

Pandemic Influenza Planning for the Mental Health Security of Survivors of Mass Deaths

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Abstract Influenza A pandemics have been documented to occur at 10- to 50-year intervals—an average of three events per century, dating back from the 16th century. Each recorded pandemic has resulted in an increase in annual mortality rates in the infected population, with mass deaths in one pandemic wave equalling fatalities sustained over six months of an epidemic season. This chapter aims to rectify the oversight in pandemic preparedness plans by presenting a compendium of guidelines and recommendations by international health organisations, pandemic fatality experts, and experienced mass death management professionals. Its objective is to have available a mass fatality framework to complement the WHO Pandemic Influenza Preparedness and Response (2009) guideline, from which individual national pandemic preparedness plans are based. It is written in a format that incorporates WHO's emphasis on finding the ethical balance between human rights and successful plan implementation; the assimilation of national pandemic plans with existing national emergency measures; and the 'whole group' system of engaging individuals, families, localities, and business establishments in the process. This chapter is also written such that it can be made applicable to analogous infectious disease outbreaks such as SARS and Ebola, as well as comparable mass fatality events.

Keywords Influenza · Pandemics · Fatalities

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1 Introduction

1.1 *Pandemic Influenza*

Influenza A pandemics have been documented to occur at 10- to 50-year intervals—an average of three events per century, dating back from the 16th century (Kasowski 2011; Taubenberger 2006; WHO 2005). Each recorded pandemic has resulted in an increase in annual mortality rates in the infected population, with mass deaths in one pandemic wave equalling fatalities sustained over six months of an epidemic season (Hardin 2009).

The three pandemics in the 20th century occurred in 1918, 1957, and 1968. The latter two have been estimated to have resulted in increased deaths totalling up to four million in people in at-risk groups worldwide, while the former resulted in the mass deaths of approximately 40 million in the otherwise healthy groups (Hardin 2009; Kasowski 2011; Taubenberger 2006; WHO 2005). The 1918 pandemic remains the most fatal pandemic in history; a novel influenza subtype of equivalent virulence is anticipated to result in deaths in approximately 2 % of the current global population (Ibid).

There has so far been one pandemic this 21st century, caused by the H1N1 influenza subtype in 2009. Although its attack rate was characterised as mild, it nonetheless resulted in the global deaths of up to 575,400 people who would not have otherwise perished at that time (Dawood 2012). Approximately 80 % of the fatalities were in populations younger than those who generally deace during influenza epidemics, and the burden was most pronounced in the poorer African and Southeast Asian countries (Ibid).

In 1999, WHO published a guidance on pandemic influenza preparedness as a framework for WHO member-nations, in their attempts to develop a plan against the risk of the occurrence of an influenza pandemic, and to introduce the six phases in the declaration of a pandemic (WHO 2005). In 2005, improvements to the guidance were incorporated in keeping with the International Health Regulations (IHR). In 2009, further revisions were made to consolidate developments that have transpired since the enactment of the 2005 framework (WHO 2009). Pertinent to this discourse is the revision accentuating the prevailing of ethical principles when finding a balance between human rights and successful pandemic plan implementation.

Upholding ethical principles include respecting both the dead and the bereaved throughout the course of the event (Morgan 2006, 2009); handling and disposing of bodies in a dignified manner; and respecting cultural and religious conventions (Ibid). Further, it encompasses the acknowledgement of the diversified vulnerabilities and capabilities of individuals and groups, so that nobody experiences marginalisation and disavowal of support (SPHERE 2004). Vulnerabilities may be physical, such as: gender; age; physical or mental impairment; and HIV/AIDS status. They may also be social, including: ethnicity; religious affiliation; political leanings; and residency status (Ibid).

1.2 Mental Health of Survivors of Mass Deaths

Published literature in psychology suggests that disasters can induce mental illnesses among survivors (Bonanno 2010; Gibbs 2003). The most often affiliated mental health illness in disasters is posttraumatic stress disorder (PTSD). However, several individual symptoms, as well as syndromes, have also been associated with the trauma, albeit not given a specific name (Ibid).

Some research promote that the amount of trauma sustained in a disaster is directly proportional to the severity of the psychological illness. Others assert, on the other hand, that ancillary factors may also contribute to mental health risks. These may include the specific context with which the survivor identifies with the disaster; the emotional and physical distance an individual has from the situation; and the quality and accessibility of the support available (Ibid). Further, there are those who argue that PTSD may be overly estimated; while other, less characterised, symptoms are under-estimated (Bonanno 2010). This dubiousness in the literature has been attributed to the difficulty encountered in assessing psychological consequences sustained in disasters, because of the chaotic nature of the event; and because of the methodological impediments to psychoanalysis (Ibid). To provide a more cohesive portrait of 'typical' mental health illnesses following a disaster, George Bonanno and colleagues (Bonanno 2010) compiled data from high quality research and summarised their findings in five categories.

The first category relates to the severity of mental illness brought on by disaster. It was determined that, although consequences of trauma from disasters may range from grief and PTSD to depression and suicidal tendencies, more extreme presentations of the disease have only been observed in a small number of cases. In adults, this accounts for only 30 % of all subjects studied. In youths, acute symptoms in the initial aftermath tend to be severe; however, chronic symptoms tend to be more similar in the adults, not exceeding 30 %. The second category pertains to differences in psychological outcomes and resilience. It is suggested that some survivors overcome the traumas within two years post-disaster; while the more resilient only experience transient symptoms and recover fairly quickly. The Third refers to the factors relating to outcomes, already alluded to above, and theorises that there is no single predictor of outcome. This is because individuals have different risk factors for mental health illness, as well as varied mechanisms for coping with trauma. The penultimate category specifies the risk to interpersonal and community relationships. It acknowledges that, although some affiliations are made stronger by shared traumatic experiences, several indicators suggest that most relationships actually do not survive the experience. Incidentally, the status of their post-traumatic interpersonal relationships also influences their coping mechanisms. Finally, in examining the mental health effects to populations located at a distance from the disaster scene, it has been determined that transient grief may be experienced by these individuals; however, psychological disorders may only be recognisable in those with prior experience in disasters, including those who lost loved ones under similar circumstances (Bonanno 2010).

Lastly, literature suggests that the emotional and psychological traumas among survivors of multiple deaths are compounded when the bodies of their loved ones are not processed with care; this is true irrespective of the age, race, or nationality of the deceased (Gibbs 2003; Morgan 2006). Poorly managed deaths therefore, present a perceivable global mental health risk.

However, despite the globally acknowledged increase in deaths due to infection with novel Influenza A subtypes, and all that is recognised about risks to mental health security in mass fatalities, pandemic preparedness plans remain disproportionately focused on preventing the manifestation of a pandemic and on mitigating morbidities and mortalities, rather than equally addressing mass fatality management preparedness plans.

Mass fatality management preparedness planning is paramount in any influenza pandemic preparedness plan if business continuity is to be expediently achieved, and survivor grief and psychological trauma can be mitigated through the honourable and respectful handling of the remains of the dead.

1.3 Aims and Objectives

This chapter aims to rectify the oversight in pandemic preparedness plans by presenting a compendium of guidelines and recommendations by international health organisations; pandemic fatality experts; and experienced mass death management professionals. Its objective is to have available a mass fatality framework to complement the 2009 WHO Pandemic Influenza Preparedness and Response guideline, from which individual national pandemic preparedness plans are based. It is written in a format that incorporates WHO's emphasis on the assimilation of national pandemic plans with existing national emergency measures; the 'whole group' system of engaging individuals, families, localities, and business establishments in the process; and on finding the ethical balance between human rights and successful plan implementation.

Sources for the guidelines include:

1. Hardin and Ahrens (2009) (Hardin hereafter) authored a chapter specific to influenza pandemic mass fatality management. It delineates the facts from the myths and provides a guideline for mass fatality planning.
2. The Integrated Regional Information Networks (2012) (IRIN), whose purposes are to promote the understanding of regional affairs; to advocate competent humanitarian response; and to advance knowledge-based media reporting.
3. The Metro Boston Department of Homeland Security '*Managing Mass Fatalities Seminar Summary Report*' (2011) (Homeland hereafter). This report focused on the lessons learned by multiple sectors, based on their experiences with mass fatality response.
4. Oliver Morgan's '*Management of Dead Bodies after Disasters: A field Manual for First Responders,*' (2009) (Morgan henceforth) whose aims are to advocate

decent and respectful dead body management; and to increase the likelihood of a successful victim identification.

5. The Sphere project: humanitarian charter and minimum standards in humanitarian response (SPHERE hereafter). It developed the ‘universal minimum standards’ in humanitarian aid, based on the cumulative experiences of disaster teams and agencies.
6. The UK Home Office ‘Guidance on dealing with fatalities in emergencies’ (Home Office henceforward). This is a joint publication of the UK Home Office and Cabinet Office, from which was based the London 2010 Olympics pandemic plan, the most successful Olympics yet.

This chapter is written such that it can be made applicable to analogous infectious disease outbreaks such as SARS and Ebola, as well as comparable mass fatality events.

2 Mass Fatality Management Planning

Mass fatality is defined as an event where the number of the dead exceeds available local capacities for appropriate management of human remains (Morgan 2006; Ralph 2015). They may ensue from natural or man-made disasters, or infectious disease pandemics. Mass fatality management planning is highly relevant because of the psychological effects improper handling of dead bodies can have on the survivors (Ibid); and because initial stages of fatality management will determine the final outcome in the unequivocal identification of dead bodies, and the subsequent return of their remains to the rightful relatives (Ibid). The survivors’ utmost desire, in disasters, is to unequivocally ascertain the circumstances of their missing loved ones (Morgan 2009). However, this desire may run contra-parallel to the disaster teams’ priority—mitigating further consequences of the event (Ibid). A balance between practicality and empathy would therefore, need to be established.

Formulating preparedness plans is made difficult by the necessity of predicting scenarios for which the plans can be rationally devised. Undoubtedly, human imagination will fail to predict every possible scenario, and the disaster that eventually unfolds will be one too unbelievable to conceptualise. Nonetheless, it is imperative that certain assumptions are made, if only to provide planners with a point of reference. When developing pandemic plans, Hardin and Ahrens (2009) suggest five assumptions that would be invaluable. They are:

1. The local community would need to be able to support itself, particularly during a pandemic, when similar events are simultaneously occurring elsewhere, and aid will tend to be diffused.
2. Funeral homes will be rapidly overwhelmed.
3. Resourcefulness will be needed in acquiring inventory essential for body management.

4. Funeral and memorial practices may need to be altered to ensure the expeditious processing of bodies.
5. Friends and family from near and far will be desperate for information.

2.1 Planning Essentials

2.1.1 Coordination

Chaos is the immediate aftermath of a disaster (Morgan 2009). Therefore, a coordinated plan put into operation as soon as practicable will be invaluable in managing the disaster area. It is likely that local emergency personnel will be first at the scene, and will already have coordinated disaster plans in operation (Ibid). However, it is important to note that stakeholders, leadership structure and operational procedures in pandemic planning may differ from these and other mass fatality plans (Hardin 2009; Morgan 2009). Hence, it is essential that:

- (a) A comprehensive list of stakeholders is included in the plan. These may include:
 1. Emergency management teams
 2. Public Health authorities
 3. Medical and veterinary teams
 4. Medical examiners and coroners
 5. Police
 6. Death registry
 7. Funeral directors
 8. Cemetery and crematorium administrators
 9. Legal professionals
 10. Religious officials and community support groups
 11. Schools
 12. Social well-being advisers
 13. Mental health professionals
- (b) Establish a structure of leadership, with absolute authority ascribed to the entity presiding over the management of the dead.
A flowchart with names, responsibilities and emergency contact numbers will be beneficial.
- (c) Specify each stakeholder's duties and responsibilities. Provide timelines and benchmarks for the successful completion of each task.
- (d) Coordinate resources. A system of real-time stock-taking will be beneficial in the sharing and distribution of essential goods and services.
Stipulate how reimbursement for the use of shared resources will be managed, including realistic timelines for monetary disbursement.

- (e) Coordinate with regional and national fatality management plans. Their resources and expertise will be of considerable value, particularly in matters relating to funeral homes, mass communication, logistics, and national and international jurisprudence and aid.
- (f) Coordinate with international aid organisations. They have the experience, expertise and resources to respond on short notice.

2.1.2 Stockpiling of Resources

Coordinating resources beforehand (in 1(d) above) should prevent stockpiling of necessities with shortened expiration dates that may later go to waste. It is suggested that funeral directors have stock in circulation that is proportionate to a six-month supply for standard operations, the assumed length of the first pandemic wave. It is necessary to note that (Hardin 2009; IRIN 2012; Morgan 2009):

- (a) Embalming fluids tend to have a protracted shelf life.
- (b) Affordable caskets will be in great demand, particularly in instances when death occurs in more than one family member.
- (c) Cremations will require large amounts of fuel.

2.1.3 Information Management

Copious amounts of information are compiled on the dead and missing, regardless of the size of the disaster. Appropriate management of all information will require human and technical expertise, which may be beyond the capabilities of local communities. Regional authorities are more likely to have trained personnel and modernistic technologies, and may therefore, be best placed to take the lead in information management (Homeland 2011; Morgan 2009).

Mass media are indispensable in communicating with a wide audience during a disaster, and both amateur and seasoned journalists will be among the first at the scene. However, the content of the information they provide as well as the manner in which they dispense their knowledge of the scene may induce stress and anxiety among the survivors. Therefore, it is paramount that members of the press be given every possible opportunity to communicate responsibly and to the best of their abilities (Homeland 2011; Morgan 2009: 19).

Effective information management reduces stress and anxiety among survivors, and augments efforts in successfully recovering remains and identifying the dead. Listed below are the matters that need to be considered (Homeland 2011; Morgan 2009):

(a) Coordinating Information

1. Information hubs need a local and regional presence and should be established in the first instance.
2. Determine who would need to be informed, and what the best method of communication would be, to ensure that information reaches as much of the appropriate target groups as possible.
3. Local centres are best for collecting and providing information on the dead and the missing, and for relaying information on the immediate needs of the grieved.
4. Impose upon humanitarian and aid agencies since they will have first-hand knowledge of the state of the scene, and the kind of support the survivors will need.
5. All information needs to be centralised and synchronised for accuracy, and for promoting the successful tracking of the dead and missing.

(b) The information

1. Foremost is the protection of the privacy of those afflicted and their families.
2. Take advantage of already established methods of gathering information (e.g. surveillance networks; automatic alert systems). Ascertain whether expanding the scope of these systems will be beneficial and can be implemented rapidly.
3. Use a template that covers all the essential information, and that could easily be updated. This would include what is being done; what is known; what is yet to be determined; and where further information will be provided when they become available.
4. An informed decision needs to be taken on when it would be appropriate to report the number of dead, missing and displaced. Too soon, and the numbers are likely to be grossly inaccurate; too late, and the media could be disposed towards exaggeration.
5. Information on the system of search and rescue, and body retrieval, identification, interment and disposal must be provided.
6. Photographs and other identifying information should only be released to the media if it has been determined that doing so would enhance the identification process.

(c) The media

1. Designate a representative with whom the media may liaise.
2. Install an office specific for media relations, preferably as close to the scene as possible.
3. Provide journalists with accurate, confirmable, and up-to-date information as close to real time as practicable, to advance factual reporting and mitigate rumour-mongering. This may be facilitated through regular press briefings or short interviews.

4. Social media is a double-edged sword. Knowledge will be available immediately and in real-time; however, the material will tend to be unedited and prone to bias. If not managed appropriately, it may disrupt fatality plans already in progress.
- (d) The public
1. Determine the most appropriate method of providing information to different age groups and social, cultural and economic strata, to avoid marginalisation.
 2. Circulate concise information on what procedures need to be adhered to, immediately following a disaster.
 3. Vigilance in social media trends is essential.
- (e) The survivors
1. Impress upon survivors that help is available. Enumerate what support can and cannot be provided, and where they need to go to receive the specific aid they need.
 2. Provide an emergency contact number strictly for the relatives of the missing and the dead.
 3. Provide specific information on where relatives need to go and what documents they would need to bring, to facilitate the efficient and expeditious management of enquiries.
 4. Specify the process for procuring a death certificate, so that they may be able to make legal and funeral arrangements.
- (f) The humanitarians
1. Ensure that humanitarian and aid agencies are provided with accurate information, particularly in regard to the risks from dead bodies, and that they themselves are sharing accurate information to those at the scene.
 2. Relief agencies such as the International Committee of the Red Cross may be able to help trace missing persons, if given sufficient information.
- (g) The dead bodies
1. Standard pro forma containing basic information should be completed for all bodies.
 2. In the absence of an electronic system of data-gathering, hand-written forms may be used. However, extreme care would be needed in writing and in the subsequent transfer onto an electronic format.
 3. All manner of original forms must be readily available, should data confirmation be necessary.
 4. All items of a personal nature, including photographs, may be included in the database.
 5. All information must be accompanied by a chain-of-custody.

2.1.4 Death Management

(a) Death surveillance

In the early stages of a pandemic, scientific intelligence gathered through already established surveillance systems would need to be rapidly apprised of the nature of the virus and the manner of death, through the investigation of the index case. It is recommended that the role of investigator be entrusted to the jurisdictional medical examiner or coroner (ME/c) in two capacities (Hardin 2009):

1. Limited jurisdiction over the dead body in cases when:

- (i) Death fits the profile for an emerging disease that needs laboratory confirmation from body fluids and tissues.
- (ii) Death of a poultry worker from influenza-like illness (ILI).
- (iii) Death from ILI of family members or contacts of poultry workers.
- (iv) Death due to recent travel to a country where pandemic flu strain is circulating.
- (v) First death case in a hospital, requiring tissue samples for virus characterisation.

2. Unconditional jurisdiction in cases when:

- (i) There is no listed attending physician.
- (ii) The deceased is unknown and decedents have not been found.
- (iii) Sudden deaths and fatalities uncharacteristic of those due to a flu virus.
- (iv) Death of incarcerated persons.
- (v) It is essential to public health.

(b) Search for the missing

Death from pandemic influenza generally occurs at home or in group care facilities. In the event that an exceedingly virulent pandemic strain also kills its victims with haste, more will be unable to seek hospital admissions prior to death (Hardin 2009). This would result in the saturation of capacities of care facilities and emergency services, and the delayed determination of death. The delay would greatly impact the efficient management of dead bodies (Hardin 2009; Morgan 2009; Ralph 2015; Home Office 2006). The plan to manage this surge, at the scene of death and in the community, should include:

1. At the scene (Home Office 2006)v

- (i) Procedures to locate the missing and presumed dead.
- (ii) Numbering and photographing the dead (or body parts for non-intact bodies).
- (iii) A mechanism for immediate confirmation of death by ME/c.
Existing laws may need to broaden the stipulations on who has legal powers to pronounce death.

- (iv) Record the date, time and place of death, as well as the testifier's name and contact information, and their affiliated organisation's name and address.

2. In the community (Hardin 2009)

- (i) Designate a phone number for the missing persons' hub where inquiries can be made about the well-being of certain individuals. This hub must be interfaced with hospital and healthcare centre systems of admissions and discharges, and with ME/cand death registry logs.
- (ii) There must be a system for the regular advertisement of the hub number in several mass media formats.
- (iii) It is essential that the hub's database be unrestrictedly shared with the police and emergency missing persons' divisions.

(c) Recovery and transport of bodies

Dead body management begins when the remains of the deceased are being recovered (Morgan 2009). Recovery commences immediately after searching of the scene has been completed (Ralph 2015). It could last for days or weeks, but may be protracted in more severe disasters (Morgan 2009). Its priority is the rapid location and retrieval of bodies or body parts, and the deceased's personal effects. Speed in recovery aids in identifying the dead; reducing the psychological impact on survivors; and diminishing the distress often associated with the image and odour of death (IRIN 2012; Morgan 2009).

The recovery scene is often chaotic and uncoordinated because there is an abundance of groups and individuals trying to help, including locals; aid agencies; and military and civilian search and rescue operatives (Morgan 2009). In order that body recovery does not impede the simultaneous assistance offered to survivors, the following should be considered (Hardin 2009; Home Office 2006; Morgan 2009):

1. Identify the strictures resulting from the immediate surge in numbers of dead bodies.
2. A balance is needed between speed of recovery and thorough documentation.
3. Appropriate body recovery procedures:
 - (i) Use of photographic equipment and standard documentation materials such as body tags with unique references. Documenting the exact place and date of recovery would augment the identification process.
 - (ii) Impermeable body bags are ideal for recovery, and double-bagging is preferential; however, sheets of any material may be used if nothing else is at hand. Each body part must be collected in separate bags and no attempts must be made to match them at the scene.

- (iii) Personal items ought not to be separated from the owner, and all documentation must remain with the body.
- (iv) Establish two teams: one to take bodies to a holding area prior to delivery; the other to deliver them for either immediate identification or temporary storage for subsequent identification.
- (v) The holding area will have rapid turn-over. Hence, it is best situated within close proximity of the scene; preferably stretched across the inner scene cordon.

The holding area is a private and secured space where documents can be cross-checked and evaluated for completeness. At no point must this area be used as a mortuary; a facility for victim identification; or as a temporary storage facility.

- (vi) Transport can be achieved by using the body bags or sheets with which they are covered, or by trucks and trailers; however under no circumstances must ambulances be used, as the living are best served by them.
4. Disaster areas may be hazardous. It is paramount that recovery teams not be exposed to undue risks in performing already stress-filled tasks. Risk assessments are requisite and basic health and safety measures must be in place (Home Office 2006; Morgan 2009).
- (i) Ventilate enclosed spaces before attempting recovery.
 - (ii) At the minimum, protective clothing would include disposable bio-hazard suits; sturdy boots and durable gloves. Face masks may be provided, if only to alleviate anxiety from odours and from fear of aerosol infections.
 - (iii) Personnel need appropriate training in donning, doffing and decontaminating protective equipment.
 - (iv) A mechanism of hand-washing, disinfection and decontamination should be available.
 - (v) First Aid and emergency treatments will be needed on-site.
 - (vi) The need for vaccination and prophylaxis would have to be evaluated.

(d) Temporary storage and interment

Mass fatalities are expected to overwhelm local surge capacities which will invariably result in delays in victim identification. Further identification delays can result from the logistics of assembling a forensics team, which can take weeks; and from natural decomposition. Places in hot climates are especially vulnerable to decomposition, resulting in bodies becoming unrecognisable within 12–48 h.

To maximise every opportunity of successfully identifying bodies, temporary storage facilities are compulsory. These can be in the form of cold storage or transitory interment (Hardin 2009; IRIN 2012; Morgan 2009; SPHERE 2004). It is imperative that bodies or body parts are stored in the bags or sheets in which they were recovered and that their associated unique identifying tags are

written on water-impermeable labels, rather than on the bodies or bags themselves (Ibid).

1. Cold storage

- (i) Refrigeration from 2 to 4 °C will slow decomposition for a maximum of 6 months.
- (ii) Types to consider:
 - 1. Chilled shipping crates have the capacity to hold approximately 50 bodies.
 - 2. Air-conditioned trucks can store as many as 30 bodies without the need to build shelving units.
 - 3. Refrigerated lockers or warehouses may be used.
- (iii) Storage facilities require:
 - 1. A means of controlling temperature and biohazards.
 - 2. A mechanism for containing biohazards.
 - 3. Suitable water supply.
 - 4. Proper lighting.
 - 5. Work and rest areas for staff.
 - 6. A system of communicating with trace and emergency operations.
 - 7. Shelving units that: are capable of carrying several bodies securely; allow for ergonomic shifting of bodies; and can be efficiently decontaminated at a later time.
 - 8. Thorough records of every stored body or body part.
- (iv) Shortage of refrigerated storage at the scene is to be expected. Establish a back-up plan until more coolers become available.
- (v) Dry ice may be used in the interim
 - 1. Overlaying dead bodies with dry ice creates forensic artefacts, and should therefore, be avoided.
Instead around small groups of bodies, construct a wall of dry ice approximately 0.5 m in height, and secured with durable plastic sheeting.
 - 2. Ventilate areas where dry ice is in use.
- (vi) The use of ice is impractical and problematic.
 - 1. A large inventory is required, particularly in instances when rapid melting occurs.
 - 2. Melted run-offs may pose concerns about diarrheal infections.
 - 3. Appropriate disposal of ice water will complicate management plans.
 - 4. Water may distort bodies and destroy personal properties.

2. Interment is the burial of bodies underground when there are no other alternatives, and when temporary storage is needed for longer periods.
 - (i) Efficient disinterment will be aided by proper grave construction.
 1. Use a familiar and protected plot of land.
 2. Bury bodies individually if at all possible. Otherwise, use trenches.
 3. Local practices may dictate how bodies are positioned (e.g.: facing Mecca).
 4. Burials should only have one level; be at least 1.5 m in depth; and have parallel spaces 0.4 m in between bodies.
 5. Bottoms of graves with less than 5 occupants should be at least 1.2 m away from ground water. This space should be increased to at least 1.5 m if buried in sand, and at least 2 m if many more bodies are interred.
 6. Tag each body, and record their positions above the grave. Use of GPS systems will be invaluable.
 - (ii) Selecting burial sites
 1. Assess soil characteristics, height of water table, and available tracts of land.
 2. Situate in land acceptable to local communities.
 3. Establish in areas easily accessible to mourners.
 4. Sites should be at a distance of at least 10 m from developed land, and 200 m from sources of water, depending on local topographical conditions.
 - (iii) Unceremonious burial in mass graves does not satisfy any public health interests; is socially unacceptable; and may waste inventory.
 - (iv) Avoid rushed and unmannerly cremations.
 - (v) It is disrespectful to gather the dead using backhoes, diggers, or bulldozers.
 - (vi) SPHERE international standards mandate that:
 1. Bodies are disposed of with dignity
 2. Cultural and religious practices be honoured
 3. Public Health practices be upheld.
 - (vii) Where burial is inconceivable due to frozen tracts of land or lack of solid ground, it may be necessary to store bodies for the duration of a pandemic wave.
 - (viii) Survivors are more likely to spread infectious diseases than dead bodies, except in cases where diarrheal diseases and haemorrhagic fevers are indicated.

1. Tuberculosis, Hepatitis B and C, and diarrhoeal diseases can survive for up to 2 days in dead bodies.
2. HIV may survive for up to 6 days.

2.1.5 Identification and Death Certification

Establishing the identity of the deceased is the second major function of incident response teams, following search and recovery, and is generally the responsibility of the ME/c (Ralph 2015). Identification is accomplished by making a match between the information collected about the deceased, and the information documented on the missing and presumed dead (Morgan 2009). The sooner a positive ID is accomplished, the better for the relatives waiting to bury their dead and to go through the legal procedures (Ibid).

Visual identification through decedent recognition or photography is the most basic method of identification (Home Office 2006; Morgan 2009; Ralph 2015). However, mistaken identity is common with this practice, particularly when the dead is soiled or already decomposed (Ibid). Further, viewing multiple dead bodies may have psychological effects on the witness, thereby diminishing the legitimacy of the identification. Errors in identification cause embarrassment to all involved; distress to the relatives; and difficulties with legal issues (Morgan 2009). Therefore, forensic methods would also need to be employed. The success of forensic identification is enhanced by the initiative and diligence of the death management team (Ibid).

(a) Morgue operations

Identification is carried out in the morgue, where the cause and manner of death are also determined. The ME/c determines where the incident morgue is eventually established (Hardin 2009; Home Office 2006; Ralph 2015); it may be that a temporary facility is constructed, or that an already existing structure is expanded to accommodate the surge (Ibid). The benefits and drawbacks of each type of facility would need to be judiciously considered (Ibid).

1. Things to consider:

- (i) Determine how soon temporary mortuaries can be commissioned for use, compared to how quickly expanded space in already built mortuaries can be made available in disasters.
- (ii) Commissioning time will have a direct impact on body recovery, storage, and transport.
- (iii) Temporary facilities need to be operational as soon as 24 h post-disaster.
- (iv) The use of previously functional morgues may mean that storage already contain bodies; hence, surge capacity will be unknown until such time as the disaster occurs.
- (v) The disaster scene will be instrumental in determining the necessity of constructing temporary facilities. Information on the projected

number of afflicted; the disposition of the dead; and the estimated time of recovering their remains, all need to be considered.

- (vi) In the event that a pandemic is caused by a CBRN attack, the mortuary will be fundamental in criminal investigations; hence, standard operating procedures must be such that substantiation does not fail under legal scrutiny.
2. Mortuaries may comprise of several stations, grouped according to specialities. These may include:
 - (i) Admitting area
 - (ii) Photography and videography
 - (iii) Radiography
 - (iv) Personal Effects
 - (v) Anthropology
 - (vi) Forensics
 - (vii) Odontology
 - (viii) Fingerprinting
 - (ix) Pathology
 - (x) Repository
 - (xi) Transport
 - (xii) Embalming
 3. Categories for a positive identification
 - (i) Primary—only one of these is necessary
 1. Fingerprints.
 2. Dental.
 3. DNA.
 4. Unique identifiers such as serial numbered artificial limbs and implants.
 - (ii) Secondary—two or three are needed
 1. Personal accessories such as jewelry, driver’s licence, or identity card.
 2. Bespoke apparel.
 3. Tattoos, scars, birthmarks or physical deformities.
 4. X-ray detailing limb fracture history or active tumours.
 5. Blood and tissue type.
 - (iii) Visual—Prudence is vital
 1. Photography.
 2. Basic description of physical features, such as race; height; and eye and hair colour.
 3. Location when found.
 4. Clothing when discovered.

4. Autopsies are not needed to confirm death caused by influenza. However, if they are performed, some guidelines apply:
 - (i) In the interests of public health, respiratory tract and tissue samples for laboratory analyses may be collected.
 - (ii) Liaising with public health laboratories on the current guidelines for collecting and transporting influenza specimens will save time and effort.
 - (iii) Next-of-kin will generally need to give permission for the autopsy to be performed in a hospital.
 - (iv) ME/cs do not need permission if the autopsy is within their remit.
5. Release of bodies to relatives
 - (i) Release dead bodies only when a definitive identification has been made.
 - (ii) Expedited release may be necessary where cultural or religious customs are indicated.
 - (iii) Some laws stipulate who has the authority to perform this task.
 - (iv) The name and contact details of the claimants need to be collected and filed along with other documents associated with the body.
 - (v) Unidentified bodies, foreign nationals, undocumented migrants, and homeless persons need to be stored or interred for further identification at a later time.
 - (vi) Release of bodies with missing parts may later impede the management of severed body parts. To minimise complications, family members' wishes regarding future identification of other body parts should be documented. Choices may include:
 1. To postpone body release until all body parts have been found.
 2. To proceed with the funeral but be apprised of other parts that are later found.
 3. To proceed with the funeral and consider the matter closed.
 - (vi) A death certificate is provided with the release of the body.
6. Death certificates
 - (i) The death certificate is a legal document; hence, the law stipulates the signatory on the certificate.
 - (ii) The document specifies the cause and manner of death; where death occurred; when it was pronounced; and the name and contact details of the signatory.
 - (iii) In pandemics, it is essential that hospitals and care facilities assign this task to specific individuals in order to mitigate chaos.
 - (iv) Funeral directors with policies against collecting bodies unaccompanied by a certificate of death need to allow for flexibility during pandemics.

1. This should be addressed in the planning stages.
2. All stakeholders must be in agreement.

(b) Funeral homes and crematory operations

Funeral directors are responsible for the recovery and transport of dead bodies; preservation of the integrity of the chain-of-custody; and assistance in disposal of the remains. Although they are not qualified grief counsellors, they are nonetheless tasked with conversing with individuals on the most discomfiting day of their lives. This therefore, also makes them the best people to facilitate the return of the dead to their bereaved relatives (Homeland 2011).

Once a body has been released to the decedents, it is generally their responsibility to contact the funeral director of their choosing, for the transport of bodies to funeral homes and the subsequent burial or cremation, according to their culture or religious beliefs (Hardin 2009; Homeland 2011; IRIN 2012; Morgan 2009; SPHERE 2004).

Pandemics could result in funeral homes overseeing 6 months' worth of dead bodies within a 6–8 week period (Hardin 2009; Homeland 2011; IRIN 2012; Morgan 2009). Therefore, it may be prudent for individual funeral homes to plan for employing more trained personnel who can be available on short notice (Ibid).

1. Transport of dead bodies

- (i) Funeral directors will be responding to requests from families to transport bodies to funeral homes, and from ME/cs to provide conveyance to mortuaries or storage facilities. Plans for the inclusion of more licensed funeral directors and transport services is therefore essential.
- (ii) Safeguard lawful body transport by ensuring that funeral home personnel are licensed and trained in recovery and transport, and that their vehicles are approved and registered for carrying dead bodies.

2. Burial or Cremation

- (i) Burials are more practicable in disasters, because they enable future identification of persons yet unknown.
- (ii) It is not good practice to cremate the remains of unidentified bodies.
 1. There is no public health benefit in cremating those who die of influenza.
 2. Cremation will not allow identification in future.
- (iii) Cremating one body takes 4 h and produces 3 to 6 pounds of ash and partially incinerated body parts; thereby, creating logistical difficulties when the number of bodies rapidly mount.

- (a) The feasibility of continuous running of furnaces need to be determined, particularly in residential areas.
 - (b) If licensing laws are in place, they may need to be lifted.
3. Embalming
 - (i) To be performed only when requested by families who would rather not have their dead cremated.
 - (ii) Expediting the process may be necessary.
 4. Death registration
 - (i) Funeral directors are normally responsible for registering deaths, after receipt of a death certificate.
 - (ii) Funeral directors collect demographic information from family members, prior to registration with a vital statistics office.
 - (iii) Electronic submission of both death certificate and registration would be well-placed during a pandemic.
- (c) Waste disposal
1. Flush liquid waste per standard practice, without the need for pre-treatment.
 2. Consult the jurisdictional wastewater treatment facility before dumping large volumes of liquid waste down the drain.
 3. Dispose of solid waste in biohazard containers for subsequent incineration.

2.1.6 Family Support and Assistance

Family Assistance is one of the most sensitive undertaking in mass fatality management. Family Assistance Centers (FAC) are generally established near mass fatality scenes, where survivors can congregate to wait to hear about the status of their missing, and to receive much-needed support (Homeland 2011; Morgan 2009; Ralph 2015). FACs are secure, private, and multi-sectorial, so that all the support and assistance needed can be provided under one facility (Ibid). Things to be considered in establishing FACs include:

1. Function of FAC
 - (i) To provide families with information on their missing and dead.
 - (ii) To provide shelter from media intrusion and from the newsmongers.
 - (iii) To enable investigators and ME/cs to gather information from families about the missing and the deceased.
2. Facilities
 - (i) Situate FACs near the disaster scene, where ingress and egress can easily flow.
 - (ii) Avoid locating FACs near the morgue.

- (iii) Ensure the area is secure and private.
- (iv) It needs to be accessible for 24 h within the first 3 days, after which it can be scaled down to operate for 14–16 h a day.
- (v) Anticipate approximately 10 kinsperson for every victim and plan accordingly.
- (vi) Multiple FACs may be necessary, but movement of families from one area to another must be avoided; instead, FAC personnel should go to where the survivors are situated.
- (vii) Facilities must be scalable.

3. Support and assistance

- (i) Prioritising the needs of the vulnerable.
- (ii) Personal and private meetings with family members as soon as practicable to initiate the collection of ante mortem information for the mortuary.
- (iii) System for reporting and providing information on the missing.
- (iv) Emotional and psycho-social support for survivors befitting their needs, culture, and the context of the disaster.
- (v) Systematic, up-to-the-minute information on the missing and the dead. Families ought to be the first informed of the status of their loved ones.
- (vi) Realistic timeframes for searching for the missing, and recovering and identifying of the dead.
- (vii) Opportunities for survivors to view their dead.
- (viii) Presence of religious leaders who could help survivors understand and reconcile their beliefs with the processes of body recovery and identification.
- (ix) Prioritise the needs of vulnerable groups.
- (x) Reunification of displaced minors with their family as much as practicable.
- (xi) Material and financial support for funerals.
- (xii) Legal assistance
- (xiii) Translators for foreign language speakers.

4. Agencies and Staffing

- (i) Each support agency within FACs needs a command post; a separate area for staff preparation and duty operation; and the capability to deploy staff to FAC.
- (ii) The nature of the disaster will determine which agencies are involved. Frequently in force are family assistance services; mental health assistance; and child agencies.
- (iii) Aid agencies and faith groups may be present.
- (iv) FAC staff must be vetted.
- (v) Flexibility is essential in order to accommodate the changing needs of the families as time progresses.

3 Conclusions

Based on the history of influenza A pandemics, this century may be due for, at most, two more pandemics. If even one of them is as deadly as that of 1918, then approximately 2 % of the global population will die. However, even if the future 21st century pandemics are atypically mild as that of 2009, still many more people will die than normally would.

The WHO provided a framework for influenza pandemic preparedness planning. However, its focus is skewed towards the prevention of the event from happening, and a bit remiss on planning for the management of the surge in deaths. Having a fatality management plan incorporated in pandemic plans is relevant because mishandling of dead bodies is a mental health risk for their loved ones.

Mass fatalities may ensue from natural or man-made disasters, or infectious disease pandemics. Regardless of how they may transpire, conflict will invariably come to pass between the fatality management team, and the surviving relatives of the missing and the dead. Conflict is inevitable, because each group contextualises the event from different perspectives; fatality management personnel perceive the event as something that needs immediate oversight, in order that they may mitigate further calamitous consequences; survivors, on the other hand, are more single-minded in their overwhelming desire to determine the circumstances of their missing loved ones (Morgan 2009). However fatality management ultimately eventuates, respect; sympathy; and caring are due the dead and their relatives throughout the event (Ibid).

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