

Triage in the health care system during an influenza pandemic: a public health perspective

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The current influenza pandemic confronting our health care system is a challenge for the responsible authorities to manage with an integrated, system-wide approach. As the entire health care system is likely to become overburdened, referrals between different levels of care should be coordinated, guided by the use of triage protocols. This paper discusses the new and important role of triage as a tool for managing patient flow during an influenza pandemic, although the specifics of the various protocols already in use internationally are not analyzed in detail. Certainly, triage is a key clinical tool at the service of public health. [Emergencias 2009;21:376-381]

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Influenza A, initially called swine flu and currently pandemic influenza (H1N1) 2009 by the World Health Organization (WHO), is a viral disease caused by a new strain of Influenza virus type A, subtype H1N1, of swine origin¹. This new variant of the H1N1 strain has originated from a mixture of viral genetic material from an avian strain, two swine strains and a human strain that has mutated. The virus has passed from the pig to humans and is now propagated by contagion from person to person².

The first known cases were detected in March 2009 in the state of Veracruz (Mexico). The first two human cases confirmed by the Center for Disease Control and Prevention (CDC)³ were two children living in the American states of California and San Diego, who became ill on March 28 and 30 respectively⁴, without having had any contact with pigs or travelling to Mexico. The first death occurred in Oaxaca (Mexico) in April; a diabetic woman who died from respiratory complications.

Subsequently, the disease spread through several states of Mexico, USA and Canada and then disseminated globally, through direct contact with people who had travelled to those countries. Currently the disease is present in virtually all parts of the world⁵. The current degree of geographical spread of the disease has meant that, from 11

June, WHO declared alert level six or pandemic level, i.e. a global epidemic⁶. The pandemic level means the appearance of local outbreaks originating without the presence of an infected person from the region of the original outbreak. The declared level does not define the severity of the disease, but rather its geographical extension. The lethality of the disease was initially high, but has reduced due to the use of antiviral treatments.

The first cases of resistance to antivirals have appeared and the evolution of the virus is still unpredictable. The major antigenic changes in the influenza A virus have traditionally produced outbreaks of more severe flu, or global epidemics or pandemics in cycles of ten to fifteen years since the initial 1918 pandemic. Lesser antigenic variations in influenza virus A and B (and even less in C) tend to produce less severe seasonal flu of variable geographic extension.

Morbidity rates in areas affected by influenza A are highly variable, ranging between 10 and 20% of the general population, although in some previous pandemics such as that in 1918-1919 they have reached 30%. The H1N1 strains that have circulated in recent years have been less virulent, causing less severe disease and have only caused epidemics, but not pandemics. The last pandemic of influenza A (subtype H3N2) initiated

in Hong Kong between 1968 and 1969. The WHO incidence rate (22-33%) is based on historical data. Expected attack rates have been scaled down to 20% by some official organisms⁷, although the virus may change its behaviour as we know from our experience of past pandemics. The incidence of seasonal flu is 5-15% depending on the population. Mortality is expected to be similar to that of seasonal influenza (around 0.14%), and hospitalization about 1-2%, more common in young people and vulnerable groups.

Historically, influenza pandemics have produced high rates of mortality and morbidity, as well as causing serious social alterations⁸. The most serious influenza pandemic of the twentieth century was the influenza of 1918-1919 that caused between 40 and 50 million deaths worldwide. Because today's world is highly interconnected and there is a high level of travelling activity, the spread of the virus is expected to be rapid. Therefore, estimates based on existing epidemiological models⁹ suggest that total deaths due to the current pandemic will be between 2 and 7.4 million. It is reasonable to expect that potential consequences include: a) high demand for vaccines, antiviral agents and antibiotics for secondary infections which may lead to difficulties in manufacture and supply, b) overcrowding in health centers because of excess health care demand for influenza and related problems, and c) under-staffing in certain community care services.

To prevent or mitigate these potential consequences, it is essential to reinforce the mechanisms of preparation for dealing with the pandemic, especially if extensive and severe. The WHO has developed technical instructions for prevention and action in these cases¹⁰.

Need for triage in pandemic influenza

The data presented above regarding incidence rates indicate a greater possible impact on society than expected for seasonal influenza, so that the health system should implement plans for managing this situation at the population level and public health level, involving the need for triage¹¹.

Currently the procedures of patient classification are a useful tool for improving the management of patient flows in emergency departments and emergency health systems, in addition to reducing morbidity and mortality of critically ill patients and reducing waiting times thanks to its early identification in hospital or out-of-hospital

services¹². At the pre-hospital level, triage has been more associated with multiple-victim incidents (MVI) and disasters, both with similar general objectives, such as improved management of patient flows and decreased morbidity and mortality of critical patients, all thanks to the adoption of a series of organizational measures and care such as: classification of patients, use of triage cards, on-site stabilization of critical patients as far as possible, transfer to an appropriate health center, and distribution of patients between health centers.

The concept of triage can and should be applied in a pandemic situation, since there could be imbalance between resources and needs, leading to decisions that seek benefits for the whole population and not only for the individual, as happens in MVI and disasters. As in the well studied case of terrorist attacks, overtriage may increase mortality¹³, since too many resources may be used for some patients who do not need them to the detriment of the rest, in the case of pandemic influenza this could be repeated. That is why triage protocols should be adapted to different stages of the pandemic, and in this case would also have other effects such as avoidance of the spread of the virus, overcrowding of health centers with non-severe patients and contamination of health facilities with the virus, as well as decreasing morbidity and mortality of critically ill patients.

To achieve these objectives, we need joint and coordinated collaboration between all the health structures, in our country mainly the primary care system, the emergency outpatient and hospital emergency systems. The public health departments of each autonomous community and the Ministry of Health play a fundamental role in the coordination of these three elements. The Ministry of Health establishes the premises of this coordination as: a) healthcare needs of the population, b) maximum home management of cases and c) referral according to unique, well-defined criteria.

Patient flow and triage

In a pandemic situation, patient flows to the health system will follow a pattern characterized by progressive increase of healthcare demands at the three levels outlined above. This increased demand will follow the pattern of the epidemic curve as it evolves. The three levels of care must act jointly to holistically manage this "Massive in-

flux of casualties," a term taken from disaster medicine, to avoid spread of the virus and unnecessary hospital admissions so that each patient is treated at the level of care commensurate with their severity and/or clinical complexity.

Since the health services may be overwhelmed by the influenza pandemic, it is necessary to implement triage systems at each level of healthcare to support uniform decision making by all the professionals involved. These triage algorithms should take into account certain aspects: a) clinical case definition, b) risk factors for being classified as a "case" as necessary; c) clinical risk factors, d) procedures for the use of personal protective gear by health professionals; e) protocolized transfer of potentially infected patients; f) criteria for hospitalization or home treatment; g) hospital isolation areas.

The advantages of implementing triage systems include consistency in decision making amongst all professionals, control of cases, control of the transmissibility of the virus and decreased mortality of critical patients, among others. This latter aspect is not only due to the correct identification of potentially severe cases, but also because correct patient selection of non-severe cases optimizes the use of health resources.

If these triage protocols are not established and adapted to each level of care, spontaneous overtriage is probable in the context of social alarm and massive influx of patients with any symptoms or signs of discomfort. This may produce increased mortality of critically ill patients, as demonstrated in the case of IMV, because the opportunity cost of having to meet all the demands for healthcare tends to exhaust the resources available. The best weapon available to our health system to combat all this is to establish coordinated emergency centres, which would play a prominent role in telephone management of non-urgent cases, and the primary care network - probably the main door to the health system for most patients^{14,15}. One of the key objectives would be to get the highest possible number of cases controlled and treated at home. This would improve the overall system response in two major respects: 1) hospital resources would be reserved for patients who really need them; and 2) on keeping affected patients in their homes, contagion of the rest of the population and especially health facilities would be minimized.

Another positive aspect of establishing emergency centres as the first point of contact of the patient with the health system is that the transfer of possibly infected patients would be made using

medical transport, thus avoiding the use of private or public vehicles and further transmission of the virus.

The categories of triage in a pandemic can be adapted to the characteristics of each society and health system, although specific categories have been published for these cases - called SEIRV triage, which classifies patients as follows¹⁶:

- Susceptible: susceptible but not exposed.
- Exposed: exposed but not infectious.
- Infectious: those infected.
- Removed: by death or recovery.
- Vaccinated: protected by vaccination or prophylactic medication.

Therefore, one of the key steps of triage is to decide what type of attention the patient should receive. This will depend largely on how patients access the healthcare system. Ideally, this should be through the emergency health telephone number, to avoid overburdening other care services, or through the primary care network. It is therefore important that a powerful campaign be previously launched for citizens on the rational use of health resources during an influenza pandemic. The coordinating centre will decide, based on telephone triage protocols, the type of resource by the patient according to their clinical picture. If there is strong suspicion of influenza but the patient has no severe signs or symptoms, home attention by the primary care team or emergency teams in order to minimize the possibility of transmission of the virus to the population. In severe cases, the patients would be assessed by advanced life support units (ALSU) like any other critical patient, although protective gear, contaminated waste management protocols and vehicle decontamination would also be necessary. A strategy to take into consideration is to create specific ALSU for severe influenza patients, although this would only apply to the worst possible epidemiological situation, and would probably only be feasible in large urban centres with multiple cases to justify such resource allocation. This strategy would also reduce the spread of the virus amongst the staff of the emergency services and reduce the number of professionals in contact with the virus as well as increasing their expertise in the use of protective gear and decontamination techniques.

Patients requiring transfer to hospital without medical attention should be transferred in basic life support units complying with the protocols indicated for the management of waste and use of protective gear, or specially created units. In the outbreak of Severe Acute Respiratory Syndrome

(SARS) in Taipei in 2003, specific units were created for the transfer of affected patients¹⁷.

To date, many triage guidelines have been published, each with their criteria of severity and/or referral of certain patients¹⁸, adapted to local circumstances but with a similar rationale: a) determine the probability that the patient is infected with influenza virus, b) determine the type of health resource type required by the patient; c) assess the possibility of home treatment and follow up d) assess the criteria for hospital admission and e) establish the criteria for intensive hospital care.

With regard to hospital management of a mass influx of patients, the objective is to avoid overcrowding of the emergency services (good telephone triage and primary care attention, along with informing the public, would be the key elements), hospital wards and intensive care units. The emergency department should have its specific protocol of triage for patients with influenza. This protocol must be agreed with the primary care teams, because certain patients who go directly to the ED do not require hospital treatment, and therefore may be referred to their primary care facility or to home monitoring teams. The main purpose of triage in hospital emergency departments would be to determine which patients require admission or observation in hospital for several hours, besides identifying those patients whose life is at risk and require admission to the intensive care unit (ICU). The referral of mild cases to other services will improve the attention given to hospitalized patients. Ultimately, ED management of patients will largely determine the workload of the other hospital departments¹⁹.

But triage does not stop in the ED. It is hypothetically possible that a high percentage of influenza patients with complications require respiratory support in the ICU. There may be a deficit of resources (ventilators) and excess demand, which introduces an important concept from disaster medicine - resources may be overwhelmed by needs. It is therefore equally important that, once the ED triage protocol refers a patient to the ICU for respiratory therapy, ICU staff must determine who should receive respiratory support not simply on the basis of the usual clinical criteria, but also, taking into account the lack of resources (in this case ventilators), which of these patients have a real chance of survival. The Utah Department of Health (USA) has developed a triage protocol which includes inclusion and exclusion criteria for the use of respiratory support in the ICU during an influenza pandemic²⁰.

Triage points

A key aspect of triage in case of an influenza pandemic with multiple victims is the place where triage is performed. It should be remembered that one of the objectives of the health system is to avoid the spread of the virus, especially in health centres. Telephone triage avoids the risk of transmission to health staff. However, a large number of patients will probably visit their health centres or hospital EDs. In these centres, those with clinically suspected influenza must be identified at the entrance where the triage area should be established to separate them from the rest, with separate waiting areas²¹. They should not mix at any point in the chain of care. Some guidelines recommend a separation of at least 3 meters between patients with flu symptoms and the rest, besides providing surgical masks to suspect patients²².

Figure 1 shows patient flows between the different structures created in the event of an influenza pandemic and the points where triage is necessary.

Although not reflected in the figure, it is important that each point of attention report to the coordinating centre on their ability to respond to the demand for care, as the use of resources and level of overcrowding can evolve over time and therefore modify triage protocols depending on the new situations that arise.

Aspects to take into account

This paper has outlined some of the measures that can prevent transmission of the virus in the community (home care, use of the emergency system and first contact with the health system, health transport etc.). Certain other considerations should be taken into account. It is essential that the people have accurate and appropriate information on the disease, including knowledge about initial signs and symptoms, measures to prevent transmission, the use of health resources and knowledge on detecting signs and symptoms of alarm. To this end the Health authorities must inform the population before the start of the epidemic wave, and have previously performed studies on perception and attitude to the disease²³, all of which will determine the content of the information programs.

Concerning the impact of the pandemic on health personnel, this sector represents one of the main risk groups because of their contact with the

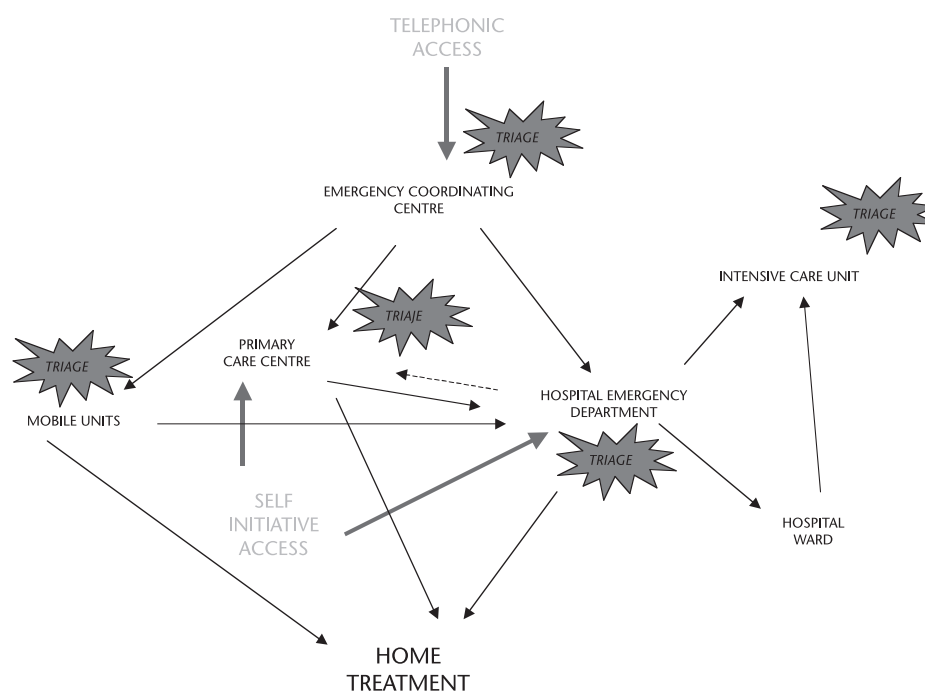


Figure 1. Patient flows.

disease. To prevent transmission to health personnel, there are protocols on the correct use of protective gear²⁴. It is important that they be developed in consensus, but also that training in their use be implemented in all healthcare workers who may have to use such protection²⁵.

Because health personnel constitute a key to our response, it is essential that appropriate safety measures are adopted to avoid absenteeism due to infection^{26,27}. In the case of the SARS outbreak in Taipei¹⁵, approximately half of all ED personnel were exposed to the virus and required home isolation, which meant a significant decline of human resources in the emergency system, and this fact is therefore a logistic aspect to be into account by the health authorities.

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Sistema sanitario y *triaje* ante una pandemia de gripe: un enfoque desde la salud pública

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La actual situación de pandemia gripal a la que se enfrenta nuestro sistema sanitario supone todo un reto que debe de ser gestionado de una manera integral por parte de los responsables sanitarios. Debido a una más que probable saturación del sistema sanitario a todos los niveles, es necesario instaurar protocolos de *triaje* coordinados entre los distintos niveles asistenciales. En este artículo se presenta como novedad el importante papel que puede tener el *triaje* como una herramienta al servicio de los profesionales sanitarios para gestionar los flujos de pacientes que se producirán debido a la pandemia gripal, sin entrar a analizar los distintos protocolos de *triaje* que ya se manejan a nivel internacional. En definitiva, se da al *triaje* una importancia relevante en cuanto a su papel como herramienta clínica al servicio de la salud pública. [*Emergencias* 2009;21:376-381]

Palabras clave: *Triage*. Pandemias. Desastres.