



Creating a New Horizon in Child Health Research

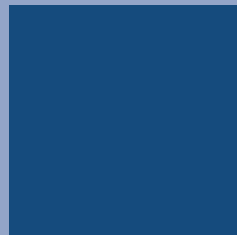
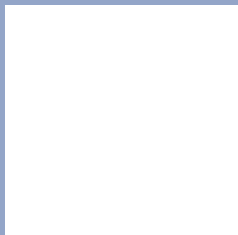
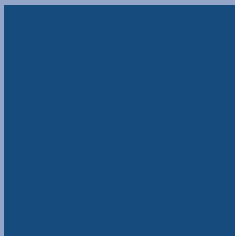
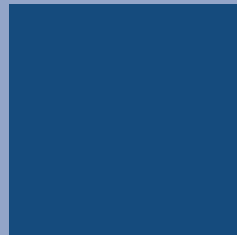
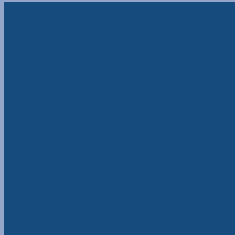




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The Council for Canadian Child Health Research (CCCHR) serves as a national advocate for child health research in Canada. The vision of the CCCHR is: A Canada in which all children, youth and families enjoy the benefits of improved health through the application of research findings.

Executive Summary

The child health clinician-scientist community has been in a state of crisis for over two decades. This crisis is becoming increasingly acute as the current cadre of clinician-scientists is nearing retirement and lower numbers of new trainees are entering the workforce. In fact, many of those with an interest in pursuing a career as a child health clinician-scientist are being deterred by the challenges faced throughout training and the career lifecycle related to heightened requirements (e.g., training, performance, workload) and insufficient recognition (e.g., tenure, grants, salary) relative to clinical counterparts.

The consequences of a dwindling child health clinician-scientist workforce will have significant implications on the quality of patient care. By virtue of their dual roles in clinical and research environments, clinician-scientists are perfectly situated to develop and translate knowledge for clinical contexts. The loss of these skills negatively impacts knowledge of current medical research findings, application of cutting edge approaches in clinical settings and the ability to recognize how and when to conduct research to inform clinical trends. Investing in maintaining and growing the child health clinician-scientist community not only improves quality of care for today's children, it signifies an investment in the health and functioning of Canada's citizens.

Presently, there are a notable efforts being made in Canada to revive the child health clinician-scientist community. For example, the Canadian Child Health Clinician-Scientist Program (CCHCSP) is internationally recognized for its success in transforming child and youth health research across many physician and non-physician disciplines and enhancing capacity across all geographical regions in Canada. Similarly, there are a handful of international programs with mandates to strengthen the child health clinician-scientist community.

These efforts are making a substantial contribution to the Canadian and international workforce, but significant gaps remain. Emerging from this crisis requires greater engagement from stakeholders at all levels, along with strong advocacy, to increase knowledge of and support for the clinician-scientist community. There are numerous avenues to pursue that would contribute to achieving these goals. Outlined herein are key actions that require prioritization and stakeholder support to strengthen the child health clinician-scientist community. It is time to change the horizon for child health clinical research.

...it is commonly acknowledged that child health is of the greatest importance for the future health of a nation, since today's children grow up to become the next generation of parents and workers, and because health in early life is the basis of health in adult life.

- Wadsworth & Butterworth, 2007; p.31

The way our nation prioritizes the health of children has a long-term impact on the health of Canadians. By developing and applying appropriate treatments for children, we are investing in the future health and functioning of our citizens (Wadsworth, 1999). When making a decision to seek medical treatment for a child, most Canadians assume they are receiving quality health care that benefits from the application of relevant medical research findings. However, the application of research to practice is not an automatic process. Providing Canadians with high quality medical treatment requires an investment in medical research and an ability to translate this research to clinical practice. Child health clinician-scientists play a central role in this work. Despite this fact, and a growing demand for evidence that will lead to improvements in health outcomes, there is still a shortage of clinician-scientists.

The shortage of child health clinician-scientists in Canada, which is becoming more acute as much of the current cohort of clinician-scientists is approaching retirement, is largely due to the many challenges individuals face to become and succeed as a clinician-scientist. The purpose of this report is to identify these challenges and review recommendations for action to revitalize the child health clinician-scientist community. In doing so, the Canadian context will be examined versus several international comparators. This report concludes that there is a clear need to prioritize the clinician-scientist role, and outlines how stakeholders can contribute to effecting change in the field of child health.

The Clinician-Scientist

Role

A clinician-scientist refers to a physician or non-physician health care professional whose primary goal is to create new knowledge and apply it to health. Clinical-scientists' time is divided between clinical practice and research, making them perfectly situated to translate and apply research results in clinical settings as well as to identify research questions to pursue based on what they encounter in practice (Lander, Hanley & Atkinson-Grojean, 2010). This fluency in both disciplines contributes to superior patient care because their understanding of health and disease, from a research and clinical perspective, provides a facility in interpreting the most imminent medical findings, allowing them to apply prioritized care in the clinical setting.

From a clinical perspective, clinician-scientists are able to bring their knowledge of research on the most cutting-edge and effective treatment approaches to the clinical setting. This leads to better outcomes for patients and learning opportunities for individuals whose work is devoted to clinical practice and, therefore, less intertwined with research. This benefit is not realized by simply increasing clinicians' awareness of recent and on-going research findings. A central part of a clinician-scientist's role is to recognize the research required to make clinical advancements, and ensure that research is relevant and viable in the clinical setting.

From a systems perspective, a health care system is enhanced by research-oriented individuals who recognize the gaps in knowledge and strive for continuing improvements in the clinical care environment. Clinician-scientists play a critical intermediary role because they have a strong understanding of the clinical and health system environment and an aptitude to identify how research knowledge can be appropriately applied within these contexts.

Demand

The need for more individuals capable of bridging the gap between health research and practice is not a new one (Wynngaarden, 1979). The clinician-scientist community has been in crisis for over two decades. Over time, a number of task forces have worked to produce recommendations for change; however, the shortage of clinician-scientists continues and is intensifying as a result of the many challenges to obtain and maintain a career as a clinician-scientist (Rosenberg, 1999; Strategy for Patient-Oriented Research SPOR, 2013). This is in contrast to the growing demand for evidence that will lead to improvements in health outcomes. For example, the Paediatric Chairs of Canada estimate a need for over 110 new paediatrician investigator/scientist positions during the next 5 years (J. Kronick, personal communications). To date, the number of clinician-scientists needed within non-physician child health professions has not been estimated. However, the small number of existing and training clinician-scientists within Canadian academic training centres indicates a very large future need. This implies a demand for a substantial increase in the number of non-physician health

clinician-scientists – nurses, occupational therapists, pharmacists, social workers, physiotherapists, psychologists, nutritionists, dentists and other health professionals – who combine research and clinical practice in their daily work.

Recent advancements in child health research make today's medical context an optimal time to capitalize on the opportunity to increase child health knowledge and enhance current practices. There has been a marked increase in the availability of powerful technologies, in-vivo imaging, non-invasive monitoring and high-throughput analytical techniques employing small sample volumes. These advancements offer an "...opportunity to involve children in research as never before, and unravel the molecular basis of links between early life exposures, development, deprivation, and disease" (Royal College of Paediatrics & Child Health, 2012; p.6).

Challenges

Pursuing a career as a clinician-scientist begins with a lengthy period of training. For example, a child health physician clinician-scientist can expect to spend at least ten years in university, residency and internship programs before obtaining his or her doctor of medicine (MD) and clinical specialization. This typically happens before starting research training, which can entail an additional five or more years of training. All of this occurs before the trainee can earn a professional-level salary.

Given the delay to receiving a salary, lengthy training requirements and challenges inherent in pursuing these expertise while maintaining a career-life balance, there is already a limited pool of individuals considering this career path. Indeed, the length of training is viewed by physician-scientist candidates, trainees, graduates and program leaders as a threat to the recruitment and retention of physician-scientists (Rosenblum, 2012). If the majority of barriers associated with the clinician-scientist career path ended upon the completion of training, these challenges may be viewed as short-term and a means to a less challenging end. However, the reality is that clinician-scientists continue



to face significant challenges throughout their careers stemming from a lack of clear career trajectory and an uncertain job market for someone of their specialization.

When seeking employment, the clinician-scientist is often required to create and negotiate a position because there tends to be very little precedence in these types of roles.

This involves convincing administration of the value of clinician-scientists; articulating the role and how clinical and research work will be balanced; negotiating an appropriate salary and seed funding; and setting appropriate expectations and evaluation criteria (MacDonald, Sharpe, Shikako-Thomas, Larsen & MacKay, 2013). For this reason, a clinician-scientist is required to take on responsibilities that would normally fall under a human resources specialist, a salesperson, and a negotiator, before he or she can even begin to play the dual role of a clinical-scientist. The challenges inherent in having to advocate for one's self in these capacities would be stressful for most individuals, in particular for those who are transitioning from trainee into the workforce.

Clinician-scientists are often required to create their position through multiple affiliations. For physician clinical-scientists, this usually involves a hospital-based position with affiliations to research institutes or universities. Each affiliation carries with it its own demands and expectations. Meeting the expectations of one affiliation requires significant effort. For those without multiple affiliations, these expectations can become a significant barrier to career progression. Clinician-scientists are required to balance the demands of clinical work, conducting research, preparing reports, service within the institution, mentoring, teaching and grant applications. Simply put, there are not enough hours in a day to successfully meet every performance requirement.

The climate for non-physician clinical-scientists poses even greater challenges, mainly because these positions are underdeveloped and there is little precedence for their type of work. Whereas physician clinician-scientists are often affiliated with, and practice within, hospitals, certain non-physician clinician-scientists work in disciplines that have traditionally had limited roles within hospitals (e.g., dentistry), making it challenging to establish career paths within institutions. Other non-physician clinical-scientists work in disciplines that are typically stationed in academic institutions, where there is greater focus on teaching, resulting in competing priorities against clinical work. Furthermore, many non-physician disciplines have only recently begun to build considerable research capacity, and as a result, lack mentoring and networking opportunities within clinician-scientist domains. Accordingly, being the 'torchbearers' of their discipline, many non-physician clinical-scientists lack any sort of institutional career path, in addition to mentors and collaborators, within their discipline—the very structures that are critical for the professional and career development required to be a successful clinician-scientist.



Despite their unique role, clinician-scientists are often compared to clinicians and scientists who do not balance their time between the two disciplines. The criteria for research grants tend to focus on the number and quality of publications. For this reason, clinician-scientists are often disadvantaged because of their lower research productivity in comparison to individuals who dedicate all of their time to research (Lander et al., 2010). Similarly, clinician-scientists are disadvantaged when it comes to promotional assessments. In universities and research-based institutions, the quantity and quality of research contributions are heavily weighted in tenure determinations. Tenure assessments include little formal recognition of clinical aspects of the clinician-scientist's work as they are mainly determined through a combination of teaching, research and service to the institution (Gravestock & Gregor Greenleaf, 2008).

A further disincentive exists because clinicians tend to earn higher salaries than researchers. Institutions do not want to pay a clinical rate for someone who takes on a significant research role. This imbalance does not acknowledge the comparable clinical knowledge, significant value added and heavy workload carried by clinician-scientists. Further, it forces clinician-scientists to obtain appropriate compensation through multiples funders and on an ad hoc basis from various sources with limited longevity.

Failure to address these challenges threatens the sustainability of the clinician-scientist community. The innate curiosity that drives people to pursue a career in the field is overcome by the challenges continuously faced throughout their career (Association of Professors of Medicine, 2008). This severely limits the ability of universities and academic health science centres to create and translate new knowledge for the benefit of children and families.

Status of Clinician-Scientists in Canada

The challenges experienced by child health clinician-scientists in Canada are significant and numerous. However, there are a number of initiatives in place designed to improve the situation for clinician-scientists, many of which are focused on child health.

Strategy for Patient-Oriented Research (SPOR)

The Strategy for Patient-Oriented Research (SPOR) is the Canadian Institute of Health Research's approach to "...[improving] health outcomes and [enhancing] patients' health care experience through integration of evidence at all levels in the health care system" (Canadian Institute of Health Research; 2011; p. iii). Although patient oriented research (POR) encompasses a range of clinicians and non-clinicians, attracting, training and mentoring clinician-scientists are recognized as key to this strategy; along with creating sustainable career paths (SPOR External Advisory Committee on Training and Career Development, 2013).

Recently, the SPOR National Steering Committee mandated an External Advisory Committee of clinician-scientists from across Canada to address the barriers to recruitment and retention of POR researchers in Canada. Based on evidence of best practices, the committee produced a set of guiding principles for POR training and career development. Overarching themes included the need to address POR training and career development as a shared responsibility between all relevant stakeholders, which must be based in a shared strategy. This entails having a long-term vision that regards the POR career as a connected lifecycle, with particular emphasis on early-career transitions.

A number of concrete recommendations were put forward by this committee, such as developing a SPOR-supported Network in POR Training and Career Development, which would come to integrate

various funding programs and allow them to invest cohesively towards collectively defined goals. Further, they recommended an expansion of the eligibility for certain funding opportunities to a broader range of institutions and disciplines, along with a review of the selection criteria for award recipients to remove systemic barriers for POR applicants.

The SPOR recognizes that Canada has failed to adequately deal with the shortage of clinical investigators, despite past CIHR and provincial efforts (Canadian Institute of Health Research, 2011). Over the coming years, the success of this strategy will be determined by the SPOR's ability to translate policies and recommendations into substantive structural and financial improvements for the training and career development of the POR community.

Clinician-Scientist Programs at the Hospital for Sick Children

The Hospital for Sick Children (SickKids) is Canada's most research-intensive hospital and the largest centre dedicated to improving children's health in the country. Their Centre for Research and Learning is Canada's largest paediatric hospital-based research institute and offers a model for paediatric clinical research in Canada. SickKids has developed two programs, the Scientist Track Investigator (STI) Program and the Clinician-Scientist Training Program (CSTP), which are designed to support the training and career development of clinician-scientists within SickKids.

Scientist Track Investigator (STI) program

In 1996, SickKids initiated the Scientist Track Investigator (STI) program to mentor junior faculty in research positions and support their transition from research training to independence (Rosenblum, Bazett-Jones & O'Brodovich, 2009). All newly appointed faculty clinician-scientists enroll in the STI program for a 2- to 4-year term and are assigned a research advisor who provides guidance on developing and conducting research, maintaining research productivity and establishing an independent program of research. This type of program demonstrates how institutions can establish a structure to support new appointees to develop and maintain a successful research program that informs clinical work.

Clinician Scientist Training Program (CSTP)

An additional program created to support child health clinician-scientists at SickKids' is the Clinician-Scientist Training Program. This program is designed to support clinician, physicians and other paediatric health care practitioners trained in a paediatric clinical discipline that are enrolled in full-time, research-based doctoral (PhD) degrees. The CSTP aims to achieve the following four goals¹:

1. To provide child health clinicians with training to enable them to serve with distinction as independent clinician-scientists in child health in Canada and around the world.
2. To attract individuals who have completed training as child health clinicians into careers as clinician-scientists in child health.
3. To attract / retain highly meritorious child health research trainees to The Hospital for Sick Children.
4. To contribute to filling the need for qualified child health clinician-scientists, including in non-medical or surgical departments with developing academic traditions, such as nursing, physiotherapy, occupational therapy, dietetics, audiology, speech and language pathology, social work, pharmacy and psychology.

1. These goals were identified as part of a program review of the CSTP conducted in 2009.

This program is recognized for enabling clinicians to become scientists. Those accepted to the program are provided with an annual salary that is equivalent to that recommended by the Canadian Institute of Health Research for up to four years (i.e., \$50,000, 80% contributed by the program and 20% contributed by the trainee's supervisor²).

In part, the development and maintenance of clinician-scientists programs of this nature are supported by the Alternative Funding Arrangements funded by the Province of Ontario. This funding provides physicians in academic health centres a single source of income to avoid the challenge many clinician-scientists face associated with having to build a salary from multiple sources to accommodate the multi-dimensional nature of their work (SickKids, 2001). This funding is designed to ensure that these centres are able to compete internationally in attracting world-class physicians (Provincial Working Group, 2002). Recognizing SickKids' Hospital as a leading institution of research and treatment for children, the provincial Government of Ontario has supported the hospital through an alternative funding plan. The alternate funding plan has enabled an integrated approach to research and clinical care at SickKids, and a viable career path for individuals trained to lead research programs as well as to care for patients. This funding contributes significantly to building the child health clinician-scientist community; however, this funding is institution-specific. This type of governmental support is required across a broader range of hospitals/institutions to see similar programs/structures created.

Canadian Child Health Clinician-Scientist Program (CCHCSP)

Perhaps the most significant national initiative for child health clinician-scientists is the Canadian Child Health Clinician-Scientist Program (CCHCSP). Founded in 2002, the CCHCSP recruits, trains and supports researchers and clinician-scientists who have an interest in child and youth health. This program is acclaimed in Canada and abroad for transforming the training landscape within the child health community.

The CCHCSP was built on the premise that transforming child and youth health research requires participation of all disciplines and enhancement of capacity across all geographical regions in Canada. The goal of this program is to train the next generation of child health clinician-scientists. This work begins with the recruitment of researchers from across all disciplines and training in the values and methods of varied scientific disciplines (Introducing the CCHCSP – Conception to birth, 2002).

Awardees engage in research training and a core curriculum in one of the 17 participating Child Health Research Training Centres of the CCHCSP. To date, the CCHCSP has funded³ nearly 50 trainees with their pre-doctoral, post-doctoral, career development and career enhancement awards.

- The *Predoctoral Award* is directed to individuals with a health professional degree (e.g., MD, a nurse with an MSc) who aim to develop or build upon their research training. Trainees dedicate 90% of their time to research while earning a salary that is comparable to individuals undergoing clinical training (i.e., \$50,000 annually) for up to four years.
- The *Postdoctoral Award* is designed for those with a health professional degree and a prior PhD who want to build upon their research competence in child and youth health research. These trainees are expected to devote a minimum of 90% of their time to the research

2. If program trainees are awarded external funding, CSTP funding will be lowered to the differential of the amount of the standard CSTP, if the funding is lower than the standard CSTP amount, or terminated, if the external funding is equivalent or higher than the standard CSTP amount.

3. Note: The costs associated with these stipends are shared equally between the CCHCSP and the awardee's host institution. The Career Advancement Program does not include a salary award.



program. Awardees receive an annual stipend of \$70,000 for up to three years.

- The *Career Development Award* is directed to clinician-scientists who have completed doctoral-level research training and who are newly appointed as a clinician-scientist (i.e., within two years of completing their research training). This award is designed to guarantee protected time while in a mentored research program. Awardees receive an annual stipend of \$70,000 for up to four years and are expected to commit a minimum of 75% of their time to research.
- The *Career Advancement Program* is targeted toward clinician-scientist trainees who have received federal funding independently of the CCHCSP. These trainees are invited to participate in CCHCSP symposia, web-based curriculum and curriculum meetings. The intention of this program is to enrich the number and quality of trainees. These trainees are provided with a small non-salary award to support their research-based career development. The duration of this program is equivalent in length to the duration of their federal funding.

The CCHCSP has inspired the participation of over 500 child health clinicians in seven different clinical disciplines, 17 Canadian universities and 3 foreign countries in an on-line curriculum recently published in book form. Further, the training materials are open to non-funded clinician-scientists, which contributes to the development of the clinician-scientist community over all. Between April 2009 and August 2013, 543 trainees participated in web-based curriculum.

Aside from being the only national program in Canada that trains and supports child health clinician-scientists, it is unique in its scope in that it is open to both physician and non-physician clinician-scientists. Currently, in addition to physicians and surgeons, the CCHCSP funds child health trainees in pharmacy, nursing, psychology, nutrition, rehabilitative sciences (i.e., occupational therapy and physical therapy), communication disorders (i.e., audiology and speech pathology), chiropractic and midwifery. The CCHCSP has provided new opportunities in fields with fewer than five clinician-scientists in Canada (i.e., Psychiatry, Dentistry, Radiology), increased the number of clinician-scientists in nursing and rehabilitation medicine by 50% and strengthened training in paediatric medicine.

Trainees have demonstrated increased productivity in the form of academic publications, invited presentations and successful grant funding applications. Among a host of positive program outcomes, program graduates indicated that the CCHCSP helped them gain interdisciplinary experience; develop greater awareness of the academic research system; and build research networks and access experts in their field. In doing so, the CCHCSP contributed to trainees' understanding of a clinician-scientist's role and supported the development of their individual identities as clinician-scientists (Parker, Burrows, Nash & Rosenblum, 2011).

Beyond its training capacity and support for research productivity, the CCHCSP has launched the careers of a set of highly successful clinician-scientists who are engaged in and leading research across the country. Further, the program has led to the development of a pan-Canadian and multidisciplinary community of collaborators. What was designed to create a transdisciplinary training program for the next generation of clinician-scientists in child and youth health research in Canada has gone on to create *cultural centres* for clinician-scientists that provide a sense of community and an opportunity for discourse among trainees and with disciplinary leaders.

The CCHCSP has been a significant contributor to strengthening the child health clinician-scientist community in Canada. However, the needs of the nation extend beyond those who have completed the training to this point. The CCHCSP plans to continue to recruit trainees and mentors across the breadth of child health disciplines to generate fully trained clinician-scientists. Recognizing the need for future research to incorporate multiple disciplines and expertise (Wuchty, Jones & Uzzi, 2007), the CCHCSP is developing new curriculum aimed at educating trainees in the theory and practice of team research (as compared to individual-led research) and will foster interdisciplinary interactions among trainees, mentors and institutional leaders within the CCHCSP curriculum.

Since its inception, the CCHCSP was partially funded by the Canadian Institute of Health Research's Strategic Training Initiative in Health Research (STIHR). This initiative was designed to "increase the capacity of the Canadian health research community to produce high-quality graduates capable of addressing major health issues and/or health research challenges" (Canadian Institute of Health Research, 2013). The CCHCSP has been recognized as one of the strongest STIHR programs. Over the past 11 years, this program provided \$325,000 annually toward CCHCSP's operation. Recent policy decisions at the Canadian Institutes of Health Research have resulted in an end to STIHR funding for the CCHCSP. However, the need for clinician-scientists and the CCHCSP remains. With this significant loss to its annual funding, the ability for the program to continue in its current form is at risk inasmuch that the future cadre of clinician-scientists is equally so.

International Comparisons

The challenges experienced by clinician-scientists are not unique to the Canadian context. The approaches, programs and funding opportunities found in other countries can, however, offer insight into best practices, alternative models and collaborative opportunities. Given the similarities in challenges experienced by clinician-scientists, Canada's ability to learn from these and other international models and adopt best practices is critical for the development of the clinician-scientist community.

United Kingdom

The United Kingdom has experienced a clear decline in the number of child-health clinical researchers in recent years. A survey of members of the Association of Clinical Professors of Paediatrics indicated that an exercise used to assess the quality of research submissions to support future grant decisions had precipitated a reduction of clinical lecturer positions. The research contributions from clinical

lecturers were deemed insufficient, in large part, because they were competing with lecturers who did not have to divide their time between clinical and academic roles. The loss of these positions, in turn, has resulted in fewer opportunities and mentors for future paediatric clinical trainees (Levene & Olver, 2005). In addition, it has become evident that most paediatric clinical trainees presently have very little exposure to research, whereas involvement in research was previously an expectation. Thirty percent of paediatricians nearing retirement have a higher research degree. This percentage is lower (10%) among new paediatric appointees (Royal College of Paediatrics & Child Health, 2012). At the same time, the number of child-health researchers employed in a university environment has declined 18% since 2000.

In many ways, the shortage of child health clinician-scientists in the UK mirrors the crisis found in Canada. The UK, however, has made some national-level efforts to improve the quality of care for children. In 2007, the Paediatric Regulation was developed in the European Union to improve the health of children in Europe by facilitating the development and availability of medicines for children (European Medicines Agency, 2007). This came about following the pervasive use of unlicensed medicine in paediatric settings. The National Institute of Health Research (NIHR) Medicines for Children Research Network (MCRN)⁴ was established in the UK from the EU Paediatric Regulation to “improve the UK’s clinical research environment and maximise the development of safe and effective medicines and formulations for children” (Royal College of Paediatrics & Child Health, 2012; p. 17). This network has achieved significant impact within the UK, including a marked increase in the number of studies conducted following the establishment of the MCRN (see Figure 1). This has produced results such as improved vaccination programs, demonstration of safety and efficacy of life-saving medications for children and evaluation of novel treatment approaches.

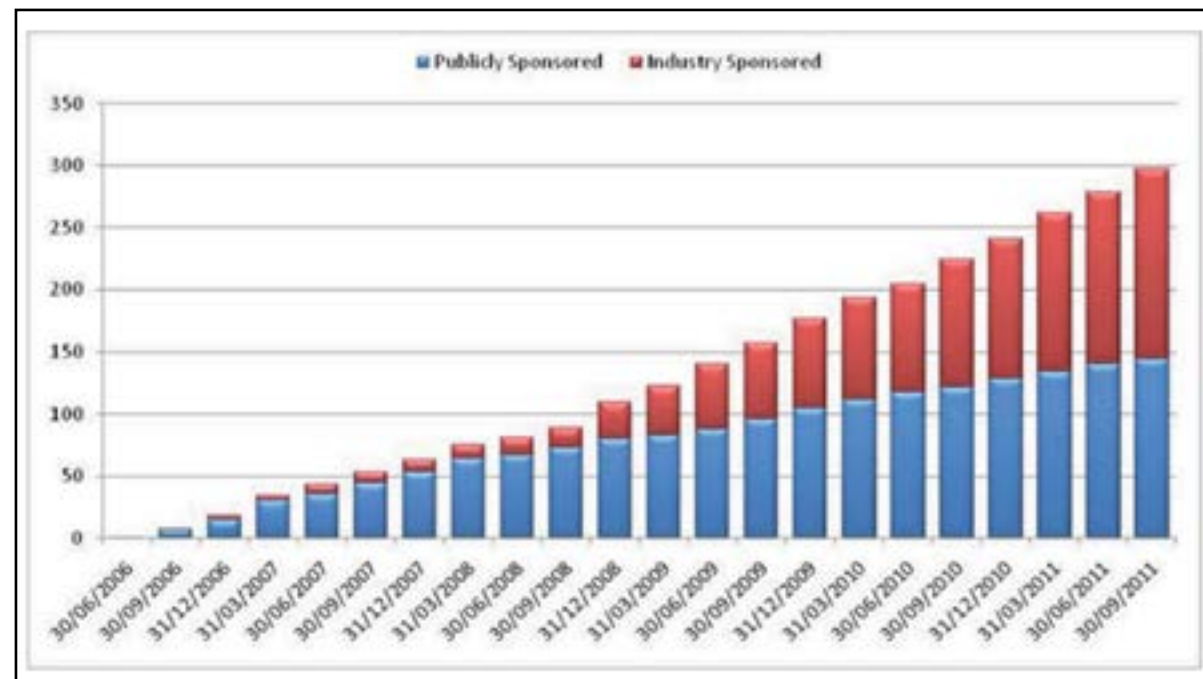


Figure 1. Number of MCRN studies since 2006

Source: Royal College of Paediatrics and Child Health

4. Scotland research support is available through ScotCRN, the Scottish Medicines for Children Network and the Chief Scientist Office; in Northern Ireland through the Clinical Research Network (Children) and in Wales through the Welsh Children & Young People’s Research Network and National Institute for Social Care & Health Research Clinical Research Centre.

Although the use of unlicensed medicine in paediatric settings has received less national-level attention in Canada, the same challenge exists for paediatric physicians domestically. In fact, the majority of drugs available in Canada are not labeled for use in this age group, which results in a lack of information regarding the indications and dosing regimens for medications in this population (Matsui, Jarine, Steer, Cukernik & Rieder, 2003). Although the NIHR-MCHN is not specifically designed to support the growth of the clinician-scientist community in the UK, it directly relates to the type of research clinician-scientists conduct and the vast clinical implications their work can have when research is supported.

Netherlands

Netherlands has developed a program dedicated to building the child health clinician-scientist community. The Training Upcoming Leaders in Paediatric Science (TULIPS) program was developed in 2006, with a mission to empower young clinician-scientists to become internationally competitive researchers in medical and paramedical fields related to child health (Tulips NVK, 2014). Program administrators recognized that clinician-scientists entering the workforce experienced challenges combining clinical work with research, and created the TULIPS program to help individuals early in their career effectively combine their two roles. TULIPS aims to stimulate young researchers to undertake high-quality research to have an impact on child health; to provide a high-quality interdisciplinary platform to further improve the quality of the research; to provide educational curricula for clinician-scientists in different phases of their careers; and to create partnerships with other national and international stakeholders.

The program has two curricula, one designed for PhD and another for post-doctoral students. The PhD curriculum is a two-year program consisting of eight half-day and four whole-day workshops. Examples of workshops include: getting protected time, being a clinician-scientist, going abroad, grant writing and building your curriculum vitae. Program participants also take part in the annual TULIPS symposium and the Young Investigators Day. The post-doctoral curriculum provides tools to extend research competences in child and youth health research to become independent researchers. Program trainees report being supported through the program by gaining an understanding of how their career can combine both research and practice and to create a vision for themselves for their future as a clinician-scientist.

Recognizing the strengths in this program, the CCHCSP has developed partnership with the Dutch TULIPS Program to learn from best practices in clinician-scientist training and to foster research collaborations. To this end, TULIPS is an international collaborator of the CCHCSP. CCHCSP trainees attend an annual Clinical Epidemiology Course organized by members of TULIPS and visit a Dutch research program related to their own research. Further, part of the TULIPS post-doc curriculum includes attendance of the CCHCSP Annual Meeting in one of the two years of the program.

United States

Major initiatives in the United States have tended to focus on the development of the physician-scientist community. A report on the revitalization of the physician-scientist community in the United States indicates that the percentage of physicians engaged in research as their major professional activity has declined from 4.6% in 1985 to 1.8% in 2003. Further, the community that remains is aging. Therefore, a continued decline is anticipated. This anticipated decline is also due, in part, to the changing demographics of those completing medical school. Over the past 25 years, the percentage of female medical graduates had doubled to 50%. Women have displayed higher exit rates from the research “pipeline” (Guelich, Singer, Castro & Rosenburg, 2002). This demographic shift could lead to fewer physicians pursuing a career as physician-scientists.

The Association of Professors and Medicine (APM)⁵ has a long-term initiative to identify, develop and implement solutions to ensure the survival and growth of the physician-scientist workforce (Association of Professors of Medicine, 2008). Although this work is not specific to the child health community, it brings together input⁶ from a range of physician-scientists on aspects of the research environment that are most important for the success of young faculty (e.g., mentoring, availability of adequate start-up support). In focus groups, junior faculty and fellows indicated that their biggest worry is the constant battle for funding. There is a large degree of unpredictability of federal support for research. Since 2003, the National Institute of Health's budget has remained flat and the funds that are available tend to be awarded to senior medical school faculty. These trends discourage young physicians from pursuing a career in research. Roughly one-third of those involved in focus groups had already begun to think of changing or altering their career paths, largely in recognition of the inevitable burnout from chasing funding.

The APM brought together leaders of the academic, medical, and research communities; representatives from the various governing bodies that influence, fund, and regulate biomedical research and academia; experts on issues facing the physician-scientist workforce; and young physician-scientists to discuss the revitalization of the physician-scientist workforce. This produced several recommendations for revitalizing the physician-scientist community, including the need to repair the “leaking pipeline” by improving government funding mechanisms and providing more stable resources, competitive salaries, mentoring, and protected time for research within institutions. In addition, recommendations were made for a greater focus on formalizing mentoring that is in touch with the contemporary context for trainees, along with promoting the advancement (or minimizing the attrition) of women in physician-scientist careers. Lastly, they identified the need for earlier and coordinated efforts to prepare future investigators.

In the child health physician-scientist community, the Pediatric Scientist Development Program (PSDP) is providing coordinated efforts to prepare trainees for a career in academic paediatrics. The goal of this program is to help ensure that a diverse pool of paediatricians trained in research procedures is available in appropriate scientific disciplines to address the biomedical and clinical research needs in the United States.⁷ This program provides two to three years of support for paediatricians with an MD, DO or MD/PhD degree who will devote themselves to academic careers with a strong research component. During the two to three years of PSDP funding, PSDP training takes place at the sponsoring institution. This time period is completely devoted to full-time work in a laboratory, without any involvement in clinical work. This highly competitive program usually accepts around eight new trainees per year.

In addition to being open to Canadian applicants, this PSDP is an international partner of the CCHCSP. CCHCSP trainees attend the PSDP Annual National Symposium, which features trainee research presentations and career development workshops. Attesting to a strong return on investment for this program, the amount of funding awarded to PSDP fellows has increased dramatically over the past 14 years, from just over \$250,000 in 1990 to nearly \$40,000,000 in 2013 (see Figure 2), while the annual program budget during this time frame has remained stable at \$2,250,000.

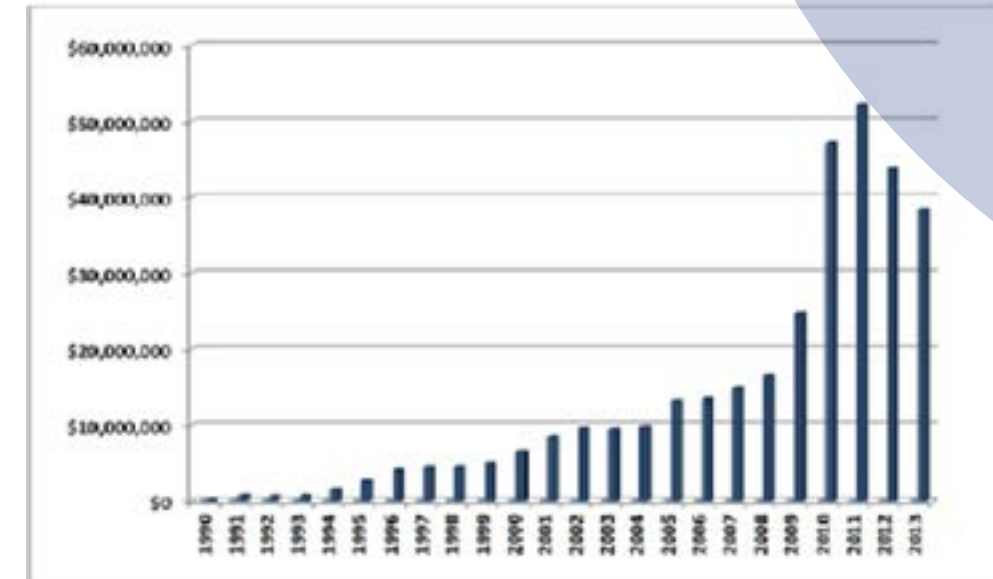


Figure 2. NIH funding (total costs) awarded to PSDP fellows by NIH fiscal year 1990-2013

Source: NIH Reporter⁸

Although there are similarities between the CCHCSP, the PSDP, and the TULIPS programs, the contrasts between these programs are significant. Unlike the CCHCSP and the PSDP, the TULIPS program does not provide trainees with funding; rather, workshop attendance comes at the trainee's expense. The TULIPS program also has a less formal mentoring function, compared to the two funded programs. However, the CCHCSP and TULIPS program are designed for both physician and non-physician clinical-scientists; whereas, only physicians are eligible to apply for the PSDP program. All three programs offer training to future clinician-scientists. However, the CCHCSP is unique in its support of early career development—a particularly precarious time period for clinician-scientist trainees.

Although there are other differences between these programs (e.g., program elements, exclusivity, tolerance for clinical work, etc.), it is clear that the scope and support offered to trainees by the CCHCSP makes it an international vanguard in addressing a training challenge that Canada and other countries are experiencing. Accordingly, the survival and development of the CCHCSP and current efforts to revitalize the clinician-scientist community are critical to meeting current and future child health needs in Canada.

Call to Action

Strides have been made to develop infrastructure and programs aimed at supporting and training child health clinician-scientists in Canada. However, substantial work remains to bring clinician-scientists out of the crisis that limits Canada's capacity to conduct research on the clinical issues affecting its children and youth and to bring this research to bear in a clinical setting. It is time to remove the barriers that are presently limiting the key function clinician-scientists play in the healthcare system and create a long-term vision toward strengthening support for the child health clinician-scientist community to improve outcomes for our children's health.

8. Note: See source for assumptions around the calculation of grant values.

5. Note: This association represents departments of internal medicine represented by chairs and appointed leaders at medical schools and affiliated teaching hospitals in the United States and Canada.

6. Input from physician-scientists was gathered through a combination of survey of program directors of MD-PhD programs and focus group methodology involving junior faculty and fellows at six institutions.

7. <http://grants.nih.gov/grants/guide/rfa-files/RFA-HD-12-209.html>

The child health clinician-scientist community requires short-, medium- and long-term support from stakeholders within child health, government and institutions to emerge from the present crisis to a point where the field of child health is a vital part of our health care system. Over the short-term, significant effort is required to develop a strategy to raise awareness and advocate for the community's value and needs. The work that comes from this can guide efforts to raise awareness and engagement at all levels. Making substantive changes to the training and career development of clinician-scientists requires a long-term commitment on behalf of stakeholders to remove the barriers to success in this field, and improve current systems to recognize the unique role and contribution of clinician-scientists. None of these pieces can happen without support from stakeholders.

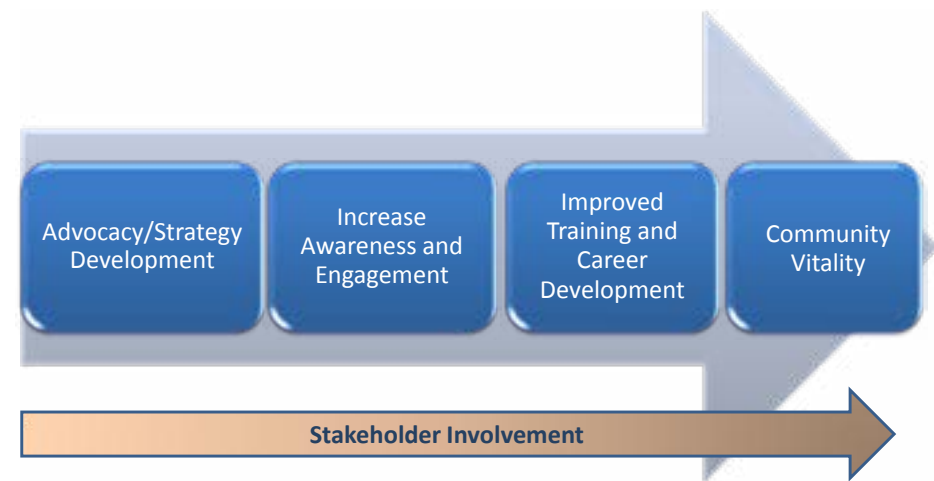


Figure 3. Short-, medium- and long-term call for action from stakeholders

Stakeholders at all levels have a role to play. Stakeholders within the child health community must lead civic, provincial and federal engagement initiatives to advocate for the clinician-scientist role within our health care system. They will also have to function as communications vehicles and change agents, and it will be important that they are supported with the tools to do so. Civic engagement will be a catalyst for this to happen, and a formal structure to initiate and maintain public-level advocacy will be required. Furthermore, there must be collaboration between child health stakeholders, institutions, and both federal and provincial government, to identify ways to better support the career path and work of clinician-scientists and to ensure that the clinician-scientist pipeline is being fueled by the best and brightest. A commitment from our government to continue to fund and build on the work that has been started, as well as to single out child health as an important issue to all Canadians, will be vital.

Looking forward, especially in view of the changing funding climate in the health care sector, partnerships and increased stakeholder involvement will be critical. Networking with new and existing partnerships, including agencies and funders, will be key for the long-term sustainability of the work of child health clinician-scientists. Stakeholders within the child health community will have an important role to effectively translate knowledge and advocate to partner organizations. Champions at partner institutions, particularly at the executive level, will have a critical role.

Ultimately, a strategy guided by a vision for the future of child health clinician-scientists is needed to piece together these components and make Canada a world leader in child health research and practice. Canadians deserve better than to watch their children remain sick or succumb to diseases that are treatable with pre-existing or emerging medical findings. Children make up only a quarter of

our population, but they are our whole future. Accordingly, promoting action to improve child health is not only important to the health of today's children, but also tomorrow's adults. Stakeholders within child health, government and institutions all have a role to play in creating a new horizon in child health research. The following are key actions towards achieving this goal (see Appendix for more detailed recommendations):

Key Actions

1. Build Engagement and Awareness

The value of paediatric clinician-scientists is not well understood outside of the clinician-scientist community. The average Canadian has little understanding of the breadth of knowledge and expertise with which their child is being treated, nor that the fact that clinician-scientists can offer leading treatment that facilitates the best possible health outcome for children at a time of great need.

Even within government and medical institutions, there is a lack of understanding of the role and unique contributions made by clinician-scientists, to the extent that within the current economically-conservative health care climate, fiscal and fiduciary decision-making does not reflect the value and return clinician-scientists provide. This will not change unless it is demanded; therefore, greater awareness amongst the public and institutional partners is crucial. Efforts must be made to ensure that the role and value of clinician-scientists is understood by citizens and institutions, such that they are able to advocate for and promote the work of clinician-scientists within their communities, health care institutions and constituencies.

Priorities:

- ✓ Invest in the development of a strategy for advocacy focused on marketing and public awareness initiatives
- ✓ Build advocacy capacity through citizen and institutional engagement
- ✓ Invest resources for ongoing knowledge translation

2. Increase Government Support

A lack of understanding of the clinician-scientist role exists among provincial and federal levels of government, resulting in a threat to the sustainability of the current work of clinician-scientists, as well as the programs that support and develop future clinician-scientists. Government officials must invest the time to understand the value child health clinician-scientists bring to child and adult health outcomes, as well as to the field internationally. The Prime Minister, Ministers of Health and their advisors, politicians, and policy officials in related ministries, have a responsibility to understand this value.

Accordingly, stakeholders in the child health clinician-scientist community must work together to lobby the government at both federal and provincial levels for increased support through commitments to funding and policy directions that single out child health as a priority. Stakeholders must build a unified, strong case for action and find common ground with other partners. Together they will need to demonstrate how clinician-scientists return value to our health care system.

Priorities:

- ✓ Actively lobby the government and political influencers
- ✓ Develop relations with relevant non-governmental and interest groups to identify synergies
- ✓ Put mechanisms in place to translate outcomes to key government officials and committees at federal and provincial levels

3. Attract and Recruit Future Clinician-Scientists

The current cadre of clinician-scientists is aging. Their exit from the workforce limits both the extent of the discipline's contribution to paediatric child health and signifies a loss of important sources of training and mentoring for the clinician-scientists of the future. Unequivocally, there is a need to prime the clinician-scientist pipeline if our country wishes to continue to advance clinical practices in order to improve child health outcomes and contribute to the international child health agenda.



Accordingly, it is the role of child health stakeholders to assist candidates to view and experience a career path that would provide meaningful work and gainful employment. However, child health stakeholders must supported to create a robust and innovative training program that aligns with the needs of clinician scientists, in addition to our country's future paediatric child health needs.

Priorities:

- ✓ Create a framework to ensure a robust pipeline of future clinician-scientists
- ✓ Streamline and shorten the training tenure for clinician scientists
- ✓ Focus on growth and innovation of training programs for clinician-scientists

4. Remove Barriers to Career Progression

Clinician-scientists experience a financial and operational disincentive of having a career that demands deep entrenchment in both clinical practice and research to be truly "bilingual". This type of role is not well supported through the type of government funding institutions receive, and there is evidence that this gap is forcing clinician-scientists, at differing career junctures, to consider more viable career options.

In the absence of funding from Alternate Funding Arrangements, combined with a trend toward

government funding for patient care over operational funding (the latter of which often covers research time), clinician-scientists must self-advocate within institutions, find other funding opportunities, or accept cross-appointments to piece together a salary. Oftentimes this leads to diverging work demands and dual-placed reporting responsibilities, which circumvent their ability to work effectively in a clinical-science capacity.

Accordingly, child health stakeholders must collaborate to counter the complex employment experience that clinical-scientists face and create clear role profiles for clinician-scientists. They must obtain a commitment from institutions to build the work of clinician-scientists into their tenure plans, as well from the government, to ensure funding of protected research time for clinician-scientists.

Priorities:

- ✓ Define a framework to support the role of clinician-scientists
- ✓ Advocate at institutional and government levels for a human resources strategy for clinician-scientists

5. Increase Stakeholder Involvement and Create Partnerships

Increased involvement from stakeholders and partners is imperative to promoting, sustaining and funding the work of child health clinician-scientists. Engaging institutional champions, promoting intra- and inter-institutional collaboration, as well as maintaining existing partnerships and brokering new ones, is critical to ensuring that there is support for the role and work of clinician-scientists. More strategic, active and coordinated efforts from all child health stakeholders will be required to ensure the long-term sustainability of training and careers for clinician-scientists.

Priorities:

- ✓ Create a formal strategy and role to enhance relations with existing partners and broker new opportunities
- ✓ Design an approach for child health clinician-scientist stakeholders to collaborate on a shared agenda
- ✓ Ensure capacity to actively build a funnel of funding dollars

Conclusion

The clinician-scientist community is presently in a period of crisis and instability. The challenges faced by the clinician-scientist community are significant, but not insurmountable. The future direction of the field depends on the engagement of stakeholders at all levels. A number of key actions have been identified to combat these challenges and strengthen the clinician-scientist community. The next step is for stakeholders to recognize their role amongst the recommendations and take action. A well-developed action plan that prioritizes and operationalizes the recommendations here-in will be required to enable action, and ultimately, change. It is time to end the prolonged state of instability experienced by the child health clinician-scientist community and to focus on what is required to create a new horizon in child health research.

References

Association of Professors of Medicine (2008). Recommendations for revitalizing the nation's physician-scientist workforce. Retrieved from <http://www.im.org/ACADEMICAFFAIRS/PSI/Pages/psiphase1.aspx>.

Canadian Institute of Health Research (2011). Canada's strategy for patient-oriented research: Improving health outcomes through evidence-informed care. Retrieved from <http://www.cihr-irsc.gc.ca/e/44000.html>

Canadian Institute of Health Research (2013). Training grant guide – Strategic training initiative in health research. Retrieved from <http://www.cihr-irsc.gc.ca/e/17948.html>

European Medicines Agency (2007). Paediatric Regulation. Retrieved from http://www.ema.europa.eu/ema/index.jsp?curl=pages/regulation/document_listing/document_listing_000068.jsp

Guelic, J.M., Singer, B.H., Castro, M.C. & Rosenberg, L.E. (2002). A gender gap in the next generation of physician-scientists: Medical student interest and participation in research. *Journal of Investigative Medicine*, 50, 412-418.

Gravestock, P., & Greenleaf, E. G. (2008). Overview of tenure and promotion policies across Canada. Retrieved from <http://www.malaspina.ca/integratedplanning/documents/OverviewofTPPoliciesinCanada.pdf>

Introducing the CCHCSP – Conception to birth (2002, Fall). *Canadian Child Health Clinician Scientist Program*, 1, 1-4.

Lander, B. Hanley, G.E., Atkinson-Grojean, J. (2010). Clinician-scientists in Canada: Barriers to career entry and progress. *PLoS ONE* 5: e13168. doi:10.1371/journal.pone.0013168.

Levene, M. & Olver, R. (2005). A survey of clinical academic staffing in paediatrics and child health in the UK. *Archives of Disease in Childhood*, 90, 450-453.

MacDonald, S.E., Sharpe, H.M., Shikako-Thomas, K., Larsen, B. & MacKay, L. (2013). Entering uncharted waters : Navigating the transition from trainee to career for the nonphysician clinician-scientist. *Academic Medicine*, 88, 61-66.

Matsui, D.M., Jarine, M.E., Steer, E., Cukernik, V. & Rieder, M.J. (2003). Where physicians look for information on drug prescribing for children. *Paediatric Child Health*, 8, 219-221.

Parker, K., Burrows, G., Nash, H. & Rosenblum, N.D. (2011). Going beyond Kirkpatrick in evaluating a clinician scientist program: It's not "if it works" by "how it works." *Academic Medicine*, 86, 1389-1396.

Personal communication between the CCHCSP and Dr. Jonathan Kronick, Paediatric Chairs of Canada.

Provincial Working Group (2002). Report of the Provincial Working Group: Alternative funding plans for academic health science centres. Retrieved from http://www.health.gov.on.ca/en/common/ministry/publications/reports/ahsc_fund.pdf.

Rosenberg, L. (1999). Physician-scientists—endangered and essential. *Science*, 283, 331-2.

Rosenblum, N. (2012). Report of the task force on physician scientist education. Retrieved from mdphd.utoronto.ca/wp-content/uploads/2012/06/ReportforWeb.pdf.

Rosenblum, N.D., Bazett-Jones, D.P. & O'Brodivich, H. (2009). A scientist track investigator program to support early career outcomes for clinician scientists. *The Journal of Pediatrics*, 155, 603-604.

Royal College of Paediatrics & Child Health (2012). "Turning the Tide": Harnessing the power of child health research. Retrieved from [http://www.childhealthresearch.eu/research/add-knowledge/Turning the Tide.pdf/at_download/file](http://www.childhealthresearch.eu/research/add-knowledge/Turning%20the%20Tide.pdf/at_download/file)

SickKids (2001). Alternative Funding Agreement for Academic Physicians at Hospital for Sick Children Backgrounder (Press Release) Retrieved from <http://www.sickkids.ca/AboutSickKids/Newsroom/Past-News/2001/Alternative-Funding-Agreement-Academic-Physicians-Hospital-Sick-Children-Backgrounder.html>.

SPOR External Advisory Committee on Training and Career Development (2013). Training and career development in patient-oriented research. Submitted to the National Steering Committee of the Strategy for Patient-Oriented Research.

Tulips NVK (2002). Training Upcoming Leaders in Paediatric Science. Retrieved from <http://www.nvk.nl/Onderzoek/TULIPS.aspx>.

Wadsworth, M. (1999). Early life. In M. Marmot, & R. Wilkinson (Eds.), *Social determinants of health*. Oxford: Oxford University Press.

Wadsworth, M. and Butterworth, S. (2006). Early life. In Marmot, M. and Wilkinson, R. (eds) *Social Determinants of Health* (2nd Edition). Oxford: Oxford University Press, 267-298.

Wuchty, S., Jones, B.F. & Uzzi, B. (2007). The increasing dominance of teams in production of knowledge. *Science*, 316, 1036-1039.

Wyngaarden, J.B. (1979). The clinical investigator as an endangered species. *New England Journal of Medicine*, 301, 1254-1259.

Appendix

The field of child health clinical science has long been in a state of crisis, making a coherent vision of the way forward of great importance. Having a strategic long-term plan will be imperative in guiding stakeholders to better support and advocate for the work of clinician-scientists, and also in helping new and existing partners clearly identify the goals to be achieved.

This will be achieved by investing in the development of a strategic planning initiative for the field of child health research, including:

- a national strategy to establish a clear vision and messaging among key stakeholders of the child health clinician-scientist community
- a roadmap for strategic initiatives and advocacy
- roles and responsibilities in carrying out strategy and objectives
- an annual strategic management review to plan, monitor and evaluate strategy
- an annual forum for the child health clinical-scientist community to conduct joint-planning around strategic initiatives

The following are specific recommendations associated with the key action areas that should be considered in the process of developing a strategic plan:

1. Build Engagement and Awareness

Invest in a public relations and social marketing campaign

- Implement a national branding initiative to bring awareness to the role and value of clinician-scientists, targeting patient-families at partner institutions and the public at-large
- Identify and prospect a public figure to champion the cause of child health
- Identify tactics for key messages to be consistently communicated through the clinician-scientist community and beyond, such as through presentations, events, conference, and national awareness activities
- Secure institutional leaders (CEOs, research chairs, etc.) to participate in conferences and other speaking engagements

Invest in the development of an advocacy strategy

- Create a strategic vision and roadmap for long-term, broader advocacy efforts
- Develop a advocacy toolkit with prepared research, recommendations, speaking points, etc. to catalyze the advocacy strategy and effectively facilitate dialogue with the right audiences at the right times
- Work with partners to identify a relevant leader along with supporting functions to implement an advocacy strategy

- Identify the role of the Council for Canadian Child Health Research (CCCHR) in broader advocacy efforts, including both inside and outside the funding world
- Identify formal responsibilities for CCCHR members to support clinician-scientists within their institution

Engage the public in an advocacy strategy

- Recruit and engage patient-family members and key influencers in a formal advocacy capacity, such as a family advisory board, to lead civic engagement initiatives
- Train and support patient-family members and key influencers ('board members') to be active advocates in their local communities and institutions, as well as through speaking and media opportunities
- Engage patient-family members and key influencers ('board members') to be champions at their local institutions including the foundations of those institutions
- Engage public in advocacy within their constituencies

Engage in intra-institution advocacy

- Identify champions for clinician-scientist role within institutions and opportunities for them to be involved with local action
- Identify ways to support local champions (Chairs, Centre Leaders, CEOs) to be involved with advocacy efforts

Engage in review of potential collaborative advocacy efforts

- Consider the creation of a national foundation for child health
- Identify opportunities for joint advocacy together with partners (i.e., specific initiatives, events, etc.)
- Consider lobbying for child health to be singled out as a priority of our health care system

Invest resources for on-going knowledge translation

- Create a platform to actively translate and communicate the accomplishments of clinician-scientists and the CCHCSP for mass consumption, including to the public, patients and institutions
- Engage stakeholders in communications initiatives
- Work with foundations to secure opportunities for institutional leaders and patient-families to participate in awareness initiatives

2. Increase Government Support

Implement a strategy to actively lobby the government and key political influencers

- Identify a role within the child health clinician-scientist community to work with federal, provincial and territorial groups to get cooperation to address funding concerns
- Develop ready-to-go election platform messages to appeal to parties in electoral opportunities

Put mechanisms in place to translate outcomes to key government officials and committees at both federal and provincial levels

- Identify a role within child health clinician-scientist community to actively and regularly translate

knowledge of important outcomes and the return on investment of child health clinician-scientists to key government officials, committees and sub-committees at both federal and provincial levels

- Identify a role within child health clinician-scientist community to actively advocate at the ministerial level, in particular, to address existing funding concerns and shepherd future opportunities with CIHR

Develop relations with relevant non-governmental organizations and interest groups to identify synergies

- Identify a strategy and role within the child health clinician-scientist community to communicate with relevant interest groups, NGOs, patient lobbying groups, faith-based organizations, healthcare professional associations, opinion leaders and media
- Identify opportunities to gain traction by finding congruencies with the international child health agenda

3. Attract and Recruit Clinician-Scientists of the Future

Create a framework to actively recruit future clinician-scientists

- Consider collaborating with international partners to define the work and role of clinician-scientists
- Create a mechanism for early identification of future clinician-scientists, and establish leading practices to shepherd them into the field (e.g., through exposure to meetings and symposia as well as networks).

Streamline and shorten clinician-scientist training tenure

- Develop coherent educational platforms that merge clinical and research training to reduce training redundancies, shorten the length of training and promote cohesiveness among the elements of a clinician-scientist's role

Support and leverage 'centre leaders' in recruiting future scientists

- Consider a strategic approach for centre leader succession planning and to the appointment of appropriate centre leaders
- Create a formal onboarding process for centre leaders and Identify opportunities where centre leaders can be engaged by the CCHCSP Principal Investigator and other CCHCSP leadership
- Prioritize developing tools to better support centre leaders (e.g., a centre leader training manual)

Focus on growth and innovation of clinician-scientist training

- Continue to apply a strategic focus to advancing the CCHCSP curriculum and program innovation
- Actively promote the need of government funding to enable curricular development
- Continue to expand the number of trainees and sub-disciplines eligible for CCHCSP funding

Actively engage clinician-scientist trainee program graduates as champions and leaders for clinician-scientists

- Devise a more formal strategy for CCHCSP trainees to have involvement in training future clinician-scientists, such as through the selection committee and other activities

4. Remove Barriers to Career Progression

Define a framework and clear role profiles for clinician-scientists

- Define and communicate a framework to support the role, funding practices, and performance expectations for clinician-scientists such that institutions have a model to work from in supporting the clinician-scientist role

Advocate at institutional and government levels for a human resources strategy for clinician scientists

- Advocate for the appropriate funding and human resources practices to ensure that clinician-scientists consistently have reporting structures and performance expectations that facilitate meaningful and gainful employment
- Advocate to the government for greater ubiquity of alternate funding agreements to reduce disparity in opportunities for clinician-scientists across institutions
- Identify tenure and funding review criteria to minimize the biases against clinician-scientists

5. Increase stakeholder involvement and create partnerships

Design a coordinated, strategic approach for the child health clinician-scientist stakeholders to collaborate on a shared agenda

- Identify roles and responsibilities to lead initiatives to promote inter- and intra-institutional collaboration
- Create a mechanism to actively identify opportunities for collaboration and joint-application

Create a formal strategy and role to enhance partner relations and broker new partnering opportunities

- Identify a role within the child health clinician-scientist community to lead partner relations
- Ensure existing partners are active in identifying and supporting clinician-scientists within their institution
- Ensure partners continue to have opportunities to network more meaningfully with the child health clinician-scientist community
- Create a formal method to garner increased support among periphery stakeholders, including research chairs, the heads of disciplines, faculty deans, hospital CEOs and foundations

Ensure capacity to actively prospect new partners and build the funnel for funding dollars

- Ensure that the CCHCSP has the capacity (resources and secretariat support) to actively identify and shepherd new funding partners
- Identify and pursue new partnering opportunities (associations, hospital foundations, universities, etc.)
- Seek out opportunities to collaborate with universities to create joint roles
- Seek out new funding partners (e.g.: Canada Research Fund, individual, corporate donors, etc.)

