

An environmental scan of emergency medicine research support, training, and infrastructure across Canada

Marcel Émond , MD, MSc^{*}; Jennifer D. Artz, PhD[†]; Laurie J. Morrison, MD, MSc[‡]; Carolyn E. Snider, MD, MPH^{**}; Shelley McLeod, PhD(c)[¶]; Natalie LeSage, MD, PhD^{*}; Ian G. Stiell , MD, MSc[§]; Jeffrey J. Perry , MD, MSc[§]

CLINICIAN'S CAPSULE

What is known about the topic?

Conducting scientifically robust educational, clinical/administrative emergency medicine (EM) research is challenging, and developing multicentre collaboration initiatives takes time and infrastructure.

What did this study ask?

This study reports the metrics of the Canadian EM research community prior to the initiation of a national network.

What did this study find?

EM researchers are concentrated in three provinces; 7/10 have salary support and infrastructure, and 1/2 had a mentor in their beginnings.

Why does this study matter to clinicians?

Working conditions promoting success include salary support, infrastructure, and mentorship, and all need improvement for Canadian EM researchers

career satisfaction, 3) time/financial compensation, and 4) research facilitators/barriers. Descriptive analyses were conducted, and results were stratified by Canadian regions.

Results: A total of 92 EM researchers were identified in *Phase 1*; 67 (73%) responded to the *Phase 2 Survey*. Of those, 42 (63%) reported being clinical researchers, and 19 (45%) had a graduate degree. Three provinces encompassed most of the researchers (n = 35). Of the respondents, 61% had a research degree, 66% felt adequately trained for their research career, 73% had financial support, 83% had access to office spaces, 52% had no mentor during their first years of their career, 69% felt satisfied with their research career, and 82% suggested that they will still be conducting research in 5 years.

Conclusion: EM researchers reported being adequately trained, even though only a little over half had a graduate degree. Only two-thirds had financial support, and mentorship was lacking in one-third of the participants. Not all respondents had a form of infrastructure, but most felt optimistic about their careers. The Canadian EM research environment could be improved to ensure better research capacity.

ABSTRACT

Objective: Our study objective was to describe the Canadian emergency medicine (EM) research community landscape prior to the initiation of a nationwide network.

Methods: A two-phase electronic survey was sent to 17 Canadian medical schools. The *Phase 1 Environmental Scan* was administered to department chairs/hospital EM chiefs, to identify EM physicians conducting clinical or educational research. The *Phase 2 Survey* was sent to the identified EM researchers to assess four themes: 1) geographic distribution, 2) training/

RÉSUMÉ

Objectif: L'objectif principal de cette étude était de décrire le contexte de la communauté de recherche en médecine d'urgence au Canada avant la mise en place d'un réseau national.

Méthode: Un sondage électronique à deux phases a été envoyé à 17 institutions offrant un programme de formation en médecine. Le sondage de la phase 1 (analyse de l'environnement) a été administré aux directeurs de départements/chefs des services d'urgence des hôpitaux et visait à identifier les médecins d'urgence menant des études cliniques ou

From the ^{*}Faculté de médecine, Département de médecine familiale et de médecine d'urgence, Université Laval, Laval, Quebec City, QC; [†]Canadian Association of Emergency Physicians, Ottawa, ON; [‡]Rescu, Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, ON; Division of Emergency Medicine, Department of Medicine, University of Toronto, Toronto, ON; [§]University of Ottawa, Department of Emergency Medicine, Ottawa, ON; Ottawa Hospital Research Institute, Clinical Epidemiology Program, Ottawa, ON; [¶]Schwartz/Reisman Emergency Medicine Institute, Sinai Health System, Department of Family and Community Medicine, University of Toronto, Toronto, ON; and the ^{**}Department of Emergency Medicine, Max Rady College of Medicine, University of Manitoba, Winnipeg, MB.

Correspondence to: Dr. Marcel Émond, CHU de Québec–Université Laval Research Center, 1401, 18e rue Québec, QC G1J 1Z4; Email: marcel.emond@fmed.ulaval.ca

pédagogiques. Le sondage de la phase 2 a été envoyé aux chercheurs en médecine d'urgence identifiés dans la phase 1 et évaluait quatre thèmes : 1) la répartition géographique, 2) la formation/satisfaction professionnelle, 3) le temps/compensation financière et 4) les facilitateurs/obstacles de la recherche. Des analyses descriptives ont été effectuées et les résultats ont été stratifiés par régions canadiennes.

Résultats: Au total, 92 chercheurs en médecine d'urgence ont été identifiés lors de la phase 1 ; 67 (73%) ont répondu au sondage de la phase 2. Parmi ceux-ci, 42 (63%) ont déclaré être des chercheurs cliniciens, et 19 (45%) étaient titulaires d'un diplôme d'études supérieures. Les chercheurs (n = 35) étaient regroupés principalement dans trois provinces. Parmi les répondants, 61% avaient un diplôme en lien avec la recherche, 66% se sentaient suffisamment formés pour leur carrière de

chercheur, 73% avaient un soutien financier, 83% avaient accès à des espaces de bureau, 52% n'avaient pas de mentor durant les premières années de leur carrière, 69% se sentaient satisfaits de leur carrière de chercheur et 82% ont suggéré qu'ils feraient encore de la recherche dans 5 ans.

Conclusion: Les chercheurs en médecine d'urgence ont déclaré avoir reçu une formation adéquate, même si seulement un peu plus de la moitié d'entre eux avaient un diplôme d'études supérieures. Deux tiers des participants bénéficiaient d'un soutien financier et un tiers n'avaient pas de mentor. Les répondants ne disposaient pas tous d'une forme d'infrastructure, mais la plupart se sentaient optimistes quant à leur carrière. L'environnement canadien de la recherche en médecine d'urgence pourrait être amélioré pour garantir une meilleure capacité de recherche.

INTRODUCTION

The Canadian Association of Emergency Physicians (CAEP) 2014 Academic Symposium panellists recommended ways to promote emergency medicine (EM) research.¹⁻⁴ They suggested that academic centres should foster EM research and that efforts should be made for the training, recruitment, and retention of clinician scientists. Endorsement of research projects and mentoring of young investigators was essential.¹ Moreover, it was suggested that multicentre, multidisciplinary initiatives were needed to foster collaborative research and build capacity through collaborative training initiatives.⁵

The pathway to build a productive multicentre collaborative research network is well developed in other disciplines. Collaboration and multicentre initiatives take time to develop and need infrastructure. The Paediatric Emergency Research Canada and the Canadian Critical Care Trials Group are excellent examples of success.^{6, 7} At the time of this survey, there was no adult Canadian EM research network. Little was known about the actual Canadian EM research community, where researchers work, what support they have, human factors impacting research, available infrastructure, and what they need to succeed.

The aim of this study was to describe the Canadian EM research community landscape prior to the initiation of the Network of Canadian Emergency Researchers (NCER). Specifically, we sought to evaluate differences across Canada in four themes: 1) geographic distribution, 2) training and career satisfaction, 3) time

and financial compensation, and 4) research facilitators and barriers to conducting EM research.

METHOD

Study design and setting

We conducted a two-phase nationwide survey in 2013 and 2014 through the CAEP Academic Section. The *Phase 1 Scan* was administered to division/department chairs and hospital EM chiefs at all 17 Canadian medical schools.⁸ A subsequent *Phase 2 Survey* was administered to individuals identified in *Phase 1* as EM researchers. No research ethics board (REB) approval was necessary for this project because the surveys were sent directly through CAEP.

Phase 1 environmental scan

An 84-question survey of Canadian EM academic units was conducted from August to December 2013. It was completed electronically by the heads of each academic emergency department at all 17 Canadian medical schools. Respondents were contacted by a CAEP Academic Section representative. Follow-up phone calls with respondents ensured that questions were detailed and answered consistently across sites. The responses were recorded using an Excel spreadsheet. Descriptive statistics, including proportions, means, medians, and ranges, were calculated with variance measures as appropriate.

Phase 2 survey

The *Phase 1 Scan* populated the *Phase 2 Survey* respondents list, which identified 92 clinical and educational researchers. This list was reviewed and approved by the CAEP research committee for completeness. All personal information was concealed by CAEP administrative professionals.

Through an iterative process, a 39-item online survey was designed by CAEP Academic Section delegates to assess four themes for EM researchers: 1) geographic distribution, 2) training and career satisfaction, 3) time and financial compensation, and 4) facilitators and barriers to conducting EM research. The survey was piloted by members of the CAEP research committee.

The survey was distributed from March to April 2014, using FluidSurveys (Fluidware Corporation, Ottawa, ON). A prenotification email was distributed 2 days before the survey. Respondents received up to three reminders at 2-week intervals. The data were analysed using descriptive statistics. Analyses were stratified by Canadian regions: west (British Columbia, Alberta, and Saskatchewan), central (Manitoba and Ontario), and east (Québec, New Brunswick, Nova Scotia, Prince Edward Island or Newfoundland and Labrador).

RESULTS

In *Phase 1*, participants from all 17 Canadian medical school EM programs responded, of which 14 (82%)

reported having a research director and 13 (76%) having researchers. Fourteen (82%) reported an affiliation with a research institute and dedicated offices for researchers. Only three institutions (18%) provided an official research fellowship program, and 13 (76%) had a resident research facilitator. Peer-reviewed publications were reported by 16 (94%) of EM programs. *Phase 1 Scan* identified 92 EM researchers, to whom the *Phase 2 Survey* was sent. We have received a response from 67 (73%) participants, of which 15 (22%) were women.

Geographic distribution

Forty-six (68%) respondents were from central Canada and 11 (16%) from western Canada (Table 1). Non-respondents were proportionally distributed across provinces, similarly to the respondents.

Training and career satisfaction

Most researchers had a graduate degree or had completed a research fellowship (61%), and this was a consistent finding across regions (Table 2). Two-thirds of the respondents felt prepared for their research careers, which was a consistent answer across regions. One out of three respondents did not have any salary support or protected time to conduct research, and this situation seemed more prevalent in the western regions. Of note, 42 (63%) respondents were self-identified as clinical researchers and 25 (37%) as educator researchers (see Table 1).

Table 1. Distribution of all Canadian EM researchers identified (n = 92)

	Clinical* researcher	Education/non-clinical researchers*				Non-respondent (% of province)	Total (%)
		Other ^a	Educator	Clinician	Education researcher		
Ontario	20	4	4	4	0	8 (20)	40 (43)
Quebec	10	1	1	1	1	9 (39)	23 (25)
British Columbia	5	2	0	0	0	3 (30)	10 (11)
Alberta	3	1	0	0	0	2 (33)	6 (7)
Nova Scotia	1	2	1	0	0	2 (33)	6 (7)
Manitoba	1	0	0	1	1	1 (25)	4 (4)
Saskatchewan	0	0	1	0	0	0	1 (1)
New Brunswick	1	0	0	0	0	0	1 (1)
Newfoundland and Labrador	1	0	0	0	0	0	1 (1)

* Those who responded to the survey (n = 67; 72%) categorized by their self-identified titles.

^a Others include researcher (in health services, health policy, health population, EMS), clinician (and administrator or part-time researcher), academic emergency physician.

Table 2. Preparedness and mentorship of Canadian EM researchers, as stratified by region

	All responses <i>n</i> (%)	West <i>n</i> (%)	Central <i>n</i> (%)	East <i>n</i> (%)
Highest level of residency or equivalent (<i>n</i> = 65)				
FRCP (EM and PEM)	44 (69)	6 (55)	27 (77)	11 (61)
CCFP-EM	13 (20)	4 (36)	7 (20)	2 (11)
FRCP + International Certification	3 (5)	1 (9)	1 (3)	1 (6)
Other (CCFP, CSPQ, Internship, International)	4 (6)	0 (0)	0 (0)	4 (22)
Research degree or research Fellowship completed (<i>n</i> = 67)	41 (61)	6 (50)	22 (63)	13 (65)
MSc (epidemiology)	19 (45)	2 (33)	12 (55)	5 (36)
PhD	6 (14)	2 (33)	1 (5)	3 (21)
MSc	5 (12)	0 (0)	3 (14)	2 (14)
MPH	5 (12)	1 (17)	3 (14)	1 (7)
Med	3 (7)	1 (17)	1 (5)	1 (7)
Other (MHSc, MA(Ed), Clinical Trials Diploma)	4 (10)	0 (0)	2 (9)	2 (14)
<i>For those who did postgraduate education or research fellowship ONLY: (n = 44)</i>				
Felt prepared for a research career, after training				
Yes	29 (66)	4 (57)	16 (70)	9 (64)
No	15 (34)	3 (43)	7 (30)	5 (36)
Had mentor during first 3 years following training				
No mentor	15 (34)	5 (71)	4 (17)	6 (43)
In EM	15 (34)	0 (0)	10 (43)	5 (36)
In other discipline ^a	14 (32)	2 (29)	9 (39)	3 (21)
Belong to a research institute (<i>n</i> = 66)				
Yes	42 (64)	7 (58)	23 (68)	12 (60)
No	24 (36)	5 (42)	11 (32)	8 (40)
Have salary support (protected time) (<i>n</i> = 66)				
Yes	48 (73)	11 (92)	24 (71)	13 (65)
No	18 (27)	1 (8)	10 (29)	7 (35)
Grant funding as a PI (<i>n</i> = 67)				
Yes	41 (61)	11 (92)	21 (60)	9 (45)
None	21 (31)	1 (8)	11 (31)	9 (45)
Unspecified amount	5 (7)	0 (0)	3 (9)	2 (10)

Mean (± SD)	\$1,379,509 (+/- \$1,889,750)	\$1,145,455 (+/- \$1,290,824)	\$1,884,329 (+/- \$2,368,610)	\$487,664 (+/- \$328,811)
Median (range)	\$500,000 (\$10,000, \$7,900,000)	\$500,000 (\$50,000, \$4,000,000)	\$786,882 (\$10,000, \$7,900,000)	\$463,055 (\$100,000, \$1,035,000)
Has the amount of time you dedicate to research changed (by 10% or more) in the past year? (n = 66)				
Increased	14 (21)	2 (17)	7 (21)	5 (25)
Stayed the same	42 (64)	9 (75)	20 (59)	13 (65)
Decreased	10 (15)	1 (8)	7 (21)	2 (10)
Support in terms of infrastructure (n = 67)				
None	4 (2)	1 (3)	1 (3)	2 (10)
Office space	56 (83)	11 (34)	29 (85)	16 (80)
Administrative support	49 (74)	7 (22)	26 (76)	16 (80)
Computer	42 (62)	7 (22)	22 (65)	13 (65)
Methodology support	37 (56)	5 (16)	25 (74)	7 (35)
Research coordinator	3 (1)	0 (0)	1 (3)	2 (10)
Information technology	2 (1)	0 (0)	3 (9)	0 (0)
Other	14 (7)	1 (3)	11 (32)	2 (10)
Staff resources (n = 67)				
Full time	42 (63)	26 (54)	10 (77)	29 (66)
Average number (± SD)	3.5 ± 4.7	4.1 ± 4.8	2.7 ± 2.	3.9 ± 4.7
Median (range)	2 (1 ,30)	1 (0 ,30)	2 (0 ,7)	2 (1 ,30)
Part time	39 (58)	26 (54)	8 (62)	28 (64)
Average number (± SD)	5.2 ± 8.8	5.4 ± 8.4	6.1 ± 5.2	5.8 ± 8.8
Median (range)	2 (1 ,50)	1 (0 ,50)	2 (0 ,15)	2 (1 ,50)
Constraints to doing research				
No constraints	5 (7)	3 (6)	0	2 (5)
Funding	43 (64)	27 (56)	11 (85)	30 (68)
Clinical commitments	35 (52)	19 (40)	11 (85)	24 (55)
Institutional support (not funding)	25 (37)	15 (31)	6 (46)	19 (43)
Availability of qualified research support workers	21 (31)	13 (27)	5 (38)	15 (34)
Child care	14 (21)	7 (15)	5 (38)	10 (23)
Elder care	4 (6)	0	2 (15)	3 (7)
Other	24 (36)	18 (38)	4 (31)	12 (27)
Will you be doing research in 5 years? (n = 61)				
Definitely	18 (30)	3 (27)	10 (30)	5 (29)
Probably	32 (52)	5 (45)	18 (55)	9 (53)
Not sure	11 (18)	3 (27)	5 (15)	3 (18)

(Continued)

Table 2. Continued.

	All responses <i>n</i> (%)	West <i>n</i> (%)	Central <i>n</i> (%)	East <i>n</i> (%)
Impact of mentors on your career (<i>n</i> = 57)				
Positive impact	52 (91)	9 (82)	28 (97)	15 (88)
No impact	4 (7)	1 (9)	1 (3)	2 (12)
Negative impact	1 (2)	1 (9)	0 (0)	0 (0)
Impact of research training during your graduate degree (<i>n</i> = 52)				
Positive impact	51 (98)	7 (100)	27 (96)	17 (100)
No impact	0 (0)	0 (0)	0 (0)	0 (0)
Negative impact	1 (2)	0 (0)	1 (4)	0 (0)
Impact of research training during your EM fellowship (<i>n</i> = 33)				
Positive impact	26 (79)	4 (67)	17 (89)	5 (63)
No impact	6 (18)	1 (17)	2 (11)	3 (38)
Negative impact	1 (3)	1 (17)	0 (0)	0 (0)
Impact of protected time/salary support that you have (<i>n</i> = 56)				
Positive impact	49 (88)	11 (100)	24 (86)	14 (82)
No impact	4 (7)	0 (0)	2 (7)	2 (12)
Negative impact	3 (5)	0 (0)	2 (7)	1 (6)
Impact of infrastructure from your institution (in kind) (<i>n</i> = 57)				
Positive impact	45 (79)	7 (70)	26 (87)	12 (71)
No impact	8 (14)	2 (20)	2 (7)	4 (24)
Negative impact	4 (7)	1 (10)	2 (7)	1 (6)
Impact of membership in a research institute (<i>n</i> = 44)				
Positive impact	27 (61)	5 (63)	14 (64)	8 (57)
No impact	17 (39)	3 (38)	8 (36)	6 (43)
Negative impact	0 (0)	0 (0)	0 (0)	0 (0)
Satisfaction with research career (<i>n</i> = 65)				
Very satisfied or satisfied	46 (71)	10 (83)	25 (76)	11 (55)
Neutral	11 (17)	2 (17)	5 (15)	4 (20)
Dissatisfied or very dissatisfied	8 (12)	0 (0)	3 (9)	5 (25)
Satisfaction with clinical career (<i>n</i> = 65)				
Very satisfied or satisfied	57 (88)	10 (83)	29 (85)	18 (95)
Neutral	5 (8)	2 (17)	3 (9)	0 (0)
Dissatisfied or very dissatisfied	3 (5)	0 (0)	2 (6)	1 (5)

Satisfaction with education career (n = 58)					
Very satisfied or satisfied	45 (69)	6 (60)	26 (90)	13 (68)	
Neutral	12 (18)	4 (40)	3 (10)	5 (26)	
Dissatisfied or very dissatisfied	1 (2)	0 (0)	0 (0)	1 (5)	
Satisfaction with work-life balance (n = 65)					
Very satisfied or satisfied	38 (58)	6 (50)	21 (64)	11 (55)	
Neutral	14 (22)	4 (33)	5 (15)	5 (25)	
Dissatisfied or very dissatisfied	13 (20)	2 (17)	7 (21)	4 (20)	

^a Often, more than one mentor was indicated. Disciplines included health services, epidemiology, internal medicine, knowledge translation, family medicine, shared decision making, quality care, trauma, cardiology, medical education, pediatric EM, and bioethics.
West includes British Columbia, Alberta, and Saskatchewan; Central includes Manitoba and Ontario; and East includes Québec, New Brunswick, and Nova Scotia. There were no responses from Prince Edward Island or Newfoundland and Labrador.

Time and financial compensation

The median hours per week dedicated to all clinical and scholarly EM activities were similar for clinical and education researchers (52 v. 54 hours). A proportion of time devoted to research was 42% among clinical researchers compared with 17% for education researchers. The mean compensation for clinician researchers was 26% of total earnings compared with 5% for education researchers.

Research facilitators and barriers

Thirty-five (52%) respondents reported a lack of mentorship in the first 3 years of their careers. This situation was more prevalent in the western (57%) and eastern (52%) regions compared with central Canada (37%). Twenty-nine (66%) out of the 44 respondents who pursued postgraduate education or research fellowship had a research mentor. However, 14 (48%) of those mentors were from other disciplines. This last finding was consistent across Canada. Forty-two (64%) EM researchers belonged to a research institute, which was also consistent across Canada. Infrastructure seemed more prevalent in the central and east regions of Canada. Forty-one (61%) researchers reported having peer-reviewed grant funding obtained as a principal investigator. Variability was observed across regions for grant funding results and amount of funding.

Fourteen (21%) reported substantially increasing the time dedicated to research in the previous year. Most respondents (82%) reported that they plan to be conducting research in 5 years (see Table 2). Nearly all EM researchers felt that mentors, research training, and salary support had a positive impact on their careers. Forty-six (69%) respondents felt very satisfied or satisfied with their research careers.

DISCUSSION

We found EM research landscape to be diverse across Canada and that EM researchers are still suffering from lack of support in some regions. Geographically, EM researchers are clustered within central and western Canada. Although collaboration and networking have been shown to increase research productivity,⁹ many gaps exist across Canada. Increasing collaboration and the emergence of new researchers may positively impact

EM research capacity.^{9, 10} The Pediatric Emergency Research Canada (PERC) group has had great success, as demonstrated by strong membership, publications, and grants.^{11,12}

EM researchers are well trained, with two-thirds having advanced research training and half with a PhD or MSc (epidemiology). However, we identified barriers to EM research productivity. To be successful in research, it has been documented that one needs to have salary support for protected research time to dedicate over 75% of their time to science, good mentorship, research infrastructure, and comprehensive training, preferably a graduate degree and academic track record of publications and salary awards.^{13–15} Based on survey results, not all Canadian EM researchers have sufficient salary support to enable them to dedicate significant time to research. Based on our results, only 33% of a 50-hour work week was dedicated to research, but less than 20% of their income emanated from research salary support, and one out of four researchers reported zero salary support for research.

Mentorship programs have been recognized as an important asset to any research training and activities.^{16, 17} However, over half of our respondents did not have a mentor in the first years of their careers.^{15, 18} Canadian authors have reported that mentoring was an important predictor of academic advancement regardless of gender and academic institutions providing mentorship support to speed up the advancement.¹⁸ Infrastructure is essential to research success. Every scientist will benefit from the resources of a research institute, that is, methodological, statistical, contractual, legal, information technology, accounting and grant reporting expertise, REB, and privacy experts and mentorship. Sixty-seven percent reported appointment in a research institute but only 56% had office space. Most respondents suggested that they had limited access to IT, methodological, and administrative support. Despite these obvious challenges, nearly 75% of respondents reported that they were satisfied with their research careers, and only 20% were unhappy with their work-life balance.

These results suggest there is a need to improve network of mentorship and improve infrastructure and financial support to EM researchers, which may be possible through a formal research network for Canadian EM researchers. To fill these gaps, the NCER was created with the goals “to enable emergency care researchers, to conduct multicentre research or education studies, to provide mentorship, create knowledge through research,

support knowledge translation, and ultimately improve emergency patient care for all Canadians.”¹⁹ The impacts of this national network on the EM research environment will need to be assessed in the nearby future.

This work is not without limitations. First, *Phase 1* obtained a list of researchers from department leaders, and this list may not have been complete. While prolific EM researchers were unlikely missed, newer EM researchers may not have been identified. In *Phase 2*, not all regions were well represented. The nonresponse error is likely small. We suspect that some of the established researchers, with more support, failed to answer. This may have underestimated the support available. Gender-based analyses were not provided because most of the responders were male (78%), leaving a very small sample of female researchers for subgroup analyses. The questions were not provided with standard definitions, thus creating a potential misclassification bias as respondents answered using their own interpretations.

CONCLUSIONS

Most EM researchers are clustered within three provinces without access to research institutes, without regular mentorship, with little infrastructure, and not all have financial support to protect their time spent in research. However, most EM researchers appear satisfied with their careers and are planning to continue research for at least 5 years. The Canadian EM research community has some gaps that could be addressed by a national network of EM researchers.

Supplementary material: The supplemental material for this article can be found at <https://doi.org/10.1017/cem.2020.18>.

REFERENCES

1. Perry JJ, Snider CE, Artz JD, et al. *CAEP 2014 Academic Symposium: how to make research succeed in your emergency department: how to develop and train career researchers in emergency medicine*. *CJEM* 2015;17(3):334–43.
2. Calder LA, Abu-Laban RB, Artz JD, et al. *CAEP 2014 Academic Symposium: how to make research succeed in your department: promoting excellence in Canadian emergency medicine resident research*. *CJEM* 2015;17(5):591–9.
3. Vaillancourt C, Rowe BH, Artz JD, et al. *CAEP 2014 Academic Symposium: how to make research succeed in your department: how to fund your research program*. *CJEM* 2015;17(4):453–61.
4. Stiell IG, Artz JD, Perry J, Vaillancourt C, Calder L. Executive summary of the *CAEP 2014 Academic Symposium: how to*

- make research succeed in your department. CJEM* 2015;17(3):328–33.
5. Government of Canada Publications. Commission on the future of health care in Canada: the Romanow Commission; 2009. Available at: <https://www.canada.ca/en/health-canada/services/health-care-system/commissions-inquiries/federal-commissions-health-care/commission-future-health-care-canada-romanow-commission/recommendations-brief.html> (accessed October 12, 2018).
 6. PERC – Pediatric Emergency Research Canada; 2019. Available at: <https://perc-canada.ca/> (accessed December 13, 2019).
 7. Canadian Critical Care Trials Group; 2019. Available at: <https://www.ccctg.ca/> (accessed December 13, 2019).
 8. Stiell I, Artz JD, Lang E, et al. An environmental scan of academic emergency medicine at the 17 Canadian medical schools: why does this matter to emergency physicians? *CJEM* 2017;19(1):39–46.
 9. Marchand GC, Hilpert JC, Bragg KM, Cummings J. Network-based assessment of collaborative research in neuroscience. *Alzheimers Dement (N Y)* 2018;4:433–43.
 10. Hall K, Stokols D, Moser R, et al. The collaboration readiness of transdisciplinary research teams and centers findings from the National Cancer Institute's TREC year-one evaluation study. *Am J Prev Med* 2008;35(2 Suppl):S161–72.
 11. Canada PER. Available at: <https://www.perc-canada.ca/> (accessed December 13, 2019).
 12. Bialy L, Plint A, Zemek R, et al. Pediatric Emergency Research Canada: origins and evolution. *Pediatr Emerg Care* 2018;34(2):138–44.
 13. Yewdell JW. How to succeed in science: a concise guide for young biomedical scientists. Part I: taking the plunge. *Nat Rev Mol Cell Biol* 2008;9(5):413–6.
 14. Stull AJ, Ciappio ED. Successful scientist: what's the winning formula? *Adv Nutr* 2014;5(6):795–6.
 15. Rankin EA. Mentor, mentee, mentoring: building career development relationships. *Nurs Connect* 1991;4(4):49–57.
 16. Yeung EN. Overcoming barriers to undergraduate research: potential usefulness of a facilitated peer mentoring programme? *Med Teach* 2014;36(8):737.
 17. Yeung M, Nuth J, Stiell IG. Mentoring in emergency medicine: the art and the evidence. *CJEM* 2010;12(2):143–9.
 18. Morrison LJ, Lorens E, Bandiera G, et al. Impact of a formal mentoring program on academic promotion of Department of Medicine faculty: a comparative study. *Med Teach* 2014;36(7):608–14.
 19. Network of Canadian Emergency Researchers – NCER. Available at: <https://ncer.ca/> (accessed December 13, 2019).