An Estimation of Canada's Public Health Physician Workforce

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ABSTRACT

Objective: Public health emergency planning includes a consideration of public health human resource requirements. We addressed the hypothetical question: How many public health physicians could Canada mobilize in the event of a public health emergency?

Methods: We used the 2004 National Physician Survey (NPS) to estimate the number of public health physicians in Canada. Using weighting to account for non-response, we estimated the numbers and population estimates of public health physicians who were active versus 'in reserve'. We explored the impact of using diverse definitions of public health physician based upon NPS questions on professional activity, self-reported degrees and certifications, and physician database classifications.

Results: Of all Canadian physicians, an estimated 769 (1.3%) are qualified to practice public health by virtue of degrees and certifications relevant to public health, of whom 367 (48%) also report active 'community medicine/public health' practice. Even among Canada's 382 Community Medicine specialists, only 60% report active public health practice.

Conclusion: The estimation of the size of Canada's public health physician workforce is currently limited by the lack of a clear definition and appropriate monitoring. It appears that, even with a reserve public health physician workforce that would almost double its numbers, Canada's available workforce is only 40% of projected requirements. Public health emergency preparedness planning exercises should clearly delineate public health physician roles and needs, and action should be taken accordingly to enhance the numbers of Canadian public health physicians and their capacity to meet these requirements.

Key words: Health manpower; Canada; physicians; public health

La traduction du résumé se trouve à la fin de l'article.

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Little is known about the numbers, qualifications and professional activities of public health physicians in Canada, despite a perception that they are in short supply.[1-3] Canadian plans for public health personnel deployment during emergencies (e.g., pandemic, avian influenza, terrorism)[4,5] include consideration of 'surge capacity' – the ability of public health systems to adequately manage the emergency health protection needs of large populations.[6] Generic competencies for public health work have recently been described for Canada.[7] Public health physicians have key roles in the investigation and mitigation of immediate risks to human health.[8] In a public health emergency, they would not only have a legislatively-mandated role as health sector leaders, but would also be considered to have specific advanced skills and preparation to lead, manage, communicate, collaborate and act.[8] How many public health physicians could Canada mobilize in the event of a public health emergency?

METHODS

We used data from the 2004 National Physician Survey (NPS) to estimate the size of the active, qualified Canadian public health physician workforce and the numbers of qualified public health physicians, both active and inactive (i.e., 'in reserve') in public health practice, who might potentially be available in a public health emergency.

The NPS is a collaborative effort of the Canadian Medical Association (CMA), the College of Family Physicians of Canada (CFPC), and the Royal College of Physicians and Surgeons of Canada (RCPSC). The first survey cycle was in 2004; survey methodologies and questionnaires are available on the NPS website.[9] The sampling frame for the survey was the CMA Masterfile, a comprehensive database of Canadian physicians which "includes all physicians in Canada holding a medical license and is compiled and updated on a daily basis with information received from provincial licensing bodies, associations, CFPC and RCPSC membership listings, and individual physicians".[9] The national response rate was 35.9%.[10] Respondents were very similar (province/territory, age, sex, and broad medical specialty groups) both to the general physician population and to non-respondents.[10]

Definition of public health physician

We used three methods to define a public health physician. For each, we assumed such a physician could either be a family physician or general practitioner (FP/GP), or be a certified specialist in

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Table 1. Definition and Examples of Core Public Health Degrees and Certifications and Other Degree Classifications Derived from the National Physician Survey Database, 2004

Credential	Definition	Examples
Core Public Health degree*	Any degree, diploma, certificate except baccalaureate that includes in its name words "public health", "social medicine", "community medicine", "community health", "preventive medicine", "public hygiene" and does not include word "family" AND/OR a professional degree with acronym MPH (Master of Public Health), MHSc (Master of Health Sciences).	MPH, MHSc, MSc (Community Health & Epidemiology), Masters of Social Medicine, PhD Public Health
Community Medicine/ Public Health certification*	Any certificate that includes the words Community Medicine or Public Health, regardless of other certifications held.	Fellowship in Community Medicine, FRCPC (CM)
Community Medicine-related certifications	Any certificate that includes the words Occupational medicine, Social sciences & humanities in medicine, Aviation/aerospace medicine, Travel/tropical medicine, Environmental medicine, Preventive medicine.	
Community Health Sciences-related degree	Any degree, diploma, certificate except baccalaureate that includes Biostatistics, Epidemiology, Occupational (Work) Environmental Health.	MSc Clinical Epidemiology, Certificate in Occupational Health
Other health science degree	Other health degrees, diplomas, certificates except baccalaureate that includes the words "health", "medicine".	MSc Tropical Medicine, MSc Health Research Methodology, MSc Health Sciences
Management and administration degrees	Any degree, diploma, certificate except baccalaureate that includes the words "management", "policy" or "administration" or the acronyms MPA (Master of Public Administration), MHA (Master of Health Administration), MHSA (Master of Health Services Administration), MBA (Master of Business Administration).	PhD (health policy and management), Master in Health Services, MASc Management Sciences, MSc Health Policy
Other graduate degree, not otherwise classified	Any non-baccalaureate degree not stated above that starts with M, Ph or includes D. Also include graduate diploma but not diploma alone.	PhD, DPhil, MSc
Degrees not applicable to analyses	Any degree that begins with B, any other certificate or diploma not captured above, or any other response. Other certification.	Unknown, Rdn. Spécialiste, CD, LLB, GP

* Individuals with these degrees and certifications were deemed to be qualified as a public health physician.

Community Medicine (CM), General Internal Medicine (IM) or Pediatrics (Ped). CM is the recognized medical specialty in Canada for public health. From our knowledge of the pattern of public health practice in Canada, we expected that most non-CM-prepared doctors in public health practice would be either FP/GP or specialists in General Internal Medicine (IM) or Pediatrics (Ped).

Self-reported degrees and certifications were captured using open-ended questions: "Please specify any medical certification(s)" and "Please specify any other non-medical degrees." We reviewed and categorized the 7,171 self-reported non-medical degrees and certifications (Table 1).* Physicians were classified as qualified to practice public health if they held one or more of a 'core public health' degree or 'certification in Community Medicine/Public Health'.

We also considered the self-reported public health practice of physicians. The NPS included a listing of 141 professional activities (for specialists) and 35 for FP/GP, with instructions to check all that applied. Both lists included the item 'community medicine/public health'.

Public health physicians were defined as being respondents:

1. Categorized by the CMA Masterfile as being "Community Medicine/Public Health"; OR
2. Qualified by virtue of Community Medicine specialty certification or holding a core public health degree obtained after medical training; OR
3. Indicating "community medicine/public health" as an area of professional activity.

Active versus reserve public health physicians

Physicians who reported 'community medicine/public health' as an area of professional activity were considered to be members of the active workforce; otherwise they were considered in reserve.

* McIntyre has special expertise in degree classification, having served as a health disciplines dean for 13.5 years.

Potential impact of including other medical specialties

To assess the impact of our assumption that most public health doctors would be found among FP/GP and CM, IM and Ped specialists, we examined the numbers of NPS respondents (excluding these physician groups) who held self-reported core public health degrees or certifications.

To take into consideration that physicians from specialties other than Community Medicine are trained in skills related to 'emergency preparedness', we identified relevant groups of physicians by examining training objectives and requirements for Royal College specialists and CFPC certificants.[11,12] Because the data were unavailable through the 2004 NPS, we estimated their numbers from the Directory of Fellows of the RCPSC (May, 2008)[13] and from a search of the website of the Canadian Association of Emergency Physicians using the terms "human resource" and "emergency medicine".[14]

Weightings for Differential Response Rates

While the NPS respondents have been reported to be representative of the physician population,[10] response rates varied by type of physician: CM 40.3%, FP/GP 35.7%, IM 32.7%, and Ped 40.5%. Thus we weighted the number of respondents by the inverse of the response rate for each type of physician to obtain estimates of the total number of public health physicians in Canada (e.g., for CM, the weighting was calculated as 154 x (1/.403).

Ethics

The University of British Columbia Behavioural Ethics Review Board approved the 2004 NPS. The Conjoint Health Research Ethics Board of the University of Calgary and the Technical Advisory Committee of the NPS approved this study.

Table 2. Estimated Numbers and Proportions of Canadian Physicians in Canada Who Are Public Health Doctors, by Practice Status

Definition of Public Health Doctor	Number of Respondents n=12,762 (FP/GP,CM, IM, Ped)	Estimated Number (%) by Public Health Activity, Weighted for Response Rate			% of Canadian Physician Workforce
		Active	Reserve	TOTAL	N=59,399
CMA Masterfile = Community Medicine/Public Health	154	228 (59.7)	154 (40.3)	382	0.64
Qualified (public health degree or certification)	240	367 (57.8)	268 (42.2)	635†‡	1.1
Credentialed/Qualified (CMA Masterfile = Community Medicine/Public Health OR public health degree or certification)	294	367 (47.7)	402 (52.3)	769	1.3
Community Medicine/Public Health as an area of professional activity	1804	5020	N/A	5020	8.5

† Inclusion of the estimated 65 respondent physicians other than CM, FP/GP, IM, Ped who held public health degrees increases this total to 700 (1.2% of Canadian physician workforce).
‡ If the estimated 1,873 physicians (other than CM, FP/GP, IM, Ped) who have training/credentials relevant to emergency preparedness are included, the total increases to 2,508 (4.2%).

Table 3. Specialties Other Than Community Medicine for Which Training Objectives Relate to Emergency Preparedness/Disaster Planning

Specialty	Estimated N, Canada[13,14]	General Objective	Specific Requirements
Emergency Medicine	484	The specialist emergency physician possesses organizational skills in emergency department and disaster management and the ability to interface with and play a leadership role in the development and organization of the emergency medical services and prehospital care.	Understand the supervisory and administrative aspects of Emergency Medical Services systems (i.e., rationalization of Emergency Services, communications systems, prehospital care programs, ambulance services, paramedical emergency services and disaster medicine).
Infectious Diseases	216	• Demonstrate diagnostic and therapeutic skills for ethical and effective patient care. • Access and apply relevant information to clinical practice.	The trainee is expected to have the appropriate level of knowledge relating to the etiology, epidemiology, pathogenesis, natural history, pathology, clinical features, prevention and management of... infections occurring as a result of emerging pathogens and bioterrorism.
Occupational Medicine	47	• Consult effectively with other physicians and health care professionals. • Contribute effectively to other interdisciplinary team activities. • Work effectively with the workplace parties and government agencies.	Participate in the development of emergency or disaster plans for the workplace and/or the community.
Pediatric Emergency Medicine	51	Apply knowledge of the clinical features, diagnostic criteria, epidemiology, natural history, pathophysiology, complications and consequences of acute illness and injury in the pediatric population.	Disaster/mass gathering.
CCFP-EM	1074	The goal of the College of Family Physicians of Canada in emergency medicine is to improve the standards and availability of emergency care from practicing family physicians.	Understand the principles of the development and implementation of support emergency medical services in the community for prehospital care, (i.e., paramedics, ambulance service, communication systems, first aid programs, poison control, public education, organization of emergency medical services, and disaster planning).

RESULTS

We obtained detailed data for 12,762 (154 CM, 730 IM, 837 Ped, and 11,041 FP/GP) of the 21,296 doctors across all specialties who responded to the 2004 NPS. Estimates of the number of public health physicians in Canada range from 382 (if only those classified as CM by the CMA Masterfile are considered) to 769 (if all qualified physicians are enumerated) to 5,020 (if all physicians who indicate 'community medicine/public health' as an area of professional activity are considered) (Table 2). Among physicians indicating 'community medicine/public health' as an area of professional activity, 95.5% were FP/GP and 4.6% were CM; all specialists who indicated that area of practice held a credential, in contrast to only 6.6% of the FP/GP physicians. Of the estimated 382 to 769 physicians qualified to practice public health according to our definitions, a large proportion are 'in reserve' rather than active: 40.3% of those classified as CM by the CMA Masterfile; 42.4% of those qualified solely on the basis of self-reported core public health degree/certifications; and 52.3% of those qualified on the basis of self-reported credentials or by classification as CM by the CMA Masterfile (Table 2). This corresponds to a total credentialed 'in reserve' workforce for the country of 268-402 public health doctors.

Potential impact of including other medical specialties

In the 2004 NPS data, there were 22 physicians representing 13 specialty groups who held a public health degree among doctors classified by the CMA Masterfile indicator as other than CM, IM, Ped or FP/GP. These represent an additional weighted estimate of 65 public health physicians (mostly likely 'in reserve').

Table 3 lists counts of physicians from specialties other than CM that include emergency preparedness among their training objectives, as well as a summary of the relevant training.[13,14] This enumeration could add 1,873 physicians to our estimation of the number of deployable public health doctors, at least for the purposes of a public health emergency.

DISCUSSION

The purpose of this paper was to provide a best estimate of the number of public health doctors in Canada who could be available

in the event of a public health emergency. We would then be in a position to speculate on whether the number was adequate and to make recommendations if it were not. In Canada, fewer than 800 physicians (1.3%) are qualified to practice public health by virtue of medical specialty training or post-graduate credential. Over half of these physicians are currently 'in reserve' including 40% of Community Medicine specialists. The contribution of 'in reserve' physicians to a public health emergency would be dependent upon their availability to take up emergency duties as well as the assumption that those physicians credentialed only with degrees possess the necessary skills to minimally meet the recently developed competencies of a Medical Officer of Health, particularly in the domain of mitigation of immediate risks to human health.[8]

How many public health physicians would Canada need in the event of a public health emergency? The Institute of Medicine estimated that for the United States, the number would be between 17,000 and 23,500, of whom 10,000 were thought to be already employed in public health agencies throughout the country.[15] The comparable numbers (proportionate to population) for Canada would be 1,863-2,576, suggesting that Canada at best meets 40% of these requirements.

How accurate are these estimates? The numbers of CM (382) projected from the NPS data are similar to the 347 CM counted (May 2008) from the public registry of the Royal College Directory of Fellows. This provides some assurance of the validity of our estimations from NPS data despite its response rate of 36%, and suggests that respondents did not differ systematically (with respect to public health credentials) from non-respondents. Other data sources might be considered for estimating the size of the public health physician workforce. An enumeration of Medical Officers of Health and Associate/Deputy Medical Officers of Health could be obtained perhaps from a survey of provincial/territorial Chief Medical Officers of Health; however such a count, even if accurate, would not capture qualified physicians working for other employers including the federal government and universities. An analysis of physician resource databases held by the Canadian Institute for Health Information, such as Scott's Medical Database, might also be considered but while this database captures specialty certifications, it does not collect information on non-medical degrees.

Our inclusion of other medical specialties whose certificants might be considered to be 'public health doctors' under conditions of a public health emergency by virtue of training in emergency preparedness could increase estimates by an additional 1,873 physicians, although the appropriateness of their inclusion is arguable. The Institute of Medicine,[15] after noting that all doctors intersect with public health to at least some degree intermittently, notes that only public health doctors are explicitly trained to address issues using a population-based approach. Public health emergencies may arise from weather, environmental exposures, communicable disease outbreaks or terrorist (including bioterrorist) incidents. Public health physicians must be able "to communicate public health information, roles, capacities and legal authority accurately to all emergency response partners, to develop and maintain agreements with partners, to describe the chain of command and incident response system, to conduct risk assessments in public health emergencies, to develop and deliver accurate event-specific, science-based risk communication messages to the public, to health care providers, to the media, and to the response community".[16,17] The focus of the responsibilities for other physicians with ostensible emergency preparedness training is primarily in prehospital/hospital care, particularly for mass casualties and for infectious diseases. Their functions lack the population focus of the public health physician, and also lack the specific powers and authority explicitly granted to public health physicians who are employed in the legally mandated role of Medical Officer of Health.[8] These physicians would also likely be fully engaged in direct patient care responsibilities in hospitals and emergency departments during mass casualty or outbreak situations.

Finally, what are we to make of the over 5,000 Canadian physicians, 95% of whom were FP/GP without a public health degree, who indicated 'community medicine/public health' among their listing of areas of professional activity? Either the vast majority of Canadian doctors who indicate practice in 'community medicine/public health' do not appear to be credentialed to do so, or the practice area is interpreted differently by respondents with credentials compared with respondents without public health training. Respondents with credentials might have interpreted the term as having a scope similar to the Index Medicus MESH heading for public health: "Branch of medicine concerned with the prevention and control of disease and disability, and the promotion of physical and mental health of the population on the international, national, state, or municipal level." Others might have interpreted it more in terms of the scope of the Index Medicus MESH term for Community Medicine: "A branch of medicine concerned with the total health of the individual within the home environment and in the community, and with the application of comprehensive care to the prevention and treatment of illness in the entire community." The latter, in particular, is a scope of practice with which many primary care physicians might identify.

In this paper, data from the 2004 NPS have been used to estimate Canadian public health human resources and to explore practice patterns, as others have done for other types of Canadian physicians.[18-20] We have defined a public health doctor in Canada as someone who is either trained in the specialty of Community Medicine or qualified by virtue of obtaining a public health credential after medical training. The estimation of Canada's public health doctors is an exercise with value beyond public health emergency preparedness planning as it is unclear how many physicians should be counted as part of the public health workforce. We suggest that future cycles of the NPS, in addition to striving to increase response rates, should include an improved set of questions based upon public health roles, including those for public health emergencies, to identify qualified public health physicians and to ascertain their current areas of practice. Public health emergency preparedness planning exercises should delineate public health physician roles and needs, and actions should be taken accordingly to enhance the capacity of the Canadian public health physician workforce to meet these requirements.

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RÉSUMÉ

Objectif : La planification des services de santé publique d'urgence comporte la prise en compte des besoins en ressources humaines en santé publique. Nous avons abordé la question hypothétique : combien de professionnels en santé publique pourraient être mobilisés au Canada en cas de crise sanitaire?

Méthodes : Nous avons utilisé les résultats du Sondage national des médecins (SNM) de 2004 pour estimer les effectifs des médecins-hygiénistes au Canada. En utilisant la méthode statistique de pondération pour tenir compte des questions restées sans réponse, nous avons évalué combien de médecins-hygiénistes pratiquaient dans le secteur de la santé publique par comparaison avec les médecins-hygiénistes « de réserve ». Nous avons étudié les répercussions dues à l'utilisation de différentes définitions du médecin-hygiéniste sur la base des réponses aux questions du SNM sur l'activité professionnelle, les diplômes et titres de compétence reportés par les intéressés, et les classifications de la base de données des médecins.

Résultats : Parmi tous les médecins canadiens, on estime que 769 (1,3 %) ont les qualifications requises pour pratiquer dans le secteur de la santé publique en vertu de diplômes et de titres de compétences pertinents, et parmi ces derniers, 367 (48 %) font état d'une pratique active dans le domaine de la « médecine communautaire/santé publique ». Même parmi les 382 spécialistes en médecine communautaire du Canada, 60 % seulement déclaraient pratiquer en santé publique.

Conclusion : L'évaluation des effectifs des médecins-hygiénistes est limitée à l'heure actuelle à cause d'un manque de clarté dans la définition de la profession et de l'absence d'un contrôle adéquat. Il semble que, même en comptant les médecins-hygiénistes de réserve qui viendraient presque doubler leur nombre, les effectifs disponibles au Canada ne couvrent que 40 % des besoins projetés. Des exercices de planification d'intervention en cas d'urgence sanitaire devraient délimiter de manière précise les rôles et les besoins des médecins-hygiénistes, et par conséquent, des mesures devraient être prises pour augmenter le nombre des médecins-hygiénistes au Canada et pour développer leurs aptitudes à répondre à ces exigences.

Mots clés : main-d'oeuvre sanitaire; Canada; médecins; santé publique