ORIGINAL RESEARCH

Development of Prehospital, Population-Based Triage-Management Protocols for Pandemics

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Keywords: disasters; disaster management; emergency medical services; emergency operations centers; incident command system; pandemics; paramedics; prehospital; triage

Abbreviations:
EMS = emergency medical services
EOC = Emergency Operations Center
ICS = Incident Command System
POC = Point of Contact
SARS = severe acute respiratory syndrome
SEIRV = susceptible, exposed, infectious removed, vaccinated

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Abstract

The lack of disease-specific triage-management protocols that address the unique aspects of a pandemic places emergency medical services, and specifically, emergency medical services practitioners, at great risk. Without adequate protocols, the emergency health system will risk needless exposure, loss of functional capacity, and inappropriately triaged patients. This paper reports on the development of population-based triage-management protocols at two patient points of contact. The primary objective of the triage-management protocols is to identify patients infected by or exposed to the biological agent, and consequently, appropriately triage patients so as to optimize the utilization of emergency medical services and surge capacity resources through disposition and care at hospital- and non-hospital-based care facilities. Protocols must include standardized "flu questions" and a Fear and Resiliency Checklist to ensure protection and separation of the susceptible population from those infected or exposed.

Bielajs I, Burkle FM, Archer FL, Smith E: Development of prehospital, population-based, triage-management protocols for pandemics. ***Prehospital Disast Med*** **2008;23(5):420–430.**

Introduction

The experience with the severe acute respiratory syndrome (SARS) outbreaks in Canada and East Asia in the early 2000s severely tested the capabilities of the public health system and the emergency medical services (EMS) system. In Toronto, paramedics were among the first healthcare workers to be exposed to SARS. Consequently, the EMS system suffered significant personnel and logistical problems. Indeed, within days, approximately half of Toronto's EMS personnel were exposed to the disease, necessitating their quarantine at home or work, and contributing to sub-optimal EMS system function.[1,2] In Taiwan, paramedics were found to be at greater risk of SARS than the general public.[3]

These experiences contribute to understanding the effects of pandemics on the EMS system and reinforce the need for peer-reviewed literature addressing specific EMS pandemic planning. The role of EMS in facilitating effective disease control during disease outbreaks and pandemics has not been explored extensively . Given the key role that EMS personnel play as essential services during all disasters, this constitutes a significant gap in EMS science and practice.

A major goal of triage-management during a pandemic is the prevention of disease transmission (containment) and appropriate utilization of scarce resources. Consequently, any triage-management process must be sensitive and specific enough to identify exposed and infectious populations, and separate them from the unexposed, but susceptible general population.[4] Traditional triage-management protocols are predicated on the assessment of acuity and severity of presentation. During a pandemic, identification and assessment of exposure to an infective agent or infection status (e.g., severity profile, duration and incubation, lethality, infectiousness, or adaptability to a changing case definition) is required. Such assessment is not supported by traditional triage-management protocols. These must be modified to take into consideration population health requirements. Strict adherence to traditional triage protocols and existing ambulance dispatch algorithms

risks containment being impeded, thereby inadvertently adding to the overall transmission of disease.

During a pandemic, the EMS system will be required to fulfill dual responsibilities: to respond to "usual business" ambulance calls, while coordinating and mobilizing the EMS response to the new pandemic threat. Therefore, these dual responsibilities must be addressed during EMS pandemic preparedness planning by including the development of suitable protocols for appropriate triage-management. Additionally, emergency planners must consider methods to best optimize the protection of the EMS system and its resources, and provide appropriate triage-management strategies that foster further opportunities for clinical, infrastructural, and systems research. These are not easy tasks, especially if the EMS workforce and support staff are depleted.

The paucity of literature investigating triage systems in pandemic settings has highlighted a gap in the current evidence base for disaster-management strategies. This project was designed to address this gap in the evidence base by encouraging critical thinking and examination of a theoretical, population-based, triage-management tool to augment the traditional triage systems applied in the EMS system.[5] Furthermore, this research can serve as a platform from which further EMS system and operational-level studies and research can evolve.

Project Design

Assumptions

During the design of this research project, three major assumptions were made: (1) pandemics are population-based events that combine individual-based care and tasks with interventions and decision-making that are informed by public health and surge capacity guidelines; (2) everyone will have the same condition, or will be susceptible to it, and all will be provided with or seek some form of assistance or intervention (e.g., clinical, educational, prevention); and (3) the EMS continuum of care commences from receipt of an emergency call and concludes with final patient disposition.[5]

Operational Points of Contact

Based on these assumptions, the research team identified two primary "points of contact" where EMS triage-management decisions will occur during a pandemic:

1. *Point of Contact 1 (POC 1)*: Primary triage-management from emergency medical dispatchers and call-takers; and
2. *Point of Contact 2 (POC 2)*: Secondary triage-management from EMS personnel at first contact with the patient.

A third point of contact (POC 3) also was identified. Tertiary triage-management (POC 3), is the ambulance transport destination, e.g., ambulatory care clinic, flu hospital, hospital emergency department, etc. Re-triage will occur at this point and be performed by medical and nursing staff, and possibly first-aiders. This project does not address triage at POC 3 in any detail as these areas are out of the normal purview of the prehospital care providers.

Design Phases

The following key project design phases were identified:

1. Pandemic planning document literature review and analysis;
2. Analytical framework identification and applicability testing;
3. Incorporation of virus-specific questioning into the triage-management process;
4. Development of Point of Contact triage-management protocols; and
5. Testing of triage-management protocols for validity.

Pandemic Planning Document Review and Analysis

A comprehensive examination of existing pandemic planning documents was performed. Key documents from the World Health Organization (WHO) and a selection of key planning documents from Australia, the United States, Canada, and the United Kingdom (Table 1) were used to identify if EMS services were included, or if the plans contained any EMS triage-management tools or clinical practice guidelines pertaining to activities at any of the identified POCs. A total of 23 plans and guidelines were examined.[5]

This literature review identified a lack of EMS-specific content within existing pandemic plans. No plan adequately addresses the EMS triage-management of patients during a pandemic. Rather, plans essentially focus on primary care and hospital clinical management. Only three Australian state-based plans (Victoria, Western Australia, and Tasmania) consider EMS. Where it is mentioned, EMS is addressed in a broad sense, and there is no mention of EMS triage-management protocols. The Australian Interim National Pandemic Clinical Guidelines provide some guidance, though minimal. In this document, EMS guidelines stand alone and apart from detailed guidelines provided for primary care practitioners and physicians in hospital emergency departments.

Analytical Framework and Applicability to Existing EMS Systems

A peer-reviewed literature search was performed to identify potential population-based analytical frameworks that support triage-management models for infectious disease. Only one suitable population-based, epidemiological, analytical framework was identified: the SEIRV (Susceptible, Exposed, Infectious Removed, Vaccinated) model.[1,6] This model is an expansion of the conventional epidemiologic cohort classification SIR (Susceptible, Infectious, Removed) that classifies stages of infection and level of biological agent replication in a host that includes dynamics of disease transmission. This framework categorizes a given population:[7–9]

1. *Susceptible*—not yet exposed but susceptible (largest population category);
2. *Exposed*—incubating and symptom-free and assumed not yet infectious;
3. *Infectious*—symptomatic and potentially communicable;
4. *Removed*—have been removed by death or recovery (assumed immunity); and
5. *Vaccinated*—immune and protected by virus-specific vaccination.

Country/Organization	Pandemic Planning Documents Examined
Australia	• National Action Plan for Human Influenza Pandemic, July 2006: Council of Australian Governments • Australian Management Plan for Pandemic Influenza, June 2005: Australian Government Department of Health and Ageing • Australian Health Management Plan for Pandemic Influenza, 2006: Australian Government Department of Health and Ageing • Interim National Pandemic Clinical Guidelines, June 2006: Australian Government Department of Health and Ageing • Australian Capital Territory Health Management Plan for Pandemic Influenza, 2006: ACT Health • New South Wales Human Influenza Pandemic Plan: NSW Influenza Pandemic Taskforce • Interim Queensland Health Influenza Pandemic Plan, June 2006: Queensland Health • Tasmanian Health Action Plan for Pandemic Influenza, May 2006: Tasmania Department of Health and Human Services • Victorian Health Management Plan for Pandemic Influenza, February 2007: Victorian Department of Human Services • Western Australian Management Plan for Pandemic Influenza, November 2005: Department of Health, Government of Western Australia
New Zealand	• Influenza, a Patient Focused View, November 2006: Canterbury District Health Board, New Zealand • Pandemic/epidemic/emerging infectious disease plan, 2006–2009, Version 7, 09 October 2006: Otago/Southland District Health Boards, New Zealand • Midcentral District Health Board Pandemic Plan, Draft, July 2006: New Zealand • New Zealand Influenza Pandemic Action Plan, September 2006: Ministry of Health, New Zealand
United Kingdom	• UK Influenza Pandemic Contingency Plan, October 2005; • Pandemic Flu—Clinical management of patients with an influenza-like illness during an influenza pandemic, 29 March 2006: British Infection Society, British Thoracic Society, Health Protection Agency in collaboration with the Department of Health
United States	• Department of Health and Human Services Pandemic Influenza Plan, November 2005: US Department of Health and Human Services, Washington, DC
World Health Organization	• Responding to the Pandemic Threat—Recommended strategic actions, 2005: WHO • Epidemic Alert and Response—WHO Checklist for Influenza Pandemic Planning, 2005 • WHO Global Influenza Preparedness Plan, 2005

Table 1—Literature review context at the time of this project proposal in October 2005 and the commencement of this project in February 2006 found limited reference to EMS services in pandemic planning

Current Australian and international influenza pandemic clinical assessment guidelines for primary care practitioners and physicians were examined to identify whether the elements of the SEIRV framework were inherent within the guidelines, and whether clinical assessment and examination guidelines for other health professionals were appropriate and compatible for EMS personnel. This literature review identified that inherent of clinical assessment guidelines were approaches to clinical care that would support the identification of all population-based elements of the framework, albeit in a different order: EI-S-RV rather than SEIRV and that compatibility and applicability existed as an EMS operational triage-management model for both POCs. In reality, EI-S are the dominant operational elements, however, this will change as population-based vaccination (V) occurs, and/or patients recover from the illness and are removed (R) with demonstrated immunity (Figure 1). Therefore, having established compatibility and applicability, triage-management protocol development within an EI-S-RV framework proceeded on the premise that any model developed must be integrated easily into and compatible with existing EMS systems and processes, and without the need for extensive training in order to enable a rapid activation of the model in the event of a pandemic.

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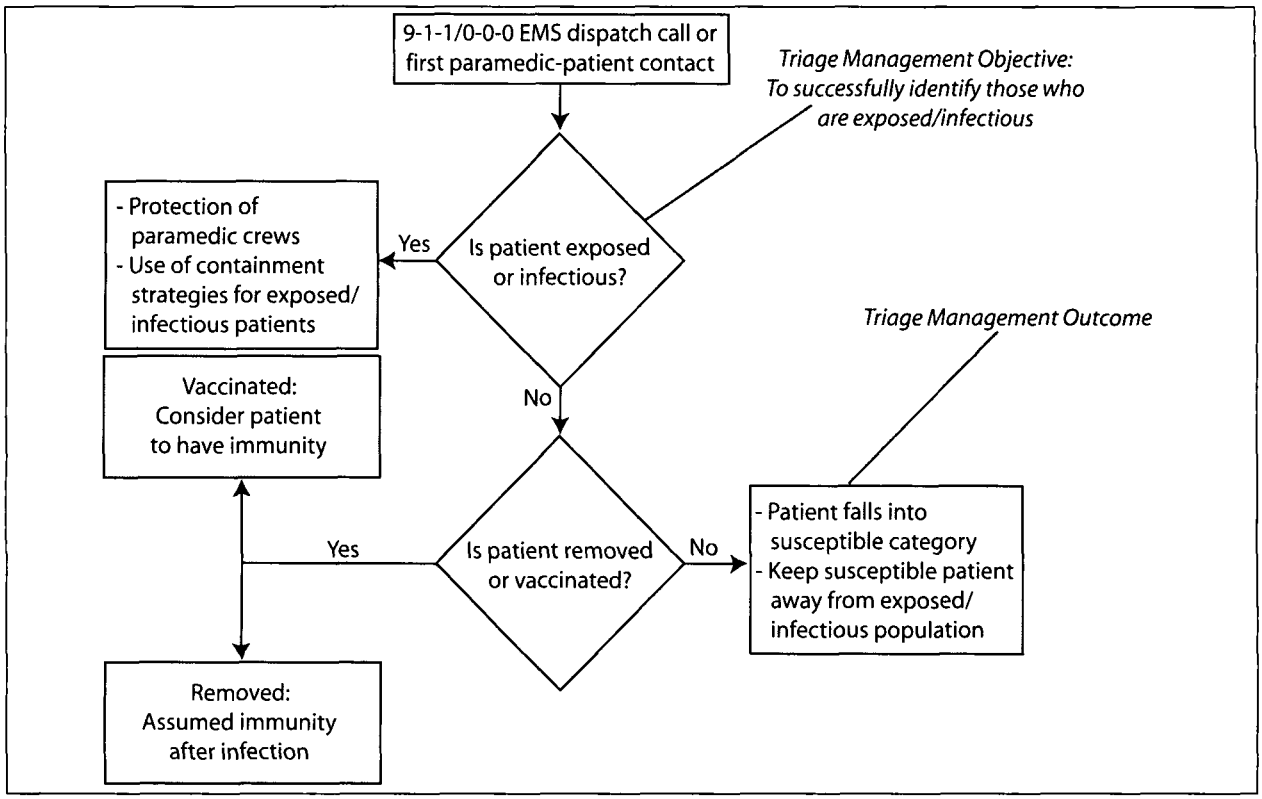

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Figure 1—Abbreviated triage-management model (EMS = emergency medical services)

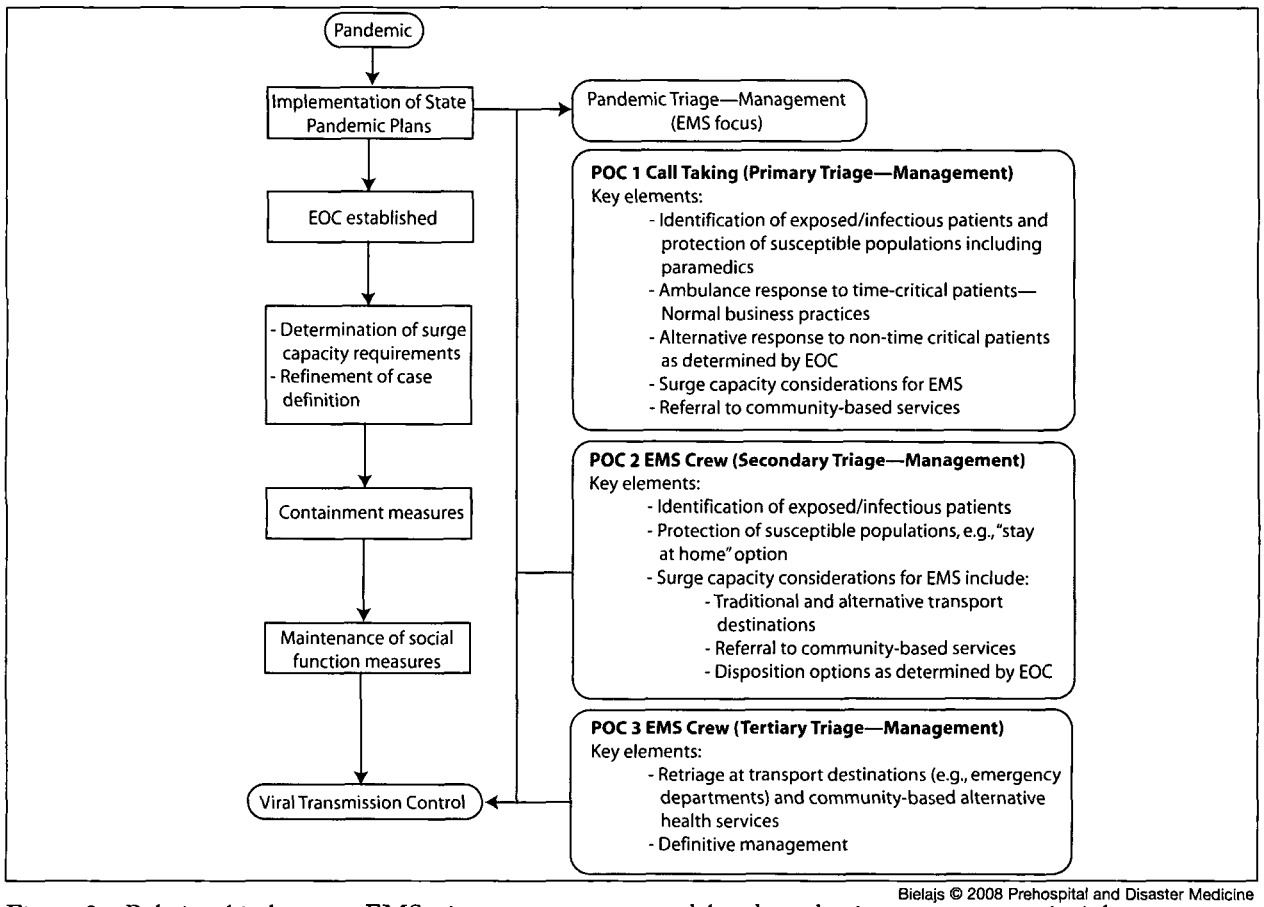

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Figure 2—Relationship between EMS triage-management model and pandemic management principles (EMS = emergency medical services; EOC = emergency operations center)

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Alignment of Triage-Management Model with Pandemic Management Principles

The relationship between pandemic management principles and the triage-management model is illustrated in Figure 2. Inherent and vital to this triage-management model is the feedback of relevant information to the Incident Command System's (ICS) Emergency Operations Center (EOC) from each POC to appropriately inform the EOC of surge capacity requirements and effectiveness of management strategies.[9,11]

Incorporation of Virus-Specific Questioning into Triage Management Process

The developed pandemic triage-management model has been designed specifically to ensure that it interfaces with existing EMS call-taking and dispatch processes. In the pandemic setting, emergency medical dispatchers are required to superimpose essential pandemic questions developed from the case definition of the infectious agent onto normal call-taking protocols. Questions asked by emergency medical dispatchers and call-takers that aim to identify those callers likely to be exposed or infectious will be based on clinical signs and epidemiological profile informed by the State health service and WHO case definition. For example:

1. Does the patient have any influenza-like symptoms (e.g., fever, cough, and fatigue)?
2. Has the patient been overseas to an affected country in the seven days before the symptoms started?

Additional or alternative questions:[10]

Part 1

1. Do you believe you have been exposed or infected?
2. If yes, how did this occur?

Part 2

1. Do you have fever?
2. Did you check your temperature with a thermometer?
3. Do you know how high the fever is?
4. Are you experiencing persistent cough?
5. Are you experiencing a sore throat?
6. Are you experiencing difficulty breathing?
7. Are you experiencing diarrhea?

Part 3

1. Is anyone in your immediate family or contacts experiencing these symptoms?
2. Have they received medical evaluation or care?

Development of Point of Contact Triage-Management Protocols

In the development of the triage-management protocols, the management strategies associated with pandemic containment (infection control practices, isolation of cases, quarantine of contacts, etc.) were applied to each POC and informed management options. Similarly, surge capacity considerations, particularly downstream at emergency departments and intensive care units, influenced decision-making outcome options within the triage-management models at both POCs with respect to criteria for patient transport and transport destinations. At POC 2, by combining the WHO pandemic planning principles with existing adult and pediatric pandemic assessment guidelines for primary care practitioners and other physicians, the SEIRV framework was applied to develop a similarly compatible triage-management model for EMS paramedics.

Point of Contact 1 (POC 1)—Primary Triage-Management: Emergency Medical Dispatchers (Figure 3)

The beginning of containment of transmission of the infectious agent occurs at this level. The objective at POC 1 is to identify patients who are exposed or infectious, versus those probably not infectious or not exposed. Questions related to the identification of exposed or infectious patients are based on the case definition of the infectious agent; it is understood that the case definition will be improved (novel virus-specific) as more data on the infectious agent and its health profile emerges. Emergency medical dispatchers should not place themselves in a position of making the decision based on inconclusive data and should refer appropriately to a professional clinician if this occurs. This process needs to be planned for and exercised.

As the triage-management model interfaces with existing call-taking and dispatch processes, normal EMS dispatch criteria for patients requiring urgent assistance (time-critical patients) remain unchanged. On receipt of an emergency call, the emergency medical dispatcher should follow standard protocol questions until entry questions are reached that require an assessment of consciousness and breathing.

Time-Critical/Urgent Calls

For patients who are conscious and breathing, the dispatch protocol is followed normally to determine the main presenting problem. When calls are triaged as time-critical or urgent, this model requires the call-taker to superimpose flu questions before initiating dispatch.

If a history of possible pandemic illness or exposure is determined, there is provision within the triage-management model at this level to consider alternate dispatch options: i.e., dedicated pandemic crew versus ordinary crew, and a dedicated EMS 'flu vehicle' versus a normal EMS vehicle. These remain policy decisions for individual EMS providers, however, it is emphasized that a national review of operational options, informed by federal and state pandemic plans, is necessary before an event occurs. The EOC should have the authority to execute these decisions in a timely manner.[11]

Emergency medical services dispatch criteria for time-critical patients triaged as suspected respiratory/cardiac arrest require an additional level of triage to identify a history of flu-like illness preceding the event. When a history of communicable disease is associated with a patient with clinical signs of cardiac arrest, an EMS clinician determines the dispatch response with reference to minimal qualifications for resuscitation criteria. This additional level of triage will help to determine if services in surge capacity management are necessary and/or available.

The policy decision of whether or not to provide an EMS response to patients in cardiac arrest with a history of influenza-like illness will require special consideration from ethical, legal, and community acceptance perspectives on health rationing. Studies on this process recommend that these decisions occur within an ICS's health-related EOC

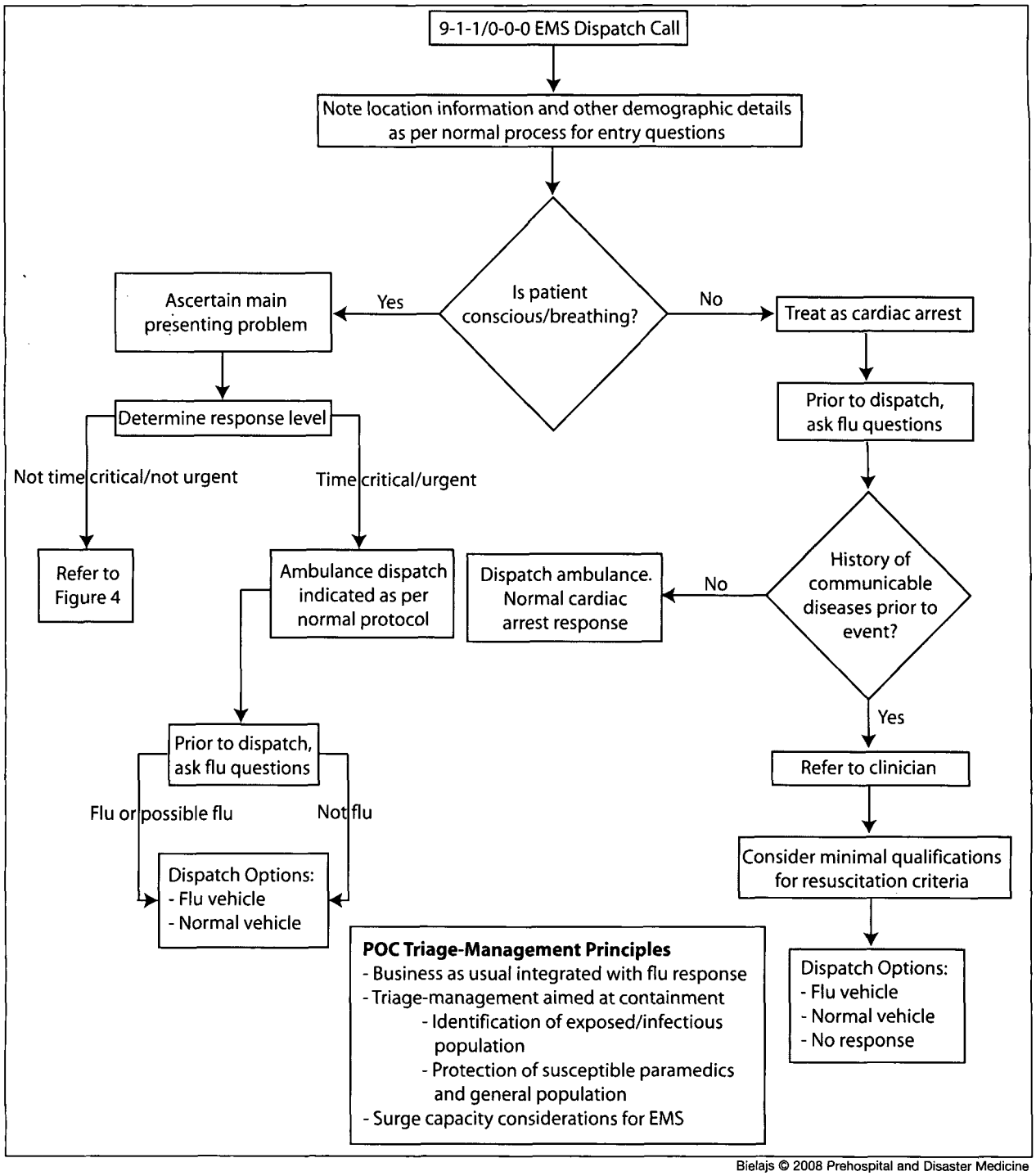

Figure 3—POC 1 Primary Triage-Management—Emergency medical dispatch call-taker model for time critical-urgent calls

where uniform decisions are made based on input from many variables (e.g., case definition, triage criteria for ventilator, and intensive care availability and capacity), and in dire situations, are assisted by central jurisdictional determination of minimal qualifications for survival and inclusion and exclusion criteria for care and transport at the EMS level.[1,9,11] These decisions must be explored further with state health departments with respect to compatibility with pandemic planning approaches, public communication, and level of health service response during different pandemic stages. Without these decisions being made and communicated to all health facilities and services, including EMS, a chaotic, *ad hoc*, and inconsistent approach to patient care will occur. It is likely that such a situation will increase transmission of disease and undermine necessary, population-based decisions that otherwise would lead to control of the pandemic.

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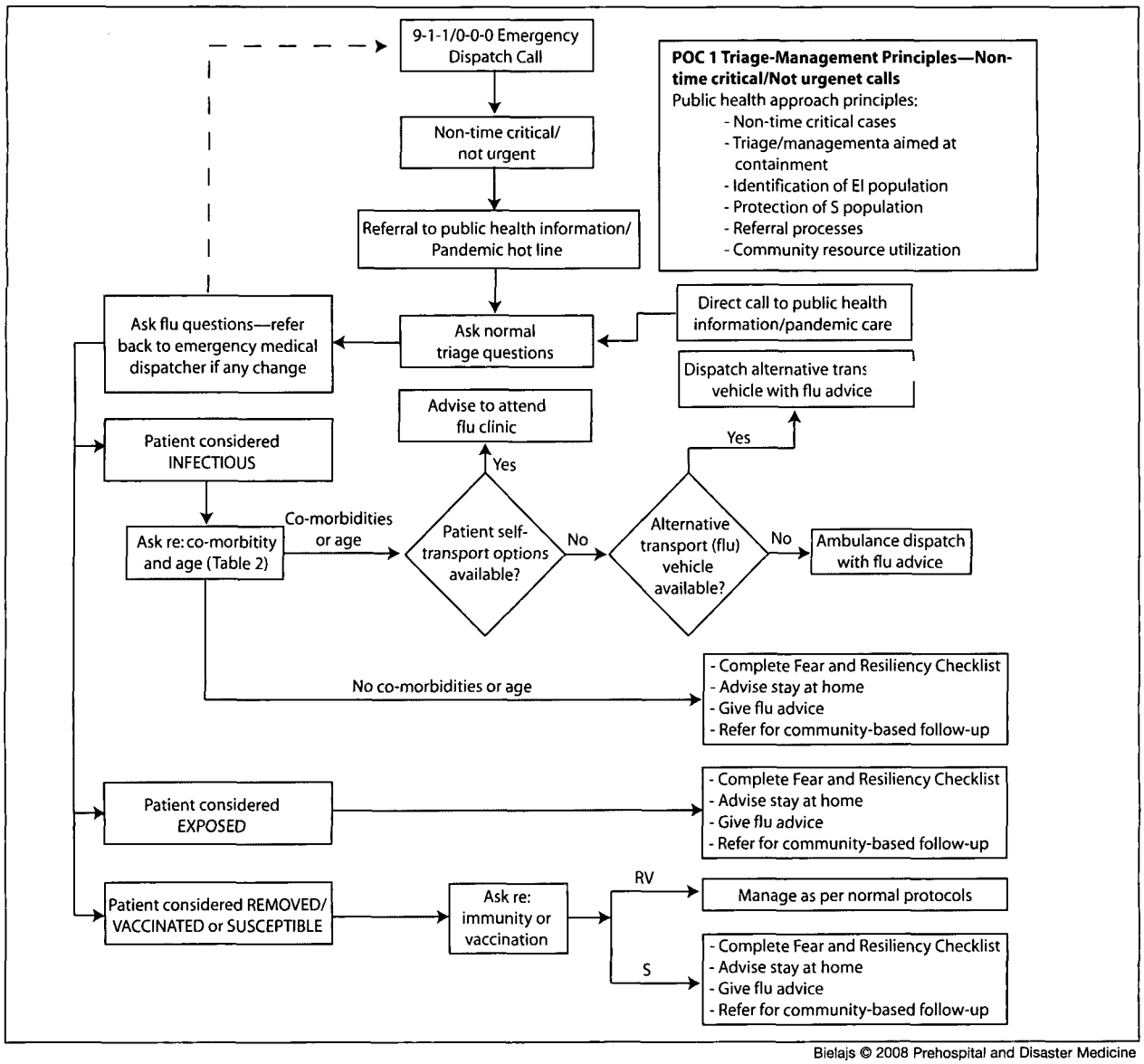

Figure 4—POC 1 primary triage-management—Emergency medical dispatch call-taker model for time non-time critical/not urgent calls

Non-Time Critical/Non-Urgent Calls (Figure 4)

For patients triaged as requiring less urgent care (non-time critical), an ambulance would not be dispatched immediately. Such patients would be referred to an internal or external call-taker for further triaging. This is a potential new protocol requirement for many emergency medical services. This step allows the emergency medical dispatchers additional leeway to take the next emergency call and allows calls requiring non-time critical response to be triaged appropriately by call-takers at pandemic hotlines and other alternative disposition options. Management options for these patients include non-urgent ambulance dispatch, non-ambulance transport, and self or assisted-self care at home options. At this point of contact, the containment strategies of quarantine and isolation are applied as exemplified by the potential to refer calls to community-based and non-hospital alternative care services.

The triage-management of calls requiring non-time critical/non-urgent response is based on the following principles and prerequisites:

1. For calls that are non-time critical and where call-taker triage has been completed, an EMS dispatch is not required;
2. Triage-management is aimed at controlling transmission through proper identification and separation of EI and S populations;
3. Referral back to the call-taker always is available if circumstances change for calls triaged as requiring a non-time critical, non-urgent response and for those calls direct to a public health information hotline/call center; and
4. Communication pathways for referral to community-based resources are available.

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Adults (≥12 years of age)	Children (<12 years of age)
- Age ≥65 years, ≥50 years for at-risk indigenous populations - Smoker - Chronic lung disease - Chronic cardiac disease - Diabetes - Renal failure - Immunosuppression and immunosuppressive therapies - Pregnancy (2nd, 3rd trimester) - Malignancy - Hematological abnormalities - Hepatic disease	- Chronic lung disease (respiratory syncytial virus), severe asthma (steroid dependent)) - Suppurative lung disease - History of premature lung disease - Congenital heart disease - Immune deficiency - Chronic conditions e.g., diabetes - Metabolic disease

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Table 2—Co-morbidities (Adapted from: Australian Government Department of Health and Aging *Interim National Pandemic Influenza Clinical Guidelines*, (June 2006) Canberra: Commonwealth of Australia, 2006, pp 43,45. Algorithm 1 Guidelines for primary/initial assessment of adult patients (page 43); Algorithm 3 Guidelines for assessing children in general practice or other primary/initial assessment center (page 45)).

Calls to Pandemic Hot Lines

Pandemic hotline call-takers receiving a call referred from an emergency medical dispatcher would be advised of the patient's main presenting problem and response to the pandemic illness questions. Any change to the presenting problem at any stage of this process that would require a higher level of response would trigger a referral back to the emergency medical dispatcher. Call-takers at public health information and pandemic hotlines would follow their usual protocols to determine the presenting problem and include specific pandemic illness questions to determine S, E, I, R, or V status. Post-SARS health hotlines emerged as a major first-line triage component in Canada.[9,12]

Infectious Patients

For patients considered to be infectious, public health measures related to social distancing, such as voluntary home confinement of symptomatic persons, are indicated.[9] To determine the safety of this option, the call-taker will ask questions related to co-morbidity. Suggested co-morbidity criteria are included in Table 2.

For patients with clinical signs of infection, who are <12 years or ≥65 years, with or without co-morbidities, medical assessment, preferably at a non-emergency department/non-hospital alternative health site is indicated. Transport options (made available by State pandemic plans) for these patients should be determined. These include:

1. Patient self- or self-assisted transport;
2. Non-ambulance flu transport vehicle; and
3. Non-emergency ambulance vehicle if non-ambulance, flu-transport vehicles are unavailable.

For patients with clinical signs of infection but without susceptible age or co-morbidity factors, stay at home/shelter-in-place is desirable to keep these infectious patients separate from susceptible populations (Table 3). These patients may require support to enable them to stay at home. The call-taker should complete the Fear and Resiliency Checklist (Table 4) or similar screening questionnaire to determine the support needed.[10] The patient should be provided with pandemic flu advice and referral for community-based follow-up within the next 24–48 hours. This may include visiting nurse services or primary care physician visits as determined by the community-based/primary healthcare pandemic plans at state or local levels.

Clinical Indicator	Results Requiring Further Assessment	
	Adult	*Pediatric*
Respiratory rate	>24/min	rapid breathing
Skin color (lips, hands)	cyanosis	pallor or cyanosis
Oxygen saturation	<90% on room air	<90% on room air
Chest signs/symptoms	abnormality on auscultation or chest pain	grunting, abnormal breath sounds
Temperature	>38°C (100.4°F)	>38°C (100.4°F) or hypothermia
Pulse	New arrhythmia or pulse >100/min	tachycardia
Blood pressure	<100 mmHg systolic or dizziness on standing	<100 mmHg systolic or dizziness on standing
Mental status	New confusion	Lethargy
Function	New inability to function independently	Inability to feed
Gastrointestinal tract	Persistent vomiting (>2–3 times/24 hours) Diarrhea (case definition: confirmed sign or symptom	Persistent vomiting (>2–3 times/24 hours) Diarrhea (case definition: confirmed sign or symptom
Central Nervous System		Convulsions Full fontanelle

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Table 3—Pandemic influenza clinical indicators (Adapted from: Australian Government Department of Health and Aging *Interim National Pandemic Influenza Clinical Guidelines*, (June 2006) Canberra: Commonwealth of Australia, 2006, pp 43,45. Algorithm 1 Guidelines for primary/initial assessment of adult patients (page 43); Algorithm 3 Guidelines for assessing children in general practice or other primary/initial assessment center (page 45)).

Exposed Patients

For patients considered to be exposed, normal advice related to the main presenting problem should be given with the

BIOEVENT FEAR & RESILIENCE (FR) CHECKLIST

Bracha & Burkle, 2006

Face-to-face __ | Phone __ | Start with part 1 below
Screener #: | Circle Yes's checkmark No's

PART 1:
Do you believe you have been exposed or infected? Yes(1) No
If so, how did this occur?

PART 2:
Do you have a fever? Yes(1) No

Did you check your temperature with a thermometer? Yes(1) No

Do you know how high the fever is? ____ Yes(1) No

Are you experiencing persistent cough? Yes(1) No

Are you experiencing a sore throat? Yes(1) No

Are you experiencing difficulty breathing? Yes(1) No

Are you experiencing diarrhea? Yes(1) No

PART 3:
Is anyone in your immediate family or contacts experiencing these symptoms? Yes(1) No

Have they received Medical evaluation or care? Yes No(1)

If any questions in PART 2 are answered in the positive please provide the caller with the immediate-referral options listed separately on referral Forms __

If determined as probably not exposed/infected please continue to PART 4 (estimate of current risk for future PTSD in civilians) ⇨

PART 4: A one-minute checklist for screened persons unlikely to be infected

		YES	?	NO	Total sub-scores:
Are you fearful that...	Circle and add YES scores:				
	...you are infected with ...? (the bird flu, SARS, etc.?)	5			Max: 30 PTSD A1
	...you will die from the ...?	10			
	...a close family member will die from...?	5			
	...your children will die from...?	10			
Right now, do you feel...	...fearful?	1			Max: 3 PTSD A2
	...helpless?	1			
	...horrified?	1			
Right now, are you experiencing...	Sweaty palms or cold sweat?	3			Max: 12 PTSD A3
	Trembling, shaking, or buckling knees?	2			
	Racing or pounding heart?	5			
	Shortness of breath?	2			
Are you fearful that you will run out of money if you cannot work for the next 2-3 months?		5			Low Resilience PTSD A4
How many (different) prescription medications are you on?					
Are you the kind of person that tends to bounce back after an illness?		-10			High Resilience PTSD A5
Do you have any nearby blood relatives who may be willing to help you?		-2			
Do you have any friends you can contact by telephone/e-mail so that you do not feel alone?		-3			

PARTS 1+2+3 Total Score ->

M/F: ___ Age: ____

Date: ___/___/___

Name:_____

Phone: _____ - _____ Phone 2: _____ -

PART 4 score range is from minus 15 to 50 (+ number of medications)

PART 4 only: Total Score -> Criterion A of PTSD

Table 4—Bracha-Burkle Bio-Event Fear and Resilience (FR) Checklist. Parts 1–3 assist in identifying those exposed and/or infectious. Part 4 aims to objectively quantify current acute-fear severity and to estimate pre-morbidity resilience levels[10]

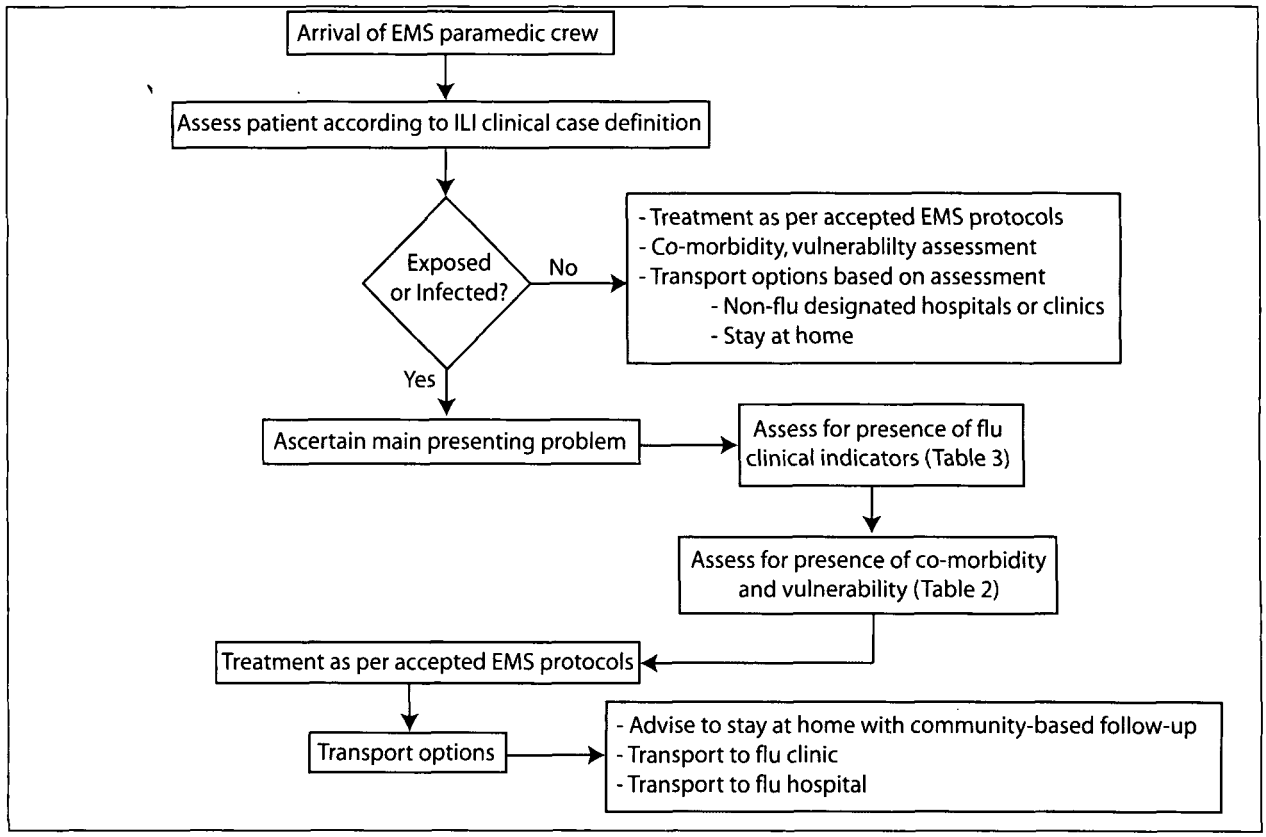

Figure 5—POC 2 Paramedic triage-management model

addition of stay at home/shelter-in-place to keep these exposed patients separate from susceptible populations. These patients require review for co-morbidities and the call taker should complete the Fear and Resiliency Checklist, provide the patient with flu advice, and referral for community-based follow-up as required.[9,10]

Susceptible Patients

For patients considered to be susceptible, normal advice related to the main presenting problem should be given with the addition of stay-at-home/shelter-in-place to keep these susceptible patients separate from exposed and infectious populations. The Fear and Resiliency Checklist should be completed to determine if community-level support needs are required to mitigate any anxiety or fear through informed knowledge.[9,10] The patient should be provided with flu advice and referral for community-based follow-up as required.

Point of Contact 2 (POC 2)—Secondary Triage/Management-Paramedic Crew (Figure 5)

At POC 2, the triage-management model again is focused on identifying exposed and infectious patients, and protecting susceptible populations by considering containment options. Patient triage-management will be informed by clinical and epidemiological information related to the current case definition and aimed at identifying exposed and infectious patients.

Surge capacity considerations and containment strategies also are evidenced by the option for paramedics to consider both traditional and alternative transport destinations for patients including flu hospitals, flu clinics, and alternative, non-hospital community health centers as well as self- or assisted self-care stay-at-home options with referral to community-based services. This model proposes alternate transport options and increased autonomy for paramedic crews that are specific to a pandemic and consistent with federal and state pandemic plans.

Point of Contact 3 (POC 3)—Tertiary Triage/Management

The POC 3 is the ambulance transport destination e.g., ambulatory care clinic, flu hospital, hospital emergency department, etc. Re-triage will occur at this point, and will be performed by medical and nursing staff and possibly first-aiders. This project did not address triage at POC 3 as clinical pandemic plans for these areas have been developed and these areas are out of the normal purview of the paramedic. It is conceivable, however, that paramedics may be employed at ambulatory care clinics during a pandemic. In such a case, training in the utilization of local protocols will be required and will interface with triage-management personnel from emergency departments and intensive care units. Critical to the ICS and the EOC is that they learn quickly of susceptible patients slipping through the risk communications gap and are arriving at hospital emergency departments. During SARS, the susceptible population, fearing they had been exposed, arrived at hospital emergency departments where the risk of mixing with infectious patients was high. Because the goal intended in every decision, no matter how small or

large, is to prevent transmission, the question that the ICS and health-related EOC will ask is what gaps are in the system that allow the separation of the population to fail?

Protocol Validity Testing

Evaluation of the reliability and validity of this triage-management model can be performed at POC 3. Evidence of rates of re-triage would be used as a measure of triage effectiveness. Re-triage rates may be affected by incorrect triage by the paramedic crew. Additionally, since re-triage at POC 3 would be based on the current case definition, a high level of re-triage may reveal problems with timely situational awareness and other communication deficiencies between the EOC and health service facilities. Re-triage rates should decline over time as sensitivity and specificity improves and surge capacity resources are known and implemented at all levels.

The identified models and tools were tested against an "expert" forum of representatives from university-level, paramedic degree-granting programs, local and interstate EMS services, human services, various emergency management systems, and hospitals to determine face validity, operational credibility, and reproducibility of the potential model.[5] This process was repeated at a national ambulance and public health workshop, and in polling of three Australian State (Queensland, Victoria, South Australia) Senior Paramedic Staff where triage protocol flowcharts were reviewed against current EMS "severe infectious-respiratory disease" protocols and recommendations for improvement were requested. Evaluations showed consistency with pandemic planning principles, soundness related to the epidemiological framework, and acceptability in principle by the EMS system. Further large-scale exercise scenarios are needed where conventional versus pandemic POC triage-management protocols are compared. Finally, actual pandemic monitoring and evaluation are necessary to ensure system-wide understanding, implementation, acceptance, and clinical application. This is relevant especially if research shows that transmission rate, through measurement of the reproductive rate (R_0), are impeded or worsened through execution of the triage-management protocols.

Limitations

This paper describes the development of population-based triage-management protocols to guide emergency medical service triage during pandemic events that can be integrated with current call-taking and dispatch processes and paramedic triage. The resulting instrument has been tested at "expert" forums to determine face validity and functional fidelity, and utility for national implementation. The protocols require modeling to determine their utility in an influenza pandemic and to predict operational implications. A comparison of the marginal costs and system issues is required to determine the implications of the protocols to existing public health surveillance and response systems.

Conclusions

Previous experience has shown that in pandemic events, significant personnel and logistical problems are experienced that places EMS and specifically, emergency medical services practitioners, at great risk. Disease-specific triage-management protocols for pandemics are essential for the prevention of the transmission of a novel virus. In addition, they will guide the subsequent demand on resources that will be inherent in any new outbreak of disease, ensuring that surge capacity resources most benefit those who have an opportunity to survive. Without such protocols, the EMS system is at risk of needless exposure, increased transmission of disease, and the loss of functional capacity. Disease-specific triage-management protocols at two points of contact were developed to identify exposed and infectious populations and separate them from the unexposed but susceptible, general population and optimize the utilization of EMS and surge capacity resources for disposition and care at hospital- and non-hospital-based care facilities. Protocols must include standardized "flu questions" and a Fear and Resiliency Checklist to ensure protection of the susceptible population.

References

1. Verbeek PR, McClelland IW, Silverman AC, *et al*: Loss of paramedic availability in an urban emergency medical services system during a severe acute respiratory syndrome outbreak. *Acad Emerg Med* 2004;11(9):973–978.
2. Silverman AC, Simor A: Toronto emergency medical services and SARS. Letter to the Editor. *Emerging Infectious Diseases* 2004;10(9):1688–1689.
3. Ko PCI, Chen WJ, Ma MH, *et al*: Emergency medical services utilization during an outbreak of severe acute respiratory syndrome (SARS) and the incidence of SARS-associated coronovirus among emergency medical technicians. *Acad Emerg Med* 2004;11(9):903–911.
4. Burkle FM: Mass casualty management of a large-scale bioterrorist event: An epidemiological approach that shapes triage decisions. *Emerg Med Clin North Am* 2002;20:409–430.
5. Tippett V, Archer F, Kelly H, *et al*: The Australian Prehospital pandemic risk perception study and an examination of new public health roles for Services in pandemic response. Australian Centre for Prehospital Research, Queensland Ambulance Service, Brisbane, 2007. Funded by the National Health and Medical Research Council (Grant No. 409973).
6. Bombardt JN, Grotte JH, Schultz DP: *CB Threats to the Corps*. Alexandria, VA: Institute for Defense Analysis paper P-3481. November 1999: 1–53.
7. Lefevre C, Picard P: Collective epidemic processes: A General Modeling Approach to the Final Outcome of SIR Infectious Diseases. In: Mollison D (ed): *Epidemic Models*. Cambridge, United Kingdom: Cambridge University Press; 2000:53–68.
8. Aron JL: Mathematical modeling: The dynamics of infection. In: Nelson KE, Williams CM, Graham NMH (eds.): *Infectious Disease Epidemiology: Theory and Practice* Gaithersburg MD: Aspen Publishers, 2001, p151.
9. Burkle FM: Population-based triage management in response to surge-capacity requirements during a large-scale bioevent disaster. *Acad Emerg Med* 2006;13:1118–1129.
10. Bracha HS, Burkle FM: Utility of fear severity and individual resilience scoring as a surge capacity, triage management tool during large-scale bioevent disasters. *Prehospital Disast Med* 2006;21(5):290–296.
11. Burkle FM, Hsu EB, Loehr M, *et al*: Definition and functions of Health Unified Command and Emergency Operations Centers for large-scale bioevent disasters within the existing ICS. *Disaster Med Public Health Preparedness* 2007;1:135–141.
12. Deng JF, Olowokure B, Kaydos-Daniels SC, *et al*: Severe acute respiratory syndrome (SARS): Knowledge, attitudes, practices and sources of information among physicians answering a SARS fever hotline service. *Public Health* 2006;120:15–19.

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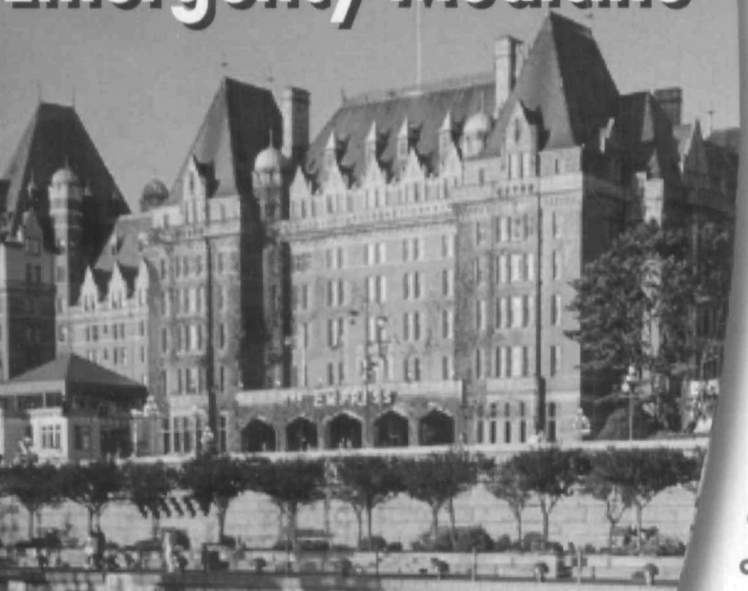

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