

REVIEW

Response of General Practitioners to Infectious Disease Public Health Crises: An Integrative Systematic Review of the Literature

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ABSTRACT

Objective: Previous research has identified gaps in pandemic response planning for primary care. Identifying the challenges that general practitioners (GPs) face during public health crises of infectious diseases will help to improve prepandemic planning. In this integrative systematic review, we identified research-based evidence to (1) challenges that GPs have when participating in pandemics or epidemics and (2) whether GPs from different countries encountered different challenges.

Methods: A systematic search was conducted in MEDLINE, PubMed, Scopus, EMBASE, PsycINFO, Cochrane Library, and ProQuest Dissertations and Theses databases during October to November 2012 to identify studies relevant to experience by GPs during epidemics or pandemics.

Results: Six quantitative, 2 mixed method, and 2 qualitative studies met the inclusion criteria. The challenges identified were not exclusive to specific countries and encompassed different responses to outbreaks. These challenges included difficulties with information access; supply and use of personal protective equipment; performing public health responsibilities; obtaining support from the authorities; appropriate training; and the emotional effects of participating in the response to an infectious disease with unknown characteristics and lethality.

Conclusion: GPs' response to public health crises in different countries presents potential for improving pandemic preparedness. (*Disaster Med Public Health Preparedness*. 2013;7:522-533)

Key Words: disease outbreaks, disaster planning, primary health care

Influenza pandemics are regarded as among the most significant threats to public health. Their timing cannot be predicted, and they have the potential to cause significant morbidity and mortality.¹ After the rapid spread of the H5N1 (avian influenza) virus, the World Health Organization has advised developing pandemic preparedness plans.² In some countries, these plans are incorporated in broader national security measures as part of an all-hazard concept. The all-hazard system-level approach, which emerged at the beginning of the 21st century, refers to plans that are designed for a broad range of emergency situations, integrating emergency activities at all governmental levels.³

The state of pandemic preparedness in primary care has been investigated. Research concerning preparedness by general practitioners (GPs) showed that while GPs were willing to discharge their professional duty during a pandemic outbreak,^{4,5} they noted a number of barriers to their efficiency. These barriers included limited time that they could spend on pandemic preparations⁶ and dependence on the support from

health authorities in terms of education, training, and supply of personal protective equipment (PPE).^{4,6,7} In addition, an analysis of the national preparedness plans of different countries identified numerous deficiencies in the way GPs were incorporated in these plans.⁸

In light of these deficiencies, a review of the literature on challenges that GPs have faced participating in responses to the virulent diseases that have caused public health crises might help to elicit strategies for an efficient response at the primary care level, and thus may help to improve the planning for such crises.

The aim of this integrative review has been to gain a broad perspective on barriers and challenges faced by GPs participating in the response to infectious disease public health crises. Quantitative, qualitative, and mixed-method studies have previously proved to be useful in policy planning, as they enhance the relevance of the review by decision makers.⁹ Different types of evidence have been integrated recently to review complex public health issues in general¹⁰ and public health issues in preparedness in particular.^{11,12}

This review describes and analyzes evidence concerning the challenges that GPs faced participating in the response to infectious disease public health crises. Two questions guided this review: (1) what were the challenges and barriers experienced by GPs during public health crises caused by infectious diseases, and (2) did GPs in various countries experience similar challenges and barriers during different public health crises caused by infectious diseases? To this end, a systematic approach using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines was applied to the literature search, study selection, and data extraction.¹³

METHODS

Search Strategy

The literature search was performed in 3 phases. First, the Scopus database was searched using the initial key words “primary care physicians” and pandemic*. Titles, abstracts, and index terms of the relevant articles were analyzed to construct the list of search terms (Table 1).

Next, database-specific searches using the search terms list were performed in the following databases: MEDLINE, PubMed, Scopus, EMBASE, PsycINFO, Cochrane Library, and ProQuest Dissertations and Theses. Finally, reference lists of all studies that were retrieved for appraisal were searched for additional relevant studies. The search was performed during November 2012 to January 2013.

Study Selection

Following the removal of duplicate entries, the abstracts and titles of all retrieved articles were screened by one of us (M.K.) for relevance. To minimize selection bias, the full text of the selected articles after this first round of screening was then independently screened by 2 reviewers (M.K. and S.T.) using the study inclusion and exclusion criteria. Disagreements were resolved by consensus after discussion.

Inclusion Criteria

This review considered empirical studies that involved primary data collection from GPs and drew on their experience during epidemics or pandemics. Studies with the following design were included: qualitative interviews (ie, in-depth, structured, semistructured, unstructured), focus groups, surveys (quantitative and qualitative), and mixed-method studies.

Research reports included peer-reviewed research articles, peer-reviewed research abstracts, and peer-reviewed summaries of research findings. The participants in these reports were GPs who were identified as physicians employed in primary care settings and who provide direct patient care. In some countries, primary care physicians include primary care pediatricians, family physicians, and general internal medicine physicians. Studies in which participants were not exclusively GPs and included, for example, health care workers in general, were included only if data relating to the experience of GPs were reported separately.

The phenomenon of interest was the experience of GPs working during epidemics or pandemics of contagious air or droplet borne diseases. The context was the management of epidemics or pandemics caused by contagious air or droplet-borne diseases in primary care.

Articles were excluded for the following criteria:

- nonempirical reports (did not involve primary care data collection with primary care physicians);
- reports drew on the same data sets;
- Non-English language publications.

Data Extraction

The primary aim of the data extraction process was to capture the entire range of barriers and challenges that GPs encountered during the response to infectious disease public

TABLE 1

Search Concepts			
Concept 1	Concept 2	Concept 3	Concept 4
“Primary care”	Influenza OR flu	Epidemic*	Attitude*
GP*	H1N1 OR “Swine Flu”	Pandemic*	Experience*
“Family doctor**”	SARS OR “severe acute respiratory syndrome”	MeSH search:	“policy implementation”
“Family pract**”	H5N1 OR “Avian Flu” OR “Avian Influenza”	Disease outbreaks/epidemics/	Challenge*
“General pract**”	MeSH search:	pandemics	Role*
MeSH search:	influenza a virus, h1n1 subtype/ or influenza a virus, h5n1 subtype/		Difficult*
Physicians/	influenza, human/ or severe acute respiratory syndrome/		Response*
primary care, general practitioner, family			Performance*

health crises. All factors reported to present barriers or challenges were coded according to the themes they represented. Different aspects of the main themes were coded as subthemes and were organized under the main theme. The theme tree provided details about the public health crises and the countries that were studied.

RESULTS

The literature search of the databases yielded 522 potential sources (Figure). An additional 4 studies were identified from the reference lists of included articles that were added to the screening process. After duplicates were removed, 232 articles remained. During the initial round of title and abstract scanning, the primary reviewer (M.K.) excluded 257 citations. The most frequent reasons for study exclusion were studies that investigated pandemic preparedness rather than experience during a pandemic; epidemiological studies about the effect of a pandemic or epidemic on the overall population; studies about vaccine development or effectiveness; and studies about seasonal influenza outbreaks. The full texts of the remaining 37 articles were separately screened by 2 reviewers (M.K. and S.T.), and an additional 27 reports

were excluded. The most frequent reasons for study exclusion in this phase were because the studies were not empirical; they were not about GPs; and their focus was on other phenomenon of interest, such as treatment effectiveness or ethical aspects.

Of the 27 articles that were full-text screened, 3 were opinion reports written by GPs and describing GPs' involvement in the response to the 2009 H1N1 influenza pandemic.¹⁴⁻¹⁶ Although they were excluded from the systematic review, these articles presented important evidence of personal experience, and key issues presented in them served as triangulation for data extracted from the reviewed studies.

Six quantitative surveys,¹⁷⁻²² 2 mixed-method studies,^{23,24} and 2 qualitative studies^{25,26} met our inclusion criteria (Table 2). Of the 6 quantitative surveys, 4^{17,18,20,22} included open-ended questions exploring the concerns of GPs during the pandemic or epidemic response and their suggestions for improvement. The mixed-method study of Wong et al²³ comprised a cross-sectional survey and 10 qualitative interviews with GPs. The mixed-method study of El Emam et al²⁴ presented the qualitative results of 5 focus groups and used descriptive statistics to present the results of the survey administered. The 2 qualitative studies^{25,26} employed qualitative in-depth interviews.

All studies that met inclusion criteria were published since 2003 and were dedicated to 1 of 2 infectious diseases that caused public health crises in the 21st century—severe acute respiratory syndrome (SARS) outbreak and the 2009 H1N1 influenza pandemic. The experience of GPs from 7 countries was presented in the reviewed studies. Four of these studies investigated the experience of GPs during the SARS outbreak in Hong Kong,¹⁹ Canada,¹⁹ Singapore,^{20,26} and Australia.¹⁸ The other 6 focused on the experience of GPs during the 2009 H1N1 influenza pandemic in Australia,²⁵ United Kingdom,¹⁷ Canada,²⁴ Hungary,²² United States,²¹ and Hong Kong.²³

Evidence of various challenges and barriers to primary care management of public health crises caused by an infectious disease was found in the reviewed literature (Table 3).

Limitations of Provided Information and Guidelines

Access to information and guidelines for treatment and infection control was discussed in relation to the SARS outbreak and the 2009 H1N1 pandemic in 4 countries, while in Australia the experience discussed included both of these crises. The opinion of GPs on this issue was measured in 4 quantitative studies and described as a theme in 1 qualitative study. Similar challenges included multiple sources of information (evidence from 2 countries during the SARS outbreak and the H1N1 pandemic); information was unclear, duplicated, and conflicting (evidence from 2 countries during the H1N1 pandemic); rapidly changing and guidelines not

FIGURE

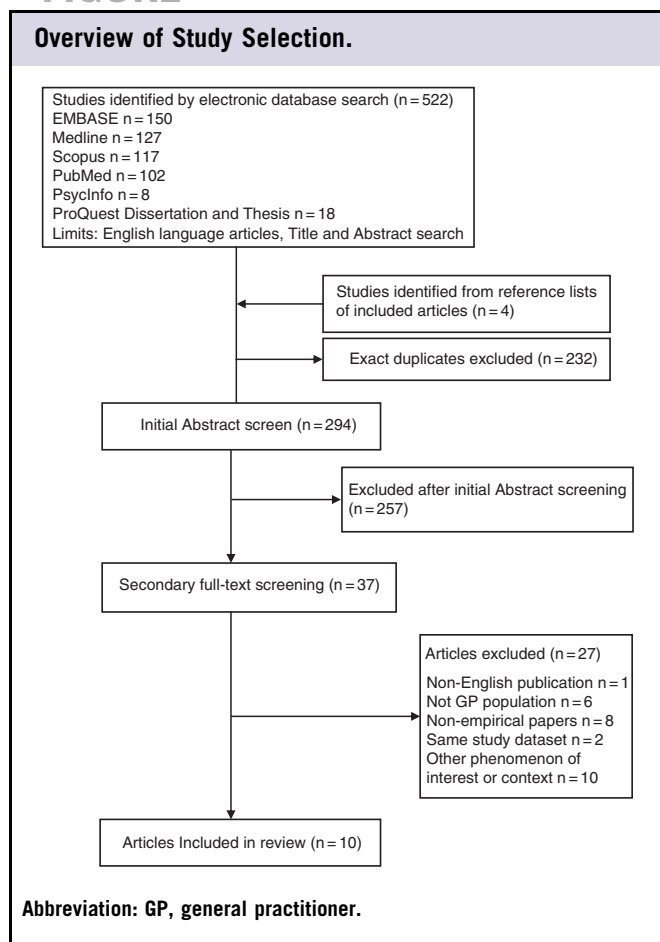


TABLE 2

Overview of Studies in Chronological Order

Study Citation	Type of Data	Study Purpose	Method	Population, N	Region and Epidemic or Pandemic Studied	Sample Design and RR	Quality Considerations
Verma et al 2004	QN	To examine the psychological impact of SARS on GPs and traditional Chinese medicine (TMC) practitioners	Three self-reported questionnaires, cross-sectional Two open-ended questions	GPs (n = 721) traditional Chinese medicine practitioners (n = 329)	Singapore SARS	All GPs and TMC practitioners registered with the Ministry of Health in Singapore RR: GPs 29% TMC practitioners 22%	Limitations acknowledge low RR and nonresponse bias Scale to assess the stigma of AIDS used to assess the stigma associated with SARS. Face validity of this scale reported Design does not establish clear “cause and effect” between psychological distress and SARS, although significant association was found
Herceg et al 2005	QN	To identify knowledge, attitudes, and practices of GPs around SARS and biothreat preparedness	Two concurrent mail surveys	GPs (n = 184) practice principals (n = 74)	Australian Capital Territory (ACT), Australia SARS	All GPs and all practice principals in ACT Division of General Practice database RR: GPs 48% practice principals 54%	Limitations acknowledge low RR, overlap between surveys and self-reporting. The survey was anonymous and voluntary, thus self-reporting was not likely to affect the validity of results
Tan et al 2006	QL	To describe the experience and behavior of family physicians and the use of PPE in their encounters with SARS patients	In-depth interviews	Family physicians who have had exposure to patients with SARS (n = 8)	Singapore SARS	All invited family physicians participated	Results were reported to fit into the Becker Health Belief Model Method of data analysis not clearly stated One participant read the draft to validate and verify the themes
Wong WC et al 2007	QN	To compare the response and management of SARS by family physicians in Hong Kong and Toronto in training for SARS, the use of screening tools, an anxiety scale, clinical practices, and demographic data	Mail survey	Family medicine tutors in Hong Kong (n = 137) family medicine tutors in Toronto (n = 51)	Hong-Kong and Toronto, Canada SARS	Details of sample design not provided RR: family medicine tutors in Hong Kong 74.8% family medicine tutors in Toronto 34%	Development of a new instrument is well described and reported to be content tested Low RR in Toronto

Table 2. Continued

Study Citation	Type of Data	Study Purpose	Method	Population, N	Region and Epidemic or Pandemic Studied	Sample Design and RR	Quality Considerations
Bocquet et al 2010	QL	To describe early experience (4 weeks from first clinic presentation) of frontline general practices	Semistructured interviews	Practice managers from practices with high volumes of presentations early in the pandemic (n = 10)	Melbourne, Australia, 2009 H1N1	Purposive sampling All identified practices with high volumes of presentations participated	Interview schedule was appraised by GPs before the interviews; number of GPs not reported Interviews were content transcribed Findings reported as consistent with clinical practice model by Phillips et al ²⁷
Caley et al 2010	QN	To assess GPs' opinions on how information was communicated to them during the first wave of the influenza A H1N1 pandemic and the overall response of the NHS and Health Protection Agency	Cross-sectional mail survey Scale and free-text questions	GPs in West Midlands (n = 367)	United Kingdom 2009 influenza A and H1N1	Random sample RR: 36.6%	Limitations acknowledge low RR; nonresponse bias and reduced risk of geographical response bias discussed Details about the instrument development and validation not provided
El Emam et al 2011	Mixed-method	To understand the privacy barriers that could potentially influence family physicians' reporting of patient-level surveillance data to public health agencies during the 2009 pandemic	Five focus groups Survey of focus group participants	Family physicians participated in family medicine forum (n = 37)	Canada 2009 influenza A and H1N1	Purposive sampling, stratified by gender, years of practice, location (rural/urban), region of Canada RR: not stated	Theories about information privacy concerns and individual behaviors used to frame data collection and analysis Triangulation design Two researchers separately coded the data Conceptual model developed and its generalizability discussed

Table 2. Continued

Study Citation	Type of Data	Study Purpose	Method	Population, N	Region and Epidemic or Pandemic Studied	Sample Design and RR	Quality Considerations
Rurik et al 2011	QN	To evaluate the knowledge, motivation, and attitudes of Hungarian family physicians toward pandemic influenza vaccination in 2009	Questionnaire with 20 questions: 16 multiple choice, 4 open ended	Family physicians participated in medical education courses and other meetings (n = 198)	Hungary 2009 influenza A and H1N1	Nonrepresentative sample RR: 85%	Limitations acknowledge small sample size Instrument developed based on discussions with GPs and public health experts; pilot testing not reported
O'Leary et al 2012	QN	To determine practices and experiences with delivery of seasonal and pH1N1 vaccines and anticipated and experienced barriers	Two national surveys, before and after vaccination; by mail or internet	Primary physicians, members of the sentinel physician networks (pediatricians, family medicine, and internal medicine [n = 776])	United States 2009 influenza A and H1N1	Results based on population responded to both surveys RR: 62%	Pilot testing reported Nonresponse and self-report bias and possible different experience of physicians who are not part of the sentinel networks acknowledged
Wong SYS et al 2012	Mixed-method	To appraise the public primary care response to pandemic 2009 in Hong Kong	Cross-sectional survey, mailed qualitative interviews	Physicians from 54 general outpatient clinics in Hong Kong (n = 126) Physicians from 2 clinics (n = 10)	Hong Kong 2009 influenza A and H1N1	Details about sample design not provided RR: 42% Participants interviewed were from 2 randomly selected clinics	Limitations acknowledge low RR and social desirability bias Model for pandemic preparedness in primary care by Patel et al ³ used to develop the instrument and frame data analysis Qualitative data reported to be analyzed by 2 researchers

Abbreviations: GP, general practitioner; NHS, National Health Service; PPE, personal protective equipment; QL, qualitative study; QN, quantitative study; RR, response rate; SARS, severe acute respiratory syndrome.

TABLE 3

Challenges and Barriers: Experience by Primary Care Physicians in Different Countries

Themes		Sources
Limitations of provided information and guidelines	Multiple sources of information	Australia, SARS (Herceg et al): GPs reported using many sources of information—facsimiles and newsletters from the Division of General Practice, websites, Australian government hotline, medical journals, newsletters, and mainstream media United Kingdom, H1N1 (Caley et al): free-text comments that the same information was sent from primary care trusts (PCTs), the Royal College of GPs, and the Health Protection Agency (HPA)
	Information was unclear, duplicated, and conflicting	United Kingdom, H1N1 (Caley et al): 45% of free-text suggestions related to reducing information duplication and improving clarity of information; 61% disagreed that advice regarding the management of people with symptoms of the 2009 influenza A and H1N1 was clear Australia, H1N1 (Bocquet et al): 5 practices reported that information provided was not synchronous with on-the-ground experience
	Rapidly changing, not tailored for primary care guidelines and screening tools	Hong Kong, SARS (Wong WC et al): 60.9% agreed that SARS screening tool changed too often Canada, SARS (Wong WC et al): 40% agreed that SARS screening tool changed too often Australia, H1N1 (Bocquet et al): 6 practices reported difficulties managing rapid escalation of information flow; 5 practices reported that information was not oriented toward practical clinical guidelines Singapore, SARS (Verma et al): Availability of prompt, accurate, and transparent information, updates, and guidelines was the most frequent response of GPs to the open-ended question about issues that would help the most
Limitations in supply and use of personal protective equipment (PPE)	Problems with supply and method of obtaining	Singapore, SARS (Tan et al): participants reported shortage and high cost of PPE; some reported prolonged use or recycling of PPE Singapore, SARS (Verma et al): provision of PPE was rated the third most frequent response to the question on what would have helped GPs in the response to SARS Australia, SARS (Herceg et al): many practices reported problems obtaining PPE, including reduced availability, cost, and long waiting times Australia, H1N1 (Bocquet et al): 7 practices had inadequate stockpile of PPE; 2 practices reported being unable to access masks from any source within their first 2 weeks of the pandemic United Kingdom, H1N1 (Caley et al): means of obtaining PPE were significantly less clear than arrangements for obtaining antiviral medication
	Compliance with PPE use	Singapore, SARS (Tan et al): family physicians persisted in PPE use in spite of high cost and inconvenience Hong Kong, H1N1 (Wong SYS et al): 99% of participants reported wearing protective masks Australia, SARS (Herceg et al): only 50% of practices bought PPE to deal with SARS
	Inconvenience of use	Singapore SARS (Tan et al): participants reported discomfort in N95 mask use and adverse reaction of patients to PPE
Difficulties performing public health responsibilities	Reporting the surveillance data to health authorities	Hong Kong, H1N1 (Wong SYS et al): 59% of physicians had not participated in surveillance activities associated with acute respiratory infections; of those who had, 58% reported suspected cases of influenza A H1N1 to the government Canada, H1N1 (El Emam et al): family physicians were reluctant to disclose patient data to public health units due to concerns about the extent to which public health agencies are dependable to protect health information (trusting beliefs) and the possibility of loss due to disclosing health information (risk beliefs) Australia, H1N1 (Bocquet et al): all practices reported that authorization requirements for swabbing and prescription of antiviral agents were time consuming and compromised clinical care when managing large number of patients
	Prioritization	United States, H1N1 (O’Leary et al): 64% of physicians reported having to prioritize patients for pH1N1 vaccine, even among high-risk groups (due to supply deficiencies) Australia, H1N1 (Bocquet et al): 5 practices reported conflicts of interest between their public health responsibilities and their capacity to provide clinical care, indicating that their patients took priority
Support from the authorities	Satisfaction with the support	Hungary, H1N1 (Rurik et al): more than half of family physicians were not satisfied with the support from the health authorities during the vaccination campaign

Table 3. Continued

Themes		Sources
	Workload relief	United Kingdom, H1N1 (Caley et al): 74% agreed that organization of NPFS was necessary to allow primary care services to continue with business as usual; 50% did not feel that NPFS can safely assess and provide treatment for people with flu-like symptoms
Insufficient training and education	Insufficient training in infectious diseases and lacked confidence in dealing with SARS	Canada, SARS (Wong WC et al): 80% of family physicians had no training in infectious disease control; 73.5% lacked confidence in dealing with SARS Hong Kong, SARS (Wong WC et al): 84% of family physicians had no training in infectious disease control; 68.1% lacked confidence in dealing with SARS Hong Kong, influenza A and H1N1 (Wong SYS): 56% of physicians had received training on the use of guidelines; 62% continued to want more professional education on how to deal with H1N1 influenza
	Need for practical scenario workshops	Australia, SARS (Herceg et al): GP comments on how general practices could be assisted included workshops and practical scenario-style education
Emotional effects of responding to a disease with unknown characteristics and lethality	Psychological distress, stigmatization, and posttraumatic stress symptoms	Singapore, SARS (Verma et al): the fear, uncertainty, and stigma caused by SARS are associated with psychological distress in GPs
	Classified in high-anxiety group	Hong Kong, SARS (Wong WC et al): 50.7% of physicians were classified in the high-anxiety group Canada, SARS (Wong WC et al): 51% of physicians were classified in the high-anxiety group

Abbreviations: GP, general practitioner; NPFS, National Pandemic Flu Service; SARS, severe acute respiratory syndrome.

tailored for primary care; and screening tools (evidence from 3 countries during the SARS outbreak and the H1N1 pandemic).

Australian GPs in the study by Herceg et al¹⁸ reported being well informed about the SARS outbreak, but their suggestions, which were derived from open-ended questions, included the need for timely information and detailed guidelines appropriate for primary care. GPs from this study reported deriving information from multiple sources. Multiple sources of information and information that was unclear, duplicated, and conflicting were also reported by GPs regarding the information and advice provided by the health authorities in the United Kingdom.¹⁷ Guidelines and screening tools that were rapidly changing and not tailored for primary care were reported in Hong Kong during the SARS outbreak¹⁹ and in Melbourne, Australia, during the H1N1 pandemic.²⁵ Availability of prompt, accurate, and transparent information; updates; and guidelines was identified as the most frequent response by GPs to the open-ended question about what issues would help the most in the study by Verma et al²⁰ about the SARS outbreak in Singapore.

Limitations in Supply and Use of Personal Protective Equipment

Problems with the supply of personal protective equipment (PPE) were reported in 4 studies.^{17,20,25,26} In Singapore²⁶ and Australia²⁵ this issue was discussed in the context of shortage

and the high cost of the PPE during the SARS outbreak and the H1N1 pandemic, respectively. In the qualitative study by Bocquet et al,²⁵ inappropriate PPE supply was described as one of the factors that negatively influenced the decision of Melbourne primary clinics to maintain care of influenza patients. The qualitative study about the SARS outbreak in Singapore²⁶ described difficulties in procuring PPE due to severe shortages and high costs. In another study, provision of protective gear was identified as the third most frequent response given by Singaporean GPs to the question about what factors would help in the primary care response during the SARS outbreak.²⁰

This same issue of PPE supply was addressed in the UK study in the context of the method of obtaining PPE during H1N1 pandemic,¹⁷ and GPs reported that the means of obtaining the protective gear was not sufficiently clear.

Compliance with the advice to use PPE was measured in 2 survey studies^{18,23} and discussed in 1 qualitative study.²⁶ Differing inclinations to comply with the advice to use PPE were found. In Singapore during the SARS outbreak²⁶ and in Hong Kong during the H1N1 pandemic,²³ GPs were reported to have high compliance with the guidelines to wear PPE. On the contrary, in Australia only one-half of the primary care clinics were reported as complying with the guidelines to buy PPE during the SARS outbreak.¹⁸ GPs from this study suggested that PPE should be provided to primary clinics by the authorities.

Inconvenience of PPE use was discussed only in the qualitative study about the SARS outbreak in Singapore.²⁶ That study reported that in spite of the discomfort, shortage, and cost, GPs persisted using PPE as they believed that its effectiveness outweighed these barriers.

Difficulties Performing Public Health Responsibilities

Performance of public health responsibilities by GPs was discussed in the reviewed studies only in the context of the H1N1 pandemic. Two aspects of this issue were addressed: reporting of the surveillance data to the health authorities and prioritization of the patients.

Reporting surveillance data to the health authorities was examined in 3 studies.²³⁻²⁵ The study about the H1N1 response in Hong Kong²³ noted that 59% of GPs were not part of the surveillance activities; among those who were, only 58% reported suspected cases of H1N1 virus to the government. A qualitative study about the privacy barriers that influenced GPs' reporting of surveillance data during the H1N1 pandemic in Canada found that GPs were reluctant to disclose patients' data to public health units due to concerns that private health information may be disclosed to other agencies.²⁴ In the qualitative study concerning GPs' experience in Melbourne,²⁵ compulsory surveillance reporting before providing antiviral drugs and viral swab tests was found to be time consuming and compromising the clinical care.

The aspect of prioritization of patients was included in 2 studies.^{21,25} In the United States, the issue was discussed in relation to vaccine shortage during the vaccination campaign. O'Leary et al²¹ reported that GPs faced difficulties prioritizing patients for vaccination during the H1N1 pandemic in the face of a new influenza strain and inadequate supplies of the vaccine, and that the way GPs prioritized high-risk patients needed further exploration. In Melbourne, prioritization arose in the qualitative study concerning GPs' experience during the H1N1 pandemic when the capacity to provide clinical care was being stretched.²⁵ In that study, 5 of 10 GPs interviewed preferred to provide care to their own patients rather than other influenza patients who presented during the outbreak without prior history of attendance in that clinic.

Support From the Authorities

We looked for evidence of organizational or financial support provided by the authorities to GPs to help them cope with the difficulties of pandemic or epidemic response. In Hungary, low satisfaction with the support from the health authorities was reported during the H1N1 vaccination campaign.²² In another report, the opinion of GPs was presented regarding the special arrangement to provide them with workload relief in the United Kingdom during the H1N1 pandemic.¹⁷ The United Kingdom organized the National Pandemic Flu Service (NPFS) to ease the pressure on primary care; all symptomatic patients were directed to seek advice and treatment through

the NPFS. In general, the UK GPs supported this arrangement, but they raised reservations about its diagnostic ability and prescribing safety, as the NPFS provided advice over the phone or through the Internet.

Insufficient Training and Education

The issue of insufficient training in the field of infectious disease control was raised both in the context of the SARS outbreak and the H1N1 pandemic. Wong et al¹⁹ reported that most GPs in Hong Kong (68.1%) and Canada (73.5%) were not confident in dealing with SARS patients and had no training in infectious disease control (80%-84.6%, respectively). Also, 62% of the GPs in Hong Kong surveyed about their experience during the H1N1 pandemic expressed the desire for more training and education on dealing with the influenza pandemic.²³ Moreover, GPs who participated in the study concerning the response to the SARS outbreak in Australia suggested that training and education in the field of infectious disease control would be beneficial for them in preparation for responding to future outbreaks.¹⁸

Emotional Effects of Responding to a Disease With Unknown Characteristics and Lethality

Two studies^{19,20} assessed the emotional effect of participating in the response during the SARS outbreak and presented the experience of GPs in 3 countries. In all 3 countries, high levels of psychological distress and anxiety were presented.

Verma et al²⁰ found that direct contact with SARS patients was associated with psychological distress, stigmatization, and posttraumatic stress symptoms in GPs in Singapore. Similarly, Wong et al¹⁹ reported that approximately 50% of each group of GPs surveyed in Canada and Hong Kong right after the SARS outbreak was classified in the high-anxiety group.

DISCUSSION

This systematic review was conducted to identify literature about GPs' experience during the response to an epidemic or pandemic. Although the search criteria had no time limitations, only 10 studies met the inclusion criteria; all were published since 2003 and investigated either the SARS outbreak or the 2009 H1N1 pandemic. No empirical studies were found that involved primary data collection with GPs about their experience during influenza pandemics of the 20th century (ie, Spanish flu of 1918-1920, Asian flu of 1957-1958, or Hong Kong flu of 1968-1969). Moreover, the 2009 H1N1 pandemic was a recent public health event that spread widely across the world, affecting 214 countries and causing more than 18 449 deaths.²⁸ GPs were the main responders to this disease.^{14,15} Even so, only 6 studies explored the experience of GPs during the response to this pandemic.

This scant scientific coverage of GPs' experience is surprising, especially considering that in most countries GPs play an important role in such public health crises and learning from

their experience is crucial for improving future prepandemic planning. One reason for this deficit may be that interest in planning for a pandemic response is a relatively new phenomenon. The global health community and national governments started to be concerned with the spread of a new virulent influenza virus in 1997,²⁹ when the death of a 3-year-old child in Hong Kong was proved to be caused by a highly pathogenic avian influenza (H5N1).³⁰ Sporadic outbreaks of the H5N1 virus recorded in Southeast Asia and the Middle East in subsequent years have prompted the development of the pandemic preparedness field. The unexpected outbreak of SARS in 2003 revealed the vulnerability of front-line medical professionals³¹ and generated some interest in research into GPs' role in the response. This trend was further developed with the analysis of GPs' participation in the management of the 2009 H1N1 pandemic. Thus, the preparedness of GPs to respond during pandemics is an emerging field of research that has only recently begun to receive attention.

Another possible reason for the limited number of studies that involve primary data collection from GPs about their experience during epidemics or pandemics may be the difficulty in recruiting GPs to participate in such research. Most quantitative studies included in this review had low response rates. This issue has been addressed in the literature, and the barriers against the participation of GPs in surveys have been studied.³²⁻³⁴

In spite of the small number of studies included in this review, the prominent role of GPs in the response to the SARS outbreak and the H1N1 pandemic has been evident. Participation in the response to the SARS outbreak was found to have an emotional impact on GPs, causing distress and anxiety. While no emotional effect was reported with regard to the H1N1 pandemic, it may have been because this issue was not investigated, analysis of the emotional effect of participating in the response was not the objective of the review, or a literature search was not attentive to this issue.

Identified Challenges and Barriers

This review identified important challenges and barriers experienced by GPs. All of the identified challenges were reported in more than one country and thus were broadly generalizable. These findings mean that, in spite of the differences in organization of primary care across nations and in spread of the disease, the experience of GPs in different countries constitutes transferable learning that can be used to improve preparedness planning. However, it also highlights the fact that some of the challenges were evident during the SARS and H1N1 outbreaks, even though planning for pandemic response was accelerated in the years between these events. This factor is probably because the data on the GPs' role and involvement during SARS was as limited as the SARS epidemic itself, and the intensive efforts in preparedness toward pandemics regarding the GPs was not emphasized.

Communication with public health authorities was a difficult issue in both cases. Evidence from the reviewed literature indicated that multiple sources of information and frequent updates that were not oriented toward primary care presented operational challenges for GPs. The study by Hecceg¹⁸ that investigated the preferred ways GPs receive updates during SARS found that, amid multiple sources of information, Australian GPs preferred updates from the Division of General Practice, the midlevel organization with which most GPs in Australia were voluntarily affiliated. This finding, however, was not acted on during the H1N1 pandemic; GPs were confronted with duplicated information. Evidence about duplicated information and guidelines that were not tailored for primary care was also presented in an opinion paper about the experience of general practices in Melbourne during the H1N1 pandemic.¹⁴

Access to PPE was another problem in different countries during the SARS and the H1N1 incidents. While the findings suggested that GPs are willing to use PPE in spite of the inconvenience associated with its use, operational problems of supply, shortage, and cost of PPE during the outbreak present a challenge for them. In one study, GPs compromised their safety by reusing masks.²⁶ Another study reported that inadequate supply of PPE affected the decision of practices about consulting the patients suspected of being infected.²⁵ Problems with the PPE supply were also highlighted in an opinion paper.¹⁴

During the SARS outbreak, GPs felt a lack of confidence dealing with a new, virulent, and potentially life-threatening disease.¹⁹ The study about the response to SARS in Australia indicated that GPs wanted more workshops and practical scenario-style education.¹⁸ Still, during the management of the H1N1 pandemic, GPs indicated that they needed more professional education on how to deal with affected patients.²³ This finding was surprising because GPs routinely consult seasonal flu patients and thus are very familiar with the disease. Perhaps, the complexity of infection control during the influenza pandemic presented a particular challenge in managing patients.

Problems associated with the performance of public health responsibilities were noted only in studies about the H1N1 pandemic. Different aspects of these responsibilities were highlighted. With respect to surveillance reporting to the health authorities, in Hong Kong low reporting rates were noted²³; in Canada, privacy concerns were cited²⁴; and in Australia, reporting was found to be time consuming.²⁵ The issue of prioritization was investigated in the United States in the context of low supply of the vaccine,²¹ and in surges of unwell patients in Australia.²⁵ It was unclear whether the mixed evidence could be explained by the difference in organization of public health versus primary care in different countries, or whether the small amount of research dedicated to this important issue can construct only a partial picture.

Evidence relevant to the support of GPs by the health authorities also was reported only in the context of the H1N1 pandemic. While the GPs' preparedness before the pandemic indicated that they rely on support from the health authorities,^{4,6,7} this issue has been limited in the reviewed literature. Only 1 study reported the special arrangement with NPFS to provide workload relief in primary care during flu patient surges in the United Kingdom. This arrangement was supported by GPs, in spite of the expressed concerns about its safety.¹⁷ In the study by Bocquet et al about the experience of GPs in Melbourne during the H1N1 pandemic, flu clinics were mentioned as places where some general practices decided to divert flu patients because of the inability to apply infection control in the general practice or the lack of PPE. Flu clinics, however, were organized to help emergency departments cope with the surges of flu patients after daytime working hours for primary care physicians. During regular daytime hours, the primary care physicians remained the first point of contact for the flu patients.³⁵

Limitations

Although a comprehensive and systematic search of the published literature was conducted, it is possible that some articles were missed. Also, the review was limited to English language publications, thus excluding works published in other languages. Our search yielded only 10 reports that conformed to all of the criteria. While the reasons for a limited number of articles were discussed, the challenges encountered by GPs during past epidemics require additional research to be fully understood. Nevertheless, the difficulties identified to date may serve as a platform for re-evaluating and improving the response of GPs to a range of emergency events, including emerging infectious diseases, bioterrorism, and natural disasters.

CONCLUSIONS

The findings of this review answered the second research question about the similarities of challenges in response to past pandemics or epidemics for GPs from different countries. They found that GPs from different countries experienced similar difficulties, indicating that their experience may offer cases of transferable learning that could be used for future response planning.

The answer to the first research question about the challenges that GPs experienced responding to past epidemics or pandemics was not definitive because of the lack of relevant research. While important difficulties were identified, the evidence was mixed and the number of studies that were dedicated to this issue was limited, precluding a complete list of possible challenges of pandemic response in primary care.

The public health role of GPs started to receive attention only after the 2009 H1N1 pandemic. Further research is needed to analyze why issues of communication with health

authorities and PPE provision still presented a challenge for GPs in 2009 after lessons learned from the SARS outbreak and extensive prepandemic planning were reported. Another area for study concerns what problems of infection control are specific to primary care and whether these problems could be solved by professional training. It is also important to investigate what types of support health authorities can provide to GPs during pandemics or epidemics. Moreover, learning from the experience of GPs in different countries may provide an important platform for improvement.

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