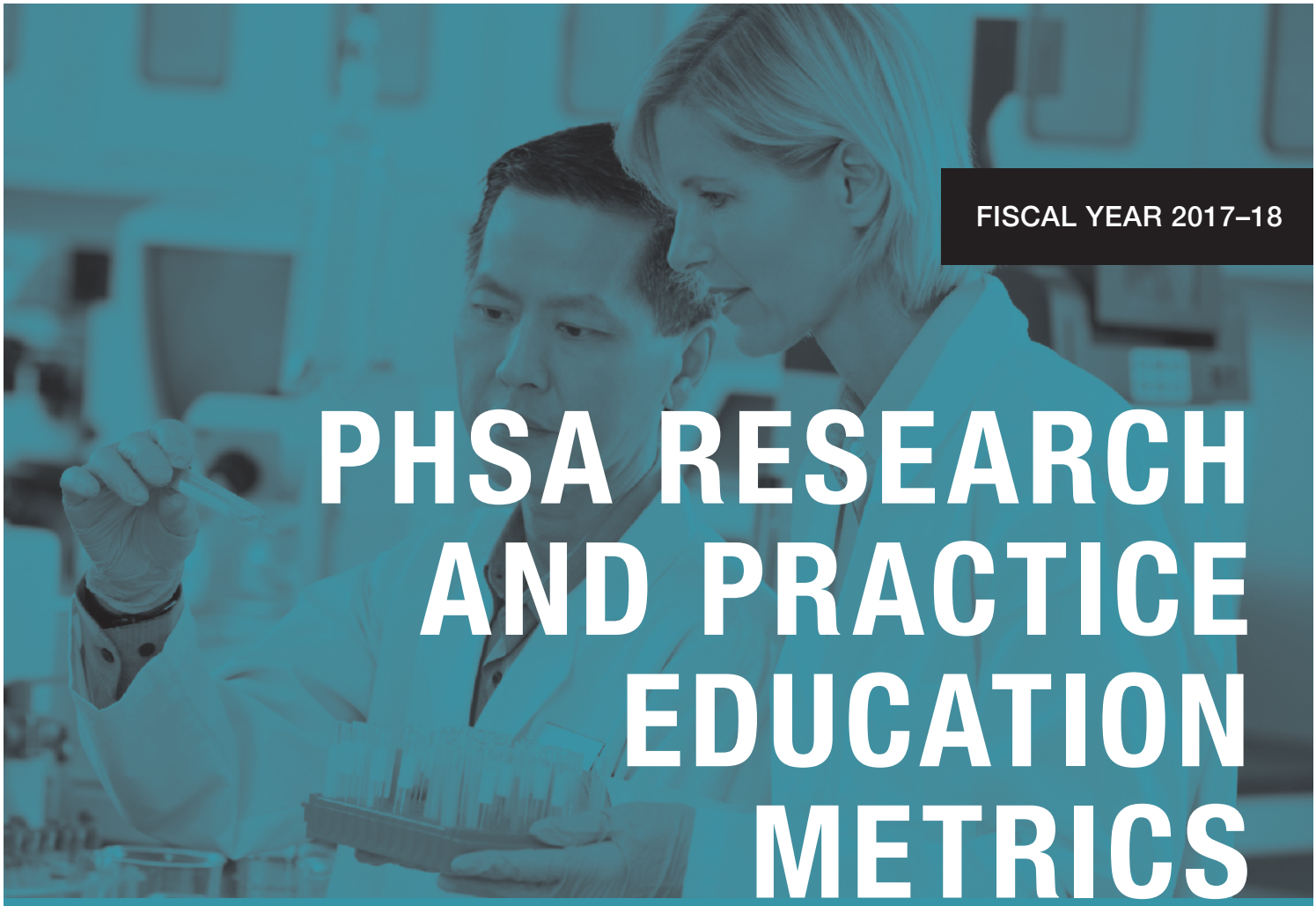

FISCAL YEAR 2017–18

PHSA RESEARCH AND PRACTICE EDUCATION METRICS

Provincial Health Services Authority
Province-wide solutions. Better health.

CONSOLIDATED SUMMARY REPORT

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

Prepared for:

PHSA Research Committee

Prepared by:

Ellen Chesney, Chief Administrative Officer – Research

Beth Palacios, PHSA Consultant

PHSA Research Metrics Working Group

Student Education Coordinating Committee

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PHSA'S 1ST INTEGRATED METRICS REPORT

After 10 years of research and five years of practice education reporting, our format is changing.

Having achieved important milestones in the reporting of annual metrics for research and practice education, PHSA Research and Academic Services is pleased to introduce a new, consolidated metrics report that presents governance-level data from a more integrated perspective.

This year is the tenth year that PHSA has published metrics for key research indicators, and the fifth year it has published metrics for practice education indicators. Research and practice education, together with patient care, represent the integrated tripartite mandate of PHSA, one of the country's largest academic health science organizations. As part of the continuous improvement of governance-level reporting related to PHSA's academic mandate, this year's report addresses research and practice education in a consolidated report. The report highlights high level inputs, outputs and, in particular, research outcomes - reflecting the PHSA Board's particular interest in advancing the implementation of research findings to benefit BC's patients, populations and health system.

While the metrics for Board-approved research and education indicators have evolved with reporting experience, it is recognized they don't reflect the full picture of the PHSA research enterprise. PHSA's research entities differ broadly in their size, function and focus, and some strengths are not well captured through indicators. In addition, previous reports have not provided an opportunity to highlight key organization-wide developments or strengths.

To improve governance-level reporting and address these gaps, a number of changes are introduced in this year's report.

Previous dashboard information, at both PHSA and research entity levels, is presented in infographics that highlight key inputs, outputs and trends. The detailed metrics data previously reported to the Board will continue to be published in separate appendixes to support management/operational requirements.

Major accomplishments that may not be captured in metrics are presented for the first time in the Top 3 Accomplishments identified by each research entity.

Synthesized information highlighting impacts and outcomes, as well as broader organization-wide strengths and developments in research, are addressed in this summary report. Next year's report will be expanded to address similar content for practice education.

Reflecting PHSA's strategic priority to advance patient and system benefits through the translation and implementation of research findings, detailed outcomes data related to PHSA programs and registries will continue to be included in this consolidated report.

PHSA's Growing Research Enterprise

Quantitative and qualitative data reflect growth and strength in key dimensions of the PHSA research enterprise.

Overall external research funding grew from $131.5 million in FY 2016/17, to $152.4 million in FY 2017/18, largely as a result of success in Canada Foundation for Innovation (CFI) infrastructure competitions. PHSA research entities received a total of $25.9 million in CFI and matching BC Knowledge Development Fund funding, with BC Cancer attracting $23.2 million, BC Children's Hospital Research (BCCHR) attracting $2.5 million, and Women's Health Research Institute (WHRI) receiving $154 thousand. Non-CFI funding also rose 15.5 per cent, the largest increase since 2009/10.

In the extraordinarily competitive arena of Canada Institutes for Health Research (CIHR) funding, PHSA's grant application success rate was very close to the national average success rate for the 2017/18 Foundation Grant and the Fall 2017 Project Grant competitions, and was well above the national average for the most recent spring 2018 Project Grant competition. Over the past 10 years, PHSA has been above the national average in 82% of IHR competitions. Since 2009/10, PHSA entities have submitted 978 applications and received 224 awards for an overall success rate of 22.9%. Though falling short of the recommendations of the Naylor Report, the federal government made an unprecedented commitment to health research in Budget 2018, and it is hoped that CIHR success rates will begin to rise in future years.

In comparison to FY 2016/17, the number of researchers, the number of research trainees, and the number of publications by PHSA authors increased for all of the PHSA research entities. From a trending perspective, the number of researchers has

External research funding for PHSA research grew from $132 million in FY 2016/17 to $152 million in FY 2017/18.

grown 66 per cent since 2009/10, and the number of trainees has risen 136 per cent since 2008/09, evidence of PHSA's growing research strength.

Over the past year, both the number of clinical trials and the number of enrolled subjects in those trials has increased, a consistent trend since PHSA began reporting clinical trials in FY 2011/12.

Metrics related to economic benefits and innovation continue to trend positively. Patent activity has remained relatively stable, while licensing revenues and the number of active license agreements have increased.

Two new PHSA-related spinoff companies were created in the past year. Curvafix, co-founded by a BC Cancer investigator, is a Seattle-based company developing a surgical product for hip repair and involves joint intellectual property held by PHSA and UBC. ME Therapeutics, co-founded by a BC Children's Hospital Research (BCCHR) investigator, is an immunotherapy company using combined expertise in tumour immunology, T cell biology and myeloid cell development to develop drugs addressing cancer-induced immune suppression.

While these quantitative data reflect growth and PHSA's position as one of Canada's largest academic health science organizations, they tell only part of PHSA's research success story. The impacts resulting from PHSA-led research are further illuminated through the top accomplishments and outcomes identified by each research entity, and through the studies generated using PHSA's rich registry data sets.

PHSA-led Research is Making a Difference through Impacts and Outcomes

For the first time this year, PHSA research entities were asked to identify their top three accomplishments. The nature of these accomplishments was not defined, giving the research entities wide latitude to highlight what they viewed as key successes over the past year. The results reflect the varying foci and strengths of PHSA's research entities and the many ways in which PHSA researchers are making a difference. Top accomplishments range from leading creation of a Women's Health Research Agenda for BC, to establishing a province-wide cancer biobank, to advancing the ability to grow insulin-producing cells in the lab, to playing a lead role in BC's opioid crisis, to having two researchers named as leading Canadians making a difference in mental health.

As in past years, PHSA research entities were asked to identify any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/18 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:

- A new test that identifies the risk of breast cancer reoccurrence, approved for use in Canada and the US, recommended in several independent international guidelines and health care assessments, and now being used in BC and 13 countries around the world.
- Genetic tests that predict the risk of serious side effects to common chemotherapy drugs, now introduced into practice at BCCH.
- HEARTSMAP, an emergency psychosocial assessment and management tool for children and youth in mental health crisis, introduced into dozens of emergency departments across the province.
- Canada's first hospital-based family immunization clinic, aimed at increasing immunization rates amongst chronically ill children and their families.
- Development and introduction of new tests that avoid the need for invasive and costly tissue biopsies and improve test turnaround time, thus enabling new treatment options for lung cancer patients.
- Adoption of standardized testing for lung cancer patients who become resistant to first line treatments by several Canadian centres.
- International adoption of a simple, two-page report template that provides the results of tuberculosis (TB) whole genome sequencing data to clinicians, allowing them to quickly and easily understand the predicted drug resistance of the specific TB strain.
- Adoption of a non-invasive prenatal blood test in BC and Quebec that has higher sensitivity and lower false positive rates compared to conventional screening, leading to fewer invasive diagnostic tests that are associated with a risk of miscarriage.

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 2017/18 is informing and guiding challenging policy decisions.

- Research undertaken by BC Cancer in collaboration with the First Nations Health Authority informed the recently launched Indigenous Cancer Strategy for BC.
- WHRI research influenced the federal policy decision to allow pharmacists and nurse practitioners to prescribe Mifepristone, leading to improved access to medical abortion for women living in rural and remote locations across the country.
- BCCDC research is impacting decisions around use of expensive new antiviral drugs that cure Hepatitis C infection. Integrated utilization and outcome data provided to PharmaCare is helping to inform dispensation guidelines and assess cost effectiveness.
- BCCDC research informed the selection of the 2017/18 influenza vaccine strain by the World Health Organization (WHO) and informed provincial, national and international guidelines on use of the 2017/18 seasonal influenza vaccine.
- WHRI research identifying determinants of successful reintegration of women into the community after release from provincial prison contributed to the decision to make correctional health care services a responsibility of the health system under PHSA.

Using evidence to identify optimum pathways for diagnosing and treating heath 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.

PHSA's success rate has exceeded the national average in 82% of CIHR competitions over the past 9 years.

- BCCDC research informed changes made to WHO guidelines for treatment of antibiotic resistant tuberculosis (TB).
- BCCDC Public Health Laboratory developed guidelines to standardize the screening, detection and control of the superbug "Carbapenemase Producing Organisms" within BC acute care and community health facilities.
- BCCDC developed a guideline to identify Legionella outbreaks quickly, improve care of affected patients, and address the environmental source.
- WHRI researchers participated in the development of national clinical guidelines in multiple areas, including treatment of pelvic organ prolapse, use of fetal ultrasound, treatments for overactive bladder, HIV pregnancy planning, egg freezing for age-related fertility decline, and Rhesus D (RhD) fetal/maternal blood group incompatibility testing.
- WHRI research contributed to new MOH guidelines for the clinical management of opioid use in pregnant women.
- A BCCH researcher participated in a United Nations Expert Working Group to create guidelines to measure protein quality in therapeutic food products used to treat severe malnutrition in young children.
- A BCCH investigator helped create new national guidelines for the diagnosis and treatment of congenital hernia in the diaphragm.
- BC Cancer researchers developed a provincial cancer treatment guideline for the treatment of oligometastases and oligoprogressive lesions.
- BC Cancer recommended a new combination of chemo-therapy drugs for specific prostate cancers that has been approved by Health Canada.

PHSA-led research is not only impacting the diagnosis and treatment of disease and illness. It's also being applied to prevent illness and injury, and to help people maximize their health. Following are examples of research-based health promotion and injury prevention initiatives introduced in 2017/18.

- SMARTMom, Canada's first prenatal education program delivered by text message, is successfully reaching underserved populations of young moms, First Nations women, and less educated mothers with timely, targeted prenatal health information.
- BCCDC-led improvements to the Air Quality Health Index and hot weather warning alerts have been adopted province-wide, helping British Columbians manage heath impacts of poor air quality and hot weather.
- New Zealand has adopted the BCCH Live 5-2-1-0 program – a program that promotes healthy eating and physical activity for children by advocating five or more fruits and vegetables, no more than two hours of screen time, one hour of active play, and zero sugary drinks each day.

- An evidence-based campaign incorporating research from the BC Injury Research and Prevention Unit and other collaborators was launched that enables seniors to take concrete steps to reduce falls.

Of note, 33 per cent of outcomes identified this year involved collaboration involving multiple PHSA research entities and/or programs.

PHSA's Rich Datasets Are Being Used to Inform Better Care

Its large number of provincial registries and data sets providing longitudinal data on services provided to specific populations is a unique 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. For the fifth year, data stewards of PHSA registries and datasets were invited to participate in a survey designed to assess their research activities. Responses underscore the high research value of these datasets, and their ability to support studies aimed at directly improving health outcomes as well as evaluating optimum care delivery models. The following sample of active research studies demonstrates the utility and potential of these data assets.

- A study using PROMIS – Transplant data will determine the optimal surgical technique for liver implantation.
- A study using data from both the BC Cardiac Registry and the BC Ambulance Service/ROC Cardiac Arrest Registry is identifying gaps in the care of patients who experience an out-of-hospital cardiac arrest in order to implement and refine care processes to improve long term outcomes.
- Data from the Lung Cancer Screening Program are being studied to conduct a cost benefit analysis of lung cancer screening.
- PROMIS- Renal data is being studied to understand the impact on Peritoneal Dialysis (PD) retention of the PD Assist Program implemented over the last three years.
- Data from the BC Perinatal Database Registry are being studied to determine whether there are differences in the outcomes of midwife-attended water births versus midwife-attended land births.
- Data from the BC Cancer Registry are being used to study the outcomes and late effects of radiation therapy in long term survivors of cervical cancer treated with brachytherapy.
- BC Cardiac Registry data are being used to compare two methods of coronary revascularization – coronary artery bypass graft and percutaneous coronary intervention.
- Data from the Endometriosis and Pelvic Pain Interdisciplinary Cohort (EPPIC) are being studied to investigate ethnic differences for moderate to severe endometriosis.
- Data from the Cervical Cancer Screening Database are being studied to identify the prevalence of HPV following introduction of the Provincial School-based HPV Vaccination Program.
- BC Generations Project data are being studied to evaluate the safety and effectiveness of a newer Hepatitis B vaccine against the currently approved Hepatitis B vaccine.
- BC Trauma Registry data are being studied to understand the practical utility of an on-line tool that captures patient reported outcomes after discharge from hospital for major trauma.

Key Strengths and Developments in Genomics, Data, Patient Engagement and Translational Research

Over the past 10 years, publishing annual research metrics has enabled the development of a much better understanding of the scope and breadth of PHSA's research enterprise, and the many ways in which PHSA-led research is benefitting patients, populations, and the health system.

The metrics do not, however, reflect all of the strengths and accomplishments of PHSA's research entities, nor all of the enterprise-wide characteristics and developments that help support current and future research success. Though far from an exhaustive list, four areas are highlighted for the critical impact they have or will have on research success: genomics, data access/management, patient engagement/orientation, and translation. These types of current and emerging areas of excellence help generate the forward momentum and reputational assets that enable the attraction of external funding and support, and the highest quality clinical, research and trainee recruitments.

PHSA's rich provincial registries and data sets support research aimed at directly improving health outcomes and optimum care delivery models.

Genomics is a critical area of research excellence across PHSA, and PHSA researchers are playing a pivotal role in developing the evidence and pathways for its clinical application.

BC Cancer's Michael Smith Genome Sciences Centre is an international leader in genomic sequencing and research. It is a key player in Canada's national genomics ecosystem as a founding partner in Canada's Genomic Enterprise (CGEn), a national genome sequencing and analysis network, and as one of three sites for the Canadian Distributed Infrastructure for Genomics (CanDIG), a CFI-funded, cutting-edge computational infrastructure for genomic analysis aimed at enabling national, distributed analysis of locally-controlled privacy genomic data.

The application of genomics expertise to clinical service is a growing strength, with impact across PHSA. From applying genomics to real-time treatment planning through the GSC Personalized Onco-Genomics Program and introducing genomic diagnostic panels through the GSC Centre for Clinical Genomics, to identifying children's rare diseases through the BCCHR CAUSES Clinic and introducing tests at BCCH that predict adverse reactions to common cancer drugs, to using genomics to identify antibiotic resistant strains of TB and the source of TB outbreaks at BCCDC, to applying genome sequencing to identify genetic disorders in newborns at BC Women's Hospital, PHSA researchers and clinicians are at the forefront of clinical application of genomics. Many of these research and clinical projects involve collaboration between multiple PHSA programs as well as with outside partners. A critical mass has been achieved that bodes well for the future. This is evidenced by PHSA's unprecedented success in the recent Genome Canada 2017 Large Scale Applied Research Project. BC led the national results of this competition with five of six funded BC projects led by PHSA researchers. The approximately $47 million awarded to these projects will be reflected in FY 2018/19 metrics.

As referenced earlier, PHSA has unique and rich data assets. Optimizing use of data for research, as well as quality improvement and evaluation, presents tremendous challenges for PHSA researchers as it does for researchers across the country and the world. PHSA is addressing the challenges related to data through a number of initiatives.

Within PHSA, access barriers are being reduced by streamlining and standardizing privacy, security and legal requirements. Important data navigation resources are being strengthened in research entities, such as a WHRI research data analyst who supports use of BC Perinatal Services Registry data, and the BCCH Data Management team that provides consultation and services related to data management, standardization, and harmonization. A database platform with REDCap software at BCCHR has been extended to previously unserved PHSA programs. PHSA is also establishing new governance structures, such as the C&W Data Collection Solutions Steering Committee,

that offer multi-disciplinary expert advice to strengthen alignment and coordination of new data collection and solution requests. Through the Clinical & Systems Transformation (CST) project, and provincial streamlining efforts led by the Ministry of Health, PHSA is working with partners to improve access to health data for research and other secondary purposes.

While these are important initiatives, optimizing use of data for research and other secondary purposes across PHSA is a continuing challenge. It requires further strengthening of data management/ optimization resources, strengthening of capacity in biostatistics and data visualization, and continued development of governance approaches that can enable data access, linkage and use, including support for collaboration at all levels, while providing pragmatic, meaningful management of risks.

A third key area of development across PHSA is the establishment of programs and initiatives aimed at further strengthening patient engagement and involvement in research. These developments align with the Canadian Institutes for Health Research (CIHR) Strategy for Patient Oriented Research, and contribute to ensuring research supports PHSA's patient focused mission. Over the past year, two research groups within the WHRI have established patient engagement committees to inform the development and progress of research projects related to clinical programs, to inform the next strategic plan, and to provide a mechanism for translating research knowledge back to their respective patient groups.

Through a joint initiative between WHRI and BCCHR, a patient contact office is being established on the Oak Street campus to improve coordination and management of contact with patients for research projects. In addition, a group of BCCH researchers is co-creating an interactive website with families to encourage collaborative engagement in research.

The fourth key area of strength and continuing development relates to the translation continuum. As often cited, it takes on average 17 years for health research to be adopted into clinical practice. PHSA researchers are active across the translation continuum, as evidenced by the PHSA research metrics. They are generating basic biomedical research discoveries, inventing new products and technologies, commercializing those inventions, and conducting clinical trials to evaluate the impact of new drugs and technologies on human subjects. While it's well established that financial big wins occur infrequently in health research, metrics reflect PHSA's progress in generating and translating discoveries to achieve patient and economic benefits.

Since FY 2008/09, 239 patent applications have been filed and 131 patents have been issued. Over the past 10 years, there have been 175 active licensing agreements, and IP related revenue, as redefined in FY 2010/12 to capture realized licensing revenue, totals more than $1.5 million for the past eight years. Of 19 spin-off companies created with the involvement of PHSA researchers since FY 2008/09, 12 remain active today (10 at BC Cancer and two at BCCHR). PHSA has seen an average annual increase of 4% in the number of clinical trials since PHSA began consistently reporting them in FY 2011/12. The number of subjects enrolled in those trials has increased from 29,041 to 149,773, an average annual increase of 22 per cent. Increasing clinical trial activity means more patients have the opportunity to participate in clinical evaluation of new drugs, many of which achieve therapeutic benefits beyond those offered by standard of care treatment.

The four highlighted areas of genomics, data, patient engagement and translational research represent only a subset of important areas of excellence and development across the PHSA research enterprise. When considered together with the annual research metrics, and the top research entity accomplishments, they present a more fulsome picture of PHSA's robust research enterprise, and how PHSA-led research is benefiting patients, populations and BC's health system.

Training Tomorrow's High-Performance Workforce is a Key Role of PHSA

As an integrated academic health science organization, PHSA provides high quality practice education to more than 18 health disciplines, helping to ensure a high-performance workplace is available to meet care requirements in the future.

Over the past five years, the number of clinical trainees seeking practice education placements with PHSA has increased 39% while the percentage of declined placements has declined. During the same period, PHSA has provided more than 1.1 million hours of practice education to just over 7,000 students, with 44 per

PHSA has provided more than 1.1 million hours of practice education to over 7,000 students over the past five years.

cent of student hours filled by nursing students, and 28% per cent of student hours filled by paramedic students. The cost of providing this critical role in training tomorrow's care providers is not insignificant; since FY2013/14, $17 million in staff time has been expended to direct supervision of non-medical students, just one element of the total cost of practice education. Full reporting of medical students is available for the first time this year, and shows PHSA provided training to 454 medical doctor undergraduates through 1,717 placements, and 793 postgraduate medical doctors through 3,498 placements.

The FY 2017/18 practice education metrics reflect several noteworthy changes.

Nursing placements at BC Children's Hospital (BCCH) are down due to the move to the new Tech Acute Care Centre, which prevented many destinations from taking placements during the transition, as well as to curriculum changes that shifted pediatric and perinatal group placements to a social pediatrics and community-based learning experience.

Mental health destinations increased due to the addition of Correctional Health Services, and placements in other health disciplines < 10,000 hours increased due to the Community Health Worker program for Forensic Psychiatric Services (FPS) and Burnaby Centre for Mental Health and Addiction (Burnaby Centre).

For the first time, the number of placements in inpatient settings has decreased and a corresponding increase is seen in ambulatory and mixed placement settings. While this could be due to the additional of more destinations that are deemed mixed, or a result of a lower number of nursing placements, it's an important trend to watch given the goal of more closely aligning practice education settings with the type of settings in which graduates will work.

A key factor in PHSA's ability to measure – and thus better manage – practice education is use of the Health Sciences Placement Network (HSPnet), the PHSA-owned, web-based system for managing practice education in the health sciences. Improved use of HSPnet is reflected in more accurate destination numbers for BCCH, BC Women's and Sunny Hill, more accurate identification of preceptors, and identification of social work placements due to FPS and Burnaby Centre using HSPnet. While HSPnet data quality continues to improve, standardizing HSPnet use and facilitating its adoption by PHSA programs that are currently not using it (PHSA corporate departments, Population and Public Health, BC Emergency Health Services and BC Cancer lab programs) continues to be a major direction moving forward.

RESEARCH METRICS PHSA

Fiscal Year Trend - PHSA Overall

Provincial Health Services Authority
Province-wide solutions. Better health.

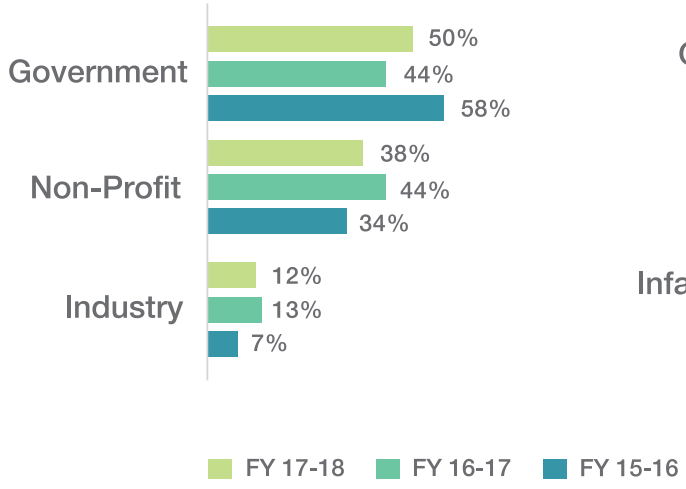
PRODUCING AND ADVANCING KNOWLEDGE

$152 Million

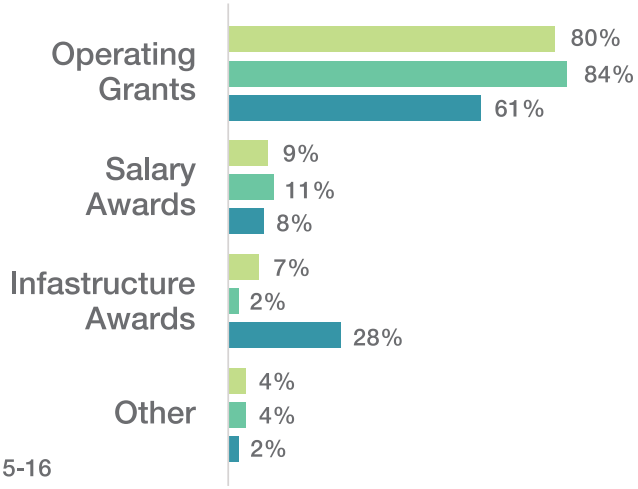
in TOTAL GRANTS AWARDED in FY 17–18

$132 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



PUBLICATIONS

BCCHR	943↑
BC CANCER	524↑
WHRI	585↑
BCCDC	215↑
BCMHSUS	82↑

33%

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

100% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

$326K ↑
of REALIZED REVENUE
in FY 17–18
$282K in FY 16–17

18 patents filed
30 patents issued
in FY 17–18
16 Filed / 37 Issued in FY 16–17

13 new ↑
ACTIVE LICENSES
in FY 17–18
12 new in FY 16–17

12 spin-offs (2 new)
# of ACTIVE SPIN-OFFS in FY 17–18
12 (2 new) in FY 16–17

BUILDING RESEARCH CAPACITY

807 ↑
OF RESEARCHERS
in FY 17–18
790 in FY 16–17

1,970 ↑
OF TRAINEES
in FY 17–18
1,687 in FY 16–17

$3.9 Million ↓
RESEARCH SUPPORT
FUND GRANTS
in FY 17–18
$4.3 Million in FY 16–17

HEALTH & POLICY BENEFITS

561 ↑
OF CLINICAL TRIALS
in FY 17–18
541 in FY 16–17

149,773 ↑
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 17–18
92,366 at the end of FY 16–17

35% ↔
% INDUSTRY FUNDED
TRIALS in FY 17–18
35% in FY 16–17

211 requests
200 approved
REGISTRY ACCESS REQUESTS/
APPROVALS in FY 17–18
264 requests / 250 approvals in FY 16–17

RESEARCH METRICS PHSA

Multi-Year Trend - PHSA Overall

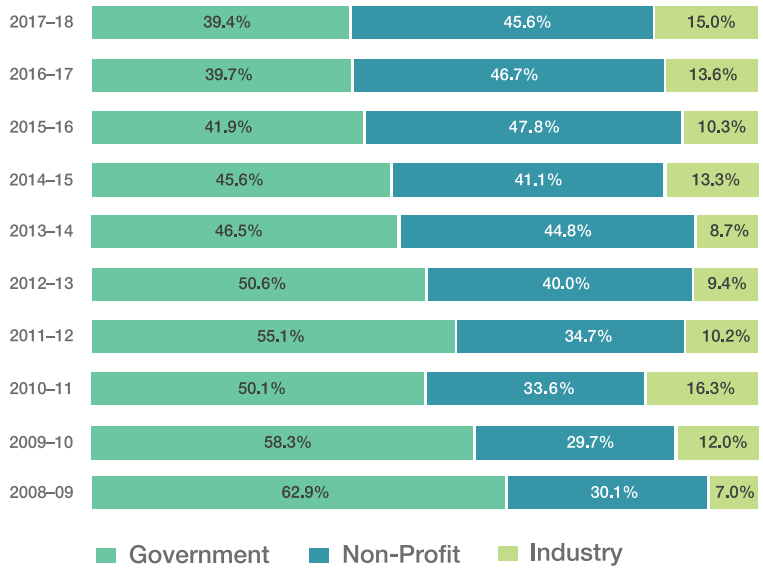
Provincial Health Services Authority
Province-wide solutions. Better health.

PRODUCING AND ADVANCING KNOWLEDGE

$1.4 Billion

in TOTAL GRANTS AWARDED over 10 years

% OF TOTAL AWARD FUNDING BY SECTOR
without major CFI



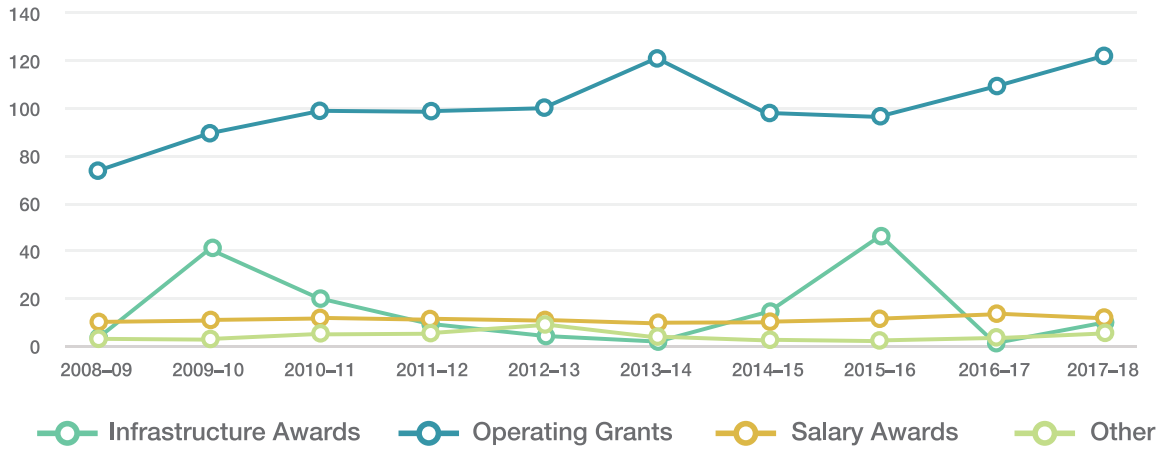
13,000+
TOTAL # OF PUBLICATIONS

10,000+
JOURNAL ARTICLES

94%
PEER REVIEWED
over 7 years

82%
% of CIHR competitions above National AVG SUCCESS RATE over 9 years

TOTAL AWARD FUNDING BY AWARD TYPE
with major CFI



ECONOMIC BENEFITS & INNOVATION

$1.5 Million
of REALIZED REVENUE
over 8 years

239 patents filed
131 patents issued
over 10 years

175
ACTIVE LICENSES
over 10 years

19 spin-offs (12 active)
CREATED over 10 years

BUILDING RESEARCH CAPACITY

66%
increase in
OF RESEARCHERS
from FY 09–10

136%
increase in
OF TRAINEES
from FY 08–09

$24.5 Million
RESEARCH SUPPORT FUND GRANTS
since collection began in FY 12–13

HEALTH & POLICY BENEFITS

4%
average annual % increase in
OF CLINICAL TRIALS
since FY 11–12

22%
average annual % change in
TOTAL CUMULATIVE SUBJECT ENROLLMENT since FY 11–12

1,896 requests
1,604 approvals
REGISTRY ACCESS REQUESTS/ APPROVALS over 10 years

33%
of reported outcomes involve INTER-PHSA COLLABORATION
(1st year of reporting)

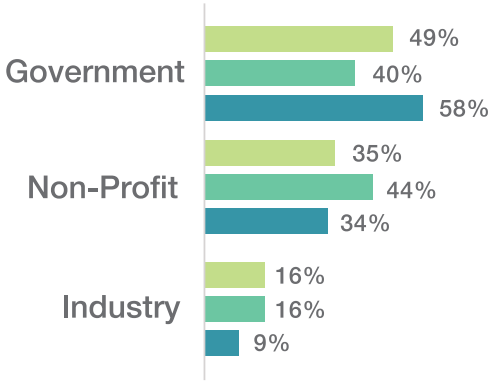
RESEARCH METRICS BC CANCER

BC CANCER
Provincial Health Services Authority

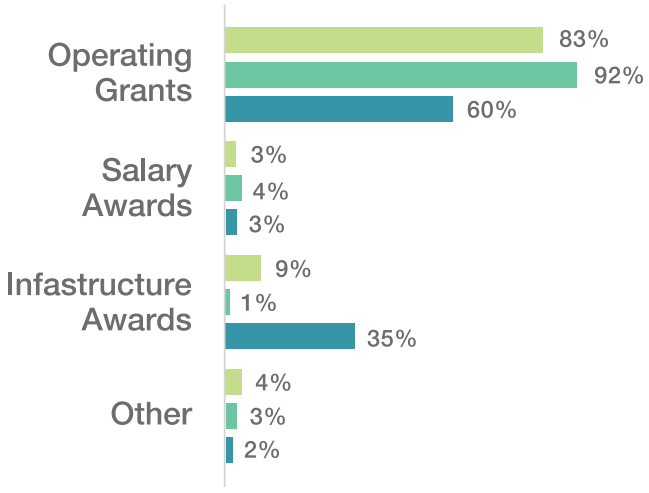
PRODUCING AND ADVANCING KNOWLEDGE

$86 Million
in TOTAL GRANTS AWARDED in FY 17–18
$68.5 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



FY 17-18 FY 16-17 FY 15-16

524 TOTAL # OF PUBLICATIONS in FY 17–18
539 in FY 16–17

443 JOURNAL ARTICLES in FY 17–18
450 in FY 16–17

95% PEER REVIEWED in FY 17–18
94% in FY 16–17

33% % of CIHR competitions above National AVG SUCCESS RATE in FY 17–18
50% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

$285K↑
of REALIZED REVENUE
in FY 17–18
$258K in FY 16–1

10 patents filed
26 patents issued
in FY 17–18
11 filed / 30 issued in FY 16–17

34
ACTIVE LICENSES
(4 new) in FY 17–18
0 new in FY 16–17

10 spin-offs (1 new)
# of ACTIVE SPIN-OFFS in FY 17–18
9 (2 new) in FY 16–17

BUILDING RESEARCH CAPACITY

342↑
OF RESEARCHERS*
in FY 17–18
330 in FY 16–17

580↑
OF TRAINEES
in FY 17–18
565 in FY 16–17

$1.6 Million↓
RESEARCH SUPPORT
FUND GRANTS
in FY 17–18
$1.7 Million in FY 16–17

*Excluding affiliate investigators

HEALTH & POLICY BENEFITS

309↓
OF CLINICAL TRIALS
in FY 17–18
321 in FY 16–17

34,573↑
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 17–18
30,084 at the end of FY 16–17

43%↑
% INDUSTRY FUNDED
TRIALS in FY 17–18
41% in FY 16–17

TOP 3 ACHIEVEMENTS
BC CANCER

Details available in Supplementary Report

1

5-year anniversary of POG - Personalized OncoGenomics

The BC Cancer Personalized OncoGenomics (POG) program is a collaborative clinical research initiative studying the impact of embedding whole genome sequencing into real-time treatment planning for British Columbian patients with metastatic cancers. Since its launch in 2012, POG has recruited 1,000 patients with metastatic cancer, and completed sequencing and analysis on more than 600. BC Cancer is the only centre in the world conducting a POG study of this scope and scale. In 2017, POG research resulted in eight publications in peer-reviewed journals, ten presentations at high profile clinical or scientific events, and an award-winning documentary on CBC's Nature of Things, called Cracking Cancer.

2

Establishment of BioCancer Initiative

The Centre for Lymphoid Cancer at BC Cancer has recently joined forces with the breast and prostate tumor groups to establish the BioCancer initiative. The initiative is creating a province-wide BioBank to collect and store biospecimens for translational research and to build comprehensive research and clinical databases housing clinical outcome and analysis data for each tumor type. Cancer patients are being recruited, and specimens acquired from across the province, including traditionally under-represented patient populations such as those from the North. The biospecimens will enable researchers to fully characterize genetic and molecular profiles which can be used to improve diagnostic precision and develop more effective therapies.

3

Molecular and clinical characterization Diffuse Large B Cell Lymphoma

The Lymphoid Cancer Research team at BC Cancer is discovering important genomic characteristics of an aggressive form of B-cell non-Hodgkin lymphoma (NHL) which is also the most common type of NHL. The team is delineating molecular and clinical characteristics of B-cell NHLs and developing assays that can be used in the clinic to better manage this aggressive disease. Their important findings have been published to date in the journal *Blood*.

TABLE 1 BC Cancer Outcomes

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
BC Cancer researchers developed a provincial guideline on the local treatment of oligometastases (and oligoprogressive lesions) with stereotactic radiation. The most significant change was allowing oliprogression to be treated in a province wide study. Oligoprogession is defined as progression of 1-5 metastases in a setting where a systemic agent is controlling all other sites of metastatic disease. It is hoped that by locally ablating tumors that are progressing, the patient can continue to take the systemic agent instead of having to come off a drug that is effective at controlling all other metastases.	Oligometastases and oligoprogression are still being studied in BC. The benefit to the treatment of oligoprogression would be to allow a patient to continue on a working systemic agent rather than having to switch to another line of systemic treatment which would likely be costlier, more toxic and/or less effective. At a population level this may reduce healthcare costs and at a patient level this may push back the use of further lines of therapy by giving local therapy to the progressing lesion(s) and keeping a patient on the first line of treatment. It came about due to collaboration between the BC Cancer sites (6 sites).	**Patient:** Access to new treatment/technology
Use of new technology for interstitial brachytherapy for gynecologic tumors at Fraser Valley/Abbotsford.	Interstitial brachytherapy is used to treat certain aggressive and advanced gynecologic malignancy. This treatment offers better results versus external beam therapy. It was being delivered only at the Centre for the Southern Interior but will now be available for Fraser Valley/Abbotsford patients. This is a transfer of knowledge from CSI Radiation Oncologists to those in Fraser Valley/Abbotsford. It came about by collaboration within BC Cancer.	**Patient:** Access to new treatment/technology
Publication of guidelines for EGFR T790M testing in Canada following co-leadership of a pan-Canadian workshop.	Development of standardized testing approach for lung cancer patients who become resistant to first line tyrosine kinase inhibitors. This test is now being used at several centres in Canada and includes when and how to test and the various clinical and technical considerations that need to be taken into account.	**Patient:** protocols and guidelines
Development of new test for EGFR T790M mutations using a "liquid biopsy" of circulating cell-free DNA in the blood.	Avoids the need of an invasive tissue biopsy and provides more rapid turnaround times. Allows access to a novel therapy (third-line tyrosine kinase inhibitor) for lung cancer patients who become resistant to first line therapy. The test is now in use and guidelines for use were published in Current Oncology.	**Patient:** Access to new treatment/technology

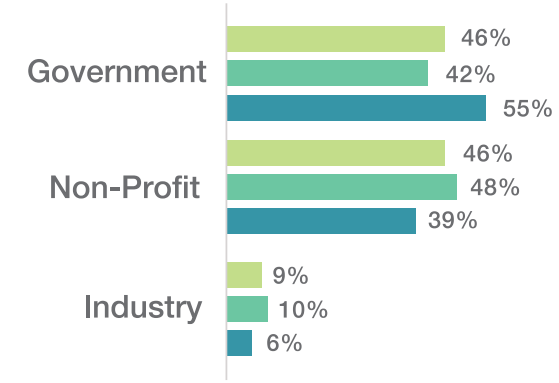
Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes)
Abiraterone added to standard androgen deprivation therapy for metastatic castration sensitive prostate cancer. Approved by Health Canada.	Improved overall survival and quality of life.	**Patient:** Delay of Disease progression/survival
The Cancer Genetics and Genomics Laboratory at BC Cancer developed and launched a new test for detecting the drug-resistant mutation, EGFR T790M in circulating tumour DNA (ctDNA) from the plasma of non-small cell lung adenocarcinoma patients, currently administered EGFR tyrosine kinase inhibitors (TKI) and diagnosed with disease progression.	The new blood based test provides an alternative to costly and invasive tissue biopsies. The ability to both collect and process blood samples more readily allows for test results to be reported rapidly, potentially allowing patients to be directed to new treatment options in a more timely manner.	**Patient:** Access to new treatment/technology
A BC Cancer research team identified factors leading to a higher (pre-existing disease) or lower (living in remote locations, or neighbourhoods with many immigrants) chance of being diagnosed through screening, and subgroups (immigrants) with longer time to diagnosis.	Researchers found that those living in different health regions or in lower income neighbourhoods had variable access to chemotherapy and a significant level of non-compliance with breast cancer follow-up guidelines, pointing to gaps in care that can affect survival. This research was part of a multi-province initiative — Canadian Team to Improve community-based cancer care coordination along the continuum of care (CanIMPACT). The results from these studies have been shared with oncology practitioners, family physicians and screening programs throughout BC and Canada.	**Patient:** Delay of disease progression/survival

RESEARCH METRICS
BC CHILDREN'S HOSPITAL RESEARCH

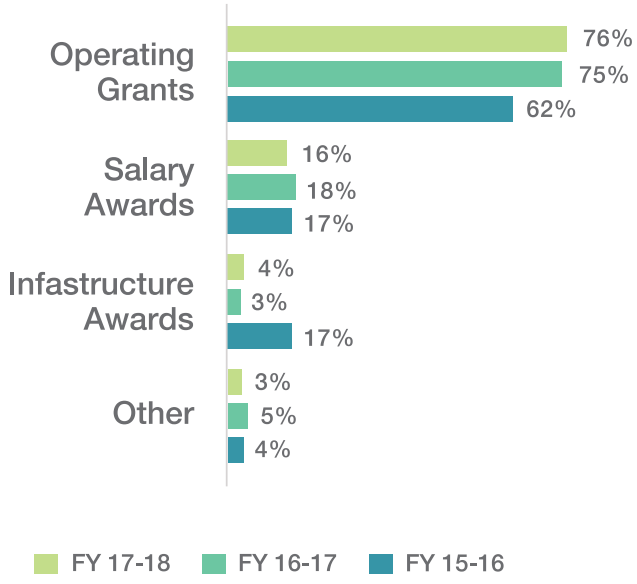
PRODUCING AND ADVANCING KNOWLEDGE

$57.8 Million
in TOTAL GRANTS AWARDED in FY 17–18
$55.2 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



943 TOTAL
 # OF PUBLICATIONS
in FY 17–18
840 in FY 16–17

792
JOURNAL ARTICLES
in FY 17–18
747 in FY 16–17

99%
PEER REVIEWED
in FY 17–18
98% in FY 16–17

100%
% of CIHR competitions above National AVG SUCCESS RATE
in FY 17–18
100% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

$40K↑
of REALIZED REVENUE
in FY 17–18
$23K in FY 16–17

7 patents filed
4 patents issued
in FY 17–18
5 filed, 7 issued in FY 16–17

141
ACTIVE LICENSES
(9 new) in FY 17–18
11 new in FY 16–17

2 spin-offs (1 new)
# of ACTIVE SPIN-OFFS in FY 17–18
2 (0 new) in FY 16–17

BUILDING RESEARCH CAPACITY

296↓
OF RESEARCHERS*
in FY 17–18
301.5 in FY 16–17

678↑
OF TRAINEES
in FY 17–18
530 in FY 16–17

$1.9 Million↓
RESEARCH SUPPORT
FUND GRANTS
in FY 17–18
$2.0 Million in FY 16–17

*Excluding affiliate investigators

HEALTH & POLICY BENEFITS

195↓
OF CLINICAL TRIALS
in FY 17–18
198 in FY 16–17

108,720↑
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 17–18
57,789 at the end of FY 16–17

27%↓
% INDUSTRY FUNDED
TRIALS in FY 17–18
28% in FY 16–17

TOP 3 ACHIEVEMENTS
BC CHILDREN'S HOSPITAL RESEARCH

Details available in Supplementary Report

1

BC Children's Hospital researchers successful in prestigious national funding competition, bringing the benefits of genomics and precision medicine to BC kids

BC Children's investigators led or co-led six of the 15 projects funded through Genome Canada's 2017 Large-Scale Applied Research Project competition. Four projects based at BC Children's were awarded $33.6 million to:

- Improve genetic testing and care for Indigenous children
- Develop new approaches to diagnose and prevent asthma
- Use genomic technology to prevent dangerous drug reactions in children with cancer
- Expand genetic counselling for families undergoing whole genome sequencing

Two projects co-led by BC Children's researchers but based at other sites will:

- Improve access to genomic sequencing to improve diagnosis of rare diseases
- Expand the use of non-invasive prenatal testing to improve prenatal diagnosis and give expectant families important health information earlier and at no cost

2

New research could lead to advances in diabetes treatment that make insulin injections obsolete

A study led by Dr. Francis Lynn and published in Developmental Cell advances knowledge of how insulin-producing pancreatic cells develop before birth, which may help scientists grow these cells in the lab. This research could result in the ability to grow large numbers of functional insulin-producing cells in the lab, increasing the availability and safety of pancreatic cell transplantation. Pancreatic cell transplantation ends the need for daily insulin injections, effectively curing diabetes, but the procedure is not currently widely performed due to a lack of donors and the risk of life-threatening side effects.

3

Dr. Ruth Grunau recognized for her leadership in research on infant pain

Dr. Ruth Grunau received the 2018 Jeffrey Lawson Award for Advocacy in Children's Pain Relief from the American Pain Society for recognition of her extraordinary career contributions to the understanding and prevention of infant pain. Her work has led to changes in health care policy and clinical practice worldwide to improve pain management for preterm babies. She recently received a four year grant from the Canadian Institutes of Health Research to study the behavioural and cognitive development of babies born very pre-term throughout childhood.

TABLE 2 BCCHR Outcomes

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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 messaging, tools, resources and approach behind Live 5-2-1-0 program – an initiative led by BC Children's investigators – have been adopted by New Zealand's Bay of Plenty District Health Board for their regional childhood obesity prevention strategy. Local public health workers have adapted Live 5-2-1-0 resources for local use and piloted them with a variety of users over a period of five months. They also created materials specifically aimed at Maori populations in the Maori language. The Live 5-2-1-0 program is now being rolled out on a large-scale across the health district. All children will receive Live 5-2-1-0 materials at their two-year-old and 4.5-year-old health check-ups and Live 5-2-1-0 messaging will be distributed across the region at hospitals, community health centres and dental practices.	The Live 5-2-1-0 initiative promotes healthy eating and physical activity with a simple message: Every day, children should enjoy five or more fruits and vegetables, have no more than two hours of screen time, play actively for one hour, and consume zero sugary drinks. Live 5-2-1-0 materials are being introduced in the Bay of Plenty Health District Board to meet a recognized need in the area for standardized, effective interventions for child obesity prevention.	**Patient:** Access to new treatment/ technology **System:** Knowledge dissemination-new policy
In November 2017, the BC Injury Research and Prevention Unit, in collaboration with the BC Falls and Injury Prevention Coalition and the BC Ministry of Health, organized activities for BC Seniors Fall Prevention Week. The multi-platform campaign saw great success in many areas, all supplemented by excellent engagement and participation from BC's health authorities. The campaign was informed by research from BC Injury Research Prevention Unit investigators and others on the most common causes of falls in seniors, and includes key messages designed to be simple and address some of the major, preventable risk factors for falls. The key messages are: keep your body active, make your home safer, have your doctor or pharmacist review your medications, and have your eyes checked by an optometrist once a year.	This initiative empowers seniors to take basic steps to prevent falls, which can lead to serious injury, disability and death. The campaign results included over 4,000 visits to the campaign website, over 6,000 posters distributed to public health units, general practitioner offices, pharmacies, and trauma units across the province; a social media campaign reaching over 140,000 people; and a media release resulting in seven media stories.	**System:** Knowledge dissemination-new policy
Additional genetic tests that predict the risk of serious side effects to common chemotherapy drugs have been introduced into practice at BC Children's Hospital. Children diagnosed with cancer are now given tests that show whether they are at risk for hearing loss from the drug cisplatin and heart damage from the drug anthracycline. BC Children's Hospital investigators developed these tests based on research identifying genetic variations that increase the risk of harmful reactions to chemotherapy drugs.	These tests provide clinicians and families with valuable information about a child's risk of experiencing hearing loss or heart damage as a result of chemotherapy. Based on the results of these tests, clinicians can work with patients and families to develop a treatment plan that balances the benefits of chemotherapy drugs against the risk of side effects. Children at high risk of developing drug reactions are also closely monitored, so they can receive immediate care if any complications develop.	**Patient:** Access to new treatment/ technology **Patient:** Delay of disease progression/ survival

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
BC Children's Hospital investigators helped introduce and implement HEARTSMAP in dozens of emergency departments across the province in 2017/2018. HEARTSMAP is an emergency psychosocial assessment and management tool for children and youth in mental health crisis. The tool provides the clinician with guiding questions to collect key information from the patient; it then uses the data to identify areas of need and provide clinicians with recommendations for management. In 2017/2018, The HEARTSMAP team travelled to sites across interior and northern BC to provide onsite training to emergency department clinicians. The tool is now implemented and being evaluated at 50 emergency departments across the province.	HEARTSMAP was developed in response to a lack of specialized pediatric mental health care and an increased need for more accurate and consistent assessment of mental health issues in the emergency department, as well as a need for better connections to community resources. HEARTSMAP is improving and standardizing care for child and youth in mental health crisis across BC by giving clinicians a standard set of effective tools to assess and respond to mental health needs in the emergency department. HEARTSMAP helps ensure children and youth in mental health crisis get timely and effective care and reduces the stress of patients and families who come to the emergency department for treatment.	**Patient:** Access to new treatment/ technology **Patient:** Improvements in timely access to care **System:** Process of care-standardization **System:** Process of care-protocol implementation
In 2017, a BC Children's Hospital investigator was among the international leaders in nutrition sciences to serve as a member of the Food and Agricultural Organization of the United Nations Expert Working Group. The working group developed guidelines on how to measure protein quality in two kinds of food products for young children: ready to use therapeutic food and follow-up formula for young children. Ready to use therapeutic food is provided under medical supervision to young children with severe malnutrition, and follow-up formula for young children is a formula given to children ages 12-36 months to improve nutrition during the transition to solid food. The guidelines will help researchers and policy makers evaluate the two kinds of food products to determine which deliver the most high-quality protein to children.	The Food and Agricultural Organization Working Group guidelines will inform the creation of specialized food products designed to optimally meet young children's nutritional needs. These food products could help the worldwide fight against protein malnutrition, which effects many children in developing countries and can lead to a range of poor health outcomes and death. The guidelines will also ensure food products for Canadian children contain a sufficient amount of protein in a form they can digest.	**System:** Knowledge dissemination-new policy
SmartMom, Canada's first parental education program delivered by text message, launched in the Fraser Health Authority, where more than 16,000 babies are delivered every year. SmartMom was developed by researchers at BC Children's Hospital and BC 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. SmartMom delivers timely, targeted information to users based on their gestational age and individual interest in reducing smoking, drugs, or alcohol. Text messages include prenatal health information aligned with professional practice standards, and links to evidence-based web sources and local community resources.	SmartMom transforms prenatal education from the classroom model to a format meeting the needs not only of the younger, mobile phone-friendly generation but also those who live in rural and remote locations. SmartMom increases access to health information, health resources, and motivates healthy behaviour change(s) throughout pregnancy to support the best possible outcomes for mothers and babies. SmartMom is successfully reaching its target group of young mothers (86 per cent of users are under 24 years old), First Nations women (14 per cent of users), and women without post-secondary education (24 per cent of users).	**System:** Knowledge dissemination-new policy **System:** Knowledge dissemination **PHSA Collaborator:** WHRI, Child Health BC

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
A BC Children's Hospital investigator helped lead the creation of new national guidelines for the diagnosis and treatment of congenital diaphragmatic hernia, a life-threatening birth defect in which the diaphragm – the wall of muscle that divides the chest and abdominal cavities – doesn't form completely early in pregnancy, leading to problems with the developmental of the internal organs. The new guidelines provide evidence-based recommendations on the management of congenital diaphragmatic hernia from diagnosis during pregnancy all the way to long-term follow-up. They are the first guidelines for treating congenital diaphragmatic hernia in Canada, and the most up-to-date guidelines for congenital diaphragmatic hernia in the world. The guidelines are currently in use at BC Children's Hospital and other hospitals across Canada.	Because their lungs are smaller than normal, babies with congenital diaphragmatic hernia need help getting enough oxygen immediately after birth and require surgery within the first few weeks of life to fix their hernias. Today, almost 80 per cent of babies with congenital diaphragmatic hernia survive, but many suffer long-term health complications and require follow-up care throughout childhood. These guidelines will help standardize care for babies with congenital diaphragmatic hernia to ensure they get the right care at the right time and have the best possible outcomes.	**Patient:** Protocols and guidelines **System:** Process of care-protocol implementation
The first in-hospital immunization clinic in Canada, delivering all publicly funded vaccines, opened at BC Children's Hospital in October 2017. The clinic was developed as the result of research conducted at the Vaccine Evaluation Center at BC Children's Hospital showing that children with chronic health conditions often do not stay up-to-date on recommended vaccinations. This clinic provides publicly funded immunizations to all hospital patients, their family members and visitors, increasing overall immunization rates and protecting the most vulnerable patient groups. The clinic also offers consultation services to vaccine providers across the province and supports vaccine research.	The clinic helps raise overall vaccination rates and ensures vulnerable patient groups are protected from illness by making vaccines easily accessible to all hospital patients, family members and visitors. The clinic is particularly valuable for children with chronic illnesses such as cancer, who often fall behind on immunizations, even when there's no medical reason for vaccinations to be delayed.	**Patient:** Improvements in timely access to care

RESEARCH METRICS BCMHSUS

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

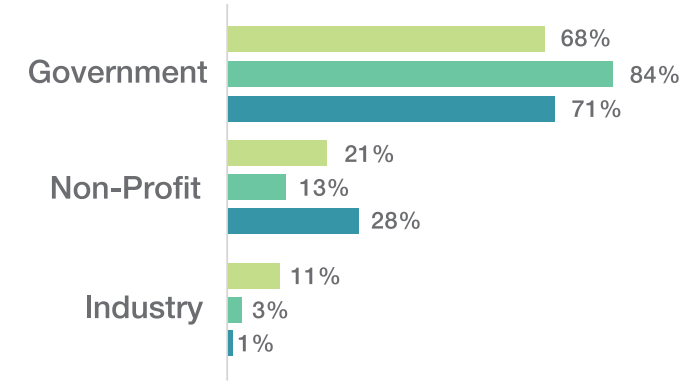
PRODUCING AND ADVANCING KNOWLEDGE

$1.99 Million

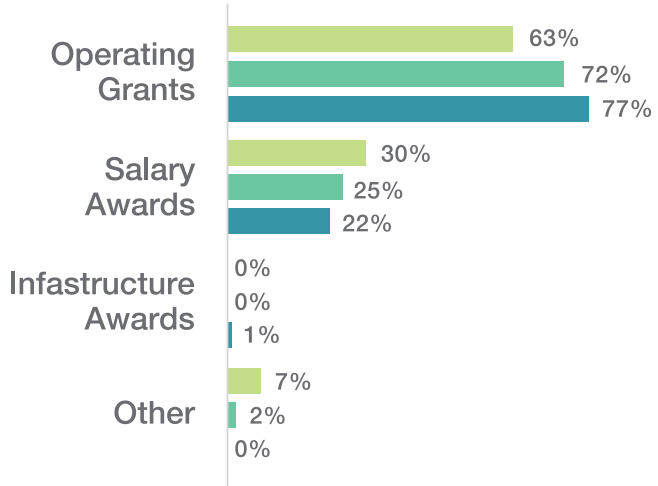
in TOTAL GRANTS AWARDED in FY 17–18

$2.0 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



FY 17-18 FY 16-17 FY 15-16

82 TOTAL
 # OF PUBLICATIONS
in FY 17–18
80 in FY 16–17

73
JOURNAL ARTICLES
in FY 17–18
63 in FY 16–17

93%
PEER REVIEWED
in FY 17–18
80% in FY 16–17

33%
% of CIHR competitions above National AVG SUCCESS RATE
in FY 17–18
50% in FY 16–17

BUILDING RESEARCH CAPACITY

19 ↔

 # OF RESEARCHERS*
in FY 17–18
19.5 in FY 16–17

125 ↑

 # OF TRAINEES
in FY 17–18
95 in FY 16–17

$179K ↓

RESEARCH SUPPORT FUND GRANTS
in FY 17–18
$185K in FY 16–17

*Excluding affiliate investigators

HEALTH & POLICY BENEFITS

5 ↑

 # OF CLINICAL TRIALS
in FY 17–18
2 in FY 16–17

423 ↑

TOTAL CUMULATIVE SUBJECT ENROLLMENT
at the end of FY 17–18
244 at the end of FY 16–17

0%

% INDUSTRY FUNDED TRIALS in FY 17–18
0% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

No activity in FY 17–18

TOP 3 ACHIEVEMENTS BCMHSUS

Details available in Supplementary Report

1 Two BCMHSUS investigators named as CAMH Difference Makers

Dr. Jehannine Austin and Dr. Todd Woodward were among 150 award recipients named by the Centre for Addiction and Mental Health (CAMH) in Toronto as Leading Canadians for Mental Health. CAMH recognized Dr. Austin as a trail blazer in psychiatric genetic counselling. Motivated by her own experience with depression, Dr. Austin established the world's first specialty clinic for psychiatric genetic counselling in 2012. Dr. Todd Woodward was recognized for his work helping people living with schizophrenia learn how to manage their delusions. A free program co-developed by Dr. Woodward that teaches people living with schizophrenia about common thinking patterns, and how to counter harmful thoughts, has been downloaded more than 50,000 times, is available internationally, and has been translated into 33 languages.

2 BCMHSUS investigators receive $1.6M grant to co-lead prestigious international study in correctional health

Dr. Johann Brink and Dr. Tonia Nicholls are co-leads (in partnership with Dr. A. Simpson at CAMH and with international collaborators) on a 5-year, $1.6 million Networks of Centres of Excellence (NCE) grant to advance evidence-based practice in correctional health. The NCE program supports large-scale, academically-led research networks that harness the creativity and inventiveness of Canadian health, natural and social scientists, and engineers. The vision for I-CEIsMIC – International Collaboration for Excellence and Innovations in Me - is to identify, develop, package, implement, and disseminate models to provide the highest quality mental health services to inmates of correctional facilities internationally.

3 New BCMHSUS investigator receives CIHR grant on first application

Dr. Will Panenka, a new BCMHSUS investigator, won a $600 thousand CIHR grant to study traumatic brain injury in Vancouver's marginally housed population. While this substantial multi-year grant is impressive in its own right, it is all the more so given it was Dr. Panenka's first CIHR grant application. This work will build on a ten-year CIHR-funded study that has been investigating persons at high risk for homelessness. Through the team's well-established links with clinical teams, municipal and provincial government and local police, this study is expected to immediately and meaningfully inform care and social policy.

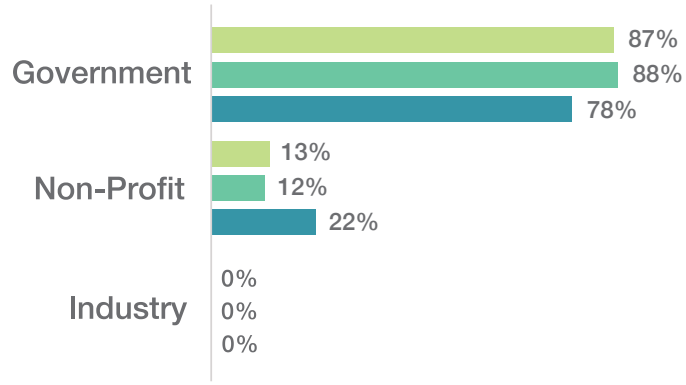
RESEARCH METRICS BCCDC

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

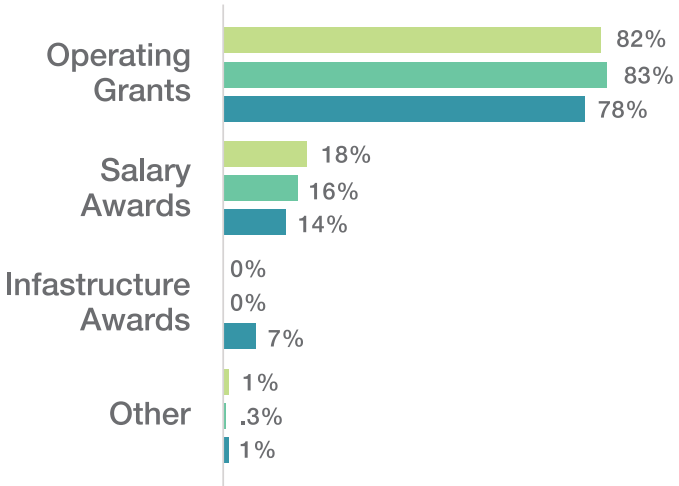
PRODUCING AND ADVANCING KNOWLEDGE

$3.7 Million
in TOTAL GRANTS AWARDED in FY 17–18
$3.2 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



FY 17-18 FY 16-17 FY 15-16

215 TOTAL
OF PUBLICATIONS
in FY 17–18
211 in FY 16–17

112
JOURNAL ARTICLES
in FY 17–18
94 in FY 16–17

80%
PEER REVIEWED
in FY 17–18
66% in FY 16–17

100%
% of CIHR competitions above National AVG SUCCESS RATE
in FY 17–18
100% in FY 16–17

BUILDING RESEARCH CAPACITY

34 ↔

 # OF RESEARCHERS*
in FY 17–18
35 in FY 16–17

139 ↑

 # OF TRAINEES
in FY 17–18
95 in FY 16–17

$82K ↓

RESEARCH SUPPORT FUND GRANTS
in FY 17–18
$93K in FY 16–17

HEALTH & POLICY BENEFITS

5 ↔

 # OF CLINICAL TRIALS
in FY 17–18
5 in FY 16–17

1,639 ↓

TOTAL SUBJECT ENROLLMENT
in FY 17–18
2,656 in FY 16–17

20% ↔

% INDUSTRY FUNDED TRIALS in FY 17–18
20% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

No activity in FY 17–18

**Excluding affiliate investigators*

TOP 3 ACHIEVEMENTS
BCCDC

Details available in Supplementary Report

1 Opioid Crisis Involvement

In the past year, BCCDC has provided extensive leadership in the response to the overdose emergency as an active member of the Ministry of Mental Health and Addictions Overdose Emergency Response Centre (OERC). This includes leading the OERC's surveillance, monitoring and evaluation activities to provide regional and community teams with data needed to inform on-the-ground actions, and scaling up the provincial take-home naloxone program across BC including, most recently, distribution through hundreds of community pharmacies. BCCDC also is leading the development of overdose-related innovations as well as conducting critical evaluations of the provincial response.

2 National Blueprint for Hepatitis C Engagement

BCCDC has been involved in developing a national blueprint for Hepatitis C engagement and its researchers, along with researchers from McGill University, were awarded a $1.2 million CIHR grant for a national study on the impact of Hepatitis C (HCV) treatment on liver disease outcomes. The study results will inform optimal screening/treatment strategies and policies for HCV care in different HCV risk groups and across diverse geographic and policy contexts in Canada.

3 Genomics

BCCDC continues its outstanding genomics work in tracking outbreaks in Salmonella, Carbapenemase Producing Organisms (CPO) and Tuberculosis (TB). BCCDC-collected whole genome sequencing (WGS) data for BC Salmonella outbreaks that has identified substantially more numbers of outbreaks, both provincially and nationally, than would have otherwise been detected prior to WGS testing. A database of WGS of superbug Carbapenemase Producing Organisms (CPO) isolates in BC from 2008 to present has been used along with the PICNet surveillance program to track cases of CPO in BC, and led to rapid detection of outbreaks in healthcare facilities across BC for infection prevention and control response. BCCDC TB researchers published three articles related to genomic work in Tuberculosis (TB), completed sequencing of ~250 TB genomes (all the TB cases diagnosed in 2015), and began sequencing all TB cases diagnosed in 2017-18.

TABLE 3 BCCDC Outcomes

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
During FY 2017/2018, Environmental Health Services at the BCCDC evaluated the utility of the Air Quality Health Index during wildfire smoke episodes province-wide. It was found that the current index is not adequately reflective of health risk and recommended an updated algorithm be used during the wildfire season. This project was completed in partnership with the BC Ministry of Environment and Environment Canada.	The Air Quality Health Index will now be more reflective of population health risk during periods when air quality is degraded by wildfire smoke.	**System:** Knowledge dissemination-new policy
During 2017, there was a push to standardize national hot weather alerts across all provinces. Although BC had a hot weather warning system for the Lower Mainland region, the rest of the province was not covered. Environmental Health Services at the BCCDC developed evidence-based temperature thresholds to be used across BC and worked closely with Environment Canada and Health Canada to disseminate the information to provincial stakeholders.	All residents of BC will now be protected by a hot weather warning system during the summer months.	**System:** Knowledge dissemination-new policy
BCCDC research led to the development of a new, user-centred reporting template to share the results of tuberculosis whole genome sequencing data with clinicians.	This simple, two-page report template allows clinicians to quickly and easily understand a bacterial isolate's predicted drug resistance phenotype, and it has been adopted by the ReSeqTB Consortium, a Gates-funded initiative cataloguing genotyping and phenotypic data for Mycobacterium tuberculosis isolates around the world.	**System:** Process of care standardization
BCCDC research evidence informed the World Health Organization Isoniazid-Resistant Tuberculosis Treatment Guidelines.	These changes to the guidelines improve outcomes of isoniazid-resistant tuberculosis treatment, including reducing the risk of relapse, acquired drug resistance and generation of multidrug resistant tuberculosis.	**Patient:** Protocols and guidelines
The new Direct Acting Antiviral drugs are a game changer in that they are able to cure Hepatitis C infection. However, these drugs, while effective, are expensive. Using the BCCDC's Hepatitis Testers Cohort, we have been able to provide PharmaCare with integrated utilization and outcome data to help inform dispensation guidelines and assess cost effectiveness.	This information helps ensure that those who need treatment are more likely to receive it. It has also provided PharmaCare with outcome data which is helpful for drug price negotiation and planning for expensive therapeutics.	**Patient:** Access to new treatment/technology

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
People Who Inject Drugs are the main drivers of new Hepatitis C infections; the BCCDC's Hepatitis Testers Cohort has been used to analyze post treatment cures to understand the effectiveness of these therapeutics. This work has demonstrated the strong need to prevent reinfection by providing wrap around services, including harm reduction (needle exchange, opioid substitution and mental health counseling) which has been shown to reduce reinfection risk in people who inject drugs. This information has been conveyed to the BC Ministry of Health and other decision makers.	This data provides the evidence for the value of harm reduction policies which will not only decrease reinfection but mortality from opioid overdoses.	**Patient:** Delay of disease progression/ Survival
The BCCDC Public Health Laboratory used molecular detection and molecular fingerprinting along with Infection Prevention and Control information from the health authorities to track the "superbug" called Carbapenemase Producing Organisms in BC. BC's Provincial Infection Control Network used that information to guide the development of an evidence-based guideline to standardize Carbapenemase Producing Organisms surveillance and this was mandated by the Ministry of Health. The Provincial Communicable Disease Policy Committee of BC reviewed and approved the protocol on December 19, 2017.	This guideline standardizes the screening, detection and control practices across BC to detect early transmission of Carbapenemase Producing Organisms within acute care and community facilities.	**Patient:** Protocols and guidelines
Legionella causes outbreaks of respiratory infections and there is a need to rapidly identify the cases and potential environmental sources to support public health investigations. This involves the use of molecular detection tools. To support rapid outbreak detection and control, the Management of Specific Diseases Legionella Outbreak Investigation and Control guideline was developed in March 2018.	This evidence-based guideline integrates laboratory, environmental and epidemiological investigations to identify legionella outbreaks quickly, improve the care of affected patients and address the environmental source.	**Patient:** Protocols and guidelines
The emergence of multidrug resistant organisms and extensively drug resistant organisms are of international concern and priority. However, the burden of disease in Canada is unknown without surveillance. The BCCDC Public Health Laboratory, as part of the Canadian Public Health Laboratory Network, developed guidelines for Canadian laboratories to standardize interpretation of multiple or extensive drug resistance bacteria.	Provides a framework for Canadian laboratories to consistently report and monitor multidrug resistant organisms and extensively drug resistant organisms for common gram-negative pathogens.	**Patient:** Protocols and guidelines

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
Recommendations for reformulation of influenza vaccine components for the southern hemisphere's 2018 influenza season (determined in September 2017) and the northern hemisphere's 2018/2019 season (determined in February 2018), was informed in part by BCCDC-led research findings from the Canadian Sentinel Practitioner Surveillance Network. The recommendations were based on genetic, antigenic and epidemiologic monitoring and characterization of influenza vaccine-virus relatedness and effectiveness and submitted by the Canadian Sentinel Practitioner Surveillance Network to the World Health Organization Vaccine Strain Selection Committee through the Global Influenza Vaccine Effectiveness consortium.	Vaccine strain selection by the World Health Organization helps determine the protection provided by vaccination to tens of millions of individuals globally.	**Patient:** access to new treatment/technology
Research findings of the BCCDC Influenza Team were presented to the World Health Organization, various provincial communicable disease policy committees to inform immunization control manuals, and to Canada's National Advisory Committee on Immunization to inform guidelines on the use of seasonal influenza vaccine for 2017/2018.	Ensures public health policies and programs are informed by the best scientific evidence on influenza vaccine protection.	**System:** Knowledge dissemination-new policy
Influenza surveillance and vaccine effectiveness findings from the BCCDC Influenza Team contributed to updated national guidelines from the Association of Medical Microbiology and Infectious Disease Canada on use of antiviral drugs during the 2017/2018 influenza season in response to a potential low vaccine effectiveness. A BCCDC researcher served as expert contributor and co-author of the guidance document, while 2016/2017 vaccine effectiveness estimates and genetic and antigenic characterization of circulating viruses reported by the Canadian Sentinel Practitioner Surveillance Network were critical for informing anticipated low VE for the 2017/2018 season and the resulting updates to antiviral drug recommendations.	Recommendations from public health authorities on adjunct protective measures during seasonal influenza epidemics need to be guided by current and reliable evidence in order to minimize the disease burden in those at high risk of serious influenza complications.	**Patient:** Delay of disease progression/survival
A BCCDC researcher was one of a handful of expert advisors consulted for the development of a national surveillance case definition of avian influenza A(H7N9) virus for the purpose of case classification and reporting to the Public Health Agency of Canada.	This case definition enables early detection of avian influenza A(H7N9) infection in Canada and supports virus surveillance systems for containment and/or mitigation of human infection and spread of illness.	**System:** Process of care standardization

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
Launched a multidimensional independent environmental health surveillance system (BCTOX). BCTOX#1 media surveillance system, monitors environmental and clinical toxicology issues in BC in the "media" and by non-health system partners. This platform was launched with the collaborative work of health professionals, students and non-health partners from the BCCDC, UBC, SFU, and related independent societies such as the Vancouver Mycological Society. This innovative interactive platform is dedicated to environmental and clinical toxicology issues and news at the population level in BC and was developed in FY 2017/2018	BCTOX#1 media surveillance system picks up, summarizes and reports rare cases of plant poisoning, mushroom poisoning, stings, bites, poisoning of animal and trees plants, chemical spills, etc. that have health consequences in near-real-time. Physicians and health workers receive information that could lead to a better diagnosis and health care. Monthly reports are also shared with 400 public health professionals and policy makers that serve as reminders and lead to developments or modification of public health notices and advisories. BCTOX is hopeful that a summary of reports from environmental and clinical incidents, poisoning and overdoses may modify allocation of attention, time and resources of policy makers based on near-real-time findings in BC to help system sustainability.	**System:** Knowledge dissemination-new policy
BCTOX#2, pollution/recall surveillance system, monitors reports of air pollution, water contamination and food exposures to toxicants as well as food and customer product recalls as a result of toxic exposures in the province. Due to a wide range, high frequency and geographical differences of high toxic exposures mediated via food for example, it is highly unlikely that health professionals keep looking for updates. BCTOX#2, pollution/recall surveillance system fills this information gap.	Physicians and health workers who are notified of food recalls or water contaminations with chemicals convey the message to their patients to avoid further risk and recall the diagnosis when encountering patients who present with related symptoms. Health systems can adjust their activities based on advisories and recalls or reports of chemical-exposed food and disseminate the information. In certain occasions such as limited toxic exposure, BCTOX's report may lead to customizing actions for well-defined geographical areas.	**System:** Process of care-protocol implementation
Other agencies (not PHSA) test marine foods for biotoxins most notably Domoic acid, Saxitoxin and Okadaic acid for food-related commercial purposes. The results are location-based and their work has advantages for public health but there is a time gap between sampling and laboratory tests, and results are not sent to the physicians. Over 10,000 environmental samples are processed annually. Connecting results with health professionals in near-real-time are of utmost importance to educate and to help understand related diseases including amnesic, diarrhoeic and paralytic shellfish poisonings. BCTOX#3, Marine biotoxins surveillance system, monitors biweekly samples, summarises the result and reports the graphs in near-real-time (i.e. on a monthly basis).	Physicians and health workers do not usually think of marine biotoxins when encountering patients with gastrointestinal or neurologic symptoms. Dissemination of surveillance results would affect case findings and improve diagnosis and treatment. Health systems would also accommodate the results to better develop the system to meet needs.	**System:** Process of care standardization

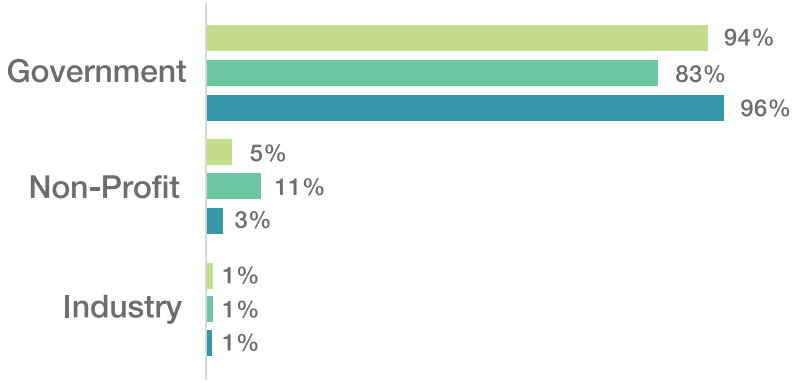
RESEARCH METRICS WHRI

WOMEN'S HEALTH RESEARCH INSTITUTE AT BC WOMEN'S

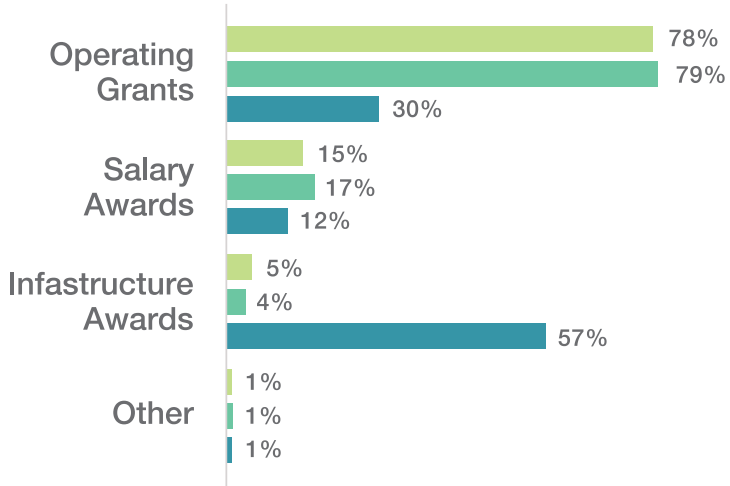
PRODUCING AND ADVANCING KNOWLEDGE

$2.9 Million
in TOTAL GRANTS AWARDED in FY 17–18
$2.5 Million in FY 16–17

$ BY SECTOR



$ BY AWARD TYPE



585 TOTAL # OF PUBLICATIONS in FY 17–18
476 in FY 16–17

353 JOURNAL ARTICLES in FY 17–18
307 in FY 16–17

94% PEER REVIEWED in FY 17–18
94% in FY 16–17

50% % of CIHR competitions above National AVG SUCCESS RATE in FY 17–18
100% in FY 16–17

BUILDING RESEARCH CAPACITY

220↑
WHRI MEMBERSHIP
in FY 17–18
173 in FY 16–17

448↑
 # OF TRAINEES
in FY 17–18
402 in FY 16–17

$160K↑
RESEARCH SUPPORT FUND GRANTS
in FY 17–18
$149K in FY 16–17

HEALTH & POLICY BENEFITS

31↑
 # OF CLINICAL TRIALS
in FY 17–18
11 in FY 16–17

3,092↑
TOTAL CUMULATIVE SUBJECT ENROLLMENT
at the end of FY 17–18
545 at the end of FY 16–17

23%↓
% INDUSTRY FUNDED TRIALS in FY 17–18
24% in FY 16–17

ECONOMIC BENEFITS & INNOVATION

No activity in FY 17–18

TOP 3 ACHIEVEMENTS
WHRI

Details available in Supplementary Report

1 WHRI leads the creation of the inaugural BC Women's Health Research Agenda

At the request of the BC Ministry of Health, the WHRI lead the creation of British Columbia's Women's Health Research Agenda this past year. The Women's Health Research Agenda is meant to serve as a guiding document for those engaged in the women's health research enterprise. This document identifies key challenges, drivers, and enablers to women's health research and implementation efforts in BC and presents strategies for enabling, facilitating, and accelerating growth and excellence in women's health research and implementation. It is intended to direct the work of women's health researchers forward with strength and cohesion, focus and vision, to advance the field of women's health research in British Columbia.

2 WHRI takes on responsibility for providing researchers with access to unlinked data from the BC Perinatal Data Registry

The WHRI has taken on the role of providing investigators in BC with access to unlinked data from the Perinatal Data Registry for research purposes. This past year, the responsibility for managing and providing researcher access to unlinked data from the Perinatal Data Registry was transferred to a PHSA Data Analyst embedded within the WHRI. This change was initiated in order to ensure that researchers in the province will be able to have timely access to data from the Perinatal Registry via streamlined request processes and expedited data export procedures.

3 WHRI establishes two patient engagement committees to promote patient-oriented research

Two BC Women's Hospital clinical programs, the BC Women's Centre for Pelvic Pain and Endometriosis Research Program and the BC Women's Complex Chronic Disease Program, have established two separate patient engagement committees in order to inform the development and progress of research projects. These patient committees not only inform the development of research projects but serve as a vehicle to allow for end of project knowledge translation back to their respective patient groups.

TABLE 4 WHRI Outcomes

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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 )
A WHRI/BCCHRI researcher led the first Canadian study of determinants of successful reintegration of women into the community after release from provincial prison. Based on the results of the study, the research contributed to the decision to move health care in BC's provincial prisons from privately hired physicians and dentists to now fall under the jurisdiction of the Provincial Health Services Authority with oversight from the Ministry of Health.	Improved health and socio-economic outcomes for incarcerated women in British Columbia through improved access to comprehensive primary health care, dental care and nutrition counselling, which have shown to be powerful protective factors against re-engagement in criminal activity. Cost savings by reducing the number of women reoffending and returning to provincial prison after being released.	**Patient:** Access to new treatment or technology **System:** Knowledge dissemination-new policy; Process of care-standardization 
WHRI researcher was one of the co-authors of a national clinical practice guideline: Transvaginal Mesh Procedures for Pelvic Organ Prolapse.	Improved outcomes for women with pelvic organ prolapse by enabling more accurate patient-informed consent before operative procedures and ensuring that health care providers are aware of outcomes related to transvaginal mesh procedures and steps in the management of related complications. .	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability  **PHSA Collaborator:** WHRI
WHRI researcher developed an open-source, online educational toolkit for health care providers: Dialogue and Shared Decisions: Advancing Person-Centered Health Care. This toolkit has been implemented across the USA and at UBC in both health professional programs and in continuing education courses for clinicians.	This toolkit provides guidance to health care providers on shared decision-making and inter-professional teamwork, communication, and conflict resolution, which will result in improved outcomes through the use of patient-centered care.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy
A WHRI researcher was one of the co-authors of a national clinical technical update: The Role of Early Comprehensive Fetal Anatomy Ultrasound Examination.	This technical update will improve maternal and fetal outcomes due to earlier identification of fetal anomalies and the presentation of earlier intervention options in high-risk populations and/or in populations where mid–second trimester transabdominal scanning is challenging. It will also result in cost savings by promoting the more efficient use of ultrasound assessment.	**Patient:** Access to new treatment or technology **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
Research findings from a WHRI/BCCHRI researcher has resulted in Non-Invasive Prenatal Testing, a new non-invasive blood test that measures the amount of cell-free fetal DNA circulating in maternal serum, being implemented in both BC and Quebec as a second-tier test for prenatal genetic screening.	This testing improves maternal and fetal health due to higher sensitivity and lower false positive rates as compared to conventional prenatal screening, thus, fewer women are expected to undergo invasive diagnostic testing associated with risk of miscarriage. Also, Non-Invasive Prenatal Testing offers screening results earlier which allows expectant parents more time for decision-making.	**Patient:** Access to new treatment or technology **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability  **PHSA Collaborator:** BCCHRI
A WHRI researcher contributed to the development of a guidance document by the Canadian HIV/AIDS Legal Network: Women and the Criminalization of HIV Non-Disclosure.	This guidance document advocates for governments to limit the use of the criminal law only to cases of intentional transmission of HIV (i.e., the HIV-positive person knows their status, acts with the intention to transmit HIV, and does in fact transmit it). This will result in improved outcomes for women, as gendered analysis of the current use HIV nondisclosure laws reveal that criminalization is a blunt, punitive and inflexible approach to HIV prevention that does little to protect women from HIV infection, violence, coercion or sexual objectification.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability 
A WHRI researcher was the principal author of a national clinical technical update: Treatments for Overactive Bladder: Focus on Pharmacotherapy.	This will improve outcomes for women with overactive bladder by providing physicians and other interested health care providers with additional options for and knowledge of safe and effective pharmacotherapy for this condition.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability 
A WHRI researcher was one of the co-authors of a national clinical practice guideline: Canadian HIV Pregnancy Planning Guidelines.	This will improve pregnancy and infant outcomes due to a reduced risk of perinatal HIV transmission by increasing the extent of pregnancy planning by individuals with HIV through informed discussions of safer options for conception and recommendations for healthy pregnancies. Maternal outcomes will improve through reduction of the stigma associated with pregnancy and HIV through education.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability

Please describe any guideline, drug, diagnostic agent or device adopted or approved in FY 2017/2018 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)
Research findings from a WHRI researcher on maternal mortality post child custody loss were included in the new British Columbia Centre on Substance Use and BC Ministry of Health Guidelines for the Clinical Management of Opioid Use Disorder (Pregnancy Supplement).	These guidelines will improve maternal and infant outcomes for women with opioid use disorder due to use of comprehensive integrated care plans for pregnant patients with appropriate use of the full range of available treatment options and harm reduction services, within a non-judgmental, trauma-informed, culturally safe, and collaborative approach to care.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy **PHSA Collaborator:** BCCDC
Three WHRI researchers participated in the Canadian fertility and andrology society clinical practice guideline committee that led to the development of the national clinical practice guideline: Egg Freezing for Age-Related Fertility Decline.	Implementation of this guideline will assist clinicians who provide fertility services to develop an optimal approach in providing counselling to women regarding egg freezing while minimizing harm and improving patient outcomes during treatment.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability
A WHRI researcher appeared before the Senate of Canada Standing Committee on Public Safety (April 5, 2017) to suggest amendments to Bill C-37 (An Act to amend the Controlled Drugs and Substances Act) on behalf of the Canadian Nurses Association to present their own research findings on supervised consumption sites.	Improved Canadian public health outcomes due to streamlined and simplified application processes that reduce the administrative burden on communities seeking to establish supervised consumption sites, without compromising the health and safety of those operating the site, or the surrounding community.	**Patient:** Protocols and guidelines **System:** Knowledge dissemination-new policy **PHSA Collaborator:** BCCDC
A WHRI/BCCHRI researcher participated in the Canadian National Rh working group that led to the development of the national clinical practice guideline: Routine Non-invasive Prenatal Prediction of Fetal RHD Genotype in Canada: The Time is Here.	Improved maternal and infant outcomes due to a non-invasive test of fetal RHD phenotype which enables appropriate monitoring and treatment if the fetus is RHD positive and avoids excessive and unnecessary testing if the fetus is RHD negative.	**Patient:** Access to new treatment or technology **System:** Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability **PHSA Collaborator:** BCCHRI

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

16
REGISTRIES & DATASETS

representing

9
PHSA PROGRAMS

REGISTRY/DATASET USES

81% (13)
USED FOR RESEARCH

TOP 3 RESEARCH SUPPORT ACTIVITIES

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

13 of 16
REGISTRY/DATASETS submit to Provincial, Federal or International datasets for purposed of research

NATURE OF RESEARCH ACTIVITIES

1,896/1,604
DATA ACCESS requests/approvals over a 10 year period

211/200
DATA ACCESS requests/approvals in FY 17–18

12/16 registries ranked CLINICAL & HEALTH SERVICES RESEARCH as predominant types of research in FY 17–18

A sample of patient and/or system benefits that were quantified, identified, or attained in FY 2017-18 that resulted from research based on the registry or dataset is excerpted below.

TABLE 5 Registry/dataset Patient and System Benefits

BC Children's BioBank	
The BioBank does not directly benefit any patients, however, the collection of samples in the BioBank are of high quality and enable high profile research. This research has the potential to impact patient care in the future.	**System:** Efficiency, cost/benefits or sustainability
Screening Mammography Database	
Review on breast density to examine evidence regarding breast density, breast cancer risk and breast screening.	**System:** Knowledge dissemination-new policy
Tumour Tissue Repository (TTR)	
The TTR has provided direct (~250) opportunities to patients to contribute to and partner with its research program.	**Patient:** Other type, Engagement
The TTR has supported BC Cancer and UBC researchers to secure grant funding for research programs in addition to generating high profile/impact research publications.	**Patient:** Other type, Research Funding
The TTR continues its partnership with the Canadian Tissue Repository Network and UBC's Office of Biobank Education and Research to support the work of the Biobank Resource Centre in assisting researchers conducting biobanking. TTR support included: 1) continuing assistance with the development of biobank education modules, 2) assistance with program testing ahead of the launch of adapted versions of the Biobank Registration and Certification Program, and 3) specific assistance with testing the BC Registration version for researchers in BC.	**System:** Other type, Standards and quality in biobanking
BC Cancer Registry	
Cancer Registry data are used in a number of diverse and impactful research projects. Some of these projects have provided evidence to motivate new programs for those affected by cancer; others aim to assess the economic impact of cancer at both the health system and patient level. This is exciting to see the research community continue to find creative approaches to use the cancer registry platform to generate new knowledge in very relevant and important areas of research.	

PROMIS - Transplant Registry	
Better understanding the management of potential organ donors in the ICU - DONATE study.	**Patient:** Protocols and guidelines
Determine optimal surgical technique for liver implantation.	**Patient:** Access to new treatment/technology
BC Cardiac Registry	
The overall goal of this study, is to identify care gaps for out of hospital cardiac arrest in order to implement and refine care processes that ultimately result in new knowledge translation and policy development.	**Patient:** Protocols and guidelines
Understanding the changes in patient reported outcomes between baseline, 1-month and 1-year after a Trans catheter aortic valve replacement will aid in identifying additional supports pre, peri and post operatively for patients receiving this procedure. Could lead to additional patient and family education materials.	**System:** Efficiency, cost/benefits or sustainability
Primary objective of one study was to use population-based cohort of diabetes patients to evaluate the real-world costs and outcomes associated with diabetes from 1997-2015. May assist in determining cost effectiveness of care for patients with dialysis during the study period and aid in understanding total cost of this type of care.	**System:** Efficiency, cost/benefits or sustainability
PROMIS - Renal	
Understanding the trajectories of patients with different forms of kidney disease allows prediction of time(s) to renal replacement therapies and informs planning for services.	**System:** Efficiency, cost/benefits or sustainability
Understanding the costs of immuno-suppressive therapies has implications for funding projections	**System:** Efficiency, cost/benefits or sustainability
BCAS/ROC - Cardiac Arrest Registry	
The overall goal of this project is to identify gaps in the care of patients who experience an out-of-hospital-cardiac arrest in order to improve long-term health outcomes. The crucial first steps are to understand how frequently out-of-hospital-cardiac arrest occurs in BC, identify gaps that may exist in the care that is provided, and determine their association with patients' long-term well-being. Findings will help improve how cardiac arrest is managed by emergency first responders in the field, by health care providers within the hospitals, and by patients and caregivers once discharged home. This project, with the proposed data linkages, represents the most comprehensive evaluation of out-of-hospital-cardiac arrest to date.	**Patient:** Delay of disease progression/survival **System:** Process of care-standardization

Lung Cancer Screening Program	
Development of a highly accurate tool to predict the probability of lung cancer in screen detected lung nodules.	**Patient:** Protocols and guidelines
Provides access to state-of-the-art computer aided diagnosis to identify screening low-dose computed tomography detected lung nodules and determine malignancy risk.	**Patient:** Access to new treatment/technology
Cost benefit analysis of lung cancer screening.	**System:** Efficiency, cost/benefits or sustainability
Provide evidence to develop lung nodule management guideline.	**Patient:** Protocols and guidelines
Standardize screening low-dose computed tomography protocol.	**System:** Process of care-standardization
Disseminate evidence-based lung cancer screening strategy.	**System:** Knowledge dissemination-new policy
Rapid access to diagnosis of lung cancer and treatment for screen detected abnormality.	**Patient:** Improvements in timely access to care
Access to latest in technology to diagnosis small peripheral lung cancers detected by screening.	**Patient:** Access to new treatment/technology

PHSA PRACTICE EDUCATION METRICS

Provincial Health Services Authority
Province-wide solutions. Better health.

BUILD PRACTICE EDUCATION CAPACITY

255,382
STUDENT HOURS
in FY 17–18

806
PLACEMENT REQUESTS
in FY 17–18

$4 Million
cost of STUDENT SUPERVISION
in FY 17–18

454
Medical Doctor Undergraduate Students w/1,717 STUDENT PLACEMENTS

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

793
Postgraduate Medical Education Residents w/3,498 STUDENT PLACEMENTS

BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION

TOP 5

EDUCATIONAL INSTITUTIONS

in FY 17–18

1. Justice Institute of BC
2. University of BC
3. BC Institute of Technology
4. Langara College
5. Thomson Rivers University

28.3%

in ambulatory & mixed PLACEMENT SETTING

representing 37,268 student hours

42% reduction

over a 5 year period in # of AFFILIATION AGREEMENTS

68/73 (88%) using the standard template

QUALITY OF CLINICAL LEARNING ENVIRONMENT & RESULTS

20%

of new hires with a PHSA PLACEMENT

1st full year of reporting

LEARNING ENVIRONMENT QUALITY SURVEY TOOL

DEVELOPED

STUDENT READINESS SURVEY PILOT

COMPLETED

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
Stephanie Dunn	Manager, Research Communication, BC Children's Hospital Research
Nur Eisma	UBC/C&W Coordinator—Pre & Post Awards
Karin Jackson	Director—Planning, Performance Management & Research, BC Mental Health & Substance Use Services
Karen Hagan	Grants Advisor—Office of Research Facilitation, BC Cancer
Phoebe Lu	Director, Research Services—BC Children's Hospital Research
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, 2017

APPENDIX 3 FRAMEWORK FOR PHSA PRACTICE 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 blue and italics* will be reported on in future reports

APPENDIX 4 STUDENT EDUCATION COORDINATING COMMITTEE

Ellen Chesney[1]	Chief Administrative Officer—Research *Executive Sponsor*
Sandra Harris[4,5,6]	Senior Leader—Clinical Education, Learning & Development
Heather Straight[1]	*Co-chair* (ended Dec 2017), Corporate Director—Academic Development
Tracy Truant[3]	*Co-chair* (Jan-April 2-18), Director- Research Innovation
Sarah Titcomb[1]	Coordinator—Academic Development
Luminita Nica[3]	Clinical Educator, Radiation Therapy
Lauren Mathany[8]	Operations Manager
Helen Lingham[2]	Director—Learning & Development
Karen Derry[4,5,6]	Associate Director—Inter-professional Practice
Sylvia Wu[4]	Manager—Education, Dept. of Pediatrics
Karen Mooder[9]	Multi-site Director—Lower Mainland Pathology & Laboratory Medicine
Deborah Scott[7]	Leader, Clinical Education, Special Projects & Practice Improvement
Sherry Hamilton[1]	Chief Nursing & Liaison Officer, *corresponding*
Sandy Tatla[4,5,6]	Director, New Knowledge & Innovation
Anne Hughes[3]	Professional Practice Leader
Cecilia Li[3]	Provincial Director, Professional Practice Nursing
Sharon McNulty[2]	Director, Professional Practice
Maureen Sexsmith[2]	Director, Professional Practice, Correctional Health Services
Justin Dodds[2]	Director, Professional Practice, Burnaby Centre for Mental Health & Addictions

1. PHSA corporate services
2. BC Mental Health and Substance Use Services
3. BC Cancer
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