- g. # of declines by reason (most frequent)
- h. # of staff participants in preceptor/educator training  
(Educator Pathway Project & BCEHS training)
- i. # preceptors in HSPnet with and without a placement by FY
- j. # of destinations in HSPnet with and without a placement by FY
- k. # of PHSA staff with practice education activities as part of defined job responsibilities

### 2. Indicator: Build Effective Partnerships and Collaborations that Support Innovation

This category includes measures reflecting partnerships and innovation in ambulatory and inter-professional collaborative practice education placements.

- a. # of formal affiliation agreements and % based on standard template
- b. Top % of Education institutions by student hours
- c. # of student hours in ambulatory/outpatient placement care setting
- d. Distribution of student hours by practice education setting

### 3. Indicator: Monitor the Quality of the Clinical Learning Environment and Results

This category includes measures reflecting improved practice education planning and decision making and assessment of Practice Education progress and impact.

- a. # hires at PHSA with previous PE placement
- b. *Quality of Clinical Learning Environment (QCLE) survey results by Student, HA Staff and Faculty/Instructor*
- c. *Readiness for Student Practice Education (RSPE) survey results by HA clinical program*

\* Metrics denoted *in grey and italics* will be reported on in future reports

# APPENDIX 4

## STUDENT EDUCATION COORDINATING COMMITTEE

### Current Membership

Ellen Chesney <sup>1</sup>	Chief Administrative Officer – Research, Executive Sponsor
Christie Diamond <sup>1</sup>	Co-chair, Corporate Director - Academic Education
Karen Derry <sup>4, 5, 6</sup>	Associate Director, Inter-professional Practice
Susan Good <sup>2</sup>	Executive Director, Inter-professional Practice
Sandra Harris <sup>4, 5, 6</sup>	Senior Leader - Clinical Education, Learning & Development
Cecilia Li <sup>3</sup>	Professional Practice Leader, Nursing
Jennifer Molhoj <sup>7</sup>	Manager, Clinical Education
Karen Mooder <sup>9</sup>	Multi-site Director – Lower Mainland Pathology & Laboratory Medicine
Neeta Nagra <sup>1</sup>	Collaborative Practice Lead
Maureen Sexsmith <sup>2</sup>	Director, Professional Practice, Correctional Health Services
Jane Sun <sup>2</sup>	Director, Professional Practice, Burnaby Centre for Mental Health
Sandy Tatla <sup>4, 5, 6</sup>	Director, New Knowledge & Innovation
Sarah Titcomb <sup>1</sup>	Administrative Coordinator - Academic Development
Christina Tsobanis <sup>1</sup>	Collaborative Practice Lead, Allied Health
Sylvia Wu <sup>4</sup>	Manager – Education, Dept. of Pediatrics

### Past Membership within FY 18-19

Sherry Hamilton <sup>1</sup>	Chief Nursing & Liaison Officer, corresponding
Kavita Sarwal <sup>3</sup>	Co-Chair, Director, Research, Innovation & Education, BCCA
Lauren Mathany <sup>9</sup>	Public Health Manager
William Turner <sup>9</sup>	Public Health Manager
Luminita Nica <sup>3</sup>	Clinical Educator, Radiation Therapy
Deborah Scott <sup>7</sup>	Leader, Clinical Education, Special Projects & Practice Improvement
Justin Dodds <sup>2</sup>	Director, Professional Practice, Burnaby Centre for Mental Health & Addictions
Sharon McNulty <sup>2</sup>	Director, Professional Practice, Forensic Hospital

1. PHSA corporate services
2. BC Mental Health and Substance Use Services
3. BC Cancer Agency
4. BC Children's Hospital
5. BC Women's Hospital and Health Centre
6. Sunny Hill Health Centre for Children
7. BC Emergency Health Services
8. BC Centre for Disease Control
9. Lower Mainland Pathology and Laboratory Medicine