

FISCAL YEAR 2019–20

PHSA RESEARCH AND STUDENT EDUCATION

Prepared for:
PHSA Research Committee

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ACKNOWLEDGEMENTS

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

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

TABLE OF CONTENTS

INTRODUCTION TO PHSA'S 3rd CONSOLIDATED SUMMARY REPORT	4
PHSA Research Metrics Fiscal Year Summary - PHSA Overall	5
PHSA Student Education Metrics Fiscal Year Summary - PHSA Overall	6
PHSA's OVERVIEW AND INFOGRAPHICS	7
Research Impacts and Outcomes	9
Student Education Impacts and Outcomes	14
PHSA Infographics	16
PROGRAM SPECIFIC RESULTS	
BC CANCER	20
Research Metrics Summary	21
Top 3 Research Achievements/Accomplishments/Highlights	23
Research Outcomes	24
Student Education Metrics Summary	26
BC CHILDREN'S HOSPITAL RESEARCH INSTITUTE	28
Research Metrics Summary	29
Top 3 Research Achievements/Accomplishments/Highlights	31
Research Outcomes	32
Student Education Metrics Summary	36
BC MENTAL HEALTH & SUBSTANCE USE SERVICES RESEARCH INSTITUTE	38
Research Metrics Summary	39
Top 3 Research Achievements/Accomplishments/Highlights	41
Research Outcomes	42
Student Education Metrics Summary	43
BC CENTRE FOR DISEASE CONTROL/UBC CENTRE FOR DISEASE CONTROL	45
Research Metrics Summary	46
Top 3 Research Achievements/Accomplishments/Highlights	48
Research Outcomes	49
Student Education Metrics Summary	51
WOMEN'S HEALTH RESEARCH INSTITUTE & BC WOMEN'S HOSPITAL & HEALTH CENTRE	53
Research Metrics Summary	54
Top 3 Research Achievements/Accomplishments/Highlights	56
Research Outcomes	57
Student Education Metrics Summary	60
BC EMERGENCY HEALTH SERVICES	62
Student Education Metrics Summary	63
PHSA REGISTRIES & DATASETS	64
Research Metrics Summary	65
Examples of Research Questions	66
APPENDICES	71
APPENDIX 1 Framework for PHSA Research Metrics	71
APPENDIX 2 Research Metrics Working Group Membership	72
APPENDIX 3 Framework for PHSA Student Education Metrics	73
APPENDIX 4 Student Education Coordinating Committee	74

PHSA'S COMMITMENT TO RESEARCH & EDUCATION

Introduction to 3rd Consolidated Summary Report

PHSA Research & Learning Services is pleased to present its third annual consolidated summary of PHSA research and student education metrics. This year's report fully integrates information related to PHSA's academic health science mandate for research and student education, and presents dashboards that reflect, at a glance, quantitative metrics based on PHSA Board-approved performance indicator frameworks. In addition, the report includes:

- a narrative that highlights PHSA's academic health science mandate, how that mandate is being strategically advanced, and the impacts and outcomes being realized;
- integrated sections for PHSA programs that present research and education infographics (illustrating high level inputs and outputs), the Top 3 research accomplishments by research entity (important achievements that may not be well reflected through quantitative metrics), and a detailed listing of research outcomes identified by PHSA research entities; and
- examples of important research questions that are being answered through the rich data assets available in PHSA registries.

PHSA is expected to conduct world-class research, and to deliver excellence in education and training.

This consolidated and integrated reporting approach better communicates how research is driving patient and health system benefits, and how student education is preparing a high-performance health workforce for the future. While research, inquiry and learning take place across PHSA, this report relates activities associated with PHSA's five programs that have research institutes and that play a vital role in providing students with clinical practice education: BC Children's (BC Children's Research Institute), BC Women's (Women's Health Research Institute), BC Cancer (BC Cancer Research), BC Mental Health & Substance Use Services (BC Mental Health & Substance Use Research Institute), and BC Centre for Disease Control (UBC Centre for Disease Control). This report also relates the essential training role of BC Emergency Health Services and the critical research role it plays in collaboration with non-PHSA researchers.

Detailed data for the PHSA Board-approved frameworks for research and student education metrics continue to be reported in the related supplementary reports that support operational decision-making and are available on the PHSA website: <http://www.phsa.ca/our-research/research-focus/research-education-metrics>.

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

The following report illustrates PHSA's commitment to this critical role and the benefits that derive to patients, populations, and the BC health system.

PHSA RESEARCH METRICS

FISCAL YEAR SUMMARY - PHSA OVERALL

Indicator		Key Measure Description	FY 2017-18	FY 2018-19	FY 2019-20
			Value	Value	Value
Producing & Advancing Knowledge	1a	Total Annual Grant Awards by Type (including Major CFI Infrastructure grants) Salary Awards Infrastructure Awards Operating Grants Other	\$152,418,527 13,731,347 10,678,089 122,147,855 5,861,206	\$134,292,906 13,121,094 6,260,726 112,180,392 2,730,693	145,597,847 13,788,858 7,011,184 119,979,796 4,818,009
	1b	Total Annual Grant Awards by RISE Sector (including Major CFI infrastructure grants) Government Non-Profit Industry	75,675,710 57,711,527 19,031,290	65,855,459 50,949,809 17,487,637	66,778,795 60,676,760 18,142,292
	1c	CIHR Annual Grant Application Success Rate - PHSa Overall/ Nat'l ** Foundation Grant (Open) Fall Project Grant Sprint Project Grants	11.1%/11.9% 15.4%/15.9% 19.7%/15.5%	0%/13% 17.7%/14.9% 20.3%/15.6%	N/A 25.3%/15.7% 19.7%/16.9%
	1d	Total # Publications with Program Author BCCHR BC Cancer WHRI BCCDC BCMHSUS	943 449 585 215 82	858 655 670 305 61	1,060 744 752 161 127
Building Research Capacity	2a	Total # Research Trainees	1,970	2,315	2,601
	2c	Total # Researchers (excluding Category 3 – Affiliate Investigator)	817	788	832.5
	2e	Research Support Fund Grants (Tri-Council only)	\$3,973,494	\$4,049,673	\$4,063,179
Achieving Economic Benefits & Innovation	3a	# Invention Disclosures	41	48	32
		# Provisional Patent Applications Filed	21	24	24
		# PCT Applications Filed	3	6	9
		# Patents Filed/Issued	18/30	12/17	11/21
	3b	# Active License Agreements	175	116	123
		# Spin-off Companies	12	14	17
	IP Related Revenue – Realized Revenue BC Cancer BCCHR	\$285,169 \$40,921	\$445,861 \$66,713	\$432,697 \$93,000	
Advancing Health & Policy Benefits	4a	Clinical Trials (including Non-PHSA PIs utilizing PHSa facilities and resources) # Active Trials at the End of the FY Cumulative Subject Enrollment at End of FY	561 149,773	619 47,600	656 21,400
		4b,c,d	Registries as Research Resources # Research Requests/Approvals	211/200	240/227

PHSA STUDENT EDUCATION METRICS

FISCAL YEAR SUMMARY - PHSA OVERALL

Indicator	Key Measure Description	FY 2017-18	FY 2018-19	FY 2019-20	
		Value	Value	Value	
Build Student Education Capacity	1a	Total Number of Student Hours by Program (excludes medical students)	255,382	272,052	263,099
		BCCH	91,497	103,766	96,351
		BCEHS	70,939	59,103	58,586
		BCW	38,029	38,418	40,905
		BCMHSUS (Forensics, MH & Addictions, Burnaby CMHA, CHS)	29,029	31,436	28,193
		BC Cancer - All Locations	17,145	26,241	28,229
		Sunny Hill	7,392	7,213	5,845
		All Other (BCCDC, PSBC, PHSA)	1,352	5,875	4,991
	1a	Total Number of Student by Program (excludes medical students)		1,723	1,714
		BCCH		643	637
	BCEHS	NA	402	351	
	BCW		319	367	
	BCMHSUS (Forensics, MH & Addictions, Burnaby CMHA, CHS)		207	175	
	BC Cancer - All Locations		95	106	
	Sunny Hill		38	58	
	All Other (BCCDC, PSBC, PHSA)		19	20	
1b	Total Number of Medical Students by Program				
	Undergraduate Medical Students (annual)	454	493	463	
	Post-Graduate Medical Students (annual)	793	805	851	
1e	Estimated Cost of Staff Time by Encounter Type**				
	One-to-one	\$3,896,341	\$4,929,262	\$4,451,977	
	Group	\$104,172	\$110,652	\$164,119	
1g	Total # PHSA Declined Placement Requests in HSPnet**	241	145	208	
1h	Total # Staff Participating in Preceptor/Educator Training				
	Educator Pathway (Preceptor/Educator Training)	45	167	235	
	BC Emergency Health Services (Preceptor Training)	2	190	55	
1i	Total # Preceptors in HSPnet With and Without a Placement				
	With a Placement	347	333	369	
	Without a Placement	300	496	237	
Build Effective Partnerships and Collaborations to Support Innovation	2a	Total # Affiliation Agreements (% based on standard template)	68(88%)	68(88%)	76(88%)
	2c	Top 5 Education Institutions by Placement Hours-All Disciplines**			
		BCIT	40,696	64,813	67,329
		Justice Institute of BC	66,235	53,980	52,705
		University of BC	45,191	45,251	45,519
		Langara	23,793	20,387	21,754
	Douglas College	9,970	19,631	13,582	
2e	Total # Student Hours in an Ambulatory/Outpatient Care Setting**	37,268	37,064	40,095	
2d	Distribution of Student Hours by Student Education setting**				
	Inpatient	103,684	113,641	108,460	
	On Car (Paramedic)	70,939	59,103	58,586	
	Ambulatory/Outpatient	37,268	37,064	40,095	
	Mixed (OP/Amb & Inpatient)	34,962	46,358	41,670	
	Admin/Support Services & Public/Population Health	8,529	15,868	14,289	
Results	3a	# Hires at PHSA with Previous Placement	559 (20%)	504 (20%)	482(18%)

**Excludes undergraduate and post-graduate medical students and paramedics

ONE OF CANADA'S LARGEST ACADEMIC HEALTH SCIENCE ORGANIZATIONS

PHSA IS A MAJOR RESEARCH AND EDUCATION ENTERPRISE

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

With total external funding of more than \$145.6 million, an increase of \$11.3 million over last year, PHSA continues to be one of the largest research hospitals in Canada. PHSA also plays a unique role in BC's health education system, providing specialized training placements often unavailable anywhere else in the province, to approximately 3000 students each year.

For the first time, these two critical dimensions of PHSA's tripartite mandate to deliver care, conduct research, and train students were reflected in PHSA's annual three-year service plan. This ambitious strategic plan identified 16 objectives aligned to the Ministry of Health's three overarching goals, including a new objective: Commitment to the central position of science, evidence and education in wellness, care and policy. Complementing the strategic plans of its research institutes, this objective was advanced through the following five specific strategies.

- Clarify and deploy PHSA policies, processes and platforms to ensure patients have access to high-quality, efficient and appropriate clinical trials;
- Create and deploy a roadmap that defines strategic and standardized processes for quality student education and a well-prepared workforce;
- Engage with PHSA's research community and academic partners to identify and trial new approaches aimed at coordinating efforts to enhance health system and clinical policy projects;
- Identify compelling shared scientific issues relevant to UBC Faculty of Medicine leadership and PHSA leadership and develop a shared action plan;
- Improve access to appropriate data for PHSA's research community through enhanced support of platforms and policies including streamlined privacy and legal tools.

The inclusion of this objective and realization of its strategies reflects and reinforces PHSA's commitment to its academic health science mandate, a mandate which continued to flourish this past year.

In addition to attracting \$145.6 million in external funding, PHSA researchers surpassed the national average success rate in the Canadian Institutes of Health (CIHR) fall and spring operating grants. The vibrancy of PHSA's research enterprise is reflected in the number of researchers, which grew from 788 to 832.5, and the number of research trainees, which grew from 2,315 to 2,601. PHSA researchers continue to publish prolifically, with the total number of publications up at BC Cancer, BC Children's Hospital Research Institute (BCCHRI), Women's Health Research Institute (WHRI) and BC Mental Health & Substance Use Research Institute (BCMHSUS RI). Revenues from the Research Support Fund, a federal funding program that supports the indirect costs of research, increased from \$4.05 million to \$4.06 million.

PHSA continues to actively advance commercialization of research discoveries, generating \$525,697

PHSA's service plan includes a new objective: Commitment to the central position of science, evidence and education in wellness, care and policy.

Three new spin-off companies were created in the past fiscal year.

PHSA plays a critical role in supporting student education and preparing BC's future health workforce.

in IP related revenue. While the number of inventions disclosed and new patents filed was down slightly this year, there was an increase in the number of PCT applications filed, patents issued, and active license agreements. The number of provincial patent applications filed remained constant at 24. Three new spin-offs were created: Alpha9 Theranostics, and Innovakine Therapeutics Inc. out of BC Cancer, and Incisive Genetics out of BCCHRI. Alpha-9 Theranostics is a clinical stage, radiopharmaceutical company developing breakthrough targeting agents for cancer imaging by positron emission tomography (PET) and therapy using targeted radioisotopes. Innovakine Therapeutics Inc. is a pre-clinical stage biotechnology company developing innovative receptor engineering strategies to improve the efficacy and safety of cell-based therapies. Incisive Genetics is developing a delivery platform to effectively and safely deliver CRISPR gene-editing machinery to the site of application.

Clinical trial activity has increased across PHSA, from 619 active trials last year to 656 active trials in FY 2019/20. The large decrease in enrollment, from 47,600 subjects to 21,400 subjects, is primarily due to the termination of the Randomized Controlled Trial of Human Papilloma Virus (HPV) Testing for Cervical Cancer Screening study, a very large study that ended in October 2019.

While these metrics reflect PHSA's research strength over the 2019/20 fiscal year, the emergence of the COVID-19 pandemic late in the fiscal year had a profound impact.

Non-essential research activities across PHSA's research enterprise were curtailed in March 2020. While research activities have partially resumed since then, under rigorous planning and safety protocols, COVID-19 will undoubtedly have a significant impact on key indicators in the 2020/21 fiscal year.

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

As a result of its specialized services and the unique knowledge and expertise of its staff, PHSA also plays a critical role in supporting student education and preparing BC's future health workforce.

PHSA supports clinical learning for students from all disciplines of the health care teams in its programs. A total of 3,028 students had placements at PHSA in the past fiscal year. Of these students, 463 were medical undergraduates (MDUG), 851 were enrolled in Post-Graduate Medical Education (PGME) or residency, 888 were nursing students, and 826 were other members of the interprofessional team.

PHSA has education affiliation agreements with 76 academic partners to support these placements. The top five partners for the most student placement hours (excluding medical students' hours) are BC Institute of Technology (BCIT), Justice Institute of BC (JIBC), University of British Columbia (UBC), Langara College, and Douglas College. As determined by PHSA's new hire orientation survey, 482 of the new employees hired this past fiscal year have had a previous placement at one of PHSA's programs.

The student education metrics data allow for examination of the alignment among student education activities, workforce planning, and post-secondary program seat allocations. By enabling PHSA to monitor student activity by discipline, academic partner, and PHSA program, the data support informed and strategic decisions.

As with research, the COVID-19 pandemic has had a profound impact on PHSA's student education activities. Effective March 16th, 2020, 400 students on clinical placements across PHSA were temporarily paused in their clinical learning. In the days and weeks since, there has been collaborative planning across post-secondary institutions, clinical leaders and teams, with provincial partners in other health care organizations, and with colleagues at the Ministry of Health and the Ministry of Advanced Education, Skills and Training to support the safe return of students to clinical learning environments.

COVID-19 has renewed understanding across sectors and stakeholders of the impact and importance of clinical placements in the preparation of the future healthcare workforce, and there is a strengthened commitment to innovative and collaborative solutions that will ensure minimal disruption to learning continuity for students in health programs as the pandemic continues.

While quantitative metrics describe PHSA's academic health science mandate to a degree, the qualitative description of outcomes is needed to more fully understand how PHSA research is impacting patients, populations and the health system.

RESEARCH IMPACTS AND OUTCOMES

PHSA-LED RESEARCH IS MAKING A DIFFERENCE FOR PATIENTS

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

Detailed in this report's program specific sections, examples of key accomplishment include:

- participating in a \$150 million pan-Canadian network to accelerate implementation of precision medicine for cancer patients;
- discovering that prescribing antibiotics for infants in their first year of life almost doubles their risk of being diagnosed with asthma by age five;
- finding that half of homeless people have suffered a traumatic brain injury;
- rapidly developing a new COVID-19 diagnostic test that enabled BC to detect its first case in January 2020; and
- creating a new national partnership amongst Canada's three women's health research institutes.

As in past years, PHSA research entities were asked to identify any guideline, drug, diagnostic agent or device adopted or approved in FY 2019/20 as a result of research driven by PHSA researchers, or collaborative research in which PHSA researchers were key participants.

The resulting outcomes, detailed in the program sections of this report, clearly demonstrate that PHSA research is being applied to improve the health of British Columbian, Canadian and international populations. PHSA researchers are creating and implementing new innovations, including cancer drugs, diagnostic tests, and tools that are improving diagnosis and treatment, as well as promoting health and preventing illness and injury. PHSA researchers are also developing clinical guidelines to guide best practice care and treatment, and are guiding policy in arenas as diverse as provincial wildfire management, municipal playground planning, and international efforts to reduce discrimination of women and girls involved in trafficking.

As with research, the COVID-19 pandemic has had a profound impact on PHSA's student education activities.

PHSA research is being applied to improve the health of British Columbian, Canadian and international populations.

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

A BC Cancer researcher received Health Canada approval to manufacture and launch a clinical trial of the first made-in Canada CAR-T therapy for Canadian patients with CFD19+ve Leukemia and Lymphoma.

- A BC Cancer researcher received Health Canada approval to manufacture and launch a clinical trial of the first made-in Canada CAR-T therapy for Canadian patients with CFD19+ve Leukemia and Lymphoma.
- A BC Cancer researcher contributed to the discovery and FDA approval of a new drug for treatment resistant advanced prostate cancer patients now undergoing phase 1 clinical trials.
- A BC Cancer researcher led a clinical trial that demonstrated men with metastatic prostate cancer who were treated with a new type of hormone-reducing medication had a 33 per cent reduction in their risk of death.
- A BC Cancer researcher published a randomized phase 2 trial demonstrating that Stereotactic Ablative Radiotherapy (SABR) for oligometastatic disease increased survival, leading to launch of a phase 3 clinical trial.
- BC Cancer researchers developed a new genomic sequencing software tool that has been adopted by other international researchers.
- BC Children’s researchers identified the gene mutation causing a newly identified rare disorder, and outlined the clinical features of the disorder, leading to clinically accredited diagnostic labs offering diagnostic testing for this gene in BC and worldwide.
- A researcher with BC Children’s and BCMHSUS conducted research and co-authored a manual, “OCD Is Not the Boss of Me”, that educates clinicians and parents about a specific cognitive behavioral therapy that effectively treats Obsessive Compulsive Disorder in children and adolescents.
- Researchers at the BC Injury Research and Prevention Unit (BCIRPU) informed development of a new module of the Concussion Awareness Training Tool (CATT) that is the first e-learning course aimed at helping working adults, their families, and their workplaces navigate return to work following a concussion.
- A tailored version of SmartMom, Canada’s first parental education program delivered via text message which was created by researchers at BC Children’s Hospital and Women’s Health Research Institute (WHRI), was launched in Vancouver Coastal Health.
- Research at the BC Children’s Asthma Clinic informed the creation of an educational video, Childhood Asthma: A Guide for Families and Caregivers, developed to make it easier for families to learn how to care for a child who has been recently diagnosed with asthma.
- A BCMHSUS researcher co-developed the SwitchRx website which provides healthcare professionals with the most current information to guide their clinical practice when adjusting a patient’s psychotropic treatment regimens.
- A BCCDC researcher established a new hepatitis C virus (HCV) testing protocol that reduces the number of blood tests and health care visits required to screen and confirm the diagnosis of patients with chronic HCV infection, leading to improved care and lower system costs.
- BCCDC researchers helped launch the BC Heat Impacts Prediction System (BCHIPS), online tools

that help public health users as well as the public predict health risks based on temperature forecasts in 32 regions across the province.

- BCCDC researchers developed new mapping tools that enabled the BC government to ensure new air quality guidelines are adequately protective.

While development of new drugs, diagnostic tests, tools and other technologies are core outcomes of research, generating evidence to guide policy also has a vital impact on health. Following are examples of how evidence generated by PHSA researchers in FY 2019/20 is informing and guiding challenging policy decisions.

- A preliminary study conducted by BCCDC researchers informed changes to the provincial Air Quality Health Index (AQHI), making it more reflective of respiratory risks from wildfires and residential wood burning; national decision-makers are considering making the same changes.
- Informed by systematic evidence reviews, BCCDC led the development of new guidelines related to wildfire smoke and health that are being used by multiple stakeholders to ensure provincially consistent and branded messaging.
- Research conducted by investigators at the Vaccine Evaluation Centre at BC Children's informed a new immunization documentation policy implemented by the provincial government that now requires parents to provide all schools with immunization records for their children.
- Studies by researchers at the BC Injury Research and Prevention Unit (BCIRPU) on outdoor risky play informed the BC government's report, Play Today – a guide for BC educators, parents and families to help facilitate high quality, play-based learning experiences in children.
- BCIRPU research informed the City of Vancouver's published plan to improve the quality and diversity of play areas for children, including more adventure and risky play, in future city development.
- BC Children's researchers, who helped develop United Nations/World Health Organization guidelines that assess the protein quality of therapeutic foods for young children with severe acute malnutrition, published follow up findings that are being used by non-government organizations, industry and others worldwide to implement the guidelines.
- Research findings from a WHRI researcher informed the federal National Standing Committee on Justice and Human Rights recommendations to limit unjust criminalization of HIV non-disclosure.
- Research findings from two WHRI investigators were included in a submission to the United Nations Committee on the Elimination of Discrimination Against Women: Draft General Recommendation on trafficking of women and girls in the context of global migration.
- Research findings from a WHRI researcher were incorporated into the latest edition of the BC Ministry of Health's childbirth handbook: Baby's Best Chance: Parents' Handbook of Pregnancy and Baby Care.

Generating evidence to identify optimum pathways for diagnosing and treating health conditions is another critical outcome of health research, and one in which PHSA researchers play a key role. PHSA-led

Research at BC Children's informed a new immunization documentation policy that now requires parents to provide all schools with immunization records for their children.

BC Children's
investigators
demonstrated the
safety of an oral
immunotherapy
(OIT) approach
to the treatment
of children with
food allergies, and
authored guidelines
that are changing
practice across
Canada

research contributed to development of the following clinical guidelines in the past fiscal year.

- Two WHRI researchers were lead authors of a national clinical practice guideline: Gynaecologic Surgery for Patients with Obesity.
- A WHRI researcher was the lead author on the international Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable.
- A WHRI researcher was one of the lead authors of a national clinical practice guideline: Classification and Management of Endometrial Hyperplasia.
- Two WHRI researchers were lead authors of a national clinical practice guideline: Universal Cervical Length Screening.
- A WHRI researcher was a co-author of a national clinical consensus statement: Attendance at and Resources for Delivery of Optimal Maternity Care.
- Three WHRI researchers were lead authors of a national clinical practice guideline that directs maternity care providers to recommend against the practice of women consuming their own placenta.
- A WHRI researcher was a co-author of a national practice guideline: Determination of Gestational Age by Ultrasound.
- A WHRI researcher was one of the lead authors of a national practice guideline for noncancerous fibroid uterine growths: Medical Management of Symptomatic Uterine Leiomyomas – An Addendum.
- A WHRI researcher was co-author of a national clinical practice guideline: Screening, Diagnosis, and Management of Placenta Accreta Spectrum Disorders, complications of pregnancy where the placenta attaches to the wall of the uterus in an abnormal way.
- A BC Children's concussion researcher and sport injury specialist helped create the Living Guideline for Diagnosing and Managing Pediatric Concussion, considered the standard in Canada for health-care practitioners treating concussions and mild traumatic brain injury in children and youth aged 5-18.
- BC Children's investigators led a study that demonstrated for the first time in a real-world setting the safety of an oral immunotherapy (OIT) approach to the treatment of children with food allergies, and authored related guidelines that are changing practice across Canada.
- A BCCDC researcher's work contributed to updated provincial guidelines on screening and treatment of latent TB and active TB for BC.

PHSA's large number of provincial registries and longitudinal data sets on services provided to specific populations and related outcomes is a major asset of PHSA. These rich data resources, unique in Canada, include a wealth of information that can be studied to gain insights on clinical outcomes and health system design. A survey of PHSA's registry data stewards identified many research questions currently being addressed through registry data. Below are just a few examples, highlighting the tremendous research value of these datasets, and how they are being used to directly improve health outcomes and evaluate optimum care delivery models.

- Data from the BC Children’s Biobank are being used to explore whether natural killer T cells regulate the expansion of tonsillar B cells (the primary cells forming the tonsil organ) following Epstein Barr Virus infection and if this virus preferentially infects specific B cells.
- BC Cardiac Registry data are being analyzed to identify the long term outcomes of chest pain in patients who undergo cardiac CT.
- Risk factors for caesarean section scar endometriosis are being evaluated using data from the Endometriosis and Pelvic Pain Interdisciplinary Cohort (EPPIC).
- Deep learning approaches are being used to predict the presence or absence of chronic obstructive pulmonary disease from screening CT scans using data from the Lung Cancer Screening Program.
- PROMIS-Renal Registry data are being used to determine the outcomes of patients receiving different types of immunosuppressive agents for specific kidney diseases affecting the glomeruli (tiny filters in the kidney), and whether those outcomes vary by age or sex.
- PROMIS-Transplant Registry data are being used to profile the indications for orthotopic liver transplantation in the South Asian Community of BC to help address disparities in transplantation access and help determine the burden of preventable disease in this population.
- Data from the Screening Mammography Database are being used to assess the state of breast imaging services in the Lower Mainland, including wait times and time to diagnosis, to identify process improvements and efficiencies in service delivery.
- Hip and knee arthroplasty data from the Surgical Patient Registry are being used to review patients who had a hip or knee replacement and then went on to have a revision.
- Tumour Tissue Repository data are being used to determine whether the presence of lymph node hypoxia (oxygen deficiency) reflects the extent of immune activation against tumours of the breast.
- Data from the Perinatal Services BC Registry are being used to compare perinatal outcomes of planned home birth after cesarean (HBAC) and planned hospital vaginal birth after cesarean in British Columbia.
- BC Trauma Registry data are being used to explore regional variability in mortality following traumatic brain injury in British Columbia.
- BCEHS Cardiac Arrest Registry data are being used to determine if use of the PulsePoint responder app increases the rate of bystander CPR and the related impacts.
- Data from the BCEHS Paramedic System Evaluation and Research Database (PSERD) are being used to examine the use of sedation in the management of non-invasively ventilated pediatric patients during out-of-hospital transport by BCEHS infant transport team paramedics.

PHSA’s 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.

Discovery, innovation and the application of new knowledge generated by PHSA researchers is clearly making a difference, improving clinical outcomes and the effectiveness of BC’s health system in myriad ways.

STUDENT EDUCATION IMPACTS AND OUTCOMES

NEW PROVINCIAL PARTNERSHIPS ADVANCE STUDENT EDUCATION

The health care teams of tomorrow are prepared through strong partnerships between academic institutions and health care organizations. The learning experiences that health care organizations provide for students in clinical settings achieve important outcomes; they support the application of newly acquired theoretical knowledge and offer an opportunity to develop and demonstrate core competencies required for graduation and readiness to join health care teams. As a result of its specialized services and the unique knowledge and expertise of its staff, PHSA plays a vital role in supporting student education and preparing the future workforce in BC's health system.

There are additional impacts to welcoming students as valued members of the health care team. These include: building staff expertise in teaching, learning, mentoring and coaching; strengthening a learning culture; and fostering excellence in care delivery through continuous critical engagement amongst students, instructors, and members of the team with current theory and evidence-based practice.

Personal impacts on student are no less important. The experience students have during their clinical placements can inform their career trajectories, expand their knowledge of provincial services no matter in which part of the province they may work, and, increase the likelihood that they will consider joining PHSA's teams when they graduate.

To better understand the impact of placements on its workforce, PHSA has introduced questions in its new hire orientation survey. In the last fiscal year, 482 newly hired employees indicated they had at least one previous student placement at a PHSA site. Of these new employees, 90% have graduated in the last five years. They represent the full range of members of the interprofessional care team (e.g. Lab, Nursing, Paramedics, Allied Health). The survey asks if their placement experience encouraged them to come back as an employee. Their responses indicate that not only do their placements at PHSA encourage new graduates to seek employment with PHSA, but they also provide learnings and connections that students carry with them, no matter where they may work in the health system. Newly hired employee responses have also strengthened PHSA's recognition of the importance of providing a positive, inclusive and welcoming learning environment for all team members, including students, a finding that has been incorporated in an important new student education plan.

PHSA achieved an important milestone in the past year. As part of its 2019-2020 Service Plan, PHSA conducted a needs assessment and evaluation of the strengths and opportunities of student education throughout PHSA's sites and programs, culminating in the development a three-year Student Education Roadmap that will situate PHSA as an exemplar in student education. With the arrival of the COVID-19 pandemic, many of the recommendations and key activities outlined in the Roadmap have been expedited in order to respond to the changing landscape of clinical environments and the need to continue to support learners throughout their programs.

In particular, PHSA has begun to provide support at the provincial level for student education, in collaboration with a wide network of stakeholders including health organizations, academic partners, and the Ministry of Health and the Ministry of Advanced Education, Skills and Training. The strengthening of this role builds upon PHSA participation in provincial collaborations for student education that were underway prior to the arrival of COVID-19.

PHSA plays a vital role in supporting student education and preparing the future workforce in BC's health system.

Two initiatives this fiscal year that demonstrate PHSA's cross-sectoral collaboration include the contributions to the Provincial Nursing Education Planning Council Report, and continued partnership with UBC Health on advancing collaborative practice.

In 2019, PHSA contributed to the development of the Ministry of Health's Provincial Nursing Education Planning Council Report which has now been approved by the Health and Medical Education Planning Board. Key recommendations within the report are now being advanced, including a proposed a new practice education and transition model for Bachelor of Nursing programs across BC that will expedite graduating nurse's ability to work in specialized care areas and provide career pathways that reflect their advancing expertise.

Additional important outcomes have been realized through PHSA's continued partnership with UBC Health on a UBC Teaching and Learning Enhancement Fund (TLEF) grant. Aimed at advancing interprofessional collaborative practice learning opportunities for health profession students, this initiative builds upon a previous TLEF grant. The 2019 grant, led by the team at BC Children's Hospital and BC Women's Hospital and Health Centre, provided students with an opportunity to participate in interprofessional learning, provided education for staff on collaborative practice competencies, tools and resources, and expanded awareness and hands-on experience of collaborative practice in the delivery of patient-centered care. The project team presented a poster at the BC Patient Safety Quality Forum in Vancouver in February, 2020.

PHSA holds an important role in preparing future health care team members by providing experiences throughout its specialized programs and services. The future requires new levels of collaboration, creativity and innovation, and PHSA is committed to designing learning experiences that prepare students to provide excellent care for the evolving health and wellness needs of British Columbians.

PHSA has begun to provide support at the provincial level for student education, in collaboration with a wide network of stakeholders.

RESEARCH METRICS

PHSA OVERALL



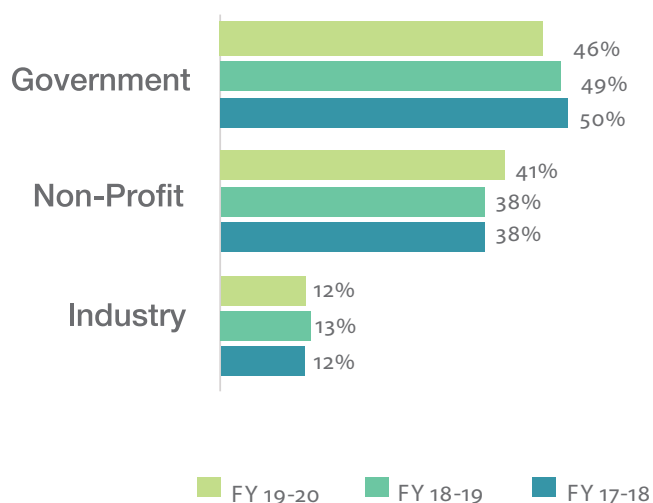
PRODUCING AND ADVANCING KNOWLEDGE

\$146 Million

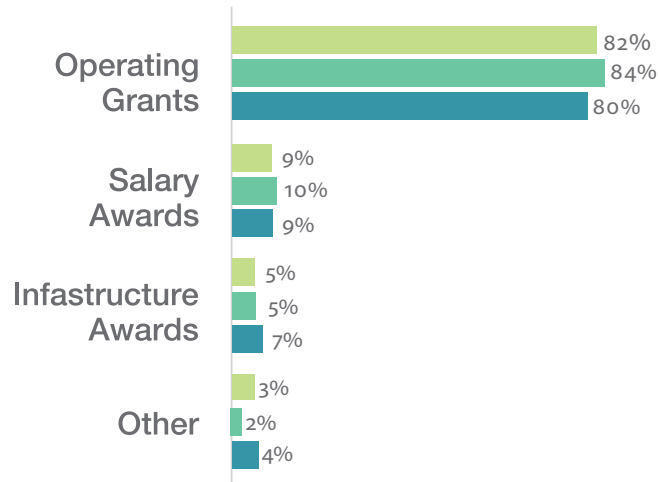
in TOTAL GRANTS AWARDED in FY 19-20

\$134 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



PUBLICATIONS

BCCHR	1,060
BC CANCER	744
WHRI	752
BCCDC	161
BCMHSUS	127



100%

% of CIHR competitions above
National AVG SUCCESS RATE
in FY 19-20

66% in FY 18-19

ECONOMIC BENEFITS & INNOVATION

\$526K
of REALIZED REVENUE
in FY 19–20
\$513K in FY 18–19



17 new
ACTIVE LICENSES
in FY 19–20
18 new in FY 18–19



11 patents filed
21 patents issued
in FY 19–20

12 Filed / 17 Issued in FY 18–19

17 spin-offs (3 new)
of ACTIVE SPIN-OFFS in FY 19–20
14 (2 new) in FY 18–19

BUILDING RESEARCH CAPACITY

832.5
OF RESEARCHERS
in FY 19–20
788 in FY 18–19



2,601
OF TRAINEES
in FY 19–20
2,315 in FY 18–19

\$4.1 Million
RESEARCH SUPPORT
FUND GRANTS
in FY 19–20
\$4.1 Million in FY 18–19

HEALTH & POLICY BENEFITS



656
OF CLINICAL TRIALS
in FY 19–20
619 in FY 18–19

21,400
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 19–20
47,600 at the end of FY 18–19



32%
% INDUSTRY FUNDED
TRIALS in FY 19–20
34.1% in FY 18–19

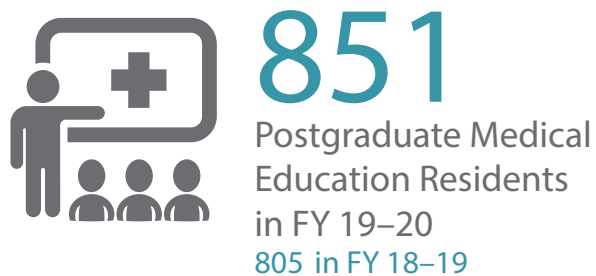
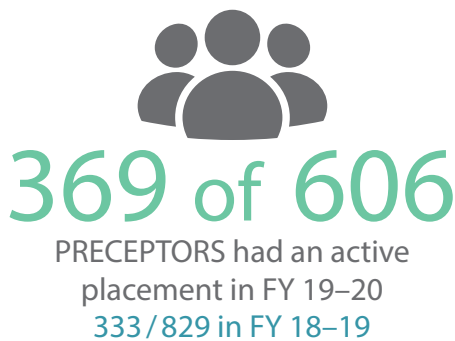
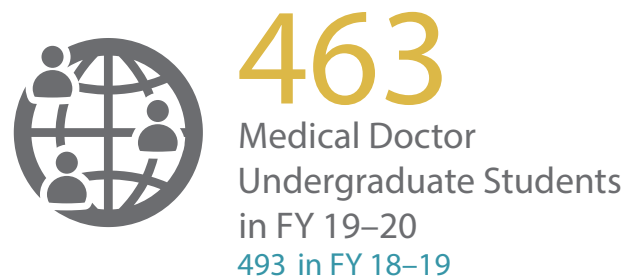
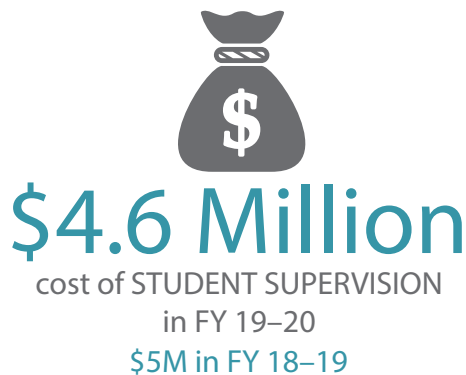
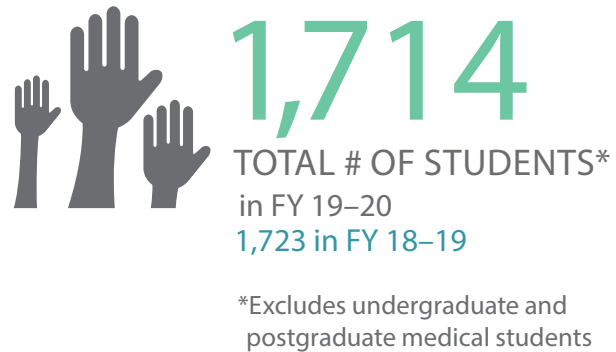
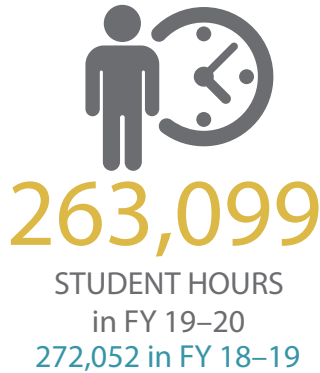
236 requests
226 approved
REGISTRY ACCESS REQUESTS/
APPROVALS in FY 19–20
240 requests / 227 approvals in FY 18–19

STUDENT EDUCATION METRICS

PHSA OVERALL



BUILD PRACTICE EDUCATION CAPACITY



BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. BC Institute of Technology (67,329)
2. Justice Institute of BC (52,705)
3. University of BC (45,519)
4. Langara College (21,754)
5. Douglas College (13,582)



31%

in ambulatory or mixed
PLACEMENT SETTING
in FY 19–20
31% in FY 18–19



38 / 76

of ACADEMIC PARTNERS
WITH AN ACTIVE
PLACEMENT in FY 19–20
36/68 in FY 18–19

QUALITY OF CLINICAL LEARNING ENVIRONMENT & RESULTS



18%

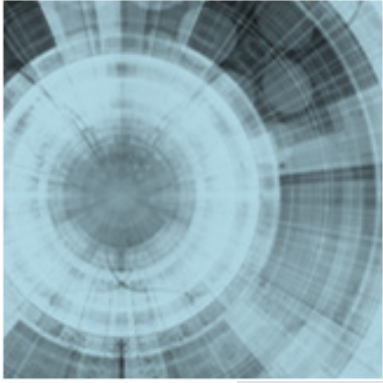
of new hires with a
PHSA PLACEMENT
in FY 19–20
20% in FY 18–19

LEARNING
ENVIRONMENT
QUALITY SURVEY TOOL
DEVELOPED



STUDENT
READINESS
SURVEY PILOT

DEVELOPED



BC Cancer

RESEARCH METRICS
STUDENT EDUCATION METRICS

RESEARCH METRICS

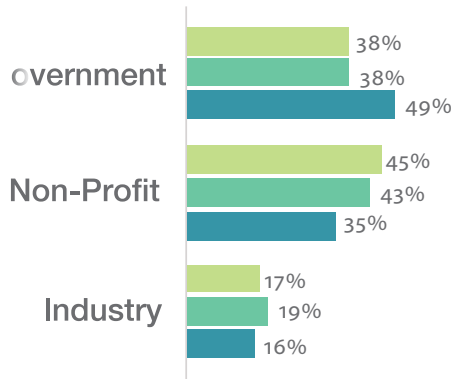
BC CANCER

PRODUCING AND ADVANCING KNOWLEDGE

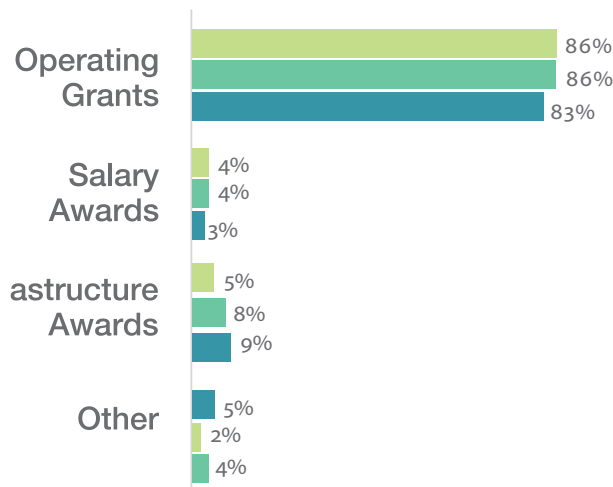
\$76 Million

in TOTAL GRANTS AWARDED in FY 19-20
\$70 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



■ FY 19-20 ■ FY 18-19 ■ FY 17-18



744

TOTAL
OF PUBLICATIONS
in FY 19-20
655 in FY 18-19

615

JOURNAL ARTICLES
in FY 19-20
556 in FY 18-19

99%

PEER REVIEWED
in FY 19-20
99.4% in FY 18-19



50%

% of CIHR competitions
above National AVG
SUCCESS RATE
in FY 19-20
34% in FY 18-19

ECONOMIC BENEFITS & INNOVATION

\$433K
of REALIZED REVENUE
in FY 19-20
\$445K in FY 18-19



11 patents filed
21 patents issued
in FY 19-20
8 filed / 17 issued in FY 18-19



41
ACTIVE LICENSES
(7 new) in FY 19-20
5 new in FY 18-19

13 spin-offs (2 new)
of ACTIVE SPIN-OFFS in FY 19-20
11 (2 new) in FY 18-19

BUILDING RESEARCH CAPACITY

301
OF RESEARCHERS*
in FY 19-20
302 in FY 18-19



732
OF TRAINEES
in FY 19-20
612 in FY 18-19

\$1.6 Million
RESEARCH SUPPORT
FUND GRANTS
in FY 19-20
\$1.7 Million in FY 18-19

HEALTH & POLICY BENEFITS



367
OF CLINICAL TRIALS
in FY 19-20
337 in FY 18-19

8,270
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 19-20
34,341 at the end of FY 18-19



59%
% INDUSTRY FUNDED
TRIALS in FY 19-20
43% in FY 18-19

*excluding affiliate investigators

TOP 3 RESEARCH ACHIEVEMENTS BC CANCER



Details available in Supplementary Report

1

Dr. Connie Eaves inducted into the Canadian Medical Hall of Fame

Dr. Connie Eaves, a co-founder of the Terry Fox Lab at BC Cancer, was inducted into the Canadian Medical Hall of Fame. Additionally, she received the Gairdner Wightman Award for extraordinary leadership and exceptional science and was named one of Chatelaine Magazine's "Women of the Year" for her research work with stems cells, leukemia and breast cancer. Discoveries have spurred the development of new treatments for these cancers. Many of the pioneering research methodologies generated by Dr. Eaves have also become the gold standard globally, facilitating research around the world.

2

Genome Sciences Centre celebrates 20 year anniversary

This year BC Cancer celebrated 20 years of the GSC. Over the last 20 years, the GSC has trained more than 2000 personnel, published more than 1400 peer-reviewed papers and has been part of nearly 900 research projects. The 13 GSC principal investigators have collectively brought in more than \$1.1 billion in projects awarded.

3


BC Cancer joins Pan-Canadian Hope Cancer Centre Network

BC Cancer will be part of the Marathon of Hope Cancer Centre Network. This Pan-Canadian initiative, led by the Terry Fox Research Institute (TFRI), will bring cancer centres across Canada together for the first time to accelerate the implementation of precision medicine so that any patient in Canada can have access to the right treatment, at the right time, for their particular cancer.

TABLE 1 BC Cancer Outcomes

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>BC Cancer researchers developed a new software tool called CellAssign. This leverages prior knowledge of cell-type marker genes to annotate single-cell RNA sequencing data into predefined or de novo cell types.</p>	<p>CellAssign fills an important role in the sequencing analysis toolbox for researchers. We anticipate the CellAssign approach will help unlock the potential for largescale population-wide studies of cell composition of human disease and other complex tissues through encoding biological prior knowledge in a robust probabilistic framework.</p>	<p>Patient: Access to new treatment/technology</p> <p> BCCHR</p>
<p>A BC Cancer researcher obtained Health Canada approval to manufacture anti-CD19 CAR-T cells and launch the CLIC-01 Clinical trial.</p>	<p>BC Cancer researchers have the first made-in Canada CAR-T therapy made available for Canadian patients with CDF19+ve Leukemia and Lymphoma. The CLIC-01 study, a clinical trial designed to assess the safety, feasibility and efficacy of autologous CD19-specific chimeric antigen receptor (CAR) T-cell product, for patients with relapsed and/or refractory CD19-positive acute lymphoblastic leukemia (ALL) and non-Hodgkin’s lymphoma (NHL). As an autologous (self) product, T cells will be collected from a patient’s blood, manufactured into CAR T-cells in the Conconci Family Immunotherapy Lab (CFIL), BC Cancer, Deeley Research Centre and then given back to the same patient in a single infusion.</p>	<p>Patient: Access to new treatment/technology</p>
<p>A BC Cancer researcher contributed to the discovery and federal Investigational New Drug filing of a new drug for advanced prostate cancer, EPI-7386. This resulted in FDA approval of EPI-7386, and the start of Phase 1 clinical trials evaluating its use for advanced prostate cancer.</p>	<p>Phase 1 / 2 clinical trial to start in heavily pre-treated (ie, treatment resistant) prostate cancer patients. The drug may provide improved clinical management of the disease.</p>	<p>Patient: Access to new treatment/technology</p>
<p>A BC Cancer researcher published a randomized phase II trial demonstrating that Stereotactic Ablative Radiotherapy (SABR) for oligometastatic disease increased survival. This has led to the researcher leading a phase III trial funded by industry and CIHR.</p>	<p>Increased survival for patients with a limited number of metastases (1-3) from solid primary malignancies.</p>	<p>Patient: Delay of disease progression/survival</p>

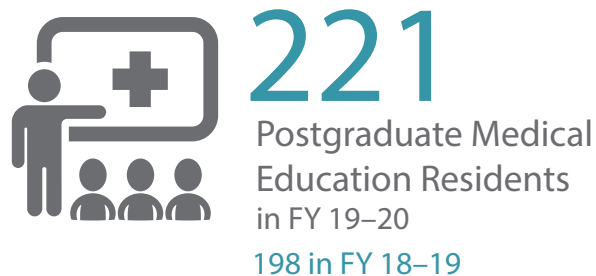
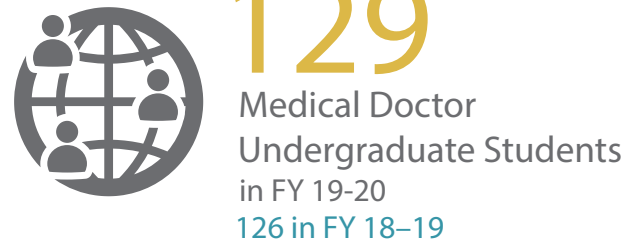
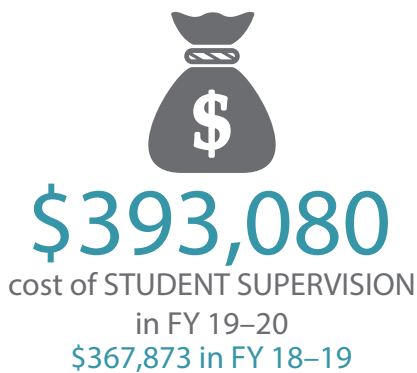
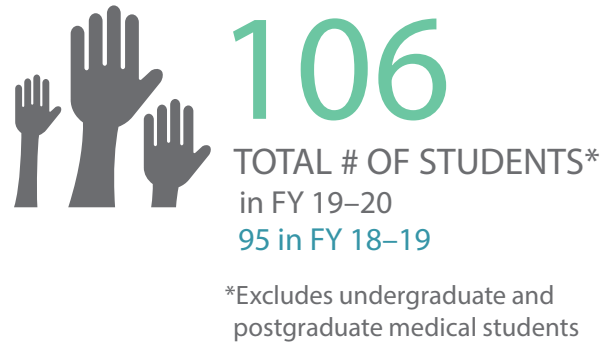
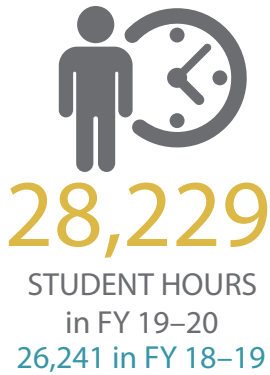
TABLE 1 BC Cancer Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>BC Cancer led a clinical trial that demonstrated a 33% reduction in the risk of prostate cancer death.</p>	<p>The results from a clinical trial offer new hope to patients with metastatic prostate cancer. The trial called TITAN study, examined the use of a new type of hormone-reducing medication in treating prostate cancer. In general, the overall survival rate is ~5 years once the cancer has spread. In this trial, 1052 men with advanced prostate cancer were randomized and included men with prior chemo treatments. The focus of the trial was lowering the rate of progression of disease and overall survival. The data shows patients experienced a 52% reduction in the risk of progression and there was a 33% improvement in overall survival.</p>	<p>Patient: Access to new treatment/technology</p>

STUDENT EDUCATION METRICS

BC CANCER

BUILD PRACTICE EDUCATION CAPACITY



••• BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



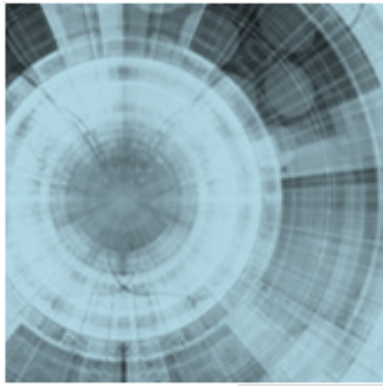
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. BC Institute of Technology (20,569)
2. University of BC (3,186)
3. Vancouver Community College (1,760)
4. Capilano College (850)
5. University of BC - Okanagan (450)



11

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
9 in FY 18–19



BCCHR/BC Children's Hospital and Sunny Hill Health Centre

RESEARCH METRICS
STUDENT EDUCATION METRICS

RESEARCH METRICS

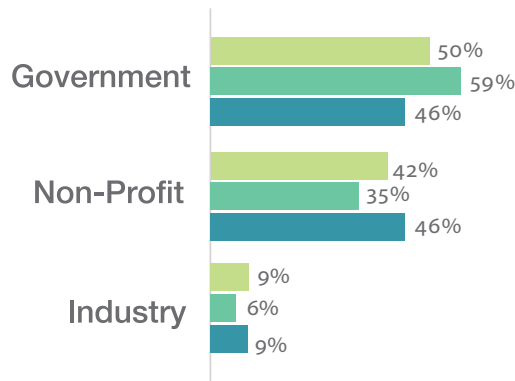
BC CHILDREN'S HOSPITAL RESEARCH INSTITUTE

PRODUCING AND ADVANCING KNOWLEDGE

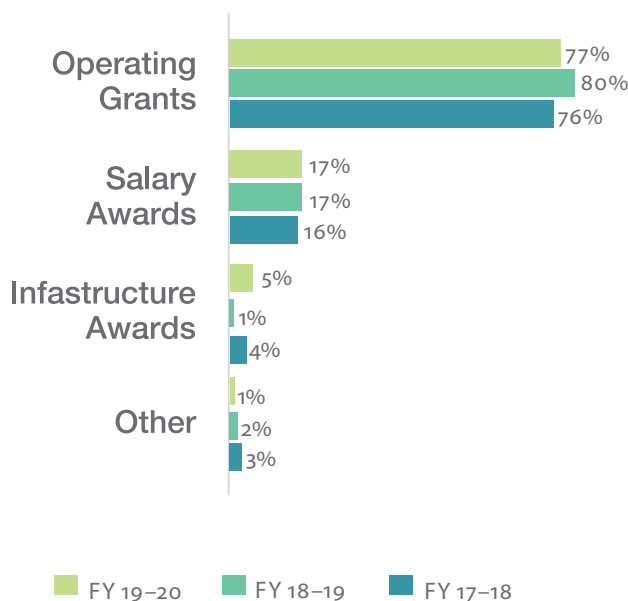
\$58.4 Million

in TOTAL GRANTS AWARDED in FY 19-20
\$56.6 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



1,060 TOTAL
OF PUBLICATIONS
in FY 19-20
858 in FY 18-19

923
JOURNAL ARTICLES
in FY 19-20
759 in FY 18-19

99%
PEER REVIEWED
in FY 19-20
98.7% in FY 18-19



100%
% of CIHR competitions
above National AVG
SUCCESS RATE
in FY 19-20
33% in FY 18-19

ECONOMIC BENEFITS & INNOVATION

\$ 93K
of REALIZED REVENUE
in FY 19-20
\$66K in FY 18-19



2 patents filed
4 patents issued
in FY 19-20
4 filed, 0 issued in FY 18-19



82
ACTIVE LICENSES
(10 new) in FY 19-20
13 new in FY 18-19

4 spin-offs (1 new)
of ACTIVE SPIN-OFFS in FY 19-20
3 (0 new) in FY 18-19

BUILDING RESEARCH CAPACITY

297
OF RESEARCHERS*
in FY 19-20
283 in FY 18-19



849
OF TRAINEES
in FY 19-20
709 in FY 18-19

\$ 1.9 Million
RESEARCH SUPPORT
FUND GRANTS
in FY 19-20
\$1.9 Million in FY 18-19

HEALTH & POLICY BENEFITS



200
OF CLINICAL TRIALS
in FY 19-20
212 in FY 18-19

5,632
TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 19-20
6,564 in FY 18-19



59%
% INDUSTRY FUNDED
TRIALS in FY 19-20
27% in FY 18-19



*Excluding affiliate investigators

TOP 3 RESEARCH ACHIEVEMENTS

BC CHILDREN'S HOSPITAL RESEARCH INSTITUTE



Details available in Supplementary Report

1

Falling childhood asthma rates linked to declining use of unnecessary antibiotics

Asthma rates are falling thanks to efforts by physicians to avoid prescribing antibiotics to young children, except when necessary. That's the key finding of a BC Children's Hospital study that shows being prescribed antibiotics within the first 12 months of life is associated with almost double the risk of being diagnosed with asthma by age five. The study, published in *The Lancet Respiratory Medicine*, suggests that careful antibiotic use in children under the age of one is important to help preserve the diversity and abundance of healthy gut bacteria, making children less susceptible to developing asthma later in life. This research was done in partnership with BC Centre for Disease Control.

2

National leadership in global effort to trial new treatments for COVID-19

A BC Children's researcher is leading the Canadian Treatments for COVID-19 (CATCO) trial which will evaluate different treatments such as antiretroviral drugs and anti-malarial drugs for COVID-19 patients in hospital. The CATCO trial is part of a multinational initiative called the Solidarity Trial which is being coordinated by the World Health Organization and supported by the Canadian Institutes of Health Research in an unprecedented level of global collaboration. Results from the trial will provide clinicians with evidence-based research on which drugs can be used to treat the virus in a way that is safe for patients.

3

Specialized immune cells could help repair damage from inflammatory bowel disease in children

A new BC Children's study suggests that specialized immune cells that dampen inflammation and help repair the gut could be used as a potential therapy for children dealing with the painful symptoms of inflammatory bowel disease. Published in *Gastroenterology*, the research shows that a specific type of T cell, called a Tr1 cell, produces a chemical signal that helps repair the barrier formed by cells lining the gut and encourages the production of protective mucus. As a new therapy, Tr1 cells could both suppress the inflammation that is ravaging the lining of the gut and help heal the tissue lining that keeps out harmful bacteria. This new treatment would be particularly helpful for as many as one third of IBD patients do not respond to the current frontline treatment.

TABLE 2 BCCHR Outcomes

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>New research by BC Children’s researchers discovered mutations in the SUZ12 gene as causing a newly identified rare disorder, and outlined the clinical features of the disorder. This has led to clinically accredited diagnostic labs worldwide offering diagnostic testing for this gene. Mutations in SUZ12 are now reported out clinically by labs in North America and Europe and tests for this genetic disease are available to clinicians in PHSA and worldwide.</p>	<p>This research makes it easier for physicians in Canada and around the world to access and order genetic tests for patients who have clinical features suggestive of SUZ12 mutations - such as developmental delay/intellectual disability, autism, overgrowth, unusual facial features and early-onset cancers.</p>	<p>Patient Other: Access to gene specific DNA testing</p>
<p>In September 2019 the B.C. provincial government implemented a new immunization documentation policy that was informed by research led by investigators at the Vaccine Evaluation Center at BC Children’s. The research showed that most adults in B.C. have favourable attitudes towards vaccination and that 75 per cent would support policies such as mandatory documentation of vaccination at school entry. The province will now require parents to provide all schools (public or private) with immunization records for their children.</p>	<p>The mandatory presentation of immunization documentation is aimed at increasing vaccine uptake and decreasing outbreaks of vaccine preventable diseases such as the measles.</p>	<p>System: Knowledge dissemination-new policy</p>
<p>In November 2019, a study led by BC Children’s investigators demonstrated for the first time in a real-world setting the safety of an oral immunotherapy (OIT) approach to the treatment of children with food allergies. OIT involves the daily ingestion of the offending food allergen beginning with a dose below the minimum amount that would elicit a reaction and increasing it over time to build tolerance. These results led to the publication of the first ever North American guidelines in the journal Allergy, Asthma & Clinical Immunology, also authored by BC Children’s investigators, in March 2020 for OIT. These guidelines are already changing practice across Canada and have resulted in an expanded oral immunotherapy program at BC Children’s.</p>	<p>These guidelines and research detail how to safely treat children with food allergies in a manner that may reduce the potential harm of an allergic reaction. This is in contrast to the current approach, which is to completely avoid the offending allergen in the diet. The advantage of OIT is that the patient and caregiver have greater control over management of the condition and may relieve some of the anxiety and social limitations over the accidental ingestion of the allergen.</p>	<p>System: Knowledge dissemination-new policy</p> <p>Patient: Protocols and guidelines</p>



TABLE 2 BCCHR Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>An investigator at BC Children’s and BC Mental Health and Substance Use Services founded an interdisciplinary program for children with obsessive-compulsive disorder and their caregivers in 2011. A team that includes psychologists, social workers and psychiatrists works together to provide exposure and response prevention (ERP) groups. ERP is a type of cognitive behavioural therapy (CBT) that is key to effective treatment for obsessive compulsive disorder (OCD). Groups for children and youth are run concurrently with groups for their caregivers at BC Children’s because OCD impacts everyone in a home, and how a parent responds to the obsessions and compulsions can greatly impact the course of OCD. Research evaluating these groups has informed a book the investigator co-authored called OCD in Children and Adolescents: The “OCD Is Not the Boss of Me” Manual that was published in February 2020. The manual presents the treatment protocol for children and adolescents (ages 6 to 18) struggling with OCD.</p> <p>Child and Youth Mental Health teams in B.C., Credit Valley Hospital in Ontario and an OCD program in Calgary are using the manual.</p>	<p>OCD can turn a child and a family’s life upside down, but it’s treatable in a short timeframe.</p> <p>The two main types of treatment proven for child-onset OCD are medication called serotonin-reuptake inhibitors and ERP, which is a particular type of cognitive behavioural therapy. ERP is key to treatment. It can lead to dramatic improvements and even remission of OCD.</p> <p>ERP requires specific training and community providers often lack the confidence to use ERP with a child with OCD.</p> <p>This book has been designed to educate clinicians and parents about ERP so that children can enjoy lives that are free from OCD behaviours.</p>	<p>Patient: protocols and guidelines</p> <p>System: Process of care-protocol implementation</p> <p>System: Knowledge dissemination–new policy</p> <p> BCMHSUSI</p>
<p>BC Injury Research and Prevention Unit (BCIRPU) research informed the development of a free workplace safety module of the Concussion Awareness Training Tool (CATT) in spring 2019. CATT Workers and Workplaces is the first e-learning course of its kind aimed at working adults with concussion, taking concussion education beyond sports, children and youth.</p> <p>CATT is a series of online modules and resources aimed at improving concussion recognition, response, diagnosis, management, and prevention. CATT for Workers and Workplaces consists of free online resources, including an e-learning course and associated materials that workers, their families and workplaces can use to navigate the return to work process after sustaining a concussion such as a medical clearance letter and an incident report form if the injury happened at work.</p> <p>CATT is part of the Concussion Harmonization Project, a federal initiative to increase the prevention, recognition and treatment of concussions in Canada.</p>	<p>While there is a misconception that concussions only happen to athletes, according to WorkSafeBC concussion was the third most reported type of serious injury claim in 2016. The leading causes of concussion in working age adults are falls, motor vehicle crashes, and sport and recreational activities.</p> <p>CATT Workers and Workplaces helps individuals recognize a concussion and outlines a step-by-step strategy to help them safely work toward resuming full duties. The module also helps employers support their employees throughout the return to work process and prevent further injury.</p>	<p>Patient: Protocols and guidelines</p> <p>System: Resource improvements-workforce</p> <p> PHSA Translation Services</p>
<p>BCIRPU studies on outdoor risky play were cited in the B.C. Ministry of Education’s October, 2019 report, Play Today - a guide for B.C. educators, parents, and families to help facilitate high-quality, play-based learning experiences in children. Outsideplay.ca was listed as an important resource for families and educators.</p>	<p>The research highlighted in the B.C. Ministry of Education’s report enables parents and educators to make informed decisions to improve children’s healthy development.</p>	<p>System: Knowledge dissemination-new policy</p>

TABLE 2 BCCHR Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>On October 9, 2019 the City of Vancouver published their implementation plan for the VanPlay Asset Targets for 2040, which was influenced by BCCHR research from investigators at the BC Injury Research and Prevention Unit at BC Children’s. These plans included a strategy to “improve quality and diversity of play areas such as nature and adventure play, risky play, potential for all-ages play features, and more universally accessible designs.”</p>	<p>Residents of Vancouver will have access to better quality play areas that allow for riskier play and healthier childhood development.</p>	<p>System: Resource improvements-workforce</p>
<p>A BC Children’s concussion researcher and sport injury specialist served on the expert panel for the creation of the Living Guideline for Diagnosing and Managing Pediatric Concussion, published in September 2019 by the Ontario Neurotrauma Foundation. The clinical guidelines and its recommendations are considered the standard in Canada for health-care practitioners treating concussions and mild traumatic brain injury in children and youth aged 5-18.</p>	<p>The research and expertise provided to the Ontario Neurotrauma Foundation by the BC Injury Research and Prevention Unit will help set guidelines and the standard of care across Canada for health-care practitioners treating children with traumatic brain injuries.</p>	<p>System: Process of care-standardization</p>
<p>In 2017, the Food and Agriculture Organization of the United Nations and the World Health Organization commissioned a working group, which included BC Children’s researchers, to develop guidelines that assess the protein quality for therapeutic foods in young children with severe acute malnutrition. In November 2019, the working group published follow-up findings to help inform non-government organizations, professional nutrition organizations, industry and researchers on interpreting these recommendations.</p>	<p>For children with severe acute malnutrition, which is not due to an infection or disease, it is important that they receive proper protein quality to recover. These guidelines help ensure that therapeutic foods, formula, or other similar products give children the nutrition they need to recover from conditions such as malnutrition.</p>	<p>System: Process of care-standardization</p>
<p>SmartMom is Canada’s first parental education program delivered via text message. Vancouver Coastal Health (VCH) launched a version of SmartMom that was tailored to the VCH region with local resources in February 2020. The program was developed by researchers at BC Children’s Hospital and Women’s Health Research Institute through the Optimal Birth BC program in partnership with the Northern Health Authority, First Nations Health Authority, B.C. Ministry of Health, Perinatal Services BC and Child Health BC. SmartMom delivers weekly text messages that are timed to be relevant to gestational age during pregnancy. Individuals may opt into supplemental message streams related to mental health, advanced maternal age, use of substances and weight management. The program is free of charge and has been endorsed by the Society of Obstetricians and Gynecologists of Canada. Texts are aligned with current Canadian professional practice standards and include links to evidence-based web sources and local community resources.</p>	<p>SmartMom’s innovative text-based format delivers valuable prenatal education to mothers who may be less likely to attend traditional prenatal classes including young mothers and those who live in rural and remote locations.</p> <p>With the expansion to the Vancouver Coastal Health region, SmartMom is available to women in Richmond, Vancouver, the North Shore, Sunshine Coast, Sea to Sky corridor, Powell River, Bella Bella and Bella Coola.</p> <p>This large geographic area includes women who may have difficulty attending prenatal classes because they live in rural communities or face other barriers to accessing health-care. By delivering evidence-based health information and connecting women to community resources, SmartMom supports women in having healthy pregnancies so babies can get the best possible start in life.</p>	<p>Patient: Access to new treatment/technology</p> <p>System: Knowledge dissemination-new policy</p> <p> WHRI, Child Health BC</p>

TABLE 2 BCCHR Outcomes (continued)

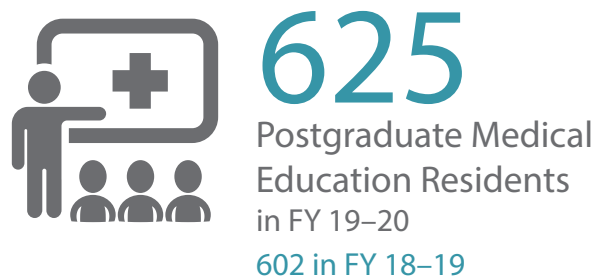
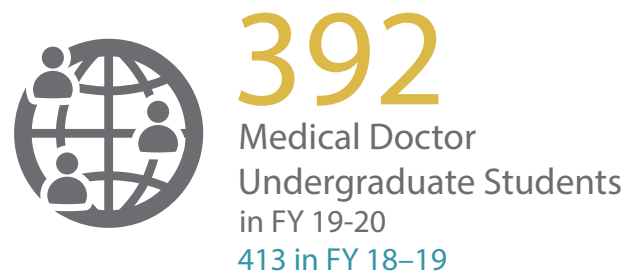
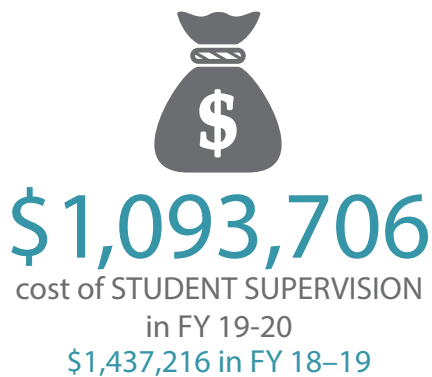
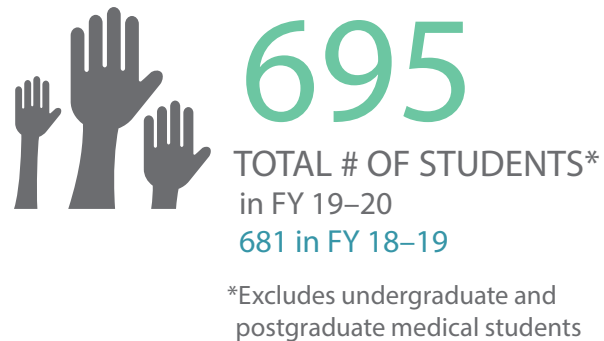
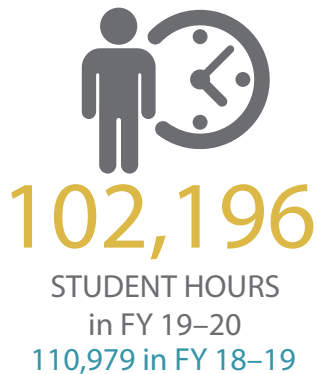
Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>Research at the BC Children’s Asthma Clinic informed the creation of an educational video, Childhood Asthma: A Guide for Families and Caregivers, which was developed to make it easier for families to learn how to care for a child that has been recently diagnosed with asthma. Increasing patients’ and caregivers’ understanding of asthma, its symptoms and treatment, has been shown to improve asthma control and reduce severe exacerbations.</p> <p>The video was made available for free in English on the PHSA YouTube channel on April 30, 2019. On YouTube, the video has seen more than 3,000 hits.</p> <p>Versions of the video that were translated into Cantonese, Mandarin and Punjabi were posted on the PHSA YouTube channel on Sept. 19, 2019 and have seen a total of 450 hits.</p> <p>This educational video has been embedded into the discharge planning process in both the Emergency Department and inpatient units at BC Children’s, and it has been disseminated widely across the province.</p>	<p>Learning that one’s child has asthma can leave caregivers with many questions. The Childhood Asthma video explains what asthma is, what asthma medications do and how to recognize and prevent asthma symptoms. Families and care providers anywhere in the province can easily access this video.</p>	<p>Patient: Other type – Knowledge translation and patient education</p> <p>System: Process of care standardization</p> <p> Child Health BC</p>

STUDENT EDUCATION METRICS

BC CHILDREN'S HOSPITAL AND SUNNY HILL HEALTH CENTRE



BUILD PRACTICE EDUCATION CAPACITY



••• BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



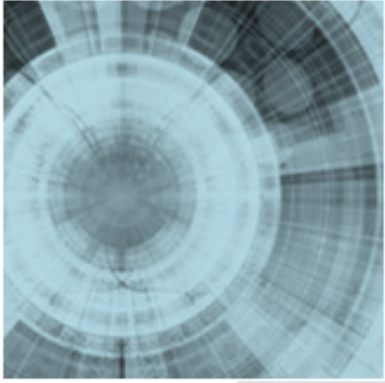
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. University of BC (26,237)
2. BC Institute of Technology (24,869)
3. Langara College (12,049)
4. Thompson Rivers University (10,100)
5. Douglas College (9,915)



26

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
21 in FY 18–19



BCMHSUS Research Institute/BC Mental Health & Substance Use Services

RESEARCH METRICS
STUDENT EDUCATION METRICS

RESEARCH METRICS

BC MENTAL HEALTH & SUBSTANCE USE SERVICES RESEARCH INSTITUTE



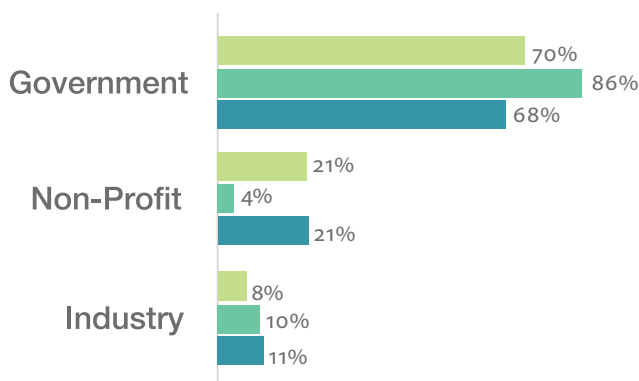
BC MENTAL HEALTH
& SUBSTANCE USE SERVICES
Provincial Health Services Authority

PRODUCING AND ADVANCING KNOWLEDGE

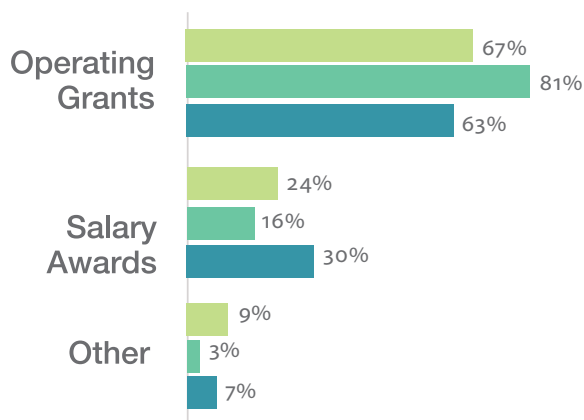
\$1.24 Million

in TOTAL GRANTS AWARDED in FY 19-20
\$1.49 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



■ FY 19-20 ■ FY 18-19 ■ FY 17-18



127 TOTAL
OF PUBLICATIONS
in FY 19-20
61 in FY 18-19

120
JOURNAL ARTICLES
in FY 19-20
60 in FY 18-19

95%
PEER REVIEWED
in FY 19-20
98.4% in FY 18-19



50%
% of CIHR competitions
above National AVG
SUCCESS RATE
in FY 19-20
30% in FY 18-19



BUILDING RESEARCH CAPACITY

16

OF RESEARCHERS*
in FY 19-20
18 in FY 18-19

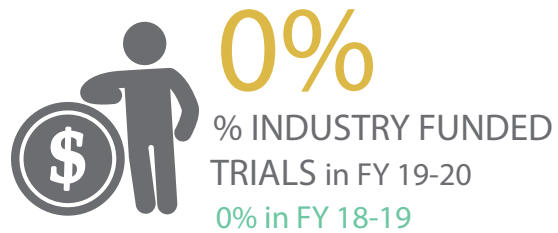
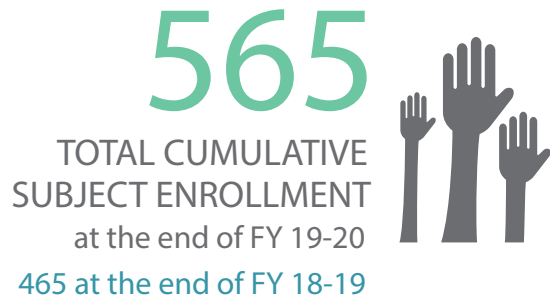


\$161K

RESEARCH SUPPORT
FUND GRANTS
in FY 19-20
\$182K in FY 18-19

*excluding affiliate investigators

HEALTH & POLICY BENEFITS



ECONOMIC BENEFITS & INNOVATION



TOP 3 RESEARCH ACHIEVEMENTS BCMHSUS RESEARCH INSTITUTE



Details available in Supplementary Report

1

Dr. Austin Recipient of the 2019 Dr. Samarthji Lal Award for Mental Health Research and Canadian Academy of Health Sciences Scientific Lecture Award

BC Mental Health and Substance Use Services Research Institute's Executive Director Dr. Jehannine Austin is the recipient of the 2019 Dr. Samarthji Lal Award for Mental Health Research and Canadian Academy of Health Sciences Scientific Lecture Award. The Dr. Samarthji Lal award recognizes innovative thinking in the area of mental health research and is awarded annually to a researcher working in a Canadian institution in the area of mental health, focusing on major mental disorders. Dr. Austin received this award for her work in genetic counselling. She hopes that the award leads to greater recognition for psychiatric genetic counselling and the benefits it can have for patients.

2

Mr. Jacob Stubbs, Dr. William Panenka and other BCMHSUS members publish meta-analysis of the burden of traumatic brain injury in the Lancet Public Health



Multiple BC Mental Health and Substance Use Services Research Institute investigators, including graduate student Jacob Stubbs as lead author, and senior author Dr. William Panenka published, "Meta-analysis of the Burden of Traumatic Brain Injury", was published by the Lancet Public Health in December 2019. This brought a lot of attention to this very important issue, including multiple radio and TV appearances, in addition to extensive print media coverage including from CTV, Global and the Guardian. Their research team found that around half of homeless people have suffered a traumatic brain injury (TBI) in their lifetime, with almost one quarter having experienced a moderate or severe injury - defined as being unconscious for at least 30 minutes or a visible injury on an MRI scan with lingering disability. The study was funded by a Canadian Institutes of Health Research project grant.

3

BCMHSUS PhD receives the Necia Elvin Memorial Prize for Schizophrenia Research

Dr. Melissa Woodward receives the Necia Elvin Memorial Prize for Schizophrenia Research. Dr. Melissa Woodward's doctoral work with BCMHSUS researcher Dr. Donna Lang focused on the impact of exercise on the brain for people with schizophrenia and other psychosis-spectrum disorders. She has recently published their findings on increases in medial temporal cortical regions in women with early psychosis who completed a 12-week aerobic exercise program, and these brain changes were associated with improvements in symptom severity. This is one of the first exercise intervention studies to focus on women with early psychosis and highlights the need for exercise to best address neuroanatomic, clinical, and physical health concerns during the early stages of illness. Dr. Woodward continues with BCMHSUS as a postdoctoral research fellow with Dr. Honer.

TABLE 3 BCMHSUS Outcomes

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>A BCMHSUS researcher co-developed the SwitchRx website to provide patient-specific psychopharmacology consultations for healthcare professionals.</p>	<p>The website provides healthcare professionals with the most current information to guide their clinical practice when adjusting a patient’s psychotropic treatment regimens: including suggested tapering and titration schedules, clinical tips and detailed information on drug pharmacokinetics and other precautions.</p>	<p>System: Knowledge dissemination; efficiency, cost/benefit or sustainability</p>
<p>A BCMHSUS researcher published a treatment manual for children and adolescents affected by obsessive–compulsive disorder (OCD).</p>	<p>This manual incorporates evidence-based clinician’s tools to support children and adolescents and their parents to apply successful exposure and response prevention activities, as well as other cognitive-behavioral therapy (CBT) strategies in the treatment of OCD symptoms.</p>	<p>Patient: Access to new treatment/technology</p> <p>Patient: Improvements in timely access to care</p> <p> BCCHR</p>

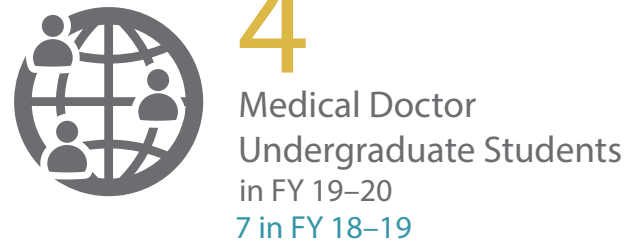
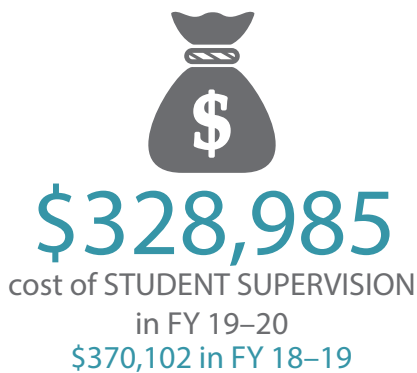
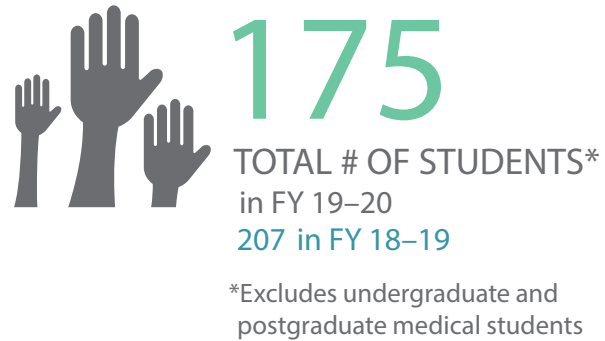
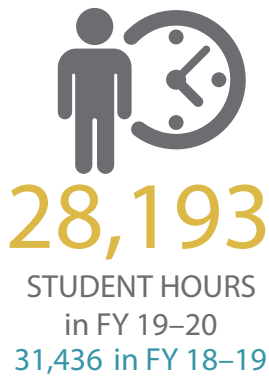
STUDENT EDUCATION METRICS

BC MENTAL HEALTH & SUBSTANCE USE SERVICES



BC MENTAL HEALTH
& SUBSTANCE USE SERVICES
Provincial Health Services Authority

BUILD PRACTICE EDUCATION CAPACITY





••• BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



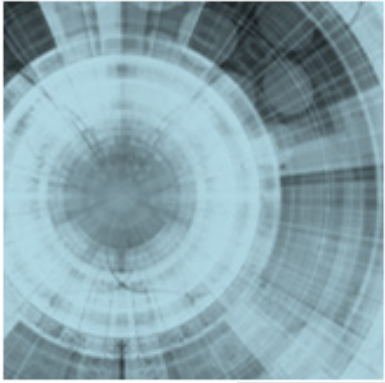
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. University of BC (8,682)
2. Langara College (3,600)
3. Kwantlen Polytechnic University (3,596)
4. Douglas College (3,552)
5. University of Victoria (1,792)



18

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
19 in FY 18–19



BC Centre for Disease Control/UBC CDC

RESEARCH METRICS
STUDENT EDUCATION METRICS

RESEARCH METRICS

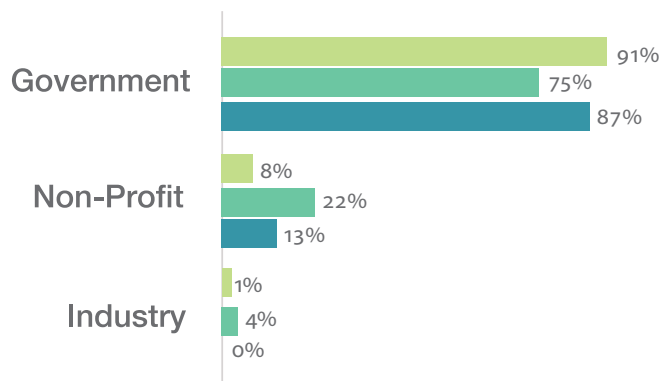
BC CENTRE FOR DISEASE CONTROL/UBC CDC

PRODUCING AND ADVANCING KNOWLEDGE

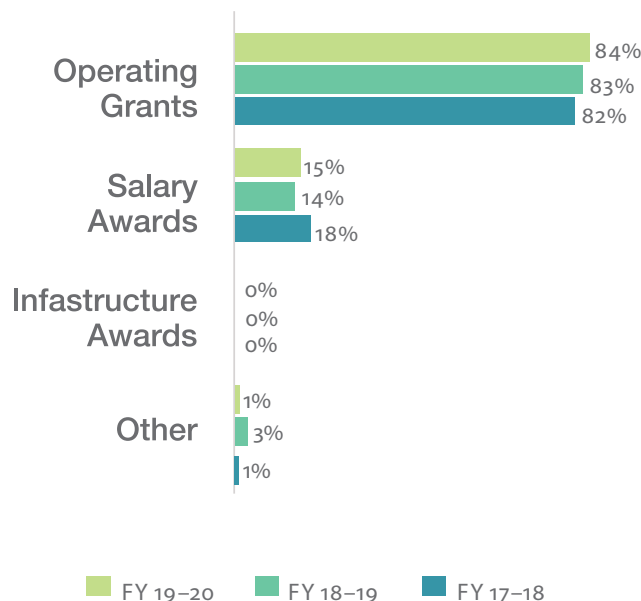
\$3.7 Million

in TOTAL GRANTS AWARDED in FY 19-20
\$2.8 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



161 TOTAL
OF PUBLICATIONS
in FY 19-20
305 in FY 18-19

110
JOURNAL ARTICLES
in FY 19-20
166 in FY 18-19

89%
PEER REVIEWED
in FY 19-20
81% in FY 18-19



100%
% of CIHR competitions
above National AVG
SUCCESS RATE
in FY 19-20
50% in FY 18-19

BUILDING RESEARCH CAPACITY

34.5

OF RESEARCHERS*
in FY 19-20
35 in FY 18-19



81

OF TRAINEES
in FY 19-20
113 in FY 18-19

\$ 129K

RESEARCH SUPPORT
FUND GRANTS
in FY 19-20
\$89K in FY 18-19

**Excluding affiliate investigators

HEALTH & POLICY BENEFITS

11



OF CLINICAL
TRIALS in FY 19-20
9 in FY 18-19

2,961

TOTAL SUBJECT
ENROLLMENT
in FY 19-20
2,707 in FY 18-19



0%



% INDUSTRY FUNDED
TRIALS in FY 19-20
0% in FY 18-19

ECONOMIC BENEFITS & INNOVATION

No activity in FY 19-20

TOP 3 RESEARCH ACHIEVEMENTS BCCDC/UBC CDC



Details available in Supplementary Report

1

BCCDC completes rapid development of a brand new COVID-19 diagnostic test by BCCDC's Public Health Laboratory

The first case of COVID-19 was detected in BC on January 28, 2020 and this was due to the rapid development of a brand new COVID-19 diagnostic test by BCCDC's Public Health Laboratory. Testing capacity was ramped up to thousands of tests per day in a few short months. Daily epidemiological summaries were posted online providing up to date information to the public health community, healthcare providers, the Ministry of Health, media and the public. By March, BCCDC researchers obtained a \$150K Genome BC grant and a \$1M CIHR grant to genetically sequence cases which was useful in determining outbreak clusters in the province. A \$120K MSFHR was also obtained to analyze blood sera to determine population infection rates.

2

BCCDC released a new 3-year directional plan, Moving Forward, 2019-2022

In December 2019, BCCDC released a new 3-year directional plan, Moving Forward, 2019-2022. This plan outlines the Provincial Health Services Authority's/BCCDC's vision, mission and values, that guide our work in public health, and denotes priorities for the coming years. These priorities include: climate change; prevention of substance use harms; positive mental health; emerging infectious diseases; chronic disease prevention; vaccine hesitancy and immunization coverage; advance data science, surveillance and analytics; a 21st century public health laboratory; enable and support partnerships; address health equity and act on truth and reconciliation; establish organizational clarity and collaboration; solidify relationships with academic partners.

3

BCCDC's mandate expanded to include chronic disease/injury prevention and population and public health program

BCCDC's mandate expanded to include chronic disease/injury prevention in 2016, and the Population and Public Health (PPH) program physically moved to BCCDC in 2019, when it became a formal service line of BCCDC. This move enhanced PPH's capacity in health surveillance, research and provincial prevention programs, and increased collaboration with other service lines at BCCDC and UBC's School of Population and Public Health. PPH's major research achievements in the year 2019/20 include: increased collaboration with the BC Public Health Observatory, contribution to collaborative research (example, the association between children's asthma and antibiotic prescribing published in a Lancet journal), completion of community health service area profiles, development of injury data-mart within BCCDC data warehouse, and development of food security

TABLE 4 BCCDC Outcomes

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
A BCCDC researcher’s work contributed to updated Provincial Manual/Guidelines in October. These are provincial guidelines on screening and treatment of latent TB and active TB for the province.	Improved screening and treatment of latent TB in particular.	Patient: Protocols and Guidelines
A BCCDC researcher’s work has informed a new Federal immigration screening protocol.	Researcher’s work with Immigration, Refugee, and Citizenship Canada, including multiple teleconferences and face-to-face meetings and presentations in Ottawa, has led to a new screening program for migrants across Canada. This will improve latent and active TB screening in migrants to Canada.	Patient: Delay of disease progression/survival
In February 2020, the BCCDC Public Health Laboratory (PHL) adopted a new policy regarding HCV testing, known as ‘HCV reflex testing’. The adoption of this new policy is a first in Canada, and was possible to implement due to the results of a study carried out by researchers at BCCDC PHL. This study allowed the creation of a new HCV diagnosis algorithm at BCCDC PHL, which was pivotal in implementing the HCV reflex testing policy. The HCV reflex testing policy means that all first time HCV antibody positive specimens that are strongly positive on two different testing platforms at BCCDC PHL are now automatically tested for HCV RNA, without requiring an additional specimen be sent to the lab. All specimens for HCV antibody testing sent to BCCDC PHL from patients who have a previous HCV antibody positive result, but have never had an HCV RNA test performed by BCCDC PHL, are now also automatically tested for HCV RNA, without requiring an additional specimen be sent to the lab.	The benefits of this new policy for patients are that they now are able to have their screening and confirmatory diagnosis for chronic HCV infection done from one single blood tube and one single visit to a health care provider. Previously, this required two separate visits to a health care provider, and two separate blood draws. Many patients were lost to follow up previously between being screened for HCV and having their confirmatory diagnosis, therefore they are unaware if they actually have a chronic infection. This new policy at BCCDC PHL will prevent more patients from being lost to follow-up, and reduce time from initial screening to confirmatory diagnosis, saving time both for health care providers and for patients. This new policy is also likely to have cost savings for the health care system, reducing costs in pathology collection fees, blood tubes and unnecessary testing. This policy change is likely to have an impact on improving the HCV care cascade on a population level, and pushes BC one step closer to being the first Canadian province to achieving the WHO goal of eliminating HCV as a public health treat by 2030.	System: Efficiency, cost/benefits or sustainability  Lower Mainland Labs

TABLE 4 BCCDC Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>A preliminary study conducted by BCCDC researchers was used to make pilot changes to the provincial Air Quality Health Index (AQHI) in fiscal FY19/20. National adoption of the same changes is under review. Two of these three studies are now published in the peer-reviewed literature, the third is under review.</p>	<p>Changes made to the AQHI ensure that the tool is more reflective of respiratory risks from wildfires and residential wood burning, both of which are important sources of air pollution in BC. Those using alert-based applications are now prompted to take health protective actions that (1) would have been prompted later or (2) would not been prompted at all under the old system.</p>	<p>System: Knowledge dissemination-new policy</p>
<p>Following the disastrous 2017 and 2018 wildfire seasons, the Wildfire Smoke and Health Coordination Committee decided that BCCDC would lead the development of new guidance materials related to wildfire smoke and health to ensure provincially consistent and branded messaging. A list of guidelines was established in FY19/20 through a multi-stakeholder engagement process, and most were posted in summer 2019 (http://www.bccdc.ca/health-info/prevention-public-health/wildfire-smoke). Two systematic evidence reviews were conducted on face masks and pregnancy risks to complete this work by BCCDC researchers.</p>	<p>The wildfire smoke and health guidelines were downloaded thousands of times during the summer of 2019, despite it being a low-activity wildfire season. Provincially consistent evidence-based messaging ensures that all public health authorities know where to turn for clear and up-to-date information.</p>	<p>System: Knowledge dissemination-new policy</p> <p> HEMBC</p>
<p>BCCDC researchers helped launch the BC Heat Impacts Prediction System (BCHIPS) in FY19/20 with both internally-facing (for public health users) and externally facing versions (http://maps.bccdc.ca/bchips/). This system takes information on forecast temperatures and the historic relationship between temperature and health outcomes to predict low, moderate, or high risk in each of 32 regions over the coming four days. In addition, the system shows information on previous years to contextualize current conditions.</p>	<p>BCHIPS provides a risk prediction framework that municipalities creating localized heat alert and response systems (HARS) can use to trigger protective actions. Although Environment and Climate Change Canada issues heat warnings for BC, they cover only five large regions where BCHIPS can account for local climate and population response.</p>	<p>System: Knowledge dissemination-new policy</p>
<p>The BC Ministry of Environment and Climate Change Strategy revised the provincial air quality objectives in light of the new Canadian Ambient Air Quality Standards (CAAQS). They approached BCCDC researchers to develop new tools that could be used to examine the intersection between air quality and population vulnerability, to ensure that the new guidelines are adequately protective. The new mapping tool was made internally available for decision-making (https://kathleenmclean.shinyapps.io/Air_Quality_Map/).</p>	<p>BCCDC participation has ensured that the major revision to the air quality guidelines for BC will be at least partially health-based, accounting for the most vulnerable populations. Biomass smoke from residential wood burning was highlighted as an ongoing regulatory concern.</p>	<p>System: Knowledge dissemination-new policy</p>

STUDENT EDUCATION METRICS

BC CENTRE FOR DISEASE CONTROL



BC Centre for Disease Control
Provincial Health Services Authority

BUILD PRACTICE EDUCATION CAPACITY



STUDENT HOURS
in FY 19-20
5,020 in FY 18-19



13

TOTAL # OF STUDENTS*
in FY 19-20
15 in FY 18-19

*Excludes undergraduate and postgraduate medical students



\$33,463

cost of STUDENT SUPERVISION
in FY 19-20
\$69,067 in FY 18-19



5

Medical Doctor
Undergraduate Students
in FY 19-20
3 in FY 18-19



4 of 12

PRECEPTORS had an active
placement in FY 19-20
2/5 in FY 18-19



19

Postgraduate Medical
Education Residents
in FY 19-20
19 in FY 18-19

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



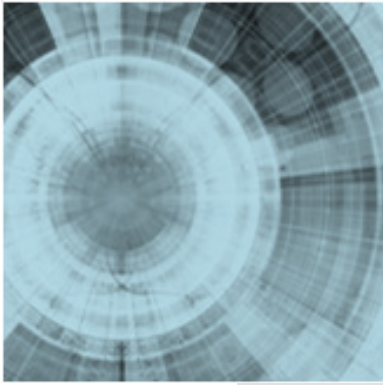
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. University of Victoria (900)
2. University of BC (624)
3. BCIT (612)
4. Simon Fraser University (415)
5. Vancouver Community College (240)



5

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
6 in FY 18–19



WHRI / BC Women's Hospital & Health Centre

RESEARCH METRICS
STUDENT EDUCATION METRICS

RESEARCH METRICS

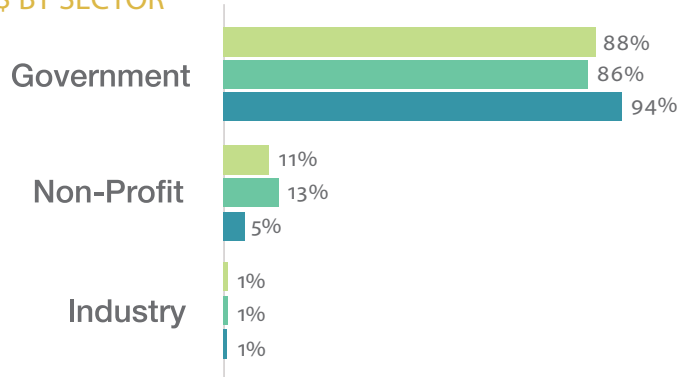
WOMEN'S HEALTH RESEARCH INSTITUTE

PRODUCING AND ADVANCING KNOWLEDGE

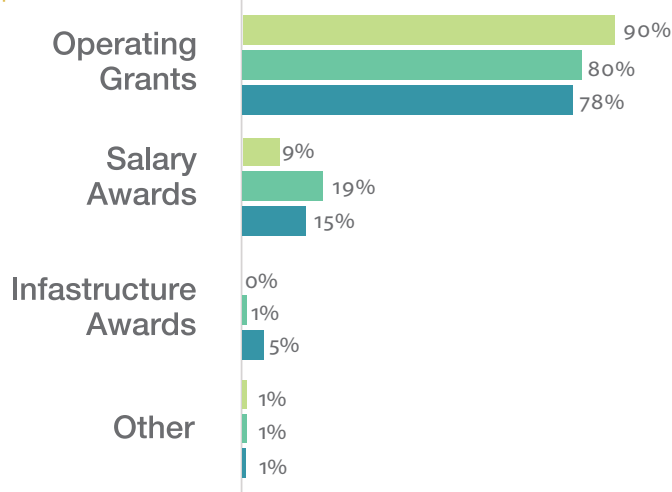
\$5.9 Million

in TOTAL GRANTS AWARDED in FY 19-20
\$2.9 Million in FY 18-19

\$ BY SECTOR



\$ BY AWARD TYPE



■ FY 19-20 ■ FY 18-19 ■ FY 17-18



744 TOTAL
OF PUBLICATIONS
in FY 19-20
670 in FY 18-19

557
JOURNAL ARTICLES
in FY 19-20
466 in FY 18-19

97%
PEER REVIEWED
in FY 19-20
96.4% in FY 18-19



100%
% of CIHR competitions
above National AVG
SUCCESS RATE
in FY 19-20
67% in FY 18-19

BUILDING RESEARCH CAPACITY

322

WHRI MEMBERSHIP
in FY 19-20
265 in FY 18-19



736

OF TRAINEES
in FY 19-20
690 in FY 18-19

\$ 191K

RESEARCH SUPPORT
FUND GRANTS
in FY 19-20
\$165K in FY 18-19

HEALTH & POLICY BENEFITS



53

OF CLINICAL TRIALS
in FY 19-20
38 in FY 18-19

3,521

TOTAL CUMULATIVE
SUBJECT ENROLLMENT
at the end of FY 19-20
3,160 at the end of FY 18-19



21%

% INDUSTRY FUNDED
TRIALS in FY 19-20
13% in FY 18-19

ECONOMIC BENEFITS & INNOVATION

No activity in FY 19-20

TOP 3 RESEARCH ACHIEVEMENTS WHRI



Details available in Supplementary Report

1

Released the WHRI 2019–2024 Strategic Plan

This plan was developed based on consultation with WHRI members, key stakeholders in the health research and education communities, patients, staff, Indigenous partners, and the WHRI scientific advisory committee. Four priorities guide the implementation of the WHRI's 5-year strategic plan: 1) increase capacity to catalyze new women's health research; 2) nurture existing relationships and cultivate new collaborations; 3) increase and promote research translation, implementation, and communication; and 4) to be a national leader in advancing women's health research. In addition to the priorities outlined in our plan, we have developed four new strategic frameworks to guide our work in the areas of: partnership engagement; patient engagement; knowledge translation; and trainees and mentorship.

2

Created a new national partnership amongst Canada's three women's health research institutes

At a summit held in November 2019 in Toronto, the leaders of Canada's three women's health research entities (Women's Health Research Institute, Vancouver; Women and Children's Health Research Institute, Edmonton; and Women's College Research Institute, Toronto) came together to discuss the future of science that strives to close health gaps for women. The event ended with a commitment from each institute to partner together and embark on an initiative to create a pan-Canadian women's health research strategy and national network. Toward this goal, a Project Manager for this national partnership has now been hired to oversee the activities required for the initiation of this new national partnership.

3

Launched the @WomensResearch podcast to advance women's health research

Over half the population listens to podcasts*. In March 2020, the WHRI released the inaugural episode of the @WomensResearch podcast. This new medium is a powerful tool for communicating with a public audience and will be a vehicle to increase the use and impact of investigators' research and provide a forum to discuss pressing issues in the field of women's health research. Recent topics that have been covered in the podcast include: the importance of knowledge translation and disseminating research results, debunking health-related misinformation online, how and why to do sex and gender-based research, and how to be a 'virtual' leader in a remote working environment.

TABLE 5 WHRI Outcomes

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
Two WHRI researchers were lead authors of a national clinical practice guideline: Gynaecologic Surgery for Patients with Obesity.	Improved outcomes for patients with obesity undergoing gynaecologic surgery by providing surgeons with an evidence-informed review of pre-, intra-, and postoperative issues associated with obesity and guidance regarding strategies for safer surgical care.	Patient: Protocols and guidelines System: Knowledge dissemination-new policy
Research findings from a WHRI researcher were used to inform the National Standing Committee on Justice and Human Rights recommendations to limit unjust criminalization of HIV non-disclosure.	Improved outcomes for Canadians living with HIV due to revisions to how criminal law in Canada is applied which will end criminal prosecutions of HIV non-disclosure, except in cases where there is actual transmission of the virus and will ensure that the factors to be respected for criminal prosecutions of HIV non-disclosure reflect the most recent medical science regarding HIV and its modes of transmission.	Patient: Protocols and guidelines System: Knowledge dissemination-new policy
WHRI researcher was the lead author on an international exercise guideline for cancer survivors: Exercise Guidelines for Cancer Survivors: Consensus Statement from International Multidisciplinary Roundtable.	Improved cancer-related health outcomes for cancer survivors through recommendations to safely engage in enough exercise training (including aerobic and resistance training) to improve physical fitness and restore physical functioning, enhance quality of life, and mitigate cancer-related fatigue.	Patient: Protocols and guidelines System: Knowledge dissemination-new policy
A WHRI researcher was one of the lead authors of a national clinical practice guideline: Classification and Management of Endometrial Hyperplasia.	Improved outcomes for women with suspected endometrial hyperplasia through the recommended use of an international classification for this condition by health care providers and the promotion of optimal treatment of women diagnosed with endometrial hyperplasia.	Patient: Protocols and guidelines System: Knowledge dissemination-new policy
Research findings from two WHRI investigators were included in a submission to the United Nations Committee on the Elimination of Discrimination Against Women: Draft General Recommendation on trafficking of women and girls in the context of global migration.	The United Nations Committee on the Elimination of Discrimination against Women is the leading body coordinating the global response on gender-based violence and discrimination and its recommendations inform international policies which impact the lives of millions of women. Improved outcomes for women migrating to Canada for the purpose of, or leading to, work in the sex industry by ensuring the committee's recommendation embody a commitment to rights-based, evidence-led measures that do not conflate trafficking in persons with sex work and do not conflate migrant sex work with trafficking and recommend decriminalization of all aspects of the sex industry.	Patient: Protocols and guidelines System: Knowledge dissemination-new policy

TABLE 5 WHRI Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
Two WHRI researchers were lead authors of a national clinical practice guideline: Universal Cervical Length Screening.	Improved maternal and fetal outcomes and cost savings to the healthcare system due to the recommended use of universal cervical length screening as an evidence-based approach to the prevention of preterm birth.	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy;</p> <p>Efficiency, cost/benefit or sustainability</p>
WHRI researcher was a co-author of a national clinical consensus statement: Attendance at and Resources for Delivery of Optimal Maternity Care.	Improved maternal and infant outcomes due to adoption of national definitions for all facilities providing maternity care for different levels of anticipated risk. Improved maternity care experience for women due to directives to respect women's autonomy is making informed decisions regarding their care.	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p>
Three WHRI researchers were lead authors of a national clinical practice guideline: Placentophagy.	Improved maternal outcomes by directing maternity care providers to recommend against the practice of women consume their own placenta given that there is no evidence of benefit from its consumption and there is potential for harm.	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p>
Research findings from a WHRI researcher were incorporated into the latest edition the British Columbia Ministry of Health's childbirth handbook: Baby's Best Chance: Parents' Handbook of Pregnancy and Baby Care.	Improved maternal and infant outcomes due to the promotion of informed decision making for pregnant patients regarding options for birth after a previous caesarean delivery.	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p>
A WHRI researcher was a co-author of a national practice guideline: Determination of Gestational Age by Ultrasound.	<p>Improved maternal and fetal outcomes due to use of evidence-based ultrasound methods for the assignment of gestational age.</p> <p>Accurate assignment of gestational age may reduce post-dates labour induction and may improve obstetric care through allowing the optimal timing of necessary interventions and the avoidance of unnecessary ones.</p>	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p>

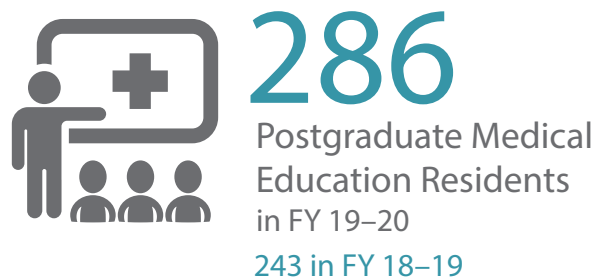
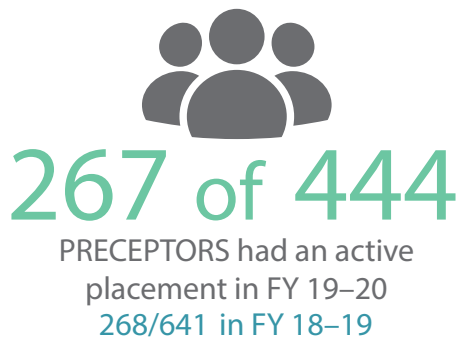
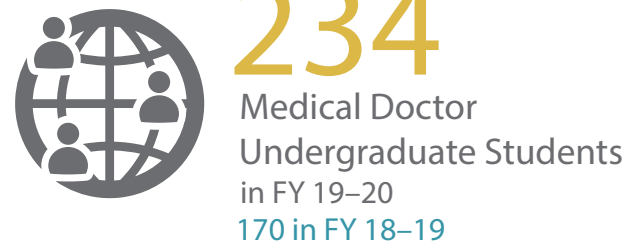
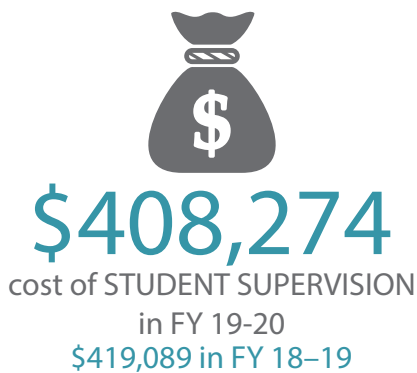
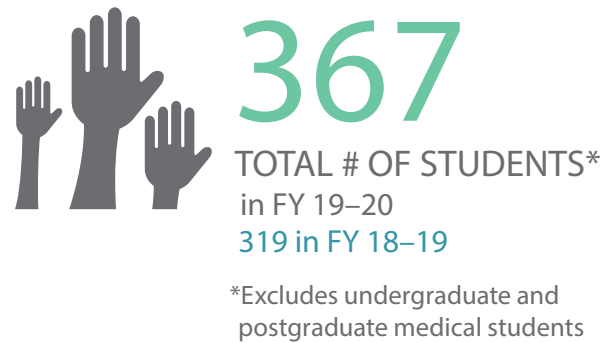
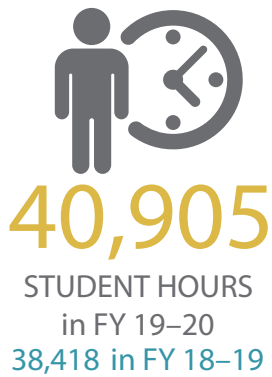
TABLE 5 WHRI Outcomes (continued)

Description of any guideline, drug, diagnostic agent or device adopted or approved in FY 2018/2019 as a result of research driven by PHSA researchers.	Please describe the benefits to patients, population health, and/or health system sustainability of the items identified.	Type of Benefit And Result of Internal Collaboration (if Yes )
<p>A WHRI researcher was one of the lead authors of a national practice guideline: Medical Management of Symptomatic Uterine Leiomyomas – An Addendum.</p>	<p>Improved outcomes for women with symptomatic Uterine Leiomyomas through the optimization of the decision-making process for women and their health care providers in proceeding with further investigation or therapy for uterine leiomyomas. This updated decision making takes into account the disease process and available treatment options and reviews the risks and anticipated benefits to allow women to make an informed decision.</p>	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy;</p>
<p>A WHRI researcher was co-author of a national clinical practice guideline: Screening, Diagnosis, and Management of Placenta Accreta Spectrum Disorders.</p>	<p>Improved outcomes for women with suspected placenta Accreta Spectrum disorders through the use of optimized diagnostic and surgical techniques used for treatment management, including anesthesia and practical considerations for interdisciplinary care.</p> <p>Implementation of these recommendations will also improve awareness of this disease and increase the proportion of affected women receiving interdisciplinary care.</p>	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy</p>
<p>WHRI researcher was the co-author of a national clinical practice guideline: Antibiotic Prophylaxis in Gynaecologic Procedures</p>	<p>Improved outcomes for women undergoing gynaecologic procedures due to the correct use of antibiotic prophylaxis for the prevention of surgical infections. Reduced cost and related harm of administering antibiotics when not required and a reduction of infection and related morbidities when antibiotics have demonstrated a proven benefit.</p>	<p>Patient: Protocols and guidelines</p> <p>System: Knowledge dissemination-new policy; Efficiency, cost/benefit or sustainability</p>

STUDENT EDUCATION METRICS

BC WOMEN'S HOSPITAL & HEALTH CENTRE

BUILD PRACTICE EDUCATION CAPACITY



... BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



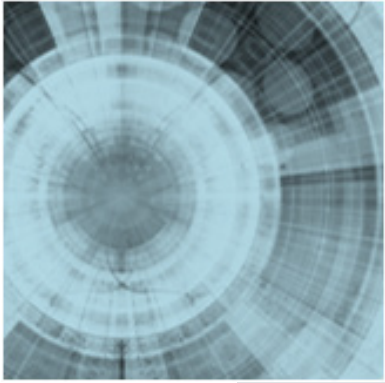
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. BC Institute of Technology (20,679)
2. University of BC (6,310)
3. Langara College (6,105)
4. Simon Fraser University (4,190)
5. Vancouver Community College (1,904)



10

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
11 in FY 18–19



BC Emergency Health Services

STUDENT EDUCATION METRICS

STUDENT EDUCATION METRICS **BCEHS** | BC Emergency Health Services

BC EMERGENCY HEALTH SERVICES

BUILD PRACTICE EDUCATION CAPACITY



58,586

STUDENT HOURS
in FY 19–20
59,103 in FY 18–19



351

TOTAL # OF STUDENTS
in FY 19–20
402 in FY 18–19



\$2.3 Million

cost of STUDENT SUPERVISION
in FY 19–20
\$2.4 Million in FY 18–19



139 of 170

PRECEPTORS had an active
placement in FY 19–20
143/177 in FY 18–19

BUILD EFFECTIVE PARTNERSHIPS & COLLABORATION TO SUPPORT INNOVATION



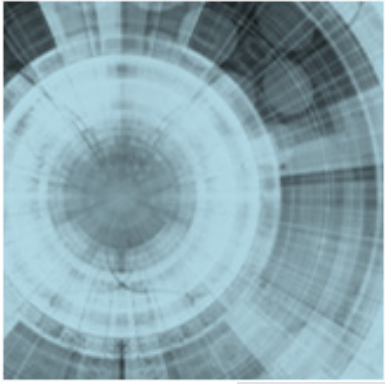
TOP EDUCATION INSTITUTIONS BY
PLACEMENT HOURS in FY 19–20

1. Justice Institute of BC (52,481)
2. Heartsafe (3,721)
3. Academy of Emergency Training (2,384)



3

of ACADEMIC PARTNERS
WITH AN ACTIVE PLACEMENT
in FY 19–20
3 in FY 18–19



PHSA Registries & Datasets

RESEARCH METRICS

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



representing



REGISTRY/DATASET USES



TOP 3 RESEARCH SUPPORT ACTIVITIES

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



NATURE OF RESEARCH ACTIVITIES



TABLE 6 These are examples of the types of research questions posed by investigators using data from PHSA registries and datasets in FY 19-20.

BCCH's Biobank	Exploring whether natural killer T cells regulate the expansion of tonsillar B cells following EBV infection and if this virus preferentially infects specific B cells Minimal data set such as sex and age.
	Assessing early-life exposures by analyzing compounds in baby teeth” 1. demographic information about the city the individual lived in, including the first 3 digits of the postal code, 2. The date each tooth was lost, 3. Month and year of the child's birth and 4. Child's sex.
	CODEX deep imaging training, validation and optimization (Healthy children)
BC Cardiac Registry	Decision making of Management of Coronary Artery disease in patients with Chronic Kidney Disease: Validation of predictive models through BC Cardiac registry and BC Renal Agency PROMIS Linkage.
	Sub-study of Multiple Arterial Bypass Grafting in BC. Graft configuration in BITA grafting outcomes affect.
	Long term outcomes of chest pain patients who undergo cardiac CT.
EPPIC	What is the prevalence of activating kras mutation in adenomyosis (with and without concurrent endometriosis)?
	What are the prevalence and characteristics of cannabis use in women referred to a chronic pelvic pain clinic? Did cannabis legalization change the prevalence of use?
	Evaluation of risk factors for caesarean section scar endometriosis.
Lung Cancer Screening Program	Use of deep learning to identify screening CT scans from participants with lung cancer and to determine screening interval.
	Use of deep learning to predict presence or absence of chronic obstructive pulmonary disease from screening CT scans.
PROMIS-Renal	What is the geographical distribution of Glomerulonephritis in BC, and is there variability by Health Authority
	What are the outcomes of patients receiving different types of immunosuppressive agents for specific GNs, and do these vary by age, or sex?
	How are oral nutritional supplements prescribed in BC, and to whom? What is the variability between HA]? Can we describe a phenotype of those prescribed ONS, and duration of prescription and outcomes?
PROMIS - Transplant Registry	It is important that the kidney transplantation process is culturally safe ethno-racial minority communities and their potential donors. We propose to conduct a mixed-methods study, which aims to improve access to living donor kidney transplantation (LDK).
	Our proposed project is part of Can PREVENT AMR program. This data will allow us to investigate negative outcomes for at risk patients during the study period and aid in development of a precision medicine approach to treating organ rejection.
	To profile the indications for orthotopic liver transplantation in the South Asian Community of British Columbia. Identification of indications will help address disparities in transplantation access and help determine the burden of preventable disease in this population.
Screening Mammography Database	Assess the state of breast imaging services in the lower mainland including wait times and time to diagnosis to identify process improvements and efficiencies in service delivery.
Surgical Patient Registry	Hip & Knee Arthroplasty Data - to review patients who had a hip or knee replacement and then went on to have a revision. What products were used and where the revision took place.

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

<p>Tumour Tissue Repository</p>	<p>Does the presence of lymph node hypoxia (oxygen deficiency) reflect the extent of immune activation against tumours of the breast?</p> <p>Atypical glycan based liquid biopsy for risk stratification in early breast cancer.</p> <p>Development of a next generation sequencing assay to detect all classes of genetic variant in a single diagnostic test.</p>
<p>Perinatal Services BC</p>	<p>Improving maternal and perinatal health outcomes in high risk mothers, BC data: (Objective) 1. To compare BMI-specific rates of composite maternal mortality and severe maternal morbidity. Using mortality/morbidity among women with a normal BMI (18.5-24.9 kg/m²) as a reference, excess mortality/morbidity rates will be quantified among women who are underweight (<18.5 kg/m²), overweight (25-29.9 kg/m²), and obese (>=30 kg/m²). 2. To examine the age-specific rates of severe maternal morbidity among mothers with twins and triplets (as compared to mothers with singleton pregnancy); and to determine effects of multifetal pregnancy on the relationship between older maternal age and severe maternal morbidity.</p> <p>Developing a multi-source surveillance system for Fetal Alcohol Spectrum Disorder and prenatal alcohol exposure (SSFASD/PAE) in Canada: (Objective) This data request exists as part of a cross-jurisdictional effort to collect prevalence and incidence estimates on FASD and PAE in Canada. The data generated from PSBC will provide estimates of alcohol consumption during pregnancy in conjunction with use of other substances. By generating descriptive statistics of adverse neonatal outcomes known to be associated with prenatal alcohol exposure from this data, we can also generate an estimate of prevalence for youth that may be at-risk for a Fetal Alcohol Spectrum Disorder later in life (diagnosed as early as 2-3 years old). With stratification of the data, we can determine how this risk changes with intrauterine exposure to different substances.</p> <p>Risk of fetal death and optimal timing of delivery among overweight and obese women: (Objective) 1. To determine the association between pre-pregnancy BMI and gestational age-specific rates of stillbirth, neonatal death (within 28 days after birth), and serious neonatal morbidity in Canada. 2. To determine the optimal timing of delivery for overweight and obese (class I, II, and III) women at term gestation (addressing modification of risk by advanced maternal age, assisted conception, hypertension and diabetes).</p> <p>Comparison of perinatal outcomes of planned home birth after cesarean (HBAC) and planned hospital vaginal birth after cesarean in British Columbia: The aim of this BC-based cohort study is to examine temporal trends in HBAC and to compare perinatal outcomes of planned HBAC and planned hospital VBAC. Our specific research questions are: 1. What are the temporal trends in HBAC and VBAC in BC. 2. Are maternal characteristics, mode of delivery and perinatal outcomes different between planned HBAC compared to planned hospital VBAC (midwife as primary care provider) in BC? 3. Are maternal characteristics, mode of delivery and perinatal outcomes different between planned HBAC compared to planned hospital VBAC (family doctors/obstetricians as primary care provider) in BC? 4. Are maternal characteristics, mode of delivery and perinatal outcomes different between planned VBAC (midwife as primary care provider) compared to planned hospital VBAC (family doctors/obstetricians as primary care provider) in BC?</p>

TABLE 6 Example Research Questions by Registry/Dataset

<p>Perinatal Services BC (continued)</p>	<p>Retrospective analysis and algorithmic development of maternal and fetal biomarkers of adverse placental outcomes - Research Questions: 1. What detailed image features associated with placental anatomy can be detected through machine learning algorithms applied to placenta ultrasound images? 2. Can detected image features not visible by manual inspection be consistently correlated with patient outcome? 3. Can a machine learning algorithm automatically extract regions of a placental ultrasound image that are relevant for prenatal examination? 4. What are spatial and pixel-intensity characteristics of regions detected by machine learning analysis to be associated with abnormal placental texture? 5. Can a machine learning algorithm assess the risk of a patient developing certain conditions from a placental ultrasound image? 6. Can a machine learning algorithm predict risk of a patient as well as or better than manual analysis from a trained obstetrical expert?</p>
	<p>Assessing Quality of Care on Treatment Outcomes attributed to Prescriber Networks: (Objective) 1. Define adequately the difference in quality of care between prescribers 2. Comparison of Quality Care of prescribers nested within sites and caring for common individuals 3. Determine the influence of prescriber characteristics on opioid use disorder (OUD) treatment outcomes.</p>
	<p>Assessing the Treatment Effect with a Multi-state Process: an Application to Opioid Use Disorder: (Objective) 1. Develop a comprehensive, rigorously-defined set of health system performance measures including a cascade of care for persons with OUD, and share information with key stakeholders to facilitate evidence-based decision making. 2. Execute supplemental analyses to further refine the performance measures and identify additional priorities for evaluation and public health intervention. 3. Using the performance measurement system and in consultation with local collaborators, identify feasible and actionable public health interventions to address deficits in health system performance in opioid use disorder.</p>
	<p>Incidence, Treatment Strategies and Prognosis of Cerebral Venous Thrombosis in British Columbia, Canada" (Objective) 1. Validate sensitivity and specificity of ICD 9/10 codes in identifying CVT from administrative data in British Columbia. 2. Use BC administrative data to estimate incidence of CVT, associated demographics and major risk factors (age, sex, peripartum status, malignancy status, use of hormonal contraceptives or hormone replacement), and prognosis (mortality, length of hospital stays, re-hospitalization related to intracranial bleeding, seizures and recurrent VTE). 3. Use BC Medical Services Plan data to assess interactions with the health care system in the 4 weeks prior to diagnosis to estimate delays in diagnosis of CVT. 4. Using BC PharmaNet prescription data to assess choice of anticoagulant and duration of therapy for CVT, and to explore differences in duration and choice of therapy by prescriber (specialty [e.g. neurologist, hematologist, internist], prescriber's geographic location) and patient characteristics (e.g. age, sex, peripartum status, malignancy status). 5. Use BC PharmaNet prescription data to estimate proportion of patients requiring anti-seizure medications after CVT diagnosis, and describe the choice of agent and duration of therapy. 6. Identify the resources used by CVT patients in their journey through hospital and post-discharge to better assess their care utilization and cost of care.</p>

TABLE 6 Example Research Questions by Registry/Dataset

BC Trauma Registry	Canadian benchmarks for acute injury care - how do acute facilities compare in outcomes (mortality, length of stay and complications) across Canada?
	In bleeding trauma patients, does receipt of minor-incompatible plasma from any blood product among non-group O recipients affect 30-day mortality compared to group O recipients of plasma and non-group O recipients of ABO compatible plasma?
	To map location of transport-related injuries (minor and major) and fatalities. This is a proof-of-concept project to confirm feasibility and the potential for yearly mapping of injuries and fatalities due to all mechanisms of injury.
	This study aims to explore the regional variability in mortality following TBI in British Columbia. We hypothesize that individuals with worse access to neurosurgical care, defined by modeled travel times from the site of injury to the nearest neurosurgical center, have worse outcomes after adjusting for important confounding variables.
	Cardiac trauma carries high mortality rates and should be considered in all patients presenting with chest trauma. These patients can have a wide range of clinical presentations from being asymptomatic to being in hemodynamic collapse. Currently, multi-detector computed tomography (MDCT) is the gold-standard diagnostic imaging modality for all patients with abnormal ECG and/or Troponin I level following chest trauma. In this review article, we discuss pathophysiology of cardiac trauma, review the role of medical imaging, and present the spectrum of abnormal findings in blunt or penetrating traumatic cardiac injuries.
	There is a growing trend towards accreditation of trauma centers in North America. However, the impact of accreditation remains unclear, due to several methodological shortcomings in the literature, such as the use of simple pre- and post-accreditation comparisons of outcome. Using population-based administrative datasets from Canada and the United States, we will assess how trauma center accreditation influences processes of care and patient outcomes over cycles of accreditation visits using an interrupted time series and difference-in-difference approach.
	Researchers seek to conduct a chart review from the BC Trauma Registry database in order to perform a retrospective validation in their population of children exposed to Blunt Abdominal Trauma in British Columbia. A validated CDR will allow them to more systematically evaluate children following blunt trauma and ideally decrease their exposure to ionizing radiation through unnecessary CT scans. This would reduce costs and malignancy risk, improving outcomes over the long term. They also aim to collect data on transport times and transport distance for patients included in this study, which will allow them to gain a more holistic overview of the patients' interactions with the trauma system, viewing these in comparison to patient outcomes in the form of Injury Severity Score, morbidity, and mortality.
	A pragmatic randomized open blinded endpoint trial that will compare the benefit of a liberal RBC transfusion strategy to a restrictive strategy on patient orientated outcomes in critically ill patients with moderate or severe blunt TBI.
	The specific aims of this study are to: 1) determine the exposure to specific operative trauma domains during residency 2) determine if exposure has changed over time 3) determine if significant variation in exposure exists across training programs 4) perform an environmental scan of the non-operative clinical exposure, as well as the formal and informal education in trauma care, provided to general surgery residents.
	The objective of this study is to identify the number of trauma patients at the Royal Columbian Hospital that may have potentially benefited from management of infra-diaphragmatic hemorrhage with deployment of REBOA through analysis of Trauma Team Activations logged in the BC Trauma Registry over a 2-year period.

TABLE 6 Example Research Questions by Registry/Dataset

BCEHS Cardiac Arrest Registry	PulsePoint-Collaborative randomized control trial to see if the use of the PulsePoint responder App increases the rate of bystander CPR and the impact of that.
	Paramedics and End-of-Life Study- Collaborative study between BCEHS and Nova Scotia where paramedics provide an alternative approach to end of life care and out-of-hospital cardiac arrest patients with a palliative diagnosis.
	Trends in Care processes and survival following prehospital resuscitation improvement initiatives for OHCA attended to by BCEHS. Data on non-traumatic ambulance treated adult OHCA in Victoria, Vancouver, Fraser Valley and Kelowna were reviewed for survival to discharge looking for trends in baseline characteristics.
BCEHS Paramedic System Evaluation and Research Database (PSERD)	Pre-Hospital Blood Product Resuscitation for Trauma- A multi centre retrospective chart review designed to evaluate the potential impact of a prehospital blood transfusion program in an areomedical settling in BC.
	Community Paramedics and Virtual Health Assessment-Commentary on the adaptations of the CP role with COVID-19, and the emerging role of telehealth services. Published in the Australasian Journal of Paramedicine.
	Paramedic Intubation During a Pandemic: Where are the Consensus Guidelines-Commentary that revisits the evidence around paramedic-led intubation and provide a perspective on paramedic-led intubation during the COVID-19 pandemic. Published in the Australian Journal of Paramedicine.
	Promoting maternal transfers for preterm deliveries to improve outcomes (ProMT) study-Collaborative study with SickKids and BCWH/BCCH. Investigation to determine the current state of in-utero transfers of mothers who present at GA<32 weeks to non-tertiary centers in order to decrease the number of out-born deliveries and to decrease neonatal mortality and morbidity.
	CHAMP (Collaborative Heart Attack Management Project) Trial- Evaluation of pre-hospital fibrinolytic medication administration for STEMI.
	Frontier Trial- Collaborative trial with BC ROC that involves examines patient outcomes from field randomization of NA-1 in patients with acute cerebral ischemia (stroke), administered early (out of hospital) after symptom onset.
	Pediatric Non-Invasive Ventilation Study- Examines the use of sedation in the management of non-invasively ventilated pediatric patients during out-of-hospital transport by BCEHS infant transport team paramedics.
	Paramedic-Led Online Medical Support: Exploring a New Paradigm in Out of Hospital Care-Qualitative review of CliniCall services offered by BCEHS
	Paramedic Utilization During the COVID Pandemic-The pandemic has created changes to the epidemiology of individuals accessing healthcare services. This project seeks to compare paramedic system utilization since the start of the outbreak to the same period in 2019.
Rural Health Equity through Social Enterprise and Technology Synergies-Qualitative research addressing how technology can be used to promote health and well-being in people living with chronic disease in rural communities.	

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

Vicki Chui
Research Services, BCCHR

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

Stephanie Dunn
Director, Communications, BCCHR

Rhonda Ellwyn
Manager, Research Operation, BCMHSUS

Karen Hagan
Grants Officer, Office of Research Facilitation, BC Cancer

Jennie Helmer
Paramedic Practice Leader, BCEHS

Virginia Lew
Finance Manager, BCCHR

Jillian McKenna
Research Administration, BC Cancer

Beth Palacios
Consultant, Performance Measurement & Reporting, PHSA

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

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

*As of September, 2019

APPENDIX 3

FRAMEWORK FOR PHSA STUDENT EDUCATION METRICS*

1. Indicator: Build Practice Education Capacity

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

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

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

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

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

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

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

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

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

APPENDIX 4

STUDENT EDUCATION COORDINATING COMMITTEE

Current Membership

Ellen Chesney ¹	Chief Administrative Officer – Research & Academic Services, Executive Sponsor
Annalies Becu ⁸	Manager, Public Health
Christie Diamond ¹	Co-chair, Corporate Director - Academic Education
Karen Derry ^{4, 5, 6}	Associate Director, Inter-professional Practice
Justin Dodds ²	Director, Professional Practice, Burnaby Centre for Mental Health & Addictions
Sandra Harris ^{4,5,6}	Senior Leader - Clinical Education, Learning & Development
Christy Hay ^{4,5,6}	Interim Director, New Knowledge & Innovation
Yujin Lim ¹	Collaborative Practice Leader
Lisa McCune ³	Provincial Director, Patient & Family Experience
Jennifer Molhoj ⁷	Manager, Clinical Education
Karen Mooder ⁹	Multi-site Director – Lower Mainland Pathology & Laboratory Medicine
Neeta Nagra ¹	Collaborative Practice Lead
Maureen Sexsmith ²	Director, Professional Practice, Correctional Health Services
Jane Sun ²	Director, Professional Practice, Burnaby Centre for Mental Health
Sarah Titcomb ¹	Administrative Coordinator - Academic Development
Christina Tsobanis ¹	Collaborative Practice Lead, Allied Health
Heena Vadgama ³	Education Coordinator
Sylvia Wu ⁴	Manager – Education, Dept. of Pediatrics

Past Membership within FY 19-20

Cecilia Li ³	Professional Practice Leader, Nursing
Kavita Sarwal ³	Co-Chair, Director, Research, Innovation & Education, BCCA
Sandy Tatla ^{4,5,6}	Director, New Knowledge & Innovation

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