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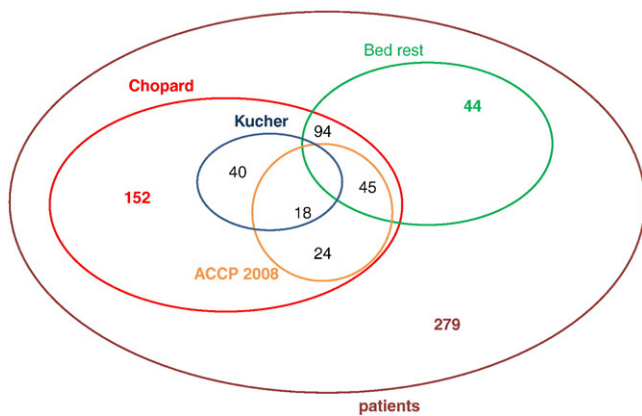


Fig. 1 Percentage and distribution of patients considered at risk by different scores.

prophylaxis in nonsurgical patients, we performed a cross-sectional study by collecting data of 875 patients, hospitalized in 23 internal medicine and 10 emergency medicine units of 21 different institutions of Lazio, Italy. The physicians of the participating units were requested to provide information, filling in a data form, which included for each patient, the items considered by the Chopard and Kucher score systems [1,2] as well as by the recommendations of the ACCP08; in addition, also the single bed rest criterion was considered [3]. Seven hundred forty-two forms (84.8%) contained all the requested information and were included in our analysis. The percentage of patients considered at risk by the 4 methods was markedly different. The Kucher and Chopard score systems, respectively, considered 12% and 55% of our patients at increased risk; intermediate values were found using the ACCP08 criteria (16%) and immobilization (29%). The different percentage and distribution of patients considered at risk by the different systems are well displayed in the Venn diagram (Fig. 1), which shows that the Chopard score comprises all subjects meeting the ACCP08 and Kucher criteria and part of those immobilized.

On the other hand, immobilization only marginally overlaps with the other criteria. The discrepancy of risk evaluation based on score systems and criteria used in the sample can partially account for the wide heterogeneity existing on risk estimation and use of pharmacological prophylaxis in medical patients.

We express our heartfelt thanks to Professor Enrico Bologna.

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doi:10.1016/j.ajem.2011.11.013

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Emergency Medical Services and 9-1-1 pandemic influenza preparedness: a national assessment

To the Editor,

The likelihood of an influenza pandemic places public agencies under pressure to ensure readiness for local outbreaks. Emergency Medical Services (EMS) is a critical infrastructure that needs to be part of preparedness and response planning for a severe pandemic. Legal and regulatory frameworks should recognize prehospital capabilities as lawmakers attempt to facilitate capacity-building collaboration, which is critical to disaster response. The prehospital system's lack of surge capacity has been detailed [1-5], and agencies seek direction regarding preparedness planning from state agencies [6,7]. The goal of this study was to describe state-level EMS and Public Safety Answering Points (PSAPs) (where 9-1-1 calls are answered) pandemic influenza preparedness. These results are especially timely as U.S. policy makers begin to discuss necessary changes to the Pandemic and All-Hazards Preparedness Act [8,9].

During 2008, a cross sectional assessment was administered to public health officials of the 50 U.S. states, 5 territories and the District of Columbia (DC) to determine the extent of state compliance with federally established guidelines for pandemic influenza preparedness [10,11].

Table 1 Criteria used by reviewers in assigning a score to each supporting activity question

Score	Assessed Threshold
0	Response missing or documentation does not address activity
1	Minimal response. Documentation indicates only intention or beginning of planning for activity, or only a part of the activity has been addressed.
2	Substantial, but incomplete, response. Documentation indicates that State has largely addressed activity, but response is not complete or actionable.
3	Complete response. Documentation indicates actionable plan.

States were asked to provide supporting documentation to substantiate each response. Reviewers examined the submitted documentation and assigned a score for each question based on the criteria shown in Table 1. Scoring consisted of an ordinal scale describing the level (or completeness) of response for each state's submitted documents and their appropriateness in supporting the activity addressed. Although these results detail preparedness efforts prior to the 2009 H1N1 pandemic, information collected post-2009 H1N1 indicates that these results are still valid [12]. However, these data fail to characterize 9-1-1 preparedness. Furthermore, the role of EMS in the 2009 H1N1 response was limited to assisting with vaccination efforts [13,14].

Completed assessments were submitted by 52 (93%) and 45 (80.4%) of the EMS and 9-1-1 respondents, respectively. The EMS activities which states most frequently completely addressed (modal score of 3) were having: 1) requirements or recommendations for basic infection control procedures, and 2) effective, reliable interoperable communications system (Table 2). The activity that was most frequently not addressed was defining the role of EMS providers in "treating and releasing" patients without transport to a healthcare facility. Similar results were found by a post 2009 H1N1 assessment which showed that many of the same EMS preparedness elements needed continued attention [12]. Furthermore, published material describing the role of EMS in the 2009 H1N1 response has so far only detailed the use of EMS personnel to assist with vaccination outreach to the population [13,14].

The 9-1-1 activities that states most frequently only minimally addressed included having: 1) a consistent statewide mechanism for communications of updates to PSAPs; 2) a mechanism and protocols in place to coordinate information with PSAPs, and 3) a mechanism to disseminate rapid updates to pandemic influenza symptom set to PSAPs (Table 3). The activity most frequently not addressed was having protocols and procedures in place to guide PSAP triage and patient classification.

Few states had complete or actionable plans defining the role of either EMS or 9-1-1 in pandemic influenza planning. However, more states had developed plans and procedures

defining the role of EMS during an influenza pandemic than for 9-1-1. In addition, there were key elements of all-hazards disaster preparedness without substantial planning. For example, protocols allowing EMS personnel to treat and release patients with conditions not requiring transfer to a healthcare facility were notably absent thus potentially limiting the healthcare system's ability to help prevent surge at medical facilities during a severe pandemic. These findings are consistent with reports demonstrating the need for better integration between EMS and the rest of the healthcare community [15-20].

EMS will play an essential role during a pandemic in many ways, including providing emergency treatment. Previous disease outbreaks have demonstrated that healthcare personnel have an increased risk of contracting respiratory illnesses [21,22] and that aggressive respiratory interventions utilized for common prehospital conditions can further increase the risk of disease transmission [21-24]. Findings that the majority of states had not begun planning to address the isolation and quarantine of EMS professionals (most frequent score of 1) could seriously impact EMS systems. Ensuring EMS workforce health and minimizing health risk is essential to supporting their role in mitigating and responding to an infectious disease outbreak. During the 2003 Severe Acute Respiratory Syndrome (SARS) outbreak, Toronto encountered significant operational problems in providing EMS services when approximately half of the city's prehospital personnel required quarantine [25]. This outbreak also demonstrated that the ability to rapidly provide medically supervised screening of EMS personnel and plan for subsequent quarantine or precautionary symptom surveillance is a vital component of protecting paramedics' health and welfare [25].

The findings that only 13.3% of states had complete or actionable plans involving PSAPs in statewide pandemic planning is consistent with previous reports demonstrating that 9-1-1 authorities have not consistently been included in emergency planning activities, potentially resulting in delaying the full response to an incident [26]. This exclusion, coupled with technological enhancements and a heightened awareness of the public safety benefits of emergency call centers, have led to recommendations that call centers be included in emergency response planning, and that policy-makers enact processes to integrate 9-1-1 with emergency response programs [27]. As 9-1-1 technologies have advanced, many have realized the potential benefit of integrating 9-1-1 into a wider emergency communications safety net. The benefits of which include enhanced situational awareness to coordinate multiple agency operations, thus improving command and control.

Historically, emergency response operations have been adversely impacted by a lack of information sharing and confusion over responsibilities among involved agencies. Furthermore, communication problems can adversely affect patient outcomes, even resulting in death [28]. Effective hazard mitigation often requires a rapid response capability

Table 2 Most Frequent Scores for National EMS Pandemic Influenza Preparedness Elements

Supporting Activities	Most Frequent Score ^a
EMS Planning	
Has the State adopted EMS pandemic influenza plans and operational procedures that define the role of EMS in preparing for, mitigating and responding to pandemic influenza?	1
Has the State established a Statewide program of pre-pandemic training and exercising to prepare EMS personnel for their role in preparing for, mitigating and responding to pandemic influenza?	1
Has the State established a method for developing and distributing pandemic influenza information, including clinical standards, treatment protocols and just-in-time training to local EMS medical directors and EMS agencies?	1
Has the State established methods to integrate best practices or lessons learned during the previous pandemic wave into EMS system operations and to issue an after action report?	1
The Role of EMS in Influenza Surveillance and Mitigation	
Has the State established procedures for involving EMS agencies in ongoing disease surveillance?	1
Has the State identified procedures for involving EMS providers in pandemic influenza community mitigation strategies, including Targeted Layered Containment?	1
Maintaining Continuity of EMS Operations	
Does the State have backup plans to augment the local EMS workforce if needed?	1
Does the State have backup plans to address disruptions in the availability of EMS equipment, supplies and services throughout the State?	1
Does the State have an effective, reliable interoperable communications system among EMS, 9-1-1, emergency management, public safety, public health and health care agencies?	3
Is there a Statewide communications plan, including communications equipment and radio frequency plan to support common hospital diversion and bed capacity situational awareness at the local, State and regional level?	1
Legal Authority	
Has the state established procedures for EMS providers to deviate legally from their established treatment procedures to support mitigation of and response to pandemic influenza and other public health emergencies while still assuring appropriate education, medical oversight and quality assurance?	1
Has the state identified mechanisms to ensure freedom of movement of EMS assets (vehicles, personnel, etc.)?	1
Clinical Standards and Treatment Protocols	
Is there coordinated Statewide medical oversight of EMS pandemic influenza planning, mitigation and response?	1
Has the State developed mechanisms for rapid development, adoption or modification of prehospital clinical standards and triage/ treatment protocols before or during an influenza pandemic that are based upon the most recent scientific information?	1
Has the State defined consistent, system-wide procedures for the rapid distribution of new or modified prehospital EMS treatment and triage protocols before or during an influenza pandemic?	1
Has the State defined a process for providing just-in-time training for EMS agencies, EMS providers, EMS medical directors and PSAPs?	1
Has the State defined the role of EMS providers in “treating and releasing” patients without transporting them to a healthcare facility?	1
EMS Workforce Protection	
Has the State identified strategies to assist local EMS agencies with the protection of the EMS and 9-1-1 workforce and their families during an influenza pandemic?	1
Does the State have requirements or recommendations for EMS agencies for basic infection control procedures?	3
Does the State have system-wide processes for providing vaccines and anti-viral medication to EMS personnel?	2
Have State EMS agencies and public health agencies identified mechanisms to address issues associated with isolation and quarantine of EMS personnel?	1
Has the State defined processes to supplement local EMS agencies in offering support services, including mental health services, to EMS personnel and their families during an influenza pandemic?	1

^a 0 = Response missing or documentation does not address activity. 1 = Documentation indicates only intention or beginning of planning for activity, or activity only partially addressed. 2 = State has largely addressed activity, but response is not complete or actionable. 3 = Documentation indicates actionable plan.

with little room for coordination difficulties [29]. This underscores the need for response agency participation from the early stages of planning, and a clear understanding of the roles and expectations during an incident. This study’s finding that only 13.3% of states had complete plans

delineating the role of 9-1-1 during a pandemic further demonstrates the absence of 9-1-1 from emergency planning.

Many transports to Emergency Departments (EDs) are for non-emergency problems [30-33]. During a pandemic the use of alternate approaches to divert non-emergent patients

Table 3 Most Frequent Scores for National 9-1-1 Pandemic Influenza Preparedness Elements

Supporting Activities	Most Frequent Score ^a
Guiding Principles for Public Safety Answering Points (PSAPs)	
Does the Statewide pandemic influenza plan delineate the role of PSAPs?	0
Are PSAPs involved in Statewide pandemic influenza planning?	0
Does the Statewide pandemic flu plan establish mechanisms for “Just-in-Time” training and education to call-takers and other PSAP personnel?	0
Is there a consistent Statewide mechanism for communications of pandemic flu updates to PSAPs?	1
Does the State pandemic influenza plan establish standardized 9-1-1 protocols that capture symptoms specific to the pandemic?	0
Does the State have established processes for the integration of best practices or lessons learned during the previous pandemic wave across the 9-1-1 system and issue an after action report?	0
Provision of Information to the Public	
Does the State have a mechanism and protocols in place to coordinate quickly the latest public health and other information and messages with PSAPs to assure a coordinated system-wide message?	1
Facilitation of Call Screening	
Does the State pandemic influenza surveillance system incorporate the role of the PSAPs in implementing automated data gathering and data packaging of specific symptoms for purposes of real-time analysis to identify geographic and temporal clusters of symptoms and patients?	0
Does the State have a mechanism established to disseminate rapid updates to pandemic influenza symptom set to PSAPs for caller screening and for data collection/analysis?	1
Are there Statewide policies and procedures and legal protections for sharing pertinent data with State and local public health authorities?	0
Are there Statewide protocols and procedures in place to guide PSAP triage and patient classification during an influenza pandemic?	0
Assistance with Priority Dispatch of Limited EMS	
Is there Statewide legal authority and protocols to allow tiered response of different EMS unit during a pandemic influenza?	0
Does the State pandemic influenza plan establish mechanisms to identify those 9-1-1 callers or patients appropriate for transfer to a secondary triage specialist or alternate call center? Is there coordination between public health, EMS and PSAPs to coordinate this transfer?	0
Education and Training of PSAPs	
Does the State identify PSAP pandemic influenza continuing education and training?	1
Does the State identify methods for pandemic influenza “just in time” training for PSAP personnel and their medical directors that is coordinated with EMS, public safety and public health?	0
Continuity of Operations	
Does the state define isolation and quarantine policies and procedures for PSAPs?	1
Does the state define system-wide processes for vaccinating 9-1-1 personnel, as an element of the critical infrastructure?	0
Does the state identify mechanisms for freedom of movement of PSAP personnel?	0

^a 0 = Response missing or documentation does not address activity. 1 = Documentation indicates only intention or beginning of planning for activity, or activity only partially addressed. 2 = State has largely addressed activity, but response is not complete or actionable. 3 = Documentation indicates actionable plan.

could be utilized. Utilizing a triage and classification system can reduce the number of EMS responses, transports, and ED visits, and without adversely affecting patient outcomes [34]. The implementation of a medically safe and appropriate emergency number triage system will be critical to a state’s ability to reduce the anticipated surge of requests for both prehospital and hospital care during a severe pandemic. Once triaged, a 9-1-1 caller may be directed to varying options for assistance given locally available resources, including instructions for home care; referral to a primary care provider, to community services (e.g., poison control), or to urgent care clinics. Furthermore, a PSAP triage and classification system can effectively guide EMS equipment and transportation resource usage, thereby lessening the

drain on EMS resources during a patient surge [35]. The absence of telephone triage protocols to guide 9-1-1 callers to alternate call centers represents a potentially missed opportunity to consistently and systematically decrease the demand for EMS and ED services during a severe pandemic.

Through this national assessment, the majority of states, territories and D.C. were shown to have incomplete plans defining the role of EMS and 9-1-1 in preparing for, mitigating and responding to an influenza pandemic. More states had plans and procedures defining the role of EMS during an influenza pandemic than defining the role of 9-1-1. Investment in focused preparedness areas ought to promote more comprehensive plans toward specific assessment criteria.

This study presents a conceptual framework for the development, application, and evaluation of EMS and 9-1-1 preparedness measurements at the state-level. Results outline a necessary baseline to help guide the evaluation of overall preparedness and effectiveness to pandemic influenza, and lend credence to continued enhancement of data acquisition capabilities for more detailed assessments in the future. Most important, this study provides the impetus for improved collaboration among public health, emergency management, emergency medical services and 9-1-1 in pandemic influenza outbreaks or other public health emergencies.

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doi:10.1016/j.ajem.2011.11.014

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