

PUBLIC HEALTH FOR MASS GATHERINGS: KEY CONSIDERATIONS



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The steering group and chapter leads were chosen in order to cover the range of specializations included in the document, and because of their experience in planning for and participating in public health at MGs.

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INTRODUCTION

This document provides an update to the Communicable disease alert and response for mass gatherings: key considerations, June 2008. This new version builds on the expertise gained across the global mass gathering (MG) community since this was published. It has also been expanded to cover more than communicable diseases and includes new areas such as legacy, environmental health and different contexts such as unplanned mass gatherings (MGs).

Legacy has been included here as a key element of the planning for MGs. Leaving a viable public health legacy and sustainable improvements in the health infrastructure and capacity should be a key aim of those involved with preparing for any MG. Legacy can include improvements in the health systems in the host country, improvements in health behaviours, and ability to deliver future MGs. It is important that the legacy planning is seen as equal to other areas of planning and both political will and the associated funding should be used to achieve this.

The document was conceived as a resource to support all those responsible for the

health needs of individuals attending a MG, and to help them plan their actions. The principles and practices outlined in the document may also provide valuable initial guidance to those involved in planning other aspects of the management of MGs.

The Global Capacity Alert and Response Department (GCAR) of the World Health Organization (WHO) and the network of the WHO Collaborating Centres for Mass Gatherings increasingly provide expertise, support and resources to those planning MGs. This document has been produced to help address these requests, and to provide support to all those involved in the health aspects of planning for MGs, not just those directly employed in the health services.

This document draws on experiences from past MGs that suggest certain common critical factors and preconditions for success, as well as strategic, organizational, and tactical “lessons learned” that can be applied to future gatherings.

Development of this document

This document has been produced as a collaborative project across the network of WHO Collaborating Centres for Mass Gatherings with experts from across the WHO Virtual Interdisciplinary Advisory Group (VIAG). The work was led by a small steering group from WHO and Public Health England as the lead Collaborating Centre.

The steering group and chapter leads were chosen in order to cover the range of specializations included in the document, and because of their experience in planning for and participating in public health at MGs. They are listed in the acknowledgements.

The document will be reviewed after five years, in 2020, taking into account any feedback that has been received in the interim. The structure and content of the document will be reassessed at that time, and any modifications required will be carried out by the steering group in consultation with other relevant experts. A revised version of the document will then be issued.

Background

The decision to host a MG will usually be made well in advance by the key agencies involved, in order to make effective prior planning possible. Such planning is of paramount importance, and addressing public health prevention and response is one of the most important aspects.

MGs are characterized by the concentration of people at a specific location for a specific purpose over a set period of time and which has the potential to strain the planning and response resources of the country or community. The definition is purposefully not linked to the size of the gathering or the number of people (although this obviously has an impact on the assessment of associated risks) because each community has a different capacity to manage crowds of people, with some systems, for example, airports or market places, managing upwards of 100,000 people on a daily basis with minimal difficulties.

Planning and preparing public health systems and services for managing a MG is a complex procedure: advanced risk

assessment and system enhancement are critical to identifying potential public health risks, both natural and manmade, and to preventing, minimizing and responding to public health emergencies.

MGs can place a strain on the local health care system; even the most prepared of events may experience a disaster, which can overwhelm local healthcare systems and their ability to provide an adequate emergency response.

Health services are generally designed to meet routine priorities and demands, and have limited capacity to expand. MGs may put a strain on these systems and so require strengthening of existing services and potentially the introduction of new or enhanced methods for managing disease and other public health risks. These can include surveillance methods, 'Standard Operational Procedures (SOPs), and establishment of a public health response command and coordination structure within and between public health sectors.

About this document

Aim

This document presents the key issues to be considered in the process of setting up and implementing public health alert, response and operational plans for MGs. It sets out methods for assessing the needs of the MG, determining the ability of existing systems to meet those needs, and modifying and strengthening those systems where required. It provides advice about prevention, detection and management of public health incidents, as well as the integration of the full range of public health activities into the MG planning process. It addresses the many different types of MG, provides case studies of the work undertaken for public health activities

at various MGs, and supporting papers and additional resources to support the information here.

This document has been developed primarily for public health professionals, as well as key policy makers, planners and executive personnel. In addition to those in the health sector, there are many outside authorities involved in contributing to healthy outcomes at MGs, who will also find this document useful. It is further anticipated that it will be a valuable resource for event promoters and managers, emergency service personnel, government bodies, and any organizations or individuals who contribute to the organization of MGs.

Wide distribution should be encouraged, providing it is understood that while many factors influence the wellbeing of those attending MGs, the detailed contents of this document are directed principally at managing public health issues that influence health and safety at a MG.

Applicability and scope

This document describes issues specifically relevant to those planning public health activities for a MG. However, there are many other programmes and agencies, within and outside public health, likely to be affected by the unique factors associated with a MG.

This document is designed to:

- Provide a framework for a hosting government or organization to assess its current public health capacities with respect to a MG, and to determine whether enhancements of public health services are required
- Ensure that the activities of those planning for MGs are based on and meet the requirements of the IHR (2005) for enhancing global health security and preventing and responding to international spread of disease – which apply to many public health issues in the context of MGs
- Provide considerations to be taken into account when establishing plans and structures for managing incidents that may threaten health security
- Encourage public health leads and key policy and decision-makers to consult with other agencies and organizations throughout the planning process for MGs
- Provide planning resources to assist nations in improving health protection, preparedness planning, prevention, prompt detection, characterization, and containment and control of public health threats.

This document addresses a wide array of key considerations, irrespective of the size, nature and complexity of the MG in question. Therefore, depending on these factors, certain sections may have greater or lesser applicability.

This document does not provide prescriptive recommendations for MGs, because of their diverse nature, the different issues they pose, as well as the varying capacities of different services available to meet the increased public health needs they impose. Instead, it gives an overview of the topics to take into consideration, together with a wide range of resources that can provide the practical details needed to adapt systems for MG.

Member states intending to host MG should consult the IHR (2005), and must ensure that their planning activities align with the revised regulations.

SECTION 1



Chapter 1 – Event context and risk assessments

KEY CONSIDERATIONS

- In order to inform all planning and delivery activities it is essential to understand the MG context and risk assessments
- Identify and understand the characteristics that make each MG a unique event; the event additionality, and what measures need to be put in place to address these for both changes to the public health risk and delivery of the event
- Use risk assessment and risk management to guide preparedness planning and facilitate a successful MG and the long term legacy. Specific information and examples of how this can be applied is included in all the following technical chapters.

INTRODUCTION

The extent to which public health and other sectors may need to be altered or developed for the MG depends largely on the type of event, the risk assessment, and the resources available to support the needs of the participants and host country population. This information determines the event planning and delivery.

In most contexts, preparation for MGs will probably require substantial investment and capacity building for a range of identified risks. Preparation should start early and include detailed planning of policies, procedures and co-ordinated involvement of health resource planners, public health providers, and emergency services, including local hospital emergency departments.

Risk assessment for MGs is undertaken to enable the public health authorities to identify and assess the generic characteristics of a MG which introduce or enhance particular threats. Risk assessment for a MG includes the evaluation of the potential public health impacts of the MG e.g. potential for

infection, disease, death, and chronic illness or injury and the systems and processes required to successfully deliver the event.

The MG difference

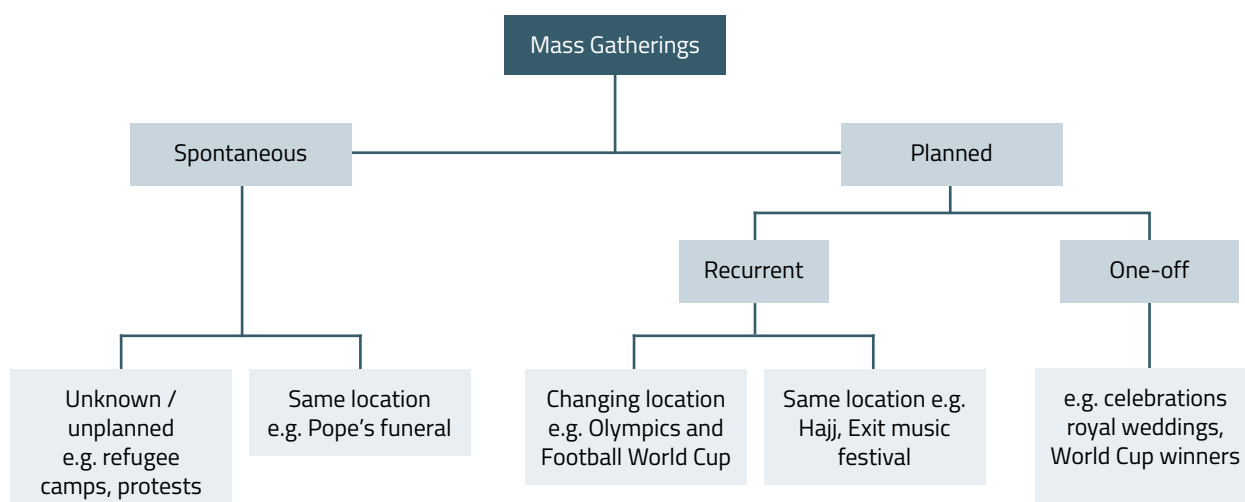
Planning for MGs is largely driven by the type of event 'context' and the risk assessment. There are many potential risks, big and small, foreseeable and unforeseeable that may develop immediately before, during, or after an event. It is challenging to tackle them all, especially since there are limited resources such as trained personnel, equipment, supplies, services, and funding; therefore it is critical to determine the greatest risks.

Organizers determining the consequences of any particular threat should take into account not only the public health concerns but other reputational, political or other factors that contribute to the success or failure of MGs.

Reducing public health risks and ensuring people's safety at MGs requires thorough planning and coordination and public health authorities need to know what to look for. This can be conceptualized in three steps:

- **Risk assessment:** What might happen, and how likely is it to happen?
- **Surveillance:** How will we know when it happens? See chapter 9
- **Response:** What will we do when it happens? See chapter 9.

The planning and risk assessment will be informed by the type of event:



Planned MGs can largely be summarized into four types:

- Sporting events e.g. Olympic and Paralympic Games, Super Bowl
- Cultural events e.g. music festivals, fairs
- Religious events e.g. pilgrimages
- Political events e.g. rallies and protests.

Spontaneous MGs, by their nature are more difficult to plan for, however experience with planned MGs can be transferable and enable these to be managed better. More information on these is in chapter 18.

GUIDING PRINCIPLES AND BEST PRACTICE

The international community has developed an international standard as a generic approach to risk management, international standard ISO/DIS 31000. This consists of a framework of essential components to help ensure that risk is managed effectively and coherently. Within the process of risk management is risk assessment; the overall process of risk identification, risk analysis, and risk evaluation. www.iso.org/iso/home/standards/iso31000.htm

Identify any risks that may enhance, prevent, degrade or delay the MG, including whether or not their source is under control. Critically this must be comprehensive, because a risk that is not identified will not be included in further analysis. As a result of each risk assessment, mitigation measures will be planned and implemented. Details on the specific risks mitigating measures are dealt with in the subject matter chapters in section 2.

Identifying what might happen is the fundamental risk assessment for the MG. It is built on *four questions*:

- *What are the existing health risks in the host country (and will they be*

affected, for better or worse, by the MG)?

This looks at what public health issues routinely arise in the host country that need acute public health interventions. These might include food poisoning, vaccine preventable diseases, meningitis or infectious respiratory illness and vector-borne disease, all of which routinely occur in most countries and will occur in the host country during the MG.

- *What health risks might be imported during the MG?*

Many MGs are international and involve significantly more international travel to the host country than would normally happen. This raises the possibility that health risks, especially communicable diseases, will be brought into the host country. This will depend on the nature and number of participants and visitors and the countries from which they travel, as well as the normal travel pattern to the host country. The immunity profile of the host population will also need to be considered.

Case study: Serogroup A meningococcal disease at the Hajj

The Hajj, an annual religious celebration, attracts millions of pilgrims. During the 1980s, a number of large outbreaks of Serogroup A meningococcal disease were identified among Hajj pilgrims. Planners assessed the risk of outbreaks in subsequent Hajj gatherings to be substantial, since few pilgrims would have immunity to this disease, and most would remain vulnerable during the crowded conditions associated with the Hajj.

Planners managed the risk of Serogroup A meningococcal disease by requiring all pilgrims to subsequent Hajj celebrations to be vaccinated against meningococcal disease, and for pilgrims from sub-Saharan Africa to take clearance antibiotics. Large outbreaks of Serogroup A meningococcal disease were averted, although Serogroup W135 meningococcal disease did emerge in subsequent years.

- *What health risks might be exported from the host country after the MG?*

Need to consider the possibility that health risks endemic to the host country will be exported when travellers return to their own country. This is particularly an issue for vaccine preventable diseases where people travel to the MG from countries where diseases (such as measles) have been eliminated, but those diseases are still prevalent in the event host country.

- *Are there particular risks from terrorism?*

The perceived risk from terrorism and in particular from terrorism related to chemical, biological or radiological threats varies greatly in different countries. Public health planners need to understand the risks, or perceived risks, to their event. See chapter 15 for more information.

Risk assessments need input from all stakeholders involved in planning health measures, including the international

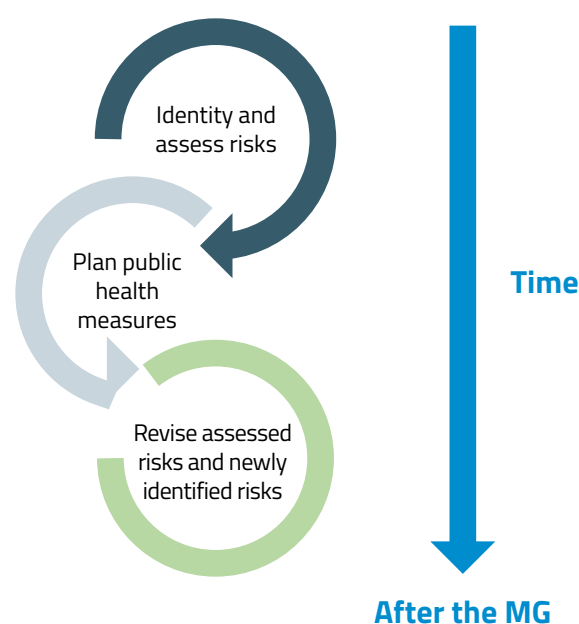
community, and often from those outside the health sector as well.

Each responsible authority should contribute and collaborate on the risk assessment of other areas. Likewise, these need to be shared across agencies in case they have an impact on the on-going risk assessment process. It is important to involve other organizations and understand their different roles, for example:

- Public health agencies are responsible for preventing or minimizing the risk of injury or illness and maximizing safety for participants, spectators, event staff and volunteers, and residents
- Law enforcement agencies are responsible for ensuring law and order and preventing criminal and terrorist activity
- Event organizers are responsible for ensuring that an event is successfully held and they may also have financial obligations to meet.

RISK ASSESSMENTS - PRACTICAL SUGGESTIONS AND IMPLICATIONS

Risk assessment is a key element in prioritizing planning. It is a continuous process that should occur throughout the period leading up to the MG and during the event, starting from the initial concept of the MG and stopping only after the event has finished and local systems have returned to 'normal' (Figure 1). It should include on-going assessments of how the public health system, the health care system and the broader community will cope or are coping with increases in public health risks related to the MG and can indicate both what and how much intervention is needed. The risk assessment process should be documented and available for later review.



*Figure 1
Steps of risk assessment*

Risk assessments must be regularly reviewed to ensure appropriate and adequate responses. Even well-established and well-organized MGs can turn negative. For example, the 2007 Chicago Marathon in the United States was cancelled mid-race due to unseasonably high temperatures and an inability to guarantee the safety of the 36,000 runners participating.

Public health needs will be determined on the basis of the results of the **strategic risk assessment** for the MG. This is undertaken before the event and requires a thorough examination of potential threats: a threat assessment (including those that seem very unlikely) and a set of standardized questions which help identify the risks to different groups.

In addition to strategic risk assessments a system for **case-based rapid risk assessment** will be required if a significant health event is detected, from the initial alert throughout the duration of response. If an outbreak occurs, and once its aetiology is known, further refinement of the risk assessment may be required.

Strategic risk assessment

This identifies health risks and determines realistic goals for reducing their impact.

MGs may cause an increase in the level of existing risks, or they may pose entirely new risks. The public health risk should be identified and assessed in relation to how the MG will affect the probability of these diseases occurring and spreading in:

- The host nation,
- Nations bordering the host nation, and
- Home nations of participants.

Risk assessment can be broken down into the following steps:

- Identification
- Characterization - evaluation of risks
- Management - decisions on precaution(s).

In a MG the risks may be amplified by a wide range of factors including the venue,

locally endemic diseases, the strength of local surveillance systems, the origin of participants, or the intention of groups to deliberately target the event.

In addition to the public health risks it is important to also undertake an analysis of strengths and vulnerabilities in existing health systems, including:

- Surveillance and response: the system's ability to rapidly detect and implement appropriate and commensurate measures to contain / minimize the impact on health; the system's ability to maintain a state of alertness for prolonged periods of time, including through false alarms, fatigue; the system's surge capacity
- Medical services: the local hospital system and its ability to manage an increased number of patients and if necessary to rapidly reach a surge operations in case of an emergency
- Food and water safety: the ability of local infrastructure to ensure safe preparation and delivery of food and water to attendees of MGs.

Risk identification

This is the process of identifying known or potential hazards for the MG. This should include:

- context - type of event
- demographics - participants and / or spectators, both host country and visitors
- normal incidence of public health risks in the host community, including communicable diseases
- environmental factors such as location, access and temperature
- potential importation and / or exportation of communicable diseases
- event additionality required for host country systems / processes
- political and / or media interest.

This process can draw on many sources of information including:

- information from previous MG

- international agencies and public health experts
- scientific literature.

For each of the identified risks the characteristics of the risk and how this can be mitigated against need to be understood.

Context - Event assessment

The event assessment examines the characteristics of the MG that enhance or introduce risks to public health. See table 1.

Table 1: Examples of MG event assessment characteristics

MG features		
Type	Sporting event	▪ Energetic, potentially emotionally aggressive mood. Risks of injuries and violence. Risk of cardiovascular events
	Religious event	▪ Higher risk of participants with existing medical conditions which may increase the need for on-site medical care
	Cultural event	▪ Risk of alcohol and drug use ▪ Risk of sexually transmitted infections ▪ Risk of dehydration, hyperthermia, hypothermia
	Political event	▪ Energetic and potentially aggressive moods ▪ Risk of demonstrations or riots, injuries
Activity level	Seated	▪ Risk of collapse if infrastructure inadequate to support attendees
	Standing	▪ Risk of injuries, fatigue
	Mobile	▪ Risk of injuries, crushes
Duration	≤ 24 hours	▪ Lack or decrease of perceived vulnerability by participants ▪ Lack of preparations by participants, health systems due to shorter duration
	1 day – week	▪ Lack or decrease of perceived vulnerability by participants ▪ Lack of preparations by participants, health systems due to shorter duration
	1 month	▪ Higher risk of communicable disease ▪ Increased duration of strain on public health system
	> 1 month	▪ Higher risk of communicable disease ▪ Extended strain on public health systems due to need to function at surge capacity for the whole period
Occurrence	Recurrent	▪ Excessive reliance on previously used systems ▪ Inflexible health systems
	Single	▪ Inadequate health systems ▪ Lack of planning

Environmental factors		
Season	Summer	▪ Risk of dehydration, heat stroke/hyperthermia
	Winter	▪ Risk of hypothermia ▪ Risk of injuries with snow or ice ▪ Potential for damage to infrastructure
	Wet	▪ Drowning, flood-related injuries ▪ Waterborne disease ▪ Potential increase in vector-borne and waterborne diseases ▪ Loss of property, damage to infrastructure
	Dry	▪ Risk of dehydration, waterborne disease ▪ Risk of allergies ▪ Risk of fires, decreased air quality
Participant characteristics		
Participant origins	National	▪ Complacency/low perceived vulnerability with health risks ▪ Potentially low immunity for imported infectious diseases
	International	▪ Risk of importation/exportation of disease ▪ Risk of delayed access to healthcare due to unfamiliarity with healthcare system ▪ Risk of delayed detection of pathogens by inexperienced healthcare system ▪ Risk of environmental risks for those not acclimatized such as heat or cold, altitude, pollution ▪ Communicable disease for unvaccinated or vulnerable travellers to endemic pathogens and parasites ▪ Unknown immunity of participants
Density of participants	High density	▪ Risk of communicable disease ▪ Risk of mass casualty event
Participants health status	Elderly or chronically ill	▪ Risk of non-communicable disease ▪ May require higher levels of health services
	Disabled	▪ Local infrastructure may not be adequate ▪ Will need special care ▪ Emergency preparedness requires planning
Venue characteristics		
Venue	Indoor	▪ Poor air circulation
	Outdoor	▪ Potential for inadequate sanitation, food and water preparations
	Contained venue (fenced)	▪ Overcrowding ▪ Spread of infectious diseases
	Uncontained venue	▪ Difficulty locating services near attendees due to geographic spread
	Rural	▪ Increased distance to health services, particularly advanced level care ▪ Increased potential for contact with animals and insects
	Temporary	▪ May lack infrastructure for safe food and water delivery ▪ May lack infrastructure for emergency medical services ▪ May lack financial capacity to create infrastructure necessary for a safe and successful MG
	Permanent	▪ Infrastructure may be aged or failing ▪ Infrastructure may need upgrading in order to comply with current standards (e.g. accessibility or fire codes)

Alcohol sold	Yes	▪ Risk of injuries, including alcohol poisoning ▪ Risk of drunk driving, property damage ▪ Risk of violence
Likely drug use	Yes	▪ Risk of injuries ▪ Risk of overdose ▪ Risk of poisoning due to consumption of unknown, counterfeit or low-quality drugs
Level of medical services at the venues	First aid stations	▪ May provide some basic medical care ▪ Triage services ▪ Potential contact point for higher level medical support services
	On-site Medical posts	▪ May provide some basic medical care ▪ Triage services ▪ Potential contact point for higher level medical support services
	On-site hospitals for participants	▪ Easy proximity to higher level medical support services ▪ Increased number of healthcare providers
Catering See chapter 12	Professional catering	▪ Lower risk of food-borne illness ▪ Improved food security
	Informal	▪ Increased risk of food-borne illness
	Self-catering	▪ Increased risk of food-borne illness
Hygiene / Sanitation services See chapter 11	None	▪ Increased risk of infectious disease, including respiratory and diarrhoeal diseases ▪ Lack of hand washing facilities ▪ Lack of toilets ▪ Increased risk of open defecation
	Hand washing stations	▪ Decreased risk of infectious disease ▪ May include alcohol-based disinfectants
	Latrines: temporary	▪ Improved sanitation and waste disposal
	Latrines: permanent	▪ Preferable to temporary latrines ▪ Requires more infrastructure than temporary latrines for construction and maintenance

Host country context assessment

This is the assessment of the public health and systems to manage the MG and the risk profile of the hosting country or community.

It should take into account, amongst other issues:

- Systems: are the normal systems fit for purpose for the MG? Are enhancements or changes required for surveillance, testing, reporting, response and command, control and communication systems; internally and across stakeholders?
- Training: will there be different working arrangements and roles and responsibilities?
- Population factors: what is the immunity profiles of hosts and visitors, susceptibility profiles, risk of importation?
- Baseline status of communicable diseases: what are the common communicable diseases in the host country and their normal levels of

occurrence, and which are the most likely to occur and which will put visitors at risk and possible exportation? E.g. vector distribution, types, density, risk of importation and food and waterborne diseases.

Risk characterization

A systematic characterization of the identified threats and vulnerabilities will help public health authorities and responsible officials to prioritize risks that require mitigation and to plan public health measures. This is a qualitative assessment of the threats identified based on expert opinion and public health practitioners.

This includes:

- Are current controls and mitigation measures sufficient or do they need to be enhanced for the MG?
- What conditions should be a priority for prevention, surveillance and treatment?
- Have the assumptions been evaluated and assessed?

The level of risk for each factor is a function of two variables: the probability of a threat occurring and the consequences (impact) of that event. This is often mapped on a risk matrix.

Decisions on acceptable levels of risk should be determined primarily by human health considerations. Other factors (e.g. economic costs, benefits, technical feasibility and societal preferences) could also be considered, particularly when determining risk management measures to be undertaken.

The characterization of risk should be transparent, particularly with regards to the identification and systematic documentation of all elements of the process, including decision-making.

Characterization of risks depends on the question that is being asked. For example, many questions that characterize risk could be asked of any potential public health threat:

- What is the impact on the MG?
 - What is the impact on public health?
- See table 2.

Table 2: Example of risk characterization

	Potential impact on the MG	Potential impact on public health
Minimal	Little or no consequence or disruption to the MG	Little or no consequences
Minor	Small impact on MG can be managed with little impact on the event	Few illness or injuries which public health and medical services can manage
Moderate	Some controlled impact on the Games and reputation for host	Death and or injuries or illness occur. Public and medical services are strained
Major	Event is disruptive to MG and reputation of host	Many deaths, injuries or illness. Disrupts public health and medical services
Severe	Event causes cancellation of some or all of MG. Significant adverse impact on MGs and host reputation.	Substantial loss of life and serious injuries or illness. Widespread disruption of local services and infrastructure

Estimations of likelihood, similarly, could be divided into:

- Almost certain: is expected to occur in most circumstances
- Highly likely: will probably occur in most circumstances
- Likely: will occur some of the time
- Unlikely: could occur some of the time
- Very unlikely: could occur under exceptional circumstances.

The risk estimate should, wherever possible, include an expression of uncertainty, so that the full implications of the range of uncertainty of risk events can be included in decision-making. For example, if the risk estimate that a particular event will occur is highly uncertain, risk management decisions might be more conservative than in the case of an event deemed to be highly likely.

Once the risks have been mapped on the risk matrix, the objective of public health planning for the MG will be to reduce the likelihood of a threat occurring and to reduce the consequences of each threat: risk management.

Risk management

This identifies what mitigation measures can be put into place to manage the risk and reduce either the probability or impact. Based on the risk evaluation, options should be determined for treating each risk. These could include initiating new surveillance programmes for early identification of disease, implementing a range of special prevention programmes to reduce the risk of food-borne, waterborne, airborne and person-to-person spread of diseases, and developing plans for immediate acquisition of additional human and material resources should a crisis occur.

Case study: Stampede at the Hajj (2006)

The Hajj annually receives over 2.5million pilgrims over a 5 day period on the last month of the Islamic calendar. One of the most serious reported cases of stampede at a MG occurred in January 2006 which resulted in 346 deaths following a stampede occurring in the Mina Valley at a bottle-neck area whereby pilgrims are required to throw a series of pebbles

at 3 stone pillars. The provision of specially equipped medical care facilities, helipads, electronic surveillance, shading and cooling mists, as well as establishing a unidirectional flow of the crowd, have helped to reduce crowd morbidity, mortality and incidence of disaster.

TOOLS AND RESOURCES

ISO STANDARD: Risk management: Principles and guidelines on implementation.
www.iso.org/iso/home/standards/iso31000.htm

Disaster Management Guidelines WHO
<http://www.who.int/surgery/publications/EmergencySurgicalCareinDisasterSituations.pdf>

WHO. Mass Casualty Management Systems: Strategies and guidelines for building health sector capacity.2007
http://www.who.int/hac/techguidance/MCM_guidelines_inside_final.pdf

Chapter 2 – Legacy and evaluation

KEY CONSIDERATIONS

- Legacy begins with planning and should be treated as an on-going process
- Ensure that plans for evaluation of legacy are considered early in the planning process to enable engagement of stakeholders
- Agree the terms of data collection and sharing so that credible evidence can be gathered regarding the system's performance
- Evaluations can be done throughout the planning, delivery and post event
- Set up systems and processes to undertake this and agree them before the event begins: It will be impossible to get buy in and stakeholder engagement otherwise
- Take opportunities to learn from others and share experiences
- Review and evaluate the longer term legacy i.e. after 2 and 5 years.

INTRODUCTION

Leaving a viable public health legacy and sustainable improvements in health infrastructure and capacity should be a key aim of those involved with preparing for any MG. Legacy can include improvements in the health systems in the host country, improvements in health behaviours, and ability to deliver future MGs.

It is important that the legacy planning is seen as equal to other areas of planning and both political will and the associated funding should be used to achieve this. Any legacy will depend on current system strengths, weaknesses, and priorities. During the post-MG period it is also important to ensure that intended actions for maintaining legacy are undertaken. Unfortunately in the demanding lead up to an event legacy is often seen as less important than ensuring all goes well during the MG.

Legacy varies considerably depending on the MG context, however, recurrent themes can be identified and are included in a framework here along with examples of good practice.

Delivering MGs, particularly those that require

the host country to expend significant resources should lead to a positive legacy. Political pressure and financial support for major MGs can drive and maintain this legacy. This is increasingly important as there are growing criticisms within host countries of the money spent on large MGs with limited, or sustainable, benefit to the public. Health systems are identified as one of the areas where there can be a legacy. However this needs to be captured and evaluated: it has been noted that one of the legacies from major MGs such as the Olympic Games has been sustained improved public health services in host countries but there is limited robust evidence, evaluation and documentation to support this.

In order to justify the legacy claims of improved public health post MG an evaluation must be conducted. This should be explicitly integrated early in the planning process, with resources provided, evaluation criteria agreed, and a dissemination process established. Despite the overwhelming importance of legacy evaluation, it is often forgotten amongst the preparations for a MG.

Currently, there is no systematic or standardized approach to the legacy from MGs; the positive benefits from MGs still need to be standardized and promoted. There is a

growing desire to make hosting mass events cost-effective which means there is a focus on long-term benefits for the host in a variety of areas, such as public health or education.

The two key elements to legacy

Legacy is one of the elements highlighted in the Lancet Infectious Diseases Series on MG health. These articles reflect the two elements of legacy taken forward and adopted here:

1. The host country legacy (framework): what is left behind
2. The legacy for others planning MGs (strengthening the knowledge and evidence base): what is passed on.

1)

The host country legacy can cover a number of aspects, from improved public health services (e.g. improved surveillance and strengthened core capacities in line with the International Health Regulations), healthier lifestyles in the local population through MG health promotion activities (e.g. improvements in healthy eating habits) and new or improved infrastructure

(e.g. ambulances, safe venues). Specifically, those living and working near MG locations should see positive benefits: for example better hygiene practices at restaurants and sports facilities to increase daily physical activity levels.

Enhancements for a specific MG will also help deliver future MGs in the host country if the systems, knowledge, experience and improved understanding, capacity and capability within the host country are retained.

Case study: Experiences from Sydney 2000 Olympic and Paralympic Games

It was concluded that public health legacies remain following the Sydney 2000 Olympic Games, particularly in areas of increased coordination, and enhanced surveillance

system, and improvements in medical / clinical care systems. Best practices in these areas have been helpful for future MGs, in Australia and abroad.

2)

Building and sharing the knowledge and evidence base globally is a key element of legacy. This work depends on an open and transparent approach for both good practice and learning from challenges.

Building the evidence base enables those planning future MGs to identify key areas where a sustainable legacy can be created and helps to justify the resources invested in the MG. As a resource this should be accessed and considered by those planning future MGs.

What do we know?

There are very few published papers which are MG legacy or evaluation focused; it is often stated as an element for consideration but no details are included. The majority of the literature is experience based / best practice and focuses on large MGs such as the reports from the Olympic and Paralympic Games in London 2012, Beijing 2008 and Athens 2004. This is partly due to "legacy" being officially included in Olympic hosting bids from 2003; it is an essential selection criterion in the proposal review process. This inclusion of legacy as a bid requirement is unusual as the majority of event owners do not have this focus.

Future planning for legacy and its evaluation is needed. The majority of studies available focus on planning and organizational delivery, and responses to any public health incident.

There is often a focus on recurring events, such as the Hajj, which offer repeated opportunities to assess the impact of the event on specific fields such as emergency medicine.

Case study: The Hajj, Kingdom of Saudi Arabia

The Lancet editorial (2012) observed that, "decades of planning for the Hajj have resulted in an advanced health-care system and a pluralistic approach to public health in The Kingdom of Saudi Arabia, highlighting the huge benefits of these events to the host nation".

Indeed, this renewed experience has enabled Saudi Arabia to accumulate a certain amount of knowledge on the management of risks

to health during MGs. Qanta Ahmed et al. observed, *"We suspect Hajj legacy is an influential actor in regional healthcare but is, as yet, an unquantified entity, presenting an important area for further enquiry. [...] We believe Hajj has been a dual driver for the intense development of healthcare in the Kingdom of Saudi Arabia and the arrival of multinational public health medicine to the region."*

Often, tangible benefits are easily identified as a part of legacy: this includes improved health care facilities e.g. clinics built specifically for an event and ambulances. However, consideration should be given on the need for these, sustainability and benefit to the local population post event.

Despite limited evidence, it is generally viewed that hosting a major MG can drive improvements in public health processes

and collaborations. Planned MGs can also improve public health responses to unplanned events and vice versa.

GUIDING PRINCIPLES AND BEST PRACTICE

There is currently no recognized framework or standardized approach to identifying, evaluating and disseminating the legacy of MGs. It is important to ensure that public health legacy, sustainability and evaluation issues are considered early in the planning process to gain stakeholder involvement and ensure that necessary resources are available. This also needs to include the processes for sharing the knowledge and experience. A process of continuing review and evaluation will help maintain the momentum. It can also be difficult to maintain a focus on legacy in the face of other pressures when preparing for the event.

The legacy will vary depending on the MG and context. The opportunity to improve health in the host nation occurs through improvements to existing systems and integration / refinement of new systems (e.g. new technologies). The planning and risk assessment process should inform these changes and identify which could be maintained long-term, such as improvements to public health surveillance or food safety legislation. As such, these should be designed to be sustainable to maximize the resources invested.

There should be clear and measurable objectives for systems and processes; it is important to define when these objectives will be evaluated. Data should be collected before, during and after an event for evaluation purposes.

There are some MG-specific risks which may affect the legacy and evaluation:

- Often expertise is lost quickly after a one off event as those involved are often temporary, move jobs, or follow the event e.g. Olympic organizers often follow the Games so expertise is maintained within the organization but lost to the host country
- Those involved in the planning and delivery do not often have time to consider legacy and evaluation.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

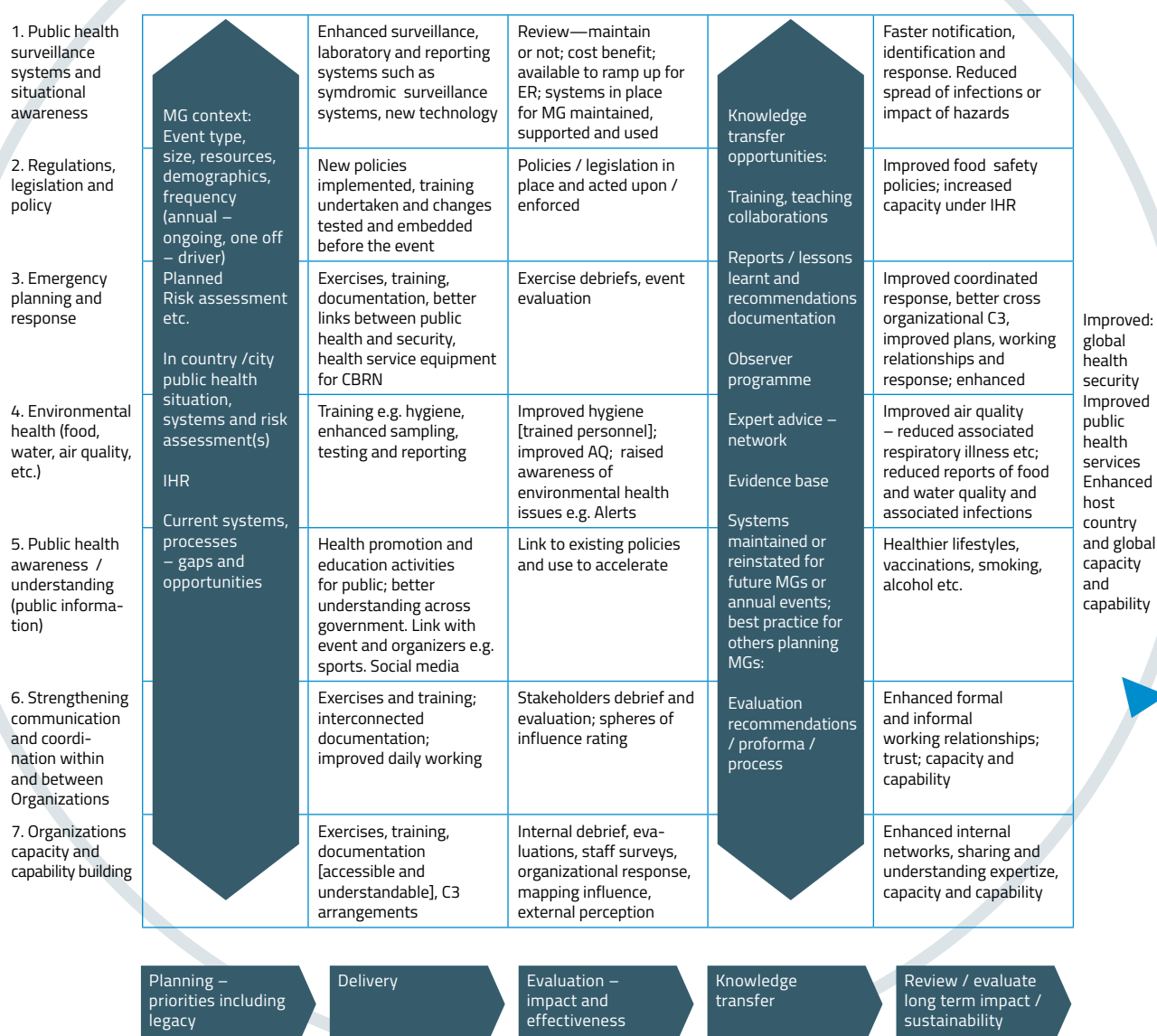
A standard health legacy framework (see Figure 1) and evaluation toolkit based on literature and experience can be adapted

to fit different contexts and can be used to build the global knowledge and evidence base.

Figure 1

Legacy Opportunities (host country)

Legacy Outcomes (global)



This approach focuses on specific legacy areas and the benefits of a known and sustainable legacy for the host country, local population and global community. It provides information on the key areas identified and

the iterative process that could be followed; from identification through delivery, evaluation and dissemination.

Figure 1 identifies the recurrent and widely recognized areas for the health legacy from MGs, focused on strengthening systems:

1. Surveillance systems and situational awareness
2. Regulations, legislation, and policies
3. Emergency preparedness and response
4. Environmental health (food and water safety and quality, air quality etc.)
5. Health promotion, awareness,

- enhanced knowledge and understanding
6. Strengthening communication networks and collaborations within and between organizations
7. Internal organizational capacity and capability building and C3 (command, control and communication).

This is also represented in the two figures below:

Figure 2: framework legacy process

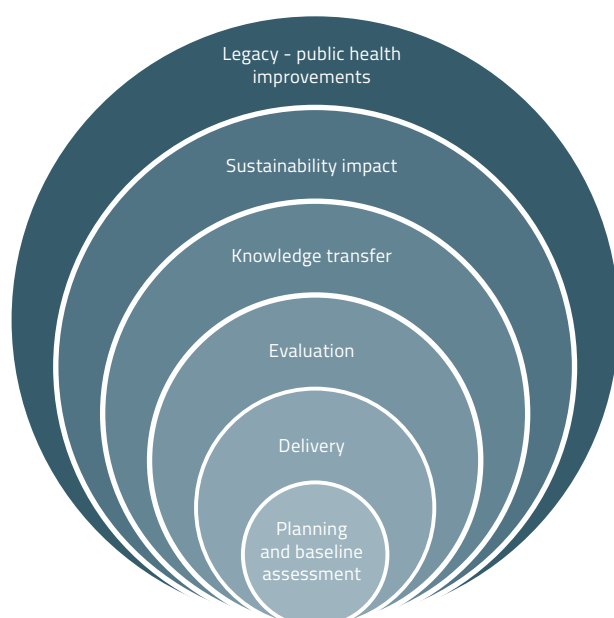


Figure 3: interconnected legacy areas



Legacy areas

1. Public health surveillance systems and situational awareness

- To enable faster notification, identification and response through strengthened routine and emergency surveillance and reporting systems; increased resilience
- Reduce the spread of infections or impact of hazards and global health security

Through:

- Implementation of improvements and addressing weaknesses in existing systems
- Establishment of syndromic or event based surveillance systems
- Improved, faster, microbiological detection systems
- Establishment of an all-hazards approach, reflecting IHR requirements
- Integration of data from multiple sources (e.g. surveillance, laboratories, intelligence community, media) into succinct reports for decision makers
- Use of technologies in an innovative way, such as the use of Short Message Service (SMS) to distribute health messages to attendees.

Case study: Sydney 2000 Olympic and Paralympic Games surveillance legacy

The Olympic surveillance effort yielded several long-term benefits:

- Demonstrated the enormous potential utility of near 'real-time' surveillance for specific target conditions (e.g., injuries, illicit drug-related presentations, and influenza-like illness) in emergency departments. The Department of Health is pursuing ongoing surveillance in this setting
- Fostered a greater understanding of the importance of timely surveillance and reporting of notifiable diseases and raised awareness among hospitals and general practitioners regarding the need for disease notification.

2. Regulations, legislation and policy

- Revised policy, regulation, and legislation plans that are cost-effective and appropriate during the MG, e.g. food and water standards
- Improved IHR compliance and capacity
- Improved SOPs; created or revised to reflect lessons learned.

Through:

- Governmental support, agreements and / or new legislation to ensure cooperation between governmental agencies and relevant private sector elements
- Modified laws / policies to facilitate the transfer of funds, resources, and / or data between agencies, organizations, international agencies or private sector, or to enable the use of new medications, devices, or other tools, including event medical services
- Memorandums of Understanding (MOUs), Mutual Aid Agreements (MAAs) and to streamline the multi-agency functions of the health structure, and roles and responsibilities; adequate financial support through budgets.

3. Emergency planning and response arrangements

- Better coordination, understanding of roles and responsibilities and working relationships across partner and stakeholder organizations
- Increased ability to re-establish systems at short notice for an emergency
- Tested and evaluated emergency response plans and systems

Through:

- Improved versions of command, control and communication (C3) plans
- Increased capacity and capability of staff trained in emergency response
- Quarantine facilities reviewed and improved at points of entry
- Data on event medical service collected which can be compared with other similar events to add to the knowledge of best practices for emergency medicine.

Case study: Sydney 2000 Olympic and Paralympic Games

Bioterrorism response protocols developed for the 2000 Games were useful in managing suspected bioterrorist incidents in New South Wales in October 2001 to February 2002.

During this period, a spate of hoaxes and scares related to suspicious "white powders"

required laboratory investigation of over 1,000 incidents and 594 samples of suspicious substances and "existing procedures for a coordinated and practical decision-making process that could be rapidly reactivated were invaluable."

4. Environmental health

- Improved environmental health e.g. improved air quality
- Remediation to improve environment e.g. chemical contamination of the event site
- Improved hygiene and waste facilities
- Improved food safety practices and infrastructures to reduce food-borne diseases in the community, including; improved food inspection procedures, surveillance activities, and strengthened food defence and emergency procedures.

Through:

- Reduced environmental sources of disease through low-cost public health interventions e.g. adequate and safe drinking water and sanitation; improved air quality; and preventing exposure to hazardous chemicals and waste
- Strengthened food and water protection systems to limit food or waterborne outbreaks during the MG
- Increased local capacity through the training and experience of local personnel to protect the public and reduce human errors in the handling of food.

Case study: London 2012 Olympic and Paralympic Games

As part of the planning to reduce the risk of food poisoning the UK's Food Standards Agency (FSA) undertook a number of initiatives, including:

- Campaigns to raise awareness among food businesses and visitors of the importance of good food hygiene and food safety
- Provision of additional training and resources for food business owners, including mobile food vendors, to improve hygiene standards
- Improving local government authority enforcement skills and capacity
- Undertaking additional testing of food premises in venues.

5. Public health awareness / understanding (health promotion)

- Healthier lifestyles and improved public health through increased awareness and understanding of public health risks and uptake of preventative measures e.g. vaccination campaigns
- Reduced illness and injury and reduced health services demand; a healthy and safe MG experience for participants and the host community
- Enhanced relationships and trust that improve the credibility of health organizations as an authoritative voice for public health issues.

Through:

- Increased physical activity in the time before, during and after the event, e.g. focused initiatives to improve the health of local population and sponsored programmes to encourage people to be more physically active
- Raised awareness of public health issues among healthcare providers and event medical service teams
- Public health information developed for and disseminated among stakeholders
- Systems developed to use social media to reach target populations for health messages
- Awareness campaigns with attendees / public to promote healthy behaviours.

Case study: WHO 3 Fives campaign on safer food, healthier nutrition and physical activity

WHO have developed a resource which is available to MG planners and is easily accessible and translatable and has been seen to be effective. This has been used in

many MGs including: FIFA 2010 and 2014 and the, South East Asia Games 2013 in Myanmar.

6. Strengthening communication and collaborations within and between organizations

- Strengthened working arrangements, increased understanding of roles and responsibilities, and resilience across stakeholders and within organizations
- Updated policy, regulation, and legislation to improve cross organizational or performance issues, increased integration of health authorities.

Through:

- Improved communications across stakeholders, including government agencies, private sector, and the public
- A unity of purpose and a command, coordination and communication system established and tested
- Establishment of a multiagency health sector coordination system established, tested and sustained with all key elements of the health sector represented.

Case study: The 2012 UEFA European Football Championship Finals: Planning for future legacy

Euro 2012 was a large international sports event held over two countries, speaking separate national languages, and operating over different time zones. As a single MG, EURO 2012 required a significant degree of coordination from the local to the national and international levels.

Early linkages between WHO and UEFA

enabled the two organizations to amend their own planning to better accommodate joint activities, and to identify specific areas where legacy could be targeted. The added-value of joint activities undertaken internationally and in conjunction with local organizers in the context of EURO 2012 must be underlined.

7. Internal organizational capacity and capability building and C3 (command, control and communication)

- Improved standard working arrangements; increased capacity, capability and resilience
- Increased understanding of roles and responsibilities and working arrangements.

Through:

- Establishment of ability to respond quickly / re-establish systems
- Improvements in local staff capacity as a result of training and technical assistance from national and international partners.

Before the event

Legacy is a part of the planning process. Identifying key legacy areas and gaining engagement and buy-in from stakeholders (such as MG organizers) is essential to this process.

Consider:

- Reviewing the event context and risk assessment, including gaps and opportunities, baseline capacity and capability (including IHR), to identify factors that might impact the development of a sustainable legacy. This review should also consider the benefits, cost effectiveness and resources available
- Reviewing legacy information from other events. These include documented reports of events and planning recommendations, as well as engaging with experts on MGs and specific subject matter experts (e.g. food safety experts)

- Developing, implementing, and testing new systems, processes, and policies
- Training staff to deliver the additional MG requirements
- Developing resources such as health promotion materials; identifying how these will be used and their impact evaluated
- Documenting activities, lessons learned, and legacy; documenting evaluation processes.

There should be an ongoing evaluation process during planning and preparation stages such as debriefs, assessment and documentation of lessons identified and development of recommendations following every operational exercise as part of the readiness assurance process.

During the event

The main focus should be on capturing and documenting the outputs of preparation activities. This includes capturing information and experiences, through documentation such as the formal situation reports and experiences both factual and anecdotal, e.g. blogs, interviews etc.

There should also be a continuous process of evaluation and learning to ensure processes and systems remain effective and that they reflect any changes in expected deliverables.

Observer programmes during an event offer an excellent opportunity to share expertise and experience with those delivering future MGs. Knowledge and experience gained in preparing and running one event can be transferred to others. Health based observer programs can also be linked with observer programmes run by the larger event organizers such as the International Olympic Committee (IOC) and FIFA.

After the event

At the conclusion of a MG, stakeholders should evaluate and document outputs (what happened), successes, lessons learned, and recommendations for the current host, organizing body, and others planning MGs. Any recommendations should be supported with actions on how these will be learnt and embedded across the health environment. The emphasis should be on observing, identifying, describing, recording, and communicating lessons identified. Evaluation should inform legacy through recommendations to the organizations involved, those planning future

MGs and the global resource for MG planning.

Documentation of the resources required at all stages is critical, and if at all possible a cost-effectiveness analysis undertaken.

Capturing the learning and experience needs to be done very quickly as those involved rapidly move on to new jobs and the event host organizations can cease to exist. There is also a short window of opportunity and interest in the event from media and politicians.

I. Evaluation

An evaluation of the effectiveness of planning and delivery systems during the event is necessary, both during steady state and any incidents. This should include a post-event assessment of the value and / or effectiveness of any specific interventions or new or enhanced systems set up for the MG: did they meet the objectives for which they were developed?

Evaluation should be done according to a structured framework with outcomes documented to inform the evidence base, particularly looking at the system's usefulness and specific attributes. Information should include the number and type of events and actions taken.

Representatives from different areas of planning and delivery should be included across local, regional and national health organizations as well as undertaking consultations with the different sectors / authorities / agencies involved.

As part of the evaluation it is worth considering:

- Identifying successful practices and how they will be maintained, e.g. surveillance, reporting, microbiology, communications system
- What was and what was not cost-effective and how this can be improved, e.g. setting up new surveillance systems, staffing costs etc. and adapting or eliminating unsuccessful or cost-

ineffective practices

- How systems enhance and compliment future routine health functions
- A review of the planning and improvements for future events
- Reviewing working arrangements with all stakeholders
- Identifying areas for improvement and recommendations to do so
- Measuring the impact of specific activities, e.g. health promotion campaigns

There are currently issues with comparing data across and between MGs. The establishment of standardized data sets and information collection, collation and evaluation procedures will greatly enhance the ability to do this. An important legacy arises when data are comparable with other events and add to the knowledge of best practices.

Case study: WHO 2010 Report on the legacy from FIFA 2010 World Cup, South Africa

Methods and objectives for legacy evaluation project:

- Combination of documentary analysis (to include official reports, policy documents, web based articles) and formal or informal interviews
- Identify areas where there has been positive or negative legacy in terms of capacity to prepare for and deliver a MG
- Identify areas where health legacy may have translated to more general benefits to the wider health system, in terms of capacity and organizational structures.

Findings:

- Improved communication - inter-departmental, intra-departmental and between sectors
- Increased expertise and training - includes knowledge transfer
- Development of guidelines and SOPs. Many still in use both between FIFA and AFCON and planned to be used for the African Cup of Nations
- Recognition of the roles of other departments / role of public health and informal or formal healthcare providers
- Confidence in ability of own departments and South Africa as a country to host MGs.

A debrief can evaluate successes, record lessons learnt and capture improvements to capacity, systems and processes, and sustainability, within the host area. Failures should be documented to better understand the impact and cause (e.g. limited resources). Debriefings should be an honest and open process to promote learning. These should be scheduled as soon as possible after the MG, while memories are fresh and interest is high.

Debriefs can be categorized as:

- 'Hot' debrief conducted immediately after the event to gather initial comments and views
- Critical incident debrief deals with any specific and potentially traumatic event
- Formal debriefs which are more constructive and considered; they may be conducted away from the event and incorporate other stakeholders. This debrief can include: interviews, surveys, group discussions.

II. Documentation – reporting and recording

The experiences and lessons learned during the MG should be documented and disseminated. Practical solutions and examples of good practice for common public health issues for MGs, such as the rapid need for information or the risks from unsafe food, can contribute to the larger body of knowledge. This documentation requires openness and a willingness to admit to challenges to reduce the risk of these being repeated.

The after-event report should summarize the events, timeline, experiences and lessons identified. There could be more critical and

detailed internal report plus an outward facing report and the learning from this with recommendations to help those planning future MGs.

All incidents and potentially dangerous occurrences ('near miss' events) during the event should be thoroughly investigated and documented. Critical tasks to be completed include: collation of data and written records such as attendance records, radio logs, and patient presentation statistics.

III. Dissemination - knowledge sharing

It is important to identify and agree across all stakeholders' how evaluation and documentation findings will be shared; in country and elsewhere. This can be achieved through a number of routes:

- Running an observer programme
- Incorporating experiences and lessons identified into teaching, training and e-learning programmes
- Publishing reports, papers, and in particular case studies of best practices and lessons learned
- Working with others planning MGs (international expert advice network and Collaborating Centres).

Consideration should be given to the public communication of legacy goals to bridge the gap between public and professional health-sector understanding of health legacy (and what constitutes success and failure), from sporting events in particular. For example, post London 2012, most of the media interest was around the promoted improvement in healthy lifestyles and uptake of organized sport; the professional story is about the enhanced and sustainable surveillance systems and microbiological capacities.

SECTION 2



Chapter 3 – International Health Regulations (2005)

KEY CONSIDERATIONS

- Ensure that those involved in the health planning for the MG are briefed, prepared and equipped to meet reporting obligations under the IHR
- Ensure that the National IHR Focal Points are involved in public health planning for the MG
- Implement IHR provisions for MG associated health measures relating to international travel and transportation.

INTRODUCTION

The International Health Regulations (2005) ("IHR" or "Regulations") are the main legally binding global agreement that addresses the coordinated global risk management of acute public health events. The Regulations were adopted by the World Health Assembly in 2005, and entered into force in June 2007. They are legally binding for signatory States and address the detection, assessment, response and communication of public health risks and apply equally to these in the context of international MGs.

A key cross-cutting factor concerning many aspects of public health risks in the context of MGs are the International Health Regulations (2005) ("IHR" or "Regulations"). The stated purpose and scope of the IHR are:

To prevent, protect against, control, and provide a public health response to the international spread of disease in ways that are commensurate with, and restricted to, public health risks, and which avoid unnecessary interference with international traffic and trade.

Delivering a MG offers a unique opportunity for host nations to review, raise awareness and enhance the implementation of IHR, resulting in a significant legacy from hosting the event. It can also be an opportunity for the host country to increase public health capacity.

This chapter provides a very brief explanation of the IHR, the rights and obligations they create for countries, and their importance for MGs.

For further information including full texts of the IHR (2005) in the six official language versions, and related informational materials, see www.who.int/ihr

SUMMARY OF IHR (2005)

The scope of the IHR (2005) is quite broad and includes the following international public health risks:

- All hazards risk including biological, chemical or radionuclear hazards
- When the disease, agent or mode of transmission is known or unknown, and
- When the hazard is transmitted by:
 - Persons (e.g. SARS, influenza, polio, Ebola)
 - Goods / food / animals (including many zoonotic disease risks)
 - Vectors (e.g. plague, yellow fever)
 - The environment (e.g. releases spills or other contamination).

The IHR create rights and obligations for states that are potentially relevant in the context of MGs, including:

- Notification to WHO of outbreaks which fulfil certain risk assessment criteria
- Verification of these events upon request from WHO
- Rules on application of health measures to international travellers, trade and transportation
- Maintenance or development of core public health capacities for surveillance, assessment, response and communication concerning public health risks and events.

The IHR also mandate a key role for WHO in the surveillance and management of public health events with international consequences. This emphasizes the importance of involvement with WHO when planning for and delivering major MGs.

Through these requirements, the IHR (2005) aims to ensure that all countries have the infrastructure they need to identify, assess, and respond to public health threats around the world.

Public health events occurring during MGs may be reportable to WHO under the IHR, or subject to a verification request from WHO. These include:

- Events in areas with a high population density and therefore having the potential for a high public health impact
- An event occurring in association with an international gathering, resulting in a risk of international travel or trade restrictions
- An event with evidence of local transmission, and a case with a history of attending an international gathering within the previous month.

Designation of PHEIC

The WHO Director General, acting on advice from staff and a specially convened group of international experts external to WHO, termed an IHR Emergency Committee, has the authority to designate an acute public health event as a public health emergency of international concern (PHEIC) according to specified criteria and procedures.

Reporting and assessment

The IHR provide a clear standard framework for identifying how countries notify WHO and what type of events should be reported.

How IHR operates

IHR related communications with WHO are channelled through the country's National IHR Focal Points (NFP). In preparation for the MG, the NFP should be involved in the surveillance reporting and assessment during the MG. In particular if any enhancements to existing surveillance systems or the development of new surveillance systems are planned.

WHO's six Regional Offices have an IHR Contact Point for the countries in their region and should receive all IHR related communications.

What should be reported?

Every country should carry out a risk assessment of public health events that take place within their borders. The criteria for decision-making about these events are explained in more detail in Annex 2 of the regulations, see http://www.who.int/ihr/annex_2/en/.

Countries must notify WHO of all events qualifying as potential PHEICs (called “notifiable events”) within 24 hours of the assessment. Notifiable events are defined according to whether the event:

- Has a serious public health impact
- Is unusual or unexpected
- Risks spreading internationally
- Risks resulting in restrictions on international trade and / or travel.

If an event meets two of these criteria, it qualifies as a possible international emergency. In this case notifying WHO through the National IHR Focal Point becomes compulsory. The IHR provides detailed guidance of the decision protocol.

Alongside this decision making procedure, there are two other types of situations that generate compulsory action.

1. Events involving specific diseases that generate particular concern must always undergo the above decision-making process. These diseases are:

- Cholera
- Pneumonic plague
- Yellow fever
- Viral haemorrhagic fevers (e.g. Marburg, Ebola)
- West Nile fever
- Other diseases of special national or regional concern (e.g., dengue fever or Rift Valley fever)

2. Events involving four specific diseases that generate the highest level of concern are always considered unusual and unexpected, may have a serious public health impact and are always notifiable. These diseases are:

- Smallpox
- Poliomyelitis due to wild-type poliovirus
- Human influenza caused by a new subtype (e.g. H5N1 in humans)
- Severe Acute Respiratory Syndrome (SARS).

WHO can provide support to assess the potential for international spread or for interference with international traffic and the adequacy of the control measures if requested by the country.

3. Other types of reporting

Through the IHR system, countries can also confidentially share information with WHO on events within their borders that are not notifiable. This provision is especially focussed on events where information is insufficient to complete the IHR decision instrument.

Response

The IHR reinforce WHO's involvement in a collaborative risk assessment and to support response activities to public health events when requested by the country. Response activities can include WHO providing technical guidance, assessing control measures, and mobilising field teams for risk assessment, clinical management, investigation or disease control.

WHO also maintains the Global Outbreak Alert and Response Network (GOARN): a network of public health institutions which can provide technical expertise to support countries' acute public health response activities.

Provision of information

The IHR guarantees that information in notifications, reports and consultations under the IHR can only be shared with other countries when necessary to address risks such as potential international impact. This privacy protects a country from excessive control

measures by other countries, and ensures that other countries have the information they need to protect their populations. The process and rationale of information sharing with other countries is clearly defined by the IHR.

The MG difference

Hosting a MG, especially a major event that generates media interest, can require host countries to review and potentially enhance their current capacities. Hosts have an opportunity to make develop or improve their public health systems and infrastructure as part of a lasting legacy. In low resource countries, this opportunity may be all the more valuable for its rarity.

In particular there is an opportunity to use the IHR requirement during the planning of

a MG event to improve national core public health capacities for detection, assessment, control and reporting of public health events, including those at international ports, airports and ground crossings.

Political interests and reputational concerns can increase awareness and understanding of the importance and added value of IHR and international partners such as WHO.

IHR and specific MG considerations

MGs may fall under a number of different aspects of the IHR, including:

1. State obligations to notify, report or verify public health events to WHO
2. State and WHO activities involving risk assessment and public health response
3. Provisions specifying health measures that States may or may not apply to

international travellers (e.g. examinations, contact investigation, isolation / quarantine, and protection of personal health information) and / or international conveyances (e.g. international aircraft and shipping).

The IHR include several basic rights and obligations for countries, many of which

may apply in the context of international MG. These include:

- Reporting / notification / verification to WHO (as outlined above). Political and media interest during a major MG can create additional pressure to provide rapid and accurate information on any public health event
- Public health capacity: Obligations on States Parties to develop core public health capacities for detection, assessment, control and reporting of public health events, and enhanced activities at some international ports, airports and ground crossings
- Travellers: obligations to provide proper treatment to international travellers by States Parties, including some human rights and other protections. These protections include protection of personal health data, prior informed consent for examinations and procedures, and other provisions
- Application of health measures: Authorizations for and limits to health / sanitary measures applied by States Parties to international travellers and / or conveyances (e.g. aircraft, ships), cargo and goods.

Before the event

Organizers need to ensure that they are prepared to meet their obligations if an outbreak occurs during the MG. Particular considerations related to the IHR may include:

- The use of outbreak information from a variety of sources, in addition to the information officially reported by the country in which the outbreak may be occurring
- The importance of avoiding stigmatization of diseases or the countries in which they are occurring
- The strengthening or re-establishment of public health infrastructure to facilitate early recognition of, and rapid response to, emerging disease threats
- The preparation of surveillance operations at MGs to identify and assess potential PHEICs
- The involvement of the National IHR Focal Points in public health planning for MGs
- Health planning for the MG that is briefed, prepared and equipped to meet reporting obligations under the IHR
- Collaboration with others in the risk assessment and response to public health events associated with MGs, upon request
- Ensuring that MG planning authorities have rapid access to the most appropriate experts and resources for planning, risk assessment and outbreak response, through the WHO Virtual Interdisciplinary Advisory Group (VIAG) and through the GOARN
- Providing authoritative information on any public health event of particular international significance that may occur in association with a MG
- Safeguards in respect to sharing information between countries
- Implementing IHR provisions for the application of health measures in the context of international travel and transportation associated with MGs.

TOOLS AND RESOURCES

For more information about the Global Outbreak Alert and Response Network (GOARN) see <http://www.who.int/csr/outbreaknetwork/en/>

Chapter 4 – Working with partners and stakeholders

KEY CONSIDERATIONS

- Ensure effective and early stakeholder engagement and build relationships and trust. In particular ensure early engagement with event organizers to obtain clear agreement on roles and responsibilities, reporting, and working arrangements
- Build on normal working arrangements as much as possible to enhance and improve resilience; a key element of the public health legacy of a MG
- Ensure public health representation at key levels and in key organizing structures, including the policy and decision-making groups. A dedicated team for this may help ensure representation
- Clear communications with stakeholders including:
 - agreeing the communication strategy across all stakeholders
 - providing the public health background of the host country's population, so any incident that related to a MG can be easily identified
- Ensure clarity and accessibility of any reporting to non-health experts
- Ensure clear, well tested operational plans, understanding of roles and responsibilities and reporting requirements both internally and across all external stakeholders; including across health and government
- Establish processes to ensure everyone involved understands and agrees standards for reporting and media statements: consistency is critical. Share this information with external partners so that messages are consistent and aligned.

INTRODUCTION

Stakeholders are those individuals or entities who have an interest in the outcome of the MG and should be involved throughout the planning and execution of the event. Examples of stakeholders include the population of the host country, healthcare workers, event organizers, and participants.

Partners are individuals or entities directly involved in ensuring the outcome of the MG. Different partners will have varying levels of engagement with specific activities.

Stakeholder collaboration and communication arrangements are key to the success of the MG. These should be tested, reviewed and revised before the event.

The MG difference

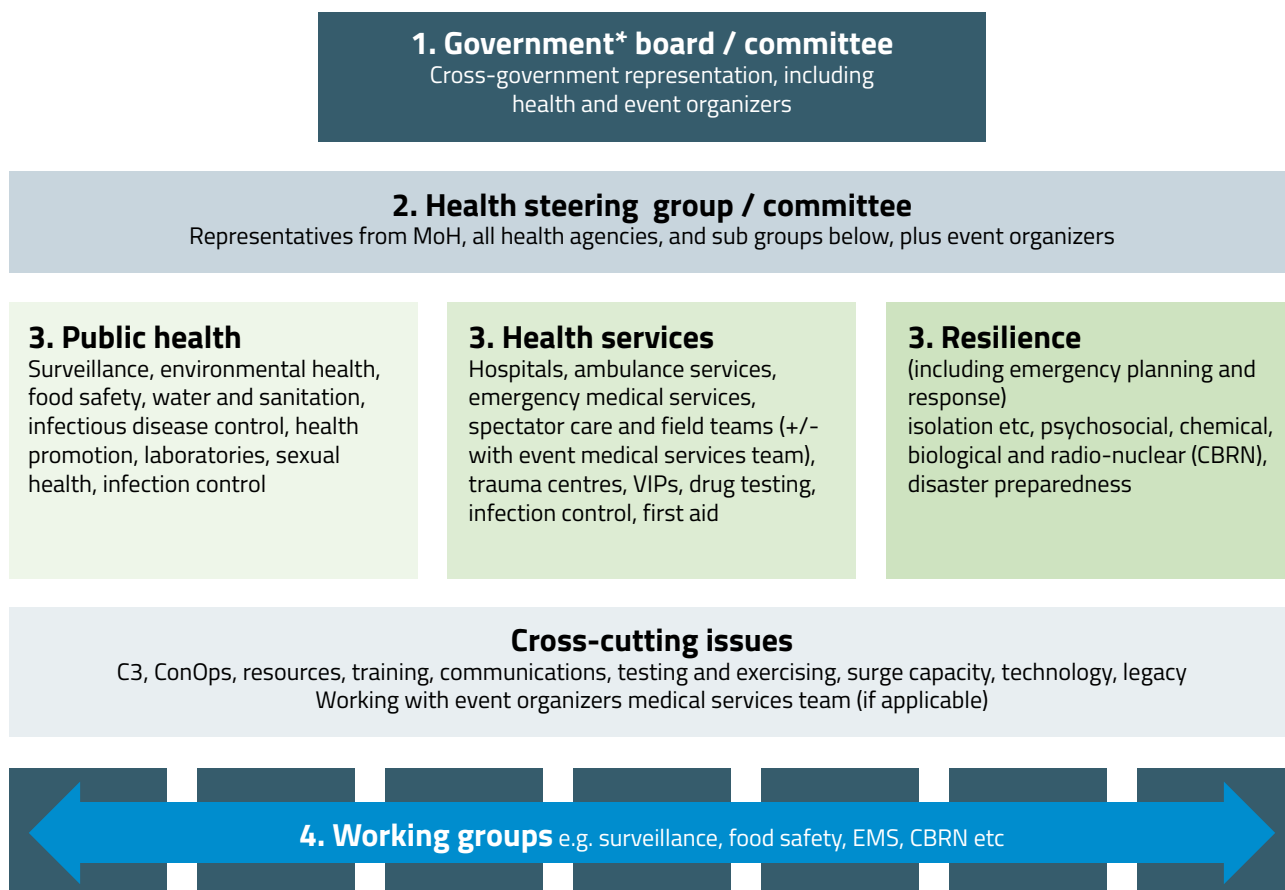
An integral part of identifying the event context and undertaking the risk assessment includes assessing the additional complexity of the MG versus normal business. This will identify the difference in stakeholders and roles and responsibilities; and the arrangements that are novel to the MG. The focus should be on enhancing and strengthening normal stakeholder working arrangements; part of the MG legacy.

Working with stakeholders is critical as no one organization or individual is able to manage or influence all of the issues that need to be addressed for the MG. The responsibilities of different parts of the MG planning system, including health, will overlap and therefore excellent communications and coordination systems are needed to

ensure that all stakeholders understand these and that appropriate command and control arrangements are in place to manage situations as they arise.

Early engagement and the establishment of dialogue and trust between stakeholders is critical. Stakeholders can be from across a range and levels of government and non-government agencies, health organizations (including public health), and private organizations. Involvement should include local, regional, national and / or international levels (see diagram 1) and internal stakeholders within the lead health organizations. The public should also be engaged early on and made aware of the public health activities for the MG.

Diagram 1: levels of stakeholder working and engagement



*the level of government involved will be determined by the MG context

Roles and responsibilities of these levels of stakeholders:

1. Government board / committee. Provides strategic oversight and coordination for all MG activities. Representation will be from all government departments, including the Ministry of Health (representing the health steering group), to ensure integration of health-related planning with the overall planning.
2. Health steering group or committee. Appropriate key stakeholder representation will depend on the MG but should include the Ministry of Health, MG organizers, public health, healthcare organizations, media and communications experts, security organizations, international organizations such as WHO and local key stakeholders such environmental health.

This health steering group should establish:

- Issue-specific planning sub-groups / working groups that report to the high-level committee, including public health, health services and resilience
- Cross-representation between the groups planning the healthcare response and those responsible for emergency preparedness and disaster planning
- Clear roles and responsibilities and scope of the group
- Clear command, control, coordination and communication structures.

The health steering group should provide strategic direction and oversight and be responsible for:

- Facilitating communication and management of joint planning and implementation processes across partners and stakeholders
- Securing adequate resources (including staff)
- Providing system-wide and event-specific job training
- Providing the accountability structures

important for assurance

- Determining the process for the escalation of risks and issues
- Formalizing linkages between sectors, and specifying and agreeing when health should take the lead and oversight for specific issues with sponsors, host bodies, and organizers.

3. Public health, health services and resilience: issue-specific planning sub-groups / working groups. Responsible for delivering the planning and implementation for their specific areas. They will also need to consider the cross cutting issues. It may be worth considering having a single coordinator and / or team, for each group, which may cut across organizations, with defined roles and responsibilities.

4. Operational working groups: for the key delivery areas as required, depending on the event context and risk assessment, e.g., surveillance, emergency medical services, chemical, biological, radiological and nuclear (CBRN) etc.

Membership of all of these groups, including the high-level committee, is unlikely to remain static. As the event gets closer more stakeholders may come forward and need to be involved.

Planning groups can place a significant draw on resources with key members spending increasing amounts of time in meetings; but it is vital to do this, and successful working relationships do require a significant investment of time. The close working and sharing of resources across stakeholders can help build resilience, capacity and capability.

What do we know?

The majority of articles are descriptive rather than analytical but trends in practice have developed and are becoming accepted as standard practices.

The importance and principles of stakeholder engagement for MGs has been identified and recognized for over 10 years and were outlined in the previous version of this document; Key considerations (2008), and remain appropriate today.

There is little evidence-based literature on stakeholder engagement specifically for MGs. Many papers identify the importance of this during the planning and preparedness stages for MGs; this is explicitly stated in most of the general MG planning papers. However, there is very limited information on what was done and how, and most lack recommendations for future MG planners.

Good stakeholder relationships enable flexibility and changes in the operational delivery in response to any issues. For example in 2009 during the H1N1 pandemic there were a number of preventative measures put in place to enable planned MG events such as the Hajj religious pilgrimage and Serbia's EXIT music festival to take place. The speed and effectiveness of these changes were a testimony to the well-established relationships across all parties involved.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

One of the recognized complexities of MGs is that there are often very different players involved than for normal business. Those stakeholders not normally involved in health may not understand the risks, roles and responsibilities associated with the MG or the need for preparedness and effective responses to any incidents.

There may be sensitivities and barriers to some cross stakeholder working. Large MGs tend to have a significant political and media focus and considerable reputational concerns, all of which can create tension.

For some major MGs such as the Olympics, and the FIFA World Cup it may be easier to engage stakeholders and obtain their input due to this political and media

interest. This engagement often starts with the development of the initial bid, and continues through to planning, operations, and evaluation of the event, and ultimately in ensuring a sustainable legacy.

Close and open collaboration and communication alongside pre-agreed and tested roles and responsibilities and reporting arrangements are important. Being able to contact a colleague quickly avoids potential conflict and confusion. The importance of trust across stakeholders cannot be underestimated. It can take years of effort at the national and international level to establish acceptable norms for data sharing.

The provision of information, either for a

real incident or rumour, requires a robust rapid response which may need to be agreed across a number of partners to ensure “one version of the truth”. This is critical to avoid delays in the communication of any public health issues to both prevent escalation of issues and manage stakeholder expectations.

Collaborate with and learn from those involved in disaster / emergency response planning as this often requires a cross government approach and may include law enforcement and a broader range of stakeholders such as water, transportation, telecommunication, and energy sectors. The experience and lessons learned from international responses to outbreaks such as severe acute respiratory syndrome (SARS) and H5N1 are useful to build on; these have led to improvements in communication and trust across the public

health community.

Involve stakeholders in the risk assessment process to assist with the identification, management and understanding of public health risks. These stakeholders include MG organizers, public health experts at national, regional and local levels, healthcare providers, clinicians, microbiologists, security specialists and MG experts e.g. from WHO Collaborating Centres.

Consider how these stakeholders will operate and collaborate to address risks, in particular with novel stakeholders such as the event organizers. The risk from these new arrangements can be mitigated through exercises to test working arrangements, roles and responsibilities, reporting procedures and communications.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

One of the most challenging aspects of planning is establishing unified command, control and communication (C3) arrangements between stakeholders as they may have overlapping responsibilities. For more information on C3 see chapter 5.

The Concept of Operations (ConOps) is the key planning document that captures this. It should be agreed and tested across all stakeholders, so all involved understand their roles and responsibilities and how services will be delivered during the event.

Communications and reporting, as the primary source of information to stakeholders, must be understandable and accessible. Time invested prior to a MG to help stakeholders understand routine

public health activities is worthwhile and can limit confusion and concerns.

A single point of contact for all health issues that could impact a MG should be established.

Framework

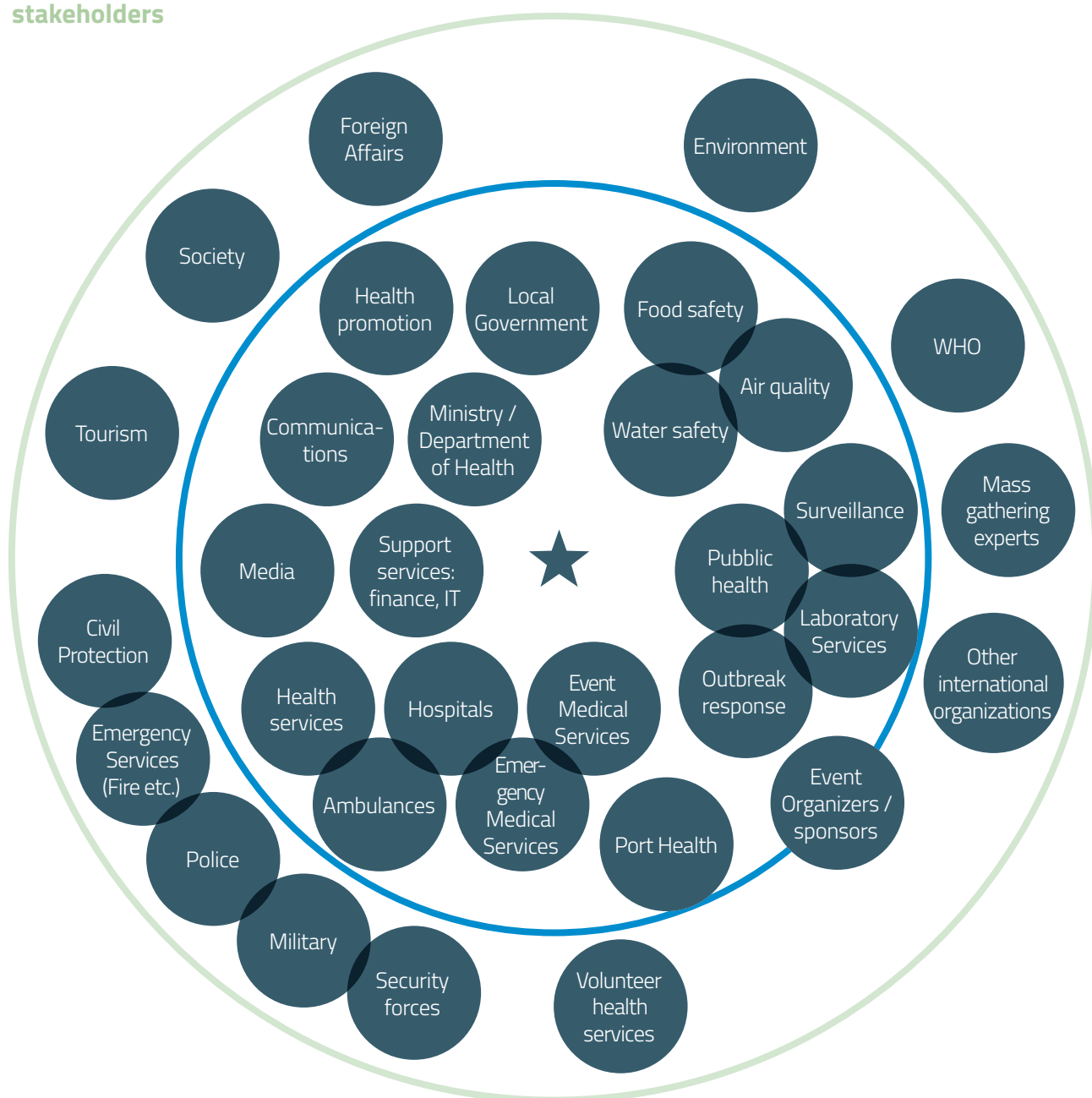
MG organizers should establish a model to identify stakeholders at various levels. The WHO stakeholder model is the key one adopted and adapted by planners. A modified version (Figure 2) reflects the lessons learned from a number of MGs.

There are two levels of the stakeholder model; the inner ring represents the health community of the host and the outer ring represents other organizations which could be involved depending on the event context.

**Inner ring: host
country health
partners**

**Outer ring: broader
stakeholders**

*Figure 2: Stakeholders
(revised WHO model)*



Before the event

It is important to:

- Gain buy-in through emphasizing the benefits of having an established and tested system and also through informing stakeholders of the public health risks relevant to the MG and how these risk are being managed
- Identify and engage partners and stakeholders, early in the planning process, agree roles and responsibilities, reporting arrangements and test and review these frequently, from steady state to emergency response
- Recognise and agree the lead agency for specific public health issues (e.g. surveillance, chemical contamination) early to help avoid confusion. Clearly define responsibilities such as reporting and response across agencies by agreeing:
 - where public health will actively lead (e.g. surveillance)
 - where public health will influence (e.g. health promotion)
 - where public health will support (e.g. security)
- Ensure collaboration across all organizations that may be involved in a health incident and across government at the day-to-day operational level. This may be facilitated through the level 3 steering and working groups and the sharing of key documents (such as the ConOps)
- Test working arrangements early through robust exercising to ensure time for reviews and improvements to be made. This will help provide assurance across all stakeholders that the arrangements work
- Consider, and establish any new legislation, policy modifications, ministerial directives, or working agreements to support joint planning and cooperation between stakeholders, which can reduce the likelihood of conflict at a later stage (e.g. when negotiating agreements on the provision of experts to event organizers). Formal arrangements will also help establish working relationships
- Include internal stakeholders to ensure buy-in and engagement, including human resources, finance and information technology
- Communicate the planning and delivery commitments to raise awareness and understanding of the additional needs due to the event
- Share contact information across all stakeholders; organizational (email, phone numbers) rather than individuals should be used to ensure resilience. Adopting a single point of contact approach will help facilitate this
- Consider engaging with international stakeholders and expert groups
- Agree the processes for providing consistent messaging particularly in response to an acute public health risk.

Case study: Building international relations: Beijing 2008 Olympic and Paralympic Games, 2008

WHO delegations in China were in charge of communicable disease surveillance and provided information and support according to international standards. Before the start of the Games, WHO supplied international public health laboratories with links to advanced equipment and diagnostic reagents, and guidelines on the diagnosis and identification of newly-emerged or complicated communicable diseases. A series of international academic activities were convened, such as a public health emergency management forum between China and the United Kingdom, a medical rescue forum between China and France, an Olympic

public health safety forum, and WHO training courses for surveillance and identification of newly-emerged / complicated communicable pathogens.

Beijing also set up out-of-hospital medical rescue cooperation programmes with other countries, enabling exchange staff to learn from each other. 30 Beijing medical personnel were sent to France to study the Event Medical Service (EMS) and European management experience. Beijing also invited specialists from Israel to give instruction in medical rescue for massive disasters.

One of the key relationships is with event organizers as this requires a high degree of close collaboration, trust and openness during the event. This collaboration can be formalized through the signing of a contract specifying the commitments (Service Level Agreement) and can be enhanced by having a public health expert integrated in the organizing body to establish data sharing, reporting and response procedures between organizations. It is important to pre-determine how incidents will be managed and who has the lead, including for media handling, venue access, and any required accreditation and systems. Some event organizers such as the International Olympic Committee (IOC) have a manual outlining expected deliverables and procedures for different areas.

Working arrangements with international partners or commercial organizations need to be agreed beforehand through setting up Terms of Reference (TOR), including clarification of information sharing, and an agreed process to meet requests for information.

The public, as stakeholders, should be engaged early. It is important that the MG does not negatively affect them, either by impacting on normal health services or the introduction of novel health concerns. The public will scrutinise what happens and there can be significant reputational issues if they are not happy, especially with the increasing use of social media.

Extensive work with stakeholders beforehand, such as providing background information on the normal public health situation in the host country, can raise the level of confidence in the public health reports and statements, as can proactive media engagement.

During the event

The dynamic nature of the event may mean changes occur so arrangements should be open to review and modification if required.

The main focus should be on maintaining frequent open and transparent communications with all stakeholders and fulfilling agreed reporting and operational commitments. This

includes the rapid agreement and distribution of public health messages in response to incidents; and information reported when there are multiple stakeholders involved, e.g. for food safety issues. This can be facilitated through taking a single point of contact approach, having daily reports / briefings and pre-prepared messages.

Case study: Rumours of food poisoning at the London 2012 Olympic and Paralympic Games

Effective working arrangements enabled a rapid response to notifications from the event organizers of a number of claims of potential food poisoning at the main park.

Teleconferences across all parties involved, including environmental and medical teams from the event organizers, Food Standards Agency and health protection teams, allowed

them to review the evidence and any known cases. No links or causes were identified.

The speed with which a robust rapid, evidence based response was provided, gave assurance that there were no food poisoning outbreaks and prevented further political or media interest.

After the event

Undertake a review of operations to determine if stakeholder collaborations were effective and could benefit other organizers of MGs. This review should include both the planning and operational phases from steady state through incident response to identifying any lasting legacy. This legacy may be that there is better working during an emergency which could require similar multi-stakeholder collaboration.

It is also useful to document best practices for stakeholder engagement and collaboration, lessons identified and key recommendations for those planning future events. However, one of the factors that may influence the

legacy is that those involved may move on, return to their day jobs, especially if work has been done voluntarily. Some of the improved stakeholder collaborations may be quickly lost after an event and this highlights the importance of documenting work quickly and actively maintaining networks beyond an individual level.

Chapter 5 – Command, control and communication (C3)

KEY CONSIDERATIONS

- Establish command, communication, and control procedures as soon as possible during the planning processes. This can be written down in the form of a “Concept of Operations” document (ConOps)
- Review business as usual arrangements and use MG context and risk assessment to inform any required changes
- Obtain governmental support and legal arrangements
- Integrate activities:
 - Identify and establish common objectives and a command system
 - Establish memorandums of understanding (MoUs), mutual aid agreements (MAAs), and budgets
 - Create SOPs that include tasks and responsibilities
 - Establish a health sector coordination body
 - Establish lines of communication
 - Plan for sustainability post-event (legacy)
- Document and distribute plans:
 - Train personnel on procedures
 - Test plans through exercises
 - Create a mechanism for adjusting and adapting plans
 - Modify plans and policies to incorporate lessons learned from testing
 - Incorporate the concept of “expecting the unexpected.”

INTRODUCTION

Command, Control and Communication (C3) are the procedures and hierarchies that are established for the planning and response to potential public health risks; they do not replace the daily operational control of resources such as emergency medical services. The goal of C3 is operational cross-disciplinary coordination. This improves local, subnational, national and international capability to rapidly recognize and manage a major incident, communicate across the health system, strengthen surveillance, conduct rapid and effective triage, monitor and manage resources, exchange information with the international community as needed, prevent escalation of a problem and save the maximum number of lives.

C3 is needed for organizations, groups, and individuals to effectively conduct a MG event which requires their collective skills and energies. It does not require a single commander nor does it require one or more individuals acting as controllers. C3 requires recognized authority, responsibilities, and accountability, and is an integral part of the Concept of Operations (ConOps).

Everyone involved – at all levels, including regulatory and emergency services, local and national authority, and even the participants – must be aware of their responsibilities. A needs-based comprehensive plan is ultimately cost effective in maximizing the safety and success of the event.

Command enables the effective and efficient use of available resources through planning, organizing, directing, coordinating, and controlling their use to safely and successfully conduct an event. This includes the obligation to assure the health, welfare, morale, safety, and discipline of individuals participating in the event. The goal for MG organizers should be to use a system where the quality of command is defined by measures relating to quality and distribution of information and the quality of decision making.

Control refers to the concept that during the planning and delivery of an event, leadership must organize the resources to respond to demands in a timely manner. It includes the communication tools, structures, procedures, and implementation of resources needed to manage risks that may arise during a MG. Control is iterative with the methods adjusted in response to changes in the situation. The development of awareness, management, and the means and response to situations that arise during the MG are continuous processes.

Communication is the rapid and coordinated dissemination of information related to the awareness of and response to public health issues. Nearly all reports of actual events or exercises of events note shortcomings in communication, which further emphasizes its importance.

The Concept of Operations (ConOps) is the key planning document that captures C3 arrangements both internally and with key partners and stakeholders. It should be defined early and agreed across all stakeholders, so all involved understand and agree how public health services will be delivered during the event. This will need to link in to, and work together with, the ConOps of other partner and stakeholder organizations, of which the most important will be those of the event organizers and the cross government plans. It will be a complex document, but it needs to be readily understandable and accessible by all involved. The establishment of a daily running schedule within the ConOps will help everyone understand their operational commitments and reporting deadlines.

The MG difference

The goal is to create a plan and determine the roles and responsibilities of leaders, managers, and employees together in the context of the needs of the event, the population, and setting in which the event takes place (see chapter 1 on contextual issues and risk assessments). It must also have hierarchy.

The ConOps requires the establishment of three key components: a command system, multiagency coordination systems (control), and communications.

The C3 strategy for a MG needs to be scalable and adaptable to facilitate rapid and effective coordination. It should align key roles and responsibilities, and provide specific authorities and best practices for managing the event, and any incidents.

Key stakeholders must be aware of current resources and continuity planning, and how to align individual organizational plans with those across all levels. The steering group needs to be aware of available resources, acquire any additional resources deemed necessary, and be aware of the needs of high risk populations and how to incorporate them into contingency planning activities.

A majority of MG planners have adopted and adapted an Incident Command System (ICS). The ICS is a detailed structure for command and control and is used in many disciplines in the coordination of emergency response. It developed from the critical need to properly manage rapidly moving wildfires in the early 1970s. It aimed to address a set of serious issues for managing complex events including:

- Unclear lines of authority
- Too many people reporting to one

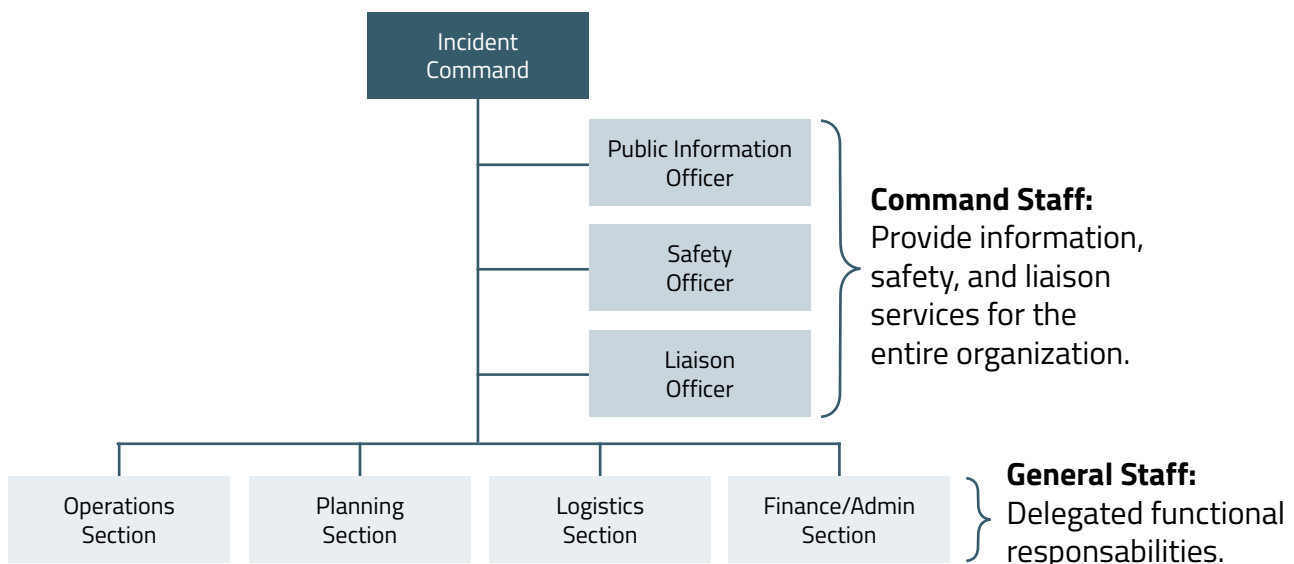
- supervisor (excessive span of control)
- Inadequate and incompatible communications between agencies
- Lack of reliable incident information
- Lack of a structure for coordinated planning between agencies
- Terminology differences between agencies
- Unclear or unspecified incident objectives
- Different emergency response organizational structures
- Multijurisdictional issues
- High public and media visibility
- Minimizing risks to property, life, and health
- How to minimize the cost of the response and maximize the results of response.

It is modular and readily allows for flexibility in the size, nature, and gravity of an event. Specifically, it provides a flexible core mechanism for coordinated and collaborative management, facilitates obtaining additional resources including those that must originate

from different organizations within a single jurisdiction or outside the jurisdiction, or for complex incidents with national implications. The ICS organization develops around five major management functions: incident command; operations, planning, logistics, and finance. The incident commander is responsible for safety, providing public information, liaison with other agencies, and with the four other management functions.

If the size of the event warrants it, then the incident commander assigns individuals to function in the command staff for safety, public information, and liaison and other individuals to the general staff to lead as chiefs of operation, planning, logistics, and finance / administration.

Figure 2: Incident Command System (ICS) structure



Case study: Athens 2004 Olympic and Paralympic Games

In Athens planners adopted an ICS with leadership, operations and capacity under a unified command. They clustered the elements into systems, sectors, subsystems, and organizations, as follows:

1. Systems operating at each administrative level (national, subnational, and local)
2. Sectors (health, emergency management, security and transport, veterinary, and agriculture)
3. Risk-based systems for specific risks (such as civil defence for natural and technological hazards and potential deliberate use of biological, chemical, or radionuclear material)
4. Function-based systems for specific functions or services (health surveillance, risk communication, emergency, response, mental health and laboratories)
5. Contributing organizations that support these systems by providing coordination and the capacity to perform functions.

During major events many different factors can lead to leadership gaps. Anticipating and planning for this potential problem can greatly reduce the gap. Command plans must include cross-training and establishing a hierarchy of decision making. MG planners may assign

committees with the competent authorities involved to reflect governmental and other changes required to adapt to the needs of the event. Instead of adopting a modified ICS, these planners develop their own system after performing a careful review and analysis of risk.

What do we know?

C3 for MGs is difficult to evaluate scientifically because studies comparing frameworks for organizing MGs do not exist. C3 systems which have different levels of hierarchy and complex interagency relationships, are not well documented and do not lend themselves to retrospective evaluations. From the reports of individual events we can surmise that what has not worked in many instances, are situations where the planning did not include good communication and / or crowd control. Interagency coordination and trust is vital for an effective response.

Strong, effective and well-trained leadership during major events reduces damage, improves outcomes for patients, and facilitates a positive experience for attendees. Flexibility is key to the success of any plan.

The planners in South Africa for the 2010 FIFA World Cup conducted a multidisciplinary risk assessment and identified the need to create a

Public Health Cluster (PHC) in their command and control organization for better communication, speed of response, and productivity. This PHC facilitated the coordination of health efforts, maximized communication between agencies, and reduced redundancy for 24 hour shifts, thereby better using the limited expert human resources available.

The South African PHC functioned similarly to the Public Health Command Centres, established for the summer Olympic and Paralympic Games; Atlanta 1996, Athens 2004, Beijing 2008, and Salt Lake City 2002 Winter Games. Salt Lake City 2002 followed soon after the 9/11 attacks and the anthrax letters alerting planners to the risk of the deliberate use of biological, chemical, or radiological agents. This realization compelled planners to require health agencies to collaborate closely with each other and also with partners in intelligence, defence, law enforcement, and those in emergency management functions.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

Operation centres for C3 of major events should be pre-established permanent facilities and not set up on an ad-hoc basis. Systems need to be

tested before hand and thereafter maintained on a continuous basis to ensure that the centre is fully functional at a minute's notice.

Case study: C3 structure, 2010 FIFA World Cup South Africa

The Department of Health of South Africa was in charge of ensuring overall provision of services for the 2010 FIFA World Cup. To ensure an effective oversight of the event they developed a robust model integrating national and provincial roles. The first step was to plan for both lateral and vertical reporting methods; this required the establishment of Provincial Health Operations Centres (ProvHOC) and a single National Health Operations Centre (NatHOC), which operated on a 24/7 basis. Various organizations, including the World Health Organization (WHO) and the United States Centers for Disease Control and Prevention (CDC) helped in designing the reporting and oversight methodology.

Besides daily medical operations, it was important that public health featured prominently to prevent or reduce the risk of infectious disease or food-borne illness outbreaks. Planners thus created a public health cluster which met daily to assess the status quo. National and Provincial Outbreak Response Teams were on standby for the duration of the event to respond to any food-borne or communicable disease outbreak.

SOPs detailed public health and medical operation reporting, including food-borne incidents and communicable disease reports. Planners developed an event-specific tool for

food-borne disease outbreaks.

Routine reporting for communicable disease was standardized using operational templates and consisted of patient contacts, tournament related resource deployments, provincial event medical services (EMS) status, incident reports, designated hospitals bed availability status and communicable disease incidents.

Exceptional reports were required in those instances when an incident was deemed to be newsworthy or requiring senior intervention. The pyramidal approach was adopted for reporting and information processes were designed to consolidate need to know information as it escalated upwards.

Health intelligence played a crucial role in the command and control process and officials within this section were responsible for constantly monitoring local, regional and international events that could have a bearing on the tournament.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

Start as soon as possible, at least a year before the event but it is better to begin planning several years in advance. C3 arrangements should be informed by the risk assessment, MG context and a review of current operations to identify and enhance systems.

READINESS:

- Stakeholders should agree on the purpose, timing, relevance, and nature of the MG
- An established organization for the MG with the policies, processes, procedures, and characteristics needed to accomplish a range of anticipated tasks
- Participating organizations and individuals must know their roles, and be motivated, educated, trained, and practised; all of this should be set down in the ConOps
- Mechanisms and tools must be implemented for the collection and sharing of information, including geospatial tools for data collection
- The means and methods for surge capacity must be established and assured.

OBTAIN GOVERNMENTAL SUPPORT AND LEGAL ARRANGEMENTS

- Significant effort is required to ensure cooperation between governmental agencies and between relevant private sector elements. See chapter 3 on working with partners and stakeholders, this is best facilitated by governmental support and may require new legislation.
- Laws may need to be modified in order to facilitate the transfer of funds, resources, and / or data between agencies, organizations, international

agencies or to the private sector or to enable the use of new medications, devices, or other tools

- Coordination of different agencies with overlapping responsibilities often requires detailed negotiations.

INTEGRATE ACTIVITIES

- Select and establish a unity of purpose and a command system
 - Create a chain of command, preferably one with built-in flexibility across the entire organization
 - Agree on a unity of purpose across all organizations for success of the MG. That is, individuals, organizations, and systems agree to act toward the common purposes of assuring a safe MG
 - Establish multiagency coordination systems
 - Establish a tracking system for all resources (human, personnel, vehicles, medications, and equipment)
 - Plan for information dissemination.
- Establish memorandums of understanding (MoUs), mutual aid agreements (MAAs) and budgets
 - Directives, MoUs, and MAAs streamline the multi-agency functions of the public health command and control structure. They determine which agencies

- will be responsible for which resources, resource distribution and activities
- Ministerial / departmental directives, formal MoUs and MAAs between different entities at all levels of government and the private sector, help ensure cooperation. Existing versions should be reviewed and revised as needed based on comprehensive planning and exercising leading up to the event
- Create a realistic budget.
- Create ConOps supported by SOPs that include lists of tasks and responsibilities
 - Outline roles and responsibilities
 - Determine and designate people with decision-making authority per level
 - Establish nodes of communication
 - Integrate data gathered from multiple sources (surveillance, laboratories, intelligence, the media, etc.) into succinct reports for decision makers. This should include all details on how information should be shared including for example on frequency and deadline for daily reports, etc.
 - Provide an identification system for key responders (including local emergency physicians) for easy access to the area
 - Participate with regional or other planning bodies.
- Establish a health sector coordination body (see chapter 3)
 - Ensure all key elements of the health sector are represented
 - Ensure that they have access to data on available resources and on potential and existing health events in the country before, during, and immediately after the event
 - Ensure that they are connected to other support agencies (law enforcement, fire rescue, border patrol, etc.)
- Coordinate with public and private hospitals, urgent care centres, clinics and facilities
- Ensure that they have multiple means of communicating
- Incorporate mass casualty planning into established event management plans
- Include citizen groups or volunteers in the planning process
- Plan and train responders to use urgent care centres, clinics and facilities other than hospitals to provide care for non-emergency patients.
- Establish lines of communication
 - Establish multiple communication
 - Assure adapted, secured communication channels
 - Consider establishing multiple real-time means of communication
 - Ensure that communication flows up, down, and laterally through the chains of command
 - Include a plan for calling and deploying personnel
 - Organize scheduled / periodic vital information updates
 - Evaluate and plan for potential language barriers to communication
 - Anticipate incident-specific communication problems and plan for alternate means of communications (e.g. text vs voice, image, hand-signals, digital, satellite, fax, pen and paper, transceivers that do not require power, etc.)
 - Remember, information is a strategic asset. How it is disseminated affects the ability of the organization to deal effectively with the challenges it faces.
- Document and distribute plans
 - Train personnel to the plan in order

- to ensure that they:
- Know and understand the preparedness plan
 - Are ready to implement plans
 - Know their roles and responsibilities
 - Are familiar with privacy concerns
 - Know and are ready to use lines of communication
 - Understand and know how and when to utilize any special equipment
 - Are ready functionally and mentally to perform independently during any unexpected incidents of communication isolation that may arise during a critical part of a massive unexpected health event
- Exercise and test the plan (see chapter 6)
- Ensure plans work in the MG location, with expected staff, for the particular event, and under the national and international environment likely to exist when the event takes place
 - This process also tests how well prepared your personnel are to manage the plan. If they are not ready, retrain them or substitute the individual for someone more capable
 - Adjust plans and policy to accommodate lessons learned from exercises and evaluation
- Incorporate the concept of “expecting the unexpected”; flexibility is key
 - Design strategy for sustainability and post-event legacy (see chapter 2).

During the event

- Review plans and if required adapt them accordingly and make sure that everyone impacted by the change knows why the change was made, what the change is, and how it will alter their roles and responsibilities
- Communicate with all stakeholders, including the media and public
- Mobilize multidisciplinary teams' onsite. Coordinate with security, law enforcement, municipal services, etc.
- Monitor hospital capacity, EMS readiness, resources availability, and surge capability.

After the event

- Immediately following the event evaluate the aspects of C3 that impacted on communication, preparedness, and response:
 - Keep what worked well
 - Adapt or eliminate what did not work
 - Adapt systems to compliment routine public health functions
 - Ensure that SOPs are modified to reflect the lessons learned during the event
- Perform a budget analysis:
 - Maintain plans for future events
 - Determine what was and what was not cost-effective
 - Identify more cost effective means of conducting safe MG events
 - Identify areas for improvement.

Chapter 6 – Testing and exercising

KEY CONSIDERATIONS

- The event risk assessment and MG context should be used to inform the testing and exercising (T&E) programme
- Use T&E to validate plans as they are developed as well as to ensure that proper training and skills have been provided
- Review and learn from other MGs and previous experiences (e.g. the H1N1 flu pandemic); share resources and scenarios
- Start early to ensure operations centres and roles, staff training and logistics are fit for purpose, including support functions such as information and communications technology
- Start with internal steady state working and ensure this is fit for purpose before testing arrangements with partners and stakeholders and escalating to significant and major events
- Test across partner organizations and all stakeholders to ensure multi-agency command, control and communication works, and that all stakeholders understand their roles and responsibilities
- Test the ability to respond rapidly and robustly to information requests / requirements from event organizers (responses may not always be evidence-led), Government and media
- Include communications to clarify arrangements for formulating, agreeing and disseminating public health advice across partners
- Run exercises to very tight timescales with rapid debriefs; identification of actions with tight deadlines, and close monitoring of these actions should then be challenged during subsequent exercises.

INTRODUCTION

The importance of including T&E in the planning for MGs was succinctly summed up in G.W.O. Fulde's report, "Open air rock concert: an organized disaster" which stated: "A plan that has not been practised may well compound a disaster".

All involved in delivering MGs need to ensure that training and exercising are included in the planning process. When establishing the T&E programme it is important to focus on the MG difference, such as changes in existing working arrangements, emergency preparedness and the ability to quickly implement surge resources. The T&E programme should include testing the

plans, procedures, systems as well as the personnel skills, knowledge and expertise required to deliver them. The level of preparedness will vary between events and hosts so it is important to ensure that an appropriate T&E programme is built into the planning process and is informed by the event context and risk assessment.

T&E is routinely included in emergency planning and preparedness; for MGs this should be expanded to cover normal daily operations, especially for large or high risk events. When planning it is important to consider current practices, for example:

- Standard T&E emergency planning and

response arrangements within and across health organizations

- Routine response plans e.g. pandemic influenza or emergency response
- Experience of responding to disasters or major incidents; their learning from these should feed into the MG planning and exercise programme
- Routine T&E.

to across all stakeholders involved in the event. These can be designed as table top, functional, or full-scale exercises or drills (see table 1).

There are many levels of T&E, from an individual organizational or service level,

Table 1: Levels of training and exercise

Type of exercise	Approach	Benefits	Examples from London 2012
Tabletop (TTX)	▪ Informal discussion of simulated, scenario-based emergency ▪ No real-time pressures ▪ Low stress	▪ Evaluating plans, procedures and roles and responsibilities ▪ Raising awareness ▪ Resolving questions of coordination and responsibility. ▪ Training. ▪ Often used early in planning to identify improvements in plans and training requirements	▪ Cross-health partners - C3 arrangements, roles and responsibilities organisational (public health) internal processes (ConOps) ▪ Working with event organizer ▪ Capacity to respond to two concurrent serious incidents during the event ▪ C3 arrangements with key external stakeholders
Command Post (CPX) (Functional)	▪ Stressful, realistic, scenario-based simulation ▪ Takes place in real time ▪ Emphasises emergency functions ▪ Operations centre should be activated and tested ▪ Can coordinate across many agencies	▪ Routinely used to practise emergency response plans ▪ Tests policy and coordination of personnel ▪ Can be used to test working arrangements across many agencies e.g. MG operational plans	▪ Cross Government C3 arrangements across Government - Integration of plans, policies, procedures and infrastructure - Security issues, e.g. Chemical, Biological, Radiological, Nuclear, Explosive
Field (full-scale) LIVEX	▪ Takes place in real time ▪ Employs real people and equipment ▪ Coordinates across agencies ▪ Tests several emergency functions ▪ Emergency operations centre is activated	▪ Provides the best assurance and most robust testing of emergency response arrangements e.g. evacuation, casualties, and media handling under 'live' conditions	▪ Event organizers sports test events ▪ Specific organizational commitments, e.g. daily public health reporting, enhanced response
Orientation exercises	▪ Informal ▪ No simulation	▪ Low level, internal ▪ Discussion of roles and responsibilities ▪ Introduction of policies, procedures, plans, responsibilities	
Drills	▪ Single emergency response function	▪ Single agency involvement, often a field component (e.g. fire evacuation drill)	

What do we know?

There is very limited published evidence based literature on T&E generally, and even less so specifically for MG. Many papers identified the need for T&E during the planning and preparedness stages, however, there is very limited information on how and what was done and identified learning or recommendations for future MG planners.

The majority of the information is experience based and focuses on large MGs such as the Olympics; more information can be found in written reports from London 2012, Beijing 2008 and Athens 2004. One of the key areas identified in the London 2012 report is the importance of testing daily operations rather than just focusing on emergency response.

The report on the Beijing 2008 Olympic and Paralympic Games section on training and exercises included:

- Carefully planned T&E were essential

for the successful emergency transfer operations during the Games

- An exercise to simulate a stampede among crowds was conducted to test communication and cooperation between medical teams and police officers, transportation teams, security guards, volunteers and other groups in venue
- Water quality: The team took part in training programmes provided by the Beijing Health Bureau, which included a series of field exercises and desktop scenarios.

There is T&E information available in the form of guidance and training documents focusing on the planning, training and testing requirements for health organizations' emergency planning arrangements and business continuity plans. These include excellent information on the principles, requirements, processes and benefits for T&E but not within the MG context.

GUIDING PRINCIPLES AND BEST PRACTICE

What we should do?

T&E should be an ongoing process in the build-up to the event and inform changes to the plans, creating an iterative and dynamic plan that is reviewed and updated by the recommendations from the exercises (see figure 1). The process should include an evaluation and learning element and should be started early enough to allow any lessons identified to be applied and challenged, but should be realistic and proportional to the event. Run exercises internally, and across partners to ensure reporting arrangements, roles and responsibilities are understood. The focus should be on daily operations and working arrangements before testing major incidents or emergency response arrangements. It is also worth ensuring that plans cover both the MG participants and the general public; there can be a tendency to focus solely on the MG and not the host community.



Figure 1: the testing and exercising iterative process

MG-specific risks

It is important that the T&E programme reflects and provides assurance on one or more core components of the planning and operational delivery, including:

- Increased demands: testing new or additional roles, organizations, capabilities and structures that are required to service the exceptional demands resulting from the event and which could not be delivered through current approaches. This also needs to consider the lower tolerance to any incidents
- Roles and responsibilities: testing whether people understand their roles and reporting arrangements within and between organizations; whether staff have been appointed and fully trained, the boundaries of decision making across organizations, with clear arrangements for managing routine events, incidents and crises
- Integration across stakeholders: these include the potentially very broad group of stakeholders that could be involved: event organizers, government, safety and security (police / military), transport, local government and the local community
- ConOps: testing whether these are defined, in place and tested, both internally and across organizations. Lessons learned need to be embedded
- Communications: testing information flow and reporting processes to ensure they are fit for purpose and that any public information can be agreed upon and disseminated rapidly
- Event systems: test these have been established and information and intelligence flows work, and whether the relevant infrastructures have been approved and tested e.g. phone or other networks, open or classified
- Resilience: testing the capacity to meet event commitments, provide emergency response and support regular operations to non-event-associated incidents
- Breadth of incidents that could happen associated with the event; the majority of these will have some public health impact e.g. a major transport problem may include inhalation of smoke or chemicals or people stuck in old and poorly ventilated tunnels.

Deliberate events and emergency response

Deliberate events should be explicitly considered, in particular for MGs that are perceived to be of higher risk e.g. religious festivals, major international sport events, and for those host countries which have a recognized risk of terrorism. Many countries will already have plans and T&E programmes

associated with deliberate events and major incidents. However, these should be reviewed, revised and tested specifically with the MG difference, including international arrangements.

Case study: Beijing 2008, health emergency teams and training and exercises, a legacy

To improve the on-site emergency response capacity, the Ministry of Health established national health emergency rescue teams including medical first aid, pandemic prevention, professional medical rescue and comprehensive medical treatment personnel.

The “National Health Emergency Training Programmes 2006 to 2010” involved disease control, healthcare, health supervision, blood

collection, mental health intervention and health security. The Ministry also organized exercises in the medical rescue in nuclear radiation incidents and plague prevention and control, avian influenza prevention and control, in collaboration with the Hong Kong and Macao health section. These exercises significantly strengthened the ability of the rescue teams.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

By nature the T&E programme will take place before the MG and should be an iterative learning process with each exercise informing improvements in the planning and delivery of the MG.

Best practice for general T&E is already outlined in guidance documents produced by governments and organizations. These include training materials focusing on the planning, training and testing requirements for health organizations emergency planning arrangements and business continuity plans.

Exercises should have the capacity to address and assess:

- Notification of a public health event
- Response to a public health event
- Communications between agencies / partners
- Internal notifications
- Procuring methods for required services
- Collection, use and disclosure of information
- Effectiveness of public health measures taken
- Media relations

- Training needs
- Contingency plans
- Identification of operational issues.

In addition, the key points below are summarized from the Health Protection Agency Health Emergency Planning Handbook. These principles should be applied for the MG programme. Exercises should:

- Bring together those involved, inform and motivate staff, assess performance and identify training needs
- Assess whether there is a competent workforce able to deliver and meet their responsibilities and assess whether they have the capacity to function during the event and / or an emergency
- Assess the decision-making and communication skills of both individuals and organizations to respond to the MG and / or emergencies
- Assess the potential impact of the event on the organization; ensure resilience under the event pressures (taking an event-based approach to the MG over an emergency response approach will help this); and

resources are available

- Test the ConOps (and / or emergency response plans)
- Include a rapid debrief process to identify lessons and recommendations. This will ensure a rapid response to learning from exercises
- Ensure that these lessons have been embedded and are addressed in the planning.

It is also important to:

- Test internally before cross-organizational testing
- Gain early engagement in planning for exercises across all stakeholders
- Work closely with government, event organizers and partners.

Scenarios

The public health risks identified during the MG risk assessment should inform the scenarios used during the T&E programme. These risks scenarios

should also include those incidents that occur frequently such as food-borne disease outbreaks to help stakeholders understand typical operations. There can also be an opportunity to raise awareness of more unusual incidents that may cause disproportionate concern if occurring during the MG but have a limited risk e.g. malaria occurring in MG visitors when in countries without the vectors which carry this.

The learning process

After exercises are concluded, the strengths and weaknesses should be identified in an after-action report, together with an improvement plan, which outlines the actions the relevant authority(s) will take to address issues. This plan outlines the recommendations, actions and the parties responsible for implementing them. Examples of possible recommendations include updates to existing plans, policies, procedures, protocols, systems, equipment, training, and facilities.

After the event

There can be a recognizable benefit and legacy from the T&E programme through improved working practices and the understanding of roles and responsibilities across stakeholders and within organizations. It can also potentially improve emergency response

arrangements. For those involved in smaller events, there can also be a benefit through further building relationships, networking and an understanding of other agencies' roles and responsibilities.

TOOLS AND RESOURCES

There is some guidance and information available, as listed from various governments, and some information included in planning texts (e.g. Key Considerations 2008) but not as explicitly as required. There is a benefit of developing specific T&E resources for MG.

The UK Cabinet Office: How to run exercises and training for emergency planning and preparedness, with an introduction to the Central Government Emergency Response Training (CGERT) Course.
www.gov.uk/emergency-planning-and-preparedness-exercises-and-training

The US Federal Emergency Management Agency: www.fema.gov/emergency-planning-exercises

The Australian manual: www.em.gov.au/Documents/Manual43-EmergencyPlanning.pdf

Health Protection Agency Health Emergency Planning: A handbook for practitioners (2nd edition). London: HPA

Chapter 7 – Risk and Crisis Communications

KEY CONSIDERATIONS

- Risk communication should be an essential activity in the preparedness, response and learning related to major public health events and MG
- Risk communication should be a sustained, systematic, proactive and engaging communication rather than crisis communication, which has a more command and control approach
- Ensure this is an on-going process rather than a product, and that it is not exclusively based on information transmission
- Shape and determine risk communication through the implicit organizational 'messages' related to governance decisions, policies and practices
- Risk communication must be shaped by intelligence about and adapted to the context of specific events in regards the cultural, social, political and economic dimensions and settings.

INTRODUCTION

Developing MG risk communication strategies helps clarify organizational assets and needs related to risk communication and increases the capacity and competence of health professionals and managers to understand and address the information, attitude and behavioural needs of different public groups involved in MGs.

The WHO International Health Regulations (2005) identify risk communication as a core capacity in the preparedness, response and recovery to major public health events and MGs.

Risk communication encompasses a range of activities related to listening, relationship building, development of supportive environments and coordination that can be applied to the organization and implementation of all MG communication activities.

However, risk communication is often marginalized. 'No news is good news' has long been the rationale for public health communication. Moving from

this reluctant communication attitude to more participatory and transparent communication approaches is a necessary, but often complex journey requiring changes to policy and public health practice and governance. The adoption of broader risk communication approaches is of particular relevance for the organization of MGs. It, however, requires pro-active, systematic, long-term efforts and changes in both individual and organizational practice before it can become part of routine / mainstream public health practice and governance.

MG risk communication: a changing landscape

New challenges and assets are reshaping the MG risk communication landscape:

- New behavioural science approaches: In recent years the understanding of human behaviour has developed significantly. This has highlighted the fact that 'message communication' approaches focused on 'crafting information and sending messages' is not enough to achieve positive impacts on people's choices. Learning from social behaviour is increasingly providing practical, and often cost-effective, solutions to addressing the diversity of behavioural challenges in different populations
- New risk communication paradigm: Building on new behavioural science knowledge, risk communicators have been moving away from scientific fact conveyance and focusing more on gathering intelligence and shaping interactive communications based on cultural and social contextual factors that shape the perception and understanding of health risk before, during and after MGs
- Social media: The visitors of MGs now connect with their peers and gather, assess and share all sorts of information quickly. Communication strategies need to acknowledge this reality and ensure that official health information is present and takes advantage of these social media networks for rapid low cost means of communication.

What do we know?

Terms and definitions: Risk communication and crisis communications

Risk communication is distinguished from crisis communication as it is more sustained, systematic, proactive and engaging, while crisis communication has a more command-and-control style.

Risk communication starts before a crisis, is less directive, and has more time to explain even difficult and contradicting scientific positions. Importantly, it also has the time and opportunity to offer diverse approaches to bridge the gap between the scientific assessment and public perceptions of risks. Risk communication is not just about the communication of risks. It is important to build the capacity of the general public and public health practise to better understand and act upon health risks at MGs and other public health emergencies.

Crisis communication occurs during an emergency when information is needed

by the public to reduce risk and increase protection. During an emergency, time is short and crisis communication therefore needs to be concise and often unidirectional. Crisis communication, however, only works well if they build on the on-going base-laying work of risk communication.

GUIDING PRINCIPLES AND BEST PRACTICE

- Participation in MGs often represents diverse social, cultural, political and economic situations. Any risk communication needs to take this into account. Different languages and behavioural norms may also need to be considered
- There is a need to balance bringing people together to meet and celebrate, and at the same time, keep them away from each other to prevent, for example, crowd injuries, stampedes or the transmission of infectious diseases
- Participants often plan for their travel a long time in advance, which may impede them from complying with health messages, especially in relation to self-reporting of disease where their participation might be put in doubt
- Major MGs are often subject to intense media interest. Managing and working with media to achieve communication objectives is a challenge but can maximize the outreach
- Risk communication has an important role to address people not only on national information focused activities, but engage with people and communities, including on an emotional level
- Organizers may have time to establish trusting relations with the local community however for travelling participants, even domestic travellers, there is only a short window of time to conduct risk communication activities.

Four key principles should be considered during the design of risk communication strategies for a MG:

1. Building relationships and trust: Risk communication is concerned with building relationships between authorities and the public through listening and understanding peoples' perceptions and behaviours. Relationship building allows authorities and relevant communities to benefit from each other's knowledge, insights, and assets

early in planning and then through on-going monitoring, and evaluation-based learning. Such relationships enhance peoples' sense of trust, empowerment and ownership and build social capital and resilience and can make public health communications more effective.

2. For MGs this means starting, long before the event begins, to communicate with relevant communities and stakeholders. Trust and relationship building with transient participants of MGs will be a particular challenge; so it is important to learn from previous experience, listen to people on the ground and engage in innovative and creative solutions.
3. Early and transparent communications: In the event of an acute public health event this will help to avoid the propagation of rumours and misinformation. At MGs, rumours will travel further and faster by the presence of international and social media.
4. Planning: The public, media and political interests in MGs can effectively bring together multinational health and security sectors to work alongside national and community groups to learn from one another in preparing for the event. Ultimately, effective planning and how to listen to and engage with various groups and stakeholders can make risk communication during the MG more effective. Including and engaging opposing groups and creating situations for finding joint solutions has achieved some success at the local level, for example, preventing fan violence.

New risk communication and MG governance: From a command-control-approach to relationship building

Risk communication and MG governance considerations call for a shift from vertical structures to management approaches that are more pro-active, interactive, horizontal and democratic.

Key characteristics include:

- Looking collaboratively across all stakeholders to facilitate communication, trust, commitment and understanding
- Engaging citizens to encourage participation, transparency and accountability
- Provide evidence to MG organizers through bodies such as international sporting agencies, commissions, regulators and auditors
- Learning from experience (in this case of similar MG events) and anticipating future needs through improved forecasting, listening, relationship building, and development at local and community levels.

Applying these approaches to risk communication allows organizations to move away from exclusively focussing and relying on reactive command and control approaches (e.g. as related to crisis communications in emergency response situations) and to develop and apply more pro-active strategies.

The aim is to engage in broader, earlier, and co-produced risk communication that increases the capacity and competence of health professionals, managers, and the general public to better understand and engage with the various impacts of MGs. This can be an important legacy of the MG.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

In order to translate the theoretical approaches described into more practical steps, a framework to encourage MG managers to analyze different layers of risk communication and different activity is provided. Risk communication has three main layers: information, communication, and coordination before, during, and after MGs.

The three layers are further subdivided into main activity areas:

- Information: Includes information and intelligence gathering, assessment and intelligence sharing
- Communication: Includes the strategy and methods of risk communication, key messages, work with key stakeholders and major groups, and appropriate communication formats (e.g. website, international relations officer, etc.)
- Coordination: Includes from the local level of the events to the regional, national and international coordination.

These activity areas are interlinked and reflect on existing activities and plans and so further improve activities based on an explicit risk communication policy agenda.

One way of using this framework is for MG risk communication planners to structure their planning according to the timescale of the event and to design a risk communication action plan for 3 phases as an on-going process. These phases are:

- Before the event (Preparedness)
- During the event (Response)
- After the event (Legacy).

Before the event

Risk communication is an on-going process and not merely a product. A key part of that process is to contextualize risk communication in regards to the cultural, social, political and economic dimensions of the event. To this end, a risk communication strategy for the MG should be built on trust and relationships with communities hosting or impacted by the MG. Within the communities there will be those that are impacted differently by the MG; some may be pleased to host the event, while others may not. Public health authorities have responsibilities to all of these groups and will need to identify and engage with them.

MG PREPAREDNESS INCLUDES:

Information: Gathering, assessing and sharing:

- Who is the audience?
- Where is the audience?
- What are objectives of the relationship building and the purpose for communicating to a particular group?
- How will this be evaluated afterwards?

Communication: Key messages and strategy

- Ways through which each group will be engaged
- Ways to promote risk communication as governance approach.

Coordination on various levels

- Coordinating stakeholders
- Other governmental and community planners of the MG
- Timelines for communications activities
- Fit with MG C3 and test these.

During the event

Information: Gathering, assessing and sharing:

Health officials should be approachable and embedded in proactive information sharing with the public, media and international intelligence. In order to engage, and maintain an open dialogue, with all the communities associated with the MG, communicating during the planning phases of the MG and listening to the concerns will help to build relationship and trust.

Communication: Key messages and strategy

Organizers may also consider developing a baseline document by key stakeholders for during the event, such as non-health government departments. This describes the normal health services of the host country / town including their approach and the MG difference, including leadership. The process of agreeing and clearing messages should also be agreed.

Coordination on various levels

Within MG C3 operations, risk communication should have a designated organizational structure with sufficient staff to conduct risk communication activities during the MG and provide additional resources if necessary if an acute public health event occurs.

After the event

Information: Gathering, assessing and sharing:

- Consider the legacy of risk communication activities, i.e. improved public awareness of health improvement
- Consider ways of maintaining the relationship after the MG.

Communication: Key messages and strategy

- Share lessons learned with the international community as a form of MG legacy.

Coordination on various levels

- Risk communication needs to be implemented as part of mainstream public health practice. This will help nations to better comply with the IHR requirements.

Future considerations

Risk communication has to become stronger and more integrated into MG planning. To this end, it would be useful to:

- Continue and broaden the development of a conceptual framework for future analysis of risk communication for MG
- Develop an evaluation framework to qualify and quantify risk communication impact on health system response
- Investigate the social amplification of different risk communication strategies.

There is an urgent need to increase and improve scientific evidence, operational, and strategic expertise in risk communication for MGs and other public health events. International and interdisciplinary collaboration should be strengthened to better inform health policy and MG planning. Risk communication is a core capacity under the IHR. Strengthening risk communication will improve public health practice and inform new governance approaches.

Chapter 8 – Health promotion and public information

KEY CONSIDERATIONS

- Health promotion and public information should be core work streams within MG planning with a clear commitment to minimizing the public health risk; There should be clear leadership and governance arrangements and appropriate and agreed funding
- Event planners should engage public health and communication professionals throughout the planning and risk assessment process to ensure public health risks, health promotion and public information opportunities are identified and realized
- The potential for MGs to be used for health promotion purposes is largely untapped. Organizers should involve communities and consider how the event can stimulate action to promote healthy behaviours in the local population before, during and after the event
- It is important to assess the options for communications, public information and health promotion intervention and methods for those most likely to achieve the greatest health gain, and be the most cost effective.

SECTION A. HEALTH PROMOTION

INTRODUCTION

The WHO defines health promotion as ‘the process of enabling people to increase control over, and to improve, their health. It aims to improve the health status of individuals and communities by empowering them to have control over aspects of their lives that impact on their health. Health is influenced by the relationship between an individual’s personal characteristics and their environment. Health promoters, therefore, centre attention on understanding the individual and environmental factors that cause morbidity and mortality and intervene upstream working across organizational boundaries to influence public policy and improve health outcomes. Health promotion is rooted in an understanding of how health behaviours are formed and draws upon social, psychological, socio-ecological and communication theories

along with other concepts to develop interventions either at individual, community or population level. It’s recognized that just telling people to adopt a particular behaviour is ineffective, an individual’s environment, knowledge, beliefs, skills, support, networks and motivation all influence behaviour.

The literature largely focuses on the opportunities for MGs to promote smoke free lifestyles; responsible alcohol consumption, improve mental wellbeing and encourage healthy eating and physical activity in the local and visiting population. However, the full potential for MGs to improve health outcomes remains largely untapped and poorly evaluated.

GUIDING PRINCIPLES AND BEST PRACTICE

The role of Health Promotion in MGs

There is limited published information on health promotion and MGs, and in particular little evaluation of these. Most of the studies are descriptive and subjective and many are limited to interventions focused on health information as opposed to the full spectrum of health promotion approaches. However, there are common themes regarding the use of health promotion in minimizing risks to health and the use of the MG setting as an opportunity to secure and focus resources to promote health and wellbeing among the local population. The literature demonstrates the effectiveness of health promotion models and approaches in improving health outcomes to ensure evidence-based approaches are adopted and these can be applied to MGs.

Health promotion is an approach to prevent harm from illness or injury and mitigate the

impact on health and wellbeing during a MG. The MG setting has the potential for positive and negative impacts on the health and wellbeing of individuals and communities. Large events pose unique challenges to maintaining health and there are a variety of health risks that can be prevented or minimized by the use of health promotion methodologies at MGs.

A brief outline of the common infectious and non-infectious risks and the health promotion responses identified in the literature is provided here; however, not all risks are included as they will depend on the context of the MG. It is therefore important to engage public health and / or health promotion specialists early in the risk assessment process so that the contribution health promotion can make is fully exploited and the public health risks are identified.

Table 1: Summary of the health risks identified in the literature and the health promotion response

Health risk	Evidence based mitigation	Examples of Health Promotion Responses implemented
Non Infectious disease		
Extreme Weather	Warm weather ▪ Covering skin ▪ Cooling ▪ Increased salt intake ▪ Fluid replacement ▪ Acclimatisation	▪ Anticipating weather extremes ▪ Water misters attached to high velocity fans ▪ Air-conditioned buses used as cooling stations ▪ Shade provision ▪ Public awareness raising of preventative behaviours e.g. use of sunscreen, increased water intake, seeking shade, covering the head, wearing loose light coloured clothing ▪ Salt intake (1g added to 1 pint of drinking water) ▪ Free and well signposted drinking water ▪ Ensuring toilets and health facilities are positioned in shaded areas ▪ Availability of sunscreen, hats and fans
	Cold and wet weather ▪ Warm clothing ▪ Hot food and drink ▪ Warm areas	▪ Provision of rain ponchos, umbrellas, foil blankets ▪ Availability of hot food and drinks ▪ Messaging to ticket holders to encourage appropriate clothing ▪ Availability of warm clothing to purchase
Minor injury Falls, sprains, minor cuts blisters, bites	▪ Appropriate footwear ▪ Responsible alcohol consumption	▪ Robust alcohol and substance misuse policy to reduce intoxication ▪ Public messaging to promote responsible alcohol consumption

Health risk	Evidence based mitigation	Examples of Health Promotion Responses implemented
Non Infectious disease		
Alcohol and substance misuse related illness	▪ Planning and licensing controls ▪ Minimum pricing ▪ Alcohol policy ▪ Responsible drinking awareness and education ▪ Alcohol and drug specific response centres ▪ Provision of safe drinking containers	▪ Licensing levers e.g. restricting drink promotions ▪ Public messages promoting responsible drinking
Existing health issues	▪ GP pre-travel assessment ▪ Self-care, self-help ▪ Adequate supply of appropriate medication ▪ Avoidance of high risk situations	▪ Pre-event health information and advice ▪ Daily air quality alerts
Infectious Disease		
Sexually transmitted infections	Safer sex practices including: ▪ Condom use ▪ Abstinence ▪ Regular STI testing of at risk groups e.g. sex workers ▪ Monogamy	▪ Condom distribution ▪ Awareness raising of safer sex practices ▪ Availability of rapid testing ▪ Targeted risk-population approaches e.g. promoting and supporting safer sex practices among sex workers; awareness raising at venues attended by men who have sex with men (MSM)
Gastrointestinal disease	▪ Food hygiene ▪ Individual hand hygiene ▪ Avoid uncooked food ▪ Surveillance ▪ Infection control	▪ Public advice on hand-washing ▪ Public awareness of food hygiene standards ▪ Public awareness of restaurants with good hygiene standards
Infectious Disease (Other)	▪ Immunization ▪ Surveillance ▪ Symptom awareness	▪ Travel health advice on infectious risk and proposed action ▪ Medical staff provision of public health messages

MGs as an opportunity to raise awareness, promote and reinforce healthy behaviours amongst individuals and communities

Utilising MGs as an opportunity and setting in which to reinforce healthy behaviours among the resident and attending population is a concept that has not yet been fully exploited by MG planners. However, there is evidence of the positive health impacts of MGs and their potential to support healthy behaviours and mental wellbeing. This is both through increasing local participation and building social networks which impact

positively on social cohesion and mental health and by exploiting opportunities to implement programmes that facilitate healthy behaviours.

There are numerous examples of evidence-based health promotion interventions that have shown to improve health outcomes. Behavioural support for smokers to quit; brief interventions to reduce people's alcohol

consumption; school based interventions to improve young people's mental health and the provision of green space, walking and cycle routes to increase physical activity levels are just some of the interventions recognized as being cost effective in improving mortality and morbidity. MGs provide a platform to implement these types of health promotion interventions through access and engagement with communities, reinforcing positive social norms, secure support of positive role models, generating investment and stimulating partnerships to improve health outcomes. Particular health issues affecting the local population can be granted increased prominence by engaging key stakeholders and aligning resources.

Event organizers and their partners have capitalised on opportunities to promote health. For example, the Athens 2004, and London 2012 Olympic and Paralympic Games implemented programmes both prior to and during the event

to increase participation in physical activity in the local community through, for example: provision of and access to sports facilities; community-based opportunities for participation in physical activity; awareness raising and training for health professionals on the benefits of physical activity. The South East Asia Games held in Vietnam in 2004, actively promoted non-smoking as the norm. The organizers implemented smoke free venues; provision of health information, restriction on tobacco sales, sponsorship and advertising and engaging a wide range of partners in health promotion efforts to promote and support the local population to be smoke free.

Planning Health Promotion Interventions

The Ottawa Charter (WHO, 1986) for health promotion provides a useful framework for the development of health promotion interventions at MG events.

They committed to a range of actions to improve health:

- Building healthy public policy – involves putting health on the agenda of all policy makers, considering the impact of policy on health and influencing opportunities to improve health
- Creating supportive environments – generating health promoting environments that are safe, supportive and energising
- Strengthening community action – identifying, utilizing and strengthening community assets for health
- Developing personal skills – empowering people to take control over their health by providing the skills, knowledge and support to enable them

to make healthy choices

- Re-orientating health care services toward prevention of illness and promotion of health – engaging all health services in upstream interventions to prevent ill health and increase individuals control over their own health.

Table 2: Health Promotion Interventions

Approach	Aim	Activity	Examples
Healthy public policy	Physical and social environment enables and / or supports healthy choices	Multi-agency policy and planning activities to consider impact on health	- Restricting the sale of alcohol - Alcohol minimum pricing - Enforcement of illegal substance laws - Infectious disease screening and immunization status controls for foreign visitors - Reducing air pollution by restricting vehicle access - Access to safe green space for physical activity - Restricting alcohol sponsorship
Supportive environments	Creation of a healthy society	- Promotion of health included in event planning. - Safe environments	- Smoke free environments. - Provision and promotion of healthy food options - Provision of free drinking water - Provision of dry areas and non-alcoholic drinks
Community action	Empowered communities taking ownership and responsibility of own health	- Community mobilization - Campaigning - Community-led health projects	- Community kitchens and allotments - Community led physical activity programmes - Community champions and role models to reinforce hygiene and sanitation - Working with the local community to reinforce responsible drinking and to support efforts to curb drinking in the local community
Personal skills	Empowered individuals with the knowledge, skills and confidence to improve and maintain their own health	- Providing information, education and tools for health and enhancing life skills. - Social normalization	- Facilitated counselling and support - Health improvement messaging. - Access to health tools – e.g. condoms, sun screen, hand sanitizer, etc. - Celebrities promoting healthy behaviours
Health services	Prevention of illness and injury	Promotion and provision of quality, appropriately resourced and accessible health services to prevent, screen and treat health	- Promotion and provision of drop-in sexual health screening and treatment services. - Mass vaccination programmes - Alcohol and substance misuse screening and treatment services

Case Study: London 2012 Olympic and Paralympic Games health promotion planning

The key aim of the public health planning for the London 2012 Olympic and Paralympic Games was to minimize the impact of preventable illness and injury on health services and ensure a healthy games experience for Londoners, spectators and visitors. The approach ensured that promoting healthy behaviours was at its core,

it utilized a national approach with central leadership, focused on creating and utilizing partnerships to support deliver and ensure consistency and maximized contribution to a lasting legacy for health improvement.

The programme had a number of projects which are outlined in table 3.

Table 3: Case Study – London 2012 Olympic and Paralympic Games

	Aims and Objectives	Outputs
Healthy events	To influence event promoters to address health risks and utilize opportunities to promote health	- Development of healthy event principles to guide event planning - Information and support for public services planning and licensing groups to guide conditions of planning applications.
Alcohol and substance misuse	To facilitate responsible drinking cultures and minimize the impact of alcohol and substance misuse on illness and injury	- Support to planning and licensing in scrutinizing event alcohol policies - Public messages promoting responsible drinking - A London wide calendar of events that captured information on provision of alcohol - Provision of public information via events regarding substance misuse - Evaluation of the impact of the Games on alcohol related illness and injury
Sexual health	To promote and raise awareness of safer sex practices, engage young people in managing their own sexual health, ensure equitable access to sexual health services throughout the Games period	- Condom distribution via key events; bars and clubs - Sexual health promotion campaign - Engagement of young people in a sexual health competition to generate innovations to improve sexual health - Planning templates for sexual health services to ensure demand for sexual health services was met during the Games
Sun safety	To reduce the impact of heat and sun on public health and health services, raise awareness of sun safety precautions and ensure sun protection was a consideration in event safety planning	- Sun safety outreach at outdoor events on hot days - Distribution of free suncream - Sun safety information campaign - Distribution of sun hats
Health information and signposting	To ensure consistent and informative health messaging for visitors and residents to support appropriate access to health services and to promote healthy behaviours	- International health signposting and healthy behaviours campaign - Dedicated health signposting and health information website
Go London: Health Improvement Legacy	To use the Games to drive participation in physical activity up to and beyond the event	- Locally driven initiatives to improve the health of Londoners - Pan London programme with industry sponsorship to encourage people with long-term conditions to be more physically active - GP training on the benefits of physical activity

SECTION B. PUBLIC INFORMATION

INTRODUCTION

Any information available to the public is considered as 'public information'. During a MG, public information helps to provide assurance to the population that actions have been taken to identify and respond to the first indication of illness that might be linked to the MG, as well as identify issues of public health significance that could have implications for the MG.

Public information is essential to enable the public to take any necessary precautions to protect their health and enjoy the MG safely. Public information before, during and after a MG is important because:

- People DO believe what they read and hear
- Utilizing the mass media (for example TV, radio, newspapers, social media channels) is the quickest and cheapest way to inform people of any potential risk to their health and what they can do to stay safe and healthy during an MG

- It is the responsibility of the health system of the host country to prepare for and protect the nation's public health during a MG
- Proactive communication with the public, even when there is little or no risk to health, is an opportunity to replace rumours / claims / urban myths with facts and communicate health promotion messages simultaneously.

However, the availability of information does not ensure that the public are aware that the information exists and is available and relevant to them.

Active promotion of information to a mass audience during a MG requires trust between the public and an organization. Fostering this trust and looking after the reputation of organizations with the aim of influencing people's opinion and behaviour is the role of public relations practitioners.

GUIDING PRINCIPLES AND BEST PRACTICE

Any public information campaign underpinning the public health elements of a MG will require early and careful strategic planning. Based on the experience of the London 2012 Olympic and Paralympic Games this section provides practical

guidance to communicate effectively with the public and prepare for expected and unexpected public relations opportunities before, during and after a MG. This guidance should be considered alongside best public relations practice.

Table 4: Case Study – London 2012 Olympics and Paralympics Games

Stage	Aims and Objectives	Outputs
Analysis/objectives	To utilize communications tools to minimize the impact of preventable illness and injury on health services and ensure a healthy games experience of Londoners, spectators and visitors	To be responsible for both internal and external communications, in co-ordinating the drafting and clearance of public health messages and in ensuring the delivery of these important messages is managed efficiently, both proactively and reactively
Publics (audience)	- Internal: communications staff, operational staff, other staff - External: Public, media, stakeholder organizations (LOCOG, Department of Health, other government departments, NHS etc)	- Internal: Regular intranet updates, regular column in staff newsletter, regular face-to-face opportunities for staff to ask questions on Olympics activity (e.g. webcasts) - External: One year before MG – introduce monthly Olympics newsletter for partners and stakeholders updating them on progress. Monthly face-to-face meetings / workshops with key partners. Leading up to MG – targeted information for public / media on actions taken and advice to protect health
Messages	- Enhanced surveillance systems in place to monitor and respond to any outbreaks - Risk assessments indicate that there is only a slight increased risk of infectious disease during the Games (such as gastrointestinal and respiratory illnesses) - Visitors can play a key role in helping to prevent the spread of infectious disease by taking practical steps	- Public health agency is “Games ready” - Model of working is enhanced “business as usual” - Reality is that serious outbreaks at Olympic and Paralympic events are rare - Practical steps like ensuring good hand hygiene, being up-to-date with routine vaccinations and practicing safe sex help to ensure everyone stays healthy - Other countries have seen improved public health systems as a result of hosting Olympic and Paralympic Games and we expect the same for the UK
Strategy	- Because public health role is so crucial during times of a health protection issue or outbreak, media to be handled in house in the usual manner - Necessary to be extra vigilant in terms of sharing lines with event organizers, government, NHS and other relevant agencies	- Internal and external communications plans – outline prepared one year in advance ‘Core’ communications team established six months prior to games to take forward communications activity - Internal workshops held for communications staff to ensure they were aware of roles and responsibilities during the MG - Develop stakeholder contact list well in advance of MG and continuously update to ensure correct contact information is available to communications team
Tactics	- Media team embedded throughout the games period in the public health operations centre - Daily communications teleconferences with all communications staff to ensure staff in the operations centre are aware of any potential local issues - Scenario planning workshops held with partner and stakeholders to stimulate communications response to incidents and outbreaks - Media briefing held with international and national print and broadcast journalists one month ahead of Games to reassure “business as usual”, outline enhanced surveillance and remind public of standard messages to enjoy healthy and safe games (hand washing, sexual health etc.)	- Daily working patterns and communications rota put in place six weeks leading up to and during Olympic and Paralympic Games (three months in total) - Communications roles identified – 3 communications staff on duty in the operations centre from 8-6, Monday to Friday (one manager, two officers), 3 communications staff (press officer, internal communication officer, briefings manager) on duty remotely to provide back-up. Regional communications rotas in place in areas where Olympic events taking place, out of hours rota established - Media handling pack prepared with key communications messages / actions identified for numerous scenarios (food poisoning outbreak, fire etc.) - Regular Olympics public health messages and information about incidents posted on website and social media channels throughout Games period to ensure there was no information vacuum

Stage	Aims and Objectives	Outputs
Timescales	▪ Begin to identify communications activity required at one year, six months and then monthly, in advance of MG	▪ Mirror communications set up of government and event organizers to ensure consistent approach. ▪ One year to six months in advance – communications team meet monthly. From six months to MG, meet weekly or more frequently
Resources	▪ Identify communications staff available during Games period ▪ Identify 'core' team to deliver agreed communications activity ▪ Identify key spokespeople for agency to use throughout Games period	▪ Work with human resources to ensure organizational wide approach to annual leave arrangements, which were limited during Games time ▪ Ensure appropriate security clearance and training for communications staff ▪ Ensure appropriate media training for identified Olympics spokes people
Evaluation / Review	▪ Did public health calls go through to the right agency? ▪ Did public health messages get communicated accurately to the public and stakeholders? ▪ Was there any public health information vacuum throughout Games period? ▪ Would you use systems again / what would you do differently next time?	▪ Scenario planning / workshops to work through potential incidents extremely useful in building relationships with stakeholders ▪ Constant stream of information on website and social media channels, and spokespeople willing to do interviews, prevented information vacuum ▪ Communications rota and reporting system subsequently emulated for other health protection incidents / emergencies (e.g. mass flooding)

SECTION C. HEALTH PROMOTION AND PUBLIC INFORMATION

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Health promotion and public information although similar should be considered as separate work streams in the planning process to ensure no gaps or overlaps.

This section outlines practical issues for consideration in health promotion and public information planning for MGs.

Before the event

- Risk assessment: Materials for public information should be based on the MG risk assessment
- Harness opportunities to promote health: Event planners should work with public health colleagues to identify opportunities to reinforce key health priorities that are of concern to the local population such as immunization, hand hygiene, mental health, sexual health, healthy eating, physical activity and responsible alcohol consumption
- Identify and understand your key audiences: Understanding your audience is a key part of tailoring your messages. During a high profile MG, spectators, visitors, and the host country's population are exposed to a considerable number of messages and advertisements so health messages need to be very clear and utilize media channels that are respected and appropriate for each particular audience (e.g. younger audiences and internet-based media channels)
- Individual behaviour change: People have different needs and will respond to different approaches, a one size fits all approach will be of limited effectiveness in helping people to change their behaviour. Efforts should be targeted to specific groups of people that share common characteristics either demographically, geographically or psychographically
- Community involvement is important to ensure appropriate health behaviour and health communication strategies and methods are implemented. Planners should work with local communities to fully understand public priorities and needs. Interventions and communications should be tested prior to implementation and barriers to engagement need to be identified and addressed to enable the public to benefit from health promotion interventions and public information campaigns
- Resource ready: Behaviour change programmes will only be effective if the advice they give is practical and supported. For example, activities that promote immunizations need to ensure that there are adequate vaccination supplies and trained staff to administer them. When costing health promotion interventions ensure that there are sufficient resources to support the health behaviour being promoted
- Population based approaches: Consider how policy can be used to promote health. For example, consider how planning and licensing can be used to support event planners to implement health promotion strategies in their planning such as smoking and alcohol policies
- Key messages: Every plan or campaign needs to have a set of key messages that form the main thrust of all communications, which are appropriate to the public health needs of the population. These messages will need to be reactive to changes in the levels of risk to the public's health. Prior to the MG, communications specialists should agree to key messages to enable a rapid response to incidents and emergencies that may affect the event, with relevant professionals, including how to respond to the media with evidence based facts and figures
- Cultural considerations: Important to respect the cultural and religious values, beliefs and practices of the target audience. Health promotion materials and interventions need to take into account literacy levels, health beliefs and practices and the social context in which health behaviour takes place
- Health Literacy: Populations with low health literacy need to be supported and empowered to act on health information, for example, through the use of visual aids

- Partnerships: It is critical to bring together partners such as police, fire, health, event organizers, industry, government and non-government organizations to work together to foster a safe, supportive, healthy promoting environment during a MG
- Working with the private sector: Aligning

industry and health goals can bring considerable resource and thus expand the reach of health promotion efforts. For example condom manufacturers may offer large amounts of free products as part of their marketing strategy which also supports health promotion efforts to promote safer sex during the event.

During the event

- Use of health promotion and public information as planned
- Ability to provide clear and effective public information rapidly, if required.

After the event

- Evaluation: Clear and measurable objectives should be set for all health promotion and public information programmes and evaluation of these objectives should be built in at the outset. Data can therefore be collected before, during and after the event to support evaluation and the sharing of learning to add value to the MG evidence base
- Legacy: Improved public awareness and understanding of public health issues.

TOOLS AND RESOURCES

Health Promotion and Community Action for Health in Developing Countries, provides case studies of health promotion efforts in developing countries.

<http://apps.who.int/bookorders/anglais/detart1.jsp?codlan=1&codcol=15&codcch=411>

Unilever's 5 levers to change: Unilever have developed a behaviour change approach which they have used to change hygiene behaviour in developing countries.

http://www.unilever.com/images/slp_5-Levers-for-Change_tcm13-276807_tcm13-284877.pdf

Chapter 9 – Disease surveillance and outbreak response

KEY CONSIDERATIONS

- Well-functioning systems for surveillance and response during MGs must be in place
- Successful surveillance and response during the MG will ensure long-term planning, integration and involvement of all stakeholders, clear lines of communication, and adequate time to test all of these prior to the event
- Surveillance systems must be sensitive enough to detect potential public health events in a timely manner
- Consider how the surveillance systems will be able to detect and report a negative e.g., provide assurance that no adverse events are occurring
- Establishing the best surveillance system for any MG will depend on the event itself, the strengths and weaknesses of existing systems, and the availability of resources
- Surveillance should be guided by a process of iterative risk assessment that takes into account the unique context characteristics of the event
- Follow the same principles of outbreak response as they would be in a non-MG setting, however with greater political and media interest, populations on the move and the potential for greater numbers of people exposed, response needs to be rapid and comprehensive
- Planning for adequate laboratory capacity is a key preparedness activity for MGs
- Legacy should be actively planned for and assessed. MGs can provide the political will and financial backing for long-term improvements in surveillance and response.

INTRODUCTION

MGs have several inherent characteristics that place them at higher risk of adverse health events, particularly communicable diseases.

In addition to the increased risk, there are other reasons to increase capacity for surveillance and response. A disease outbreak that occurs at or during the period of an international MG has increased potential for spreading globally and may then need reporting under the International Health Regulations (2005) (IHR). The influx of people places a strain on existing surveillance and response systems, and the media and political attention generated by MGs mean that the adverse consequences of any negative health event may be greatly magnified. Traditional surveillance is designed to detect

when things are happening, but for MGs there is often a need for reassurance to challenge rumours and false stories that will arise during the event. Finally, MGs provide an opportunity to build legacy by strengthening both emergency and routine surveillance and response systems, which can benefit countries long after the event.

What do we know?

When planning surveillance for the MG, the questions that public health authorities are likely to ask are:

- 1) What diseases or syndromes should surveillance be conducted for and what is the risk of these?
- 2) What is the best type of public health surveillance system(s) to use?
- 3) What are the special considerations for outbreak or public health response?

What diseases or syndromes should surveillance be conducted for and what is the risk of these?

MGs encompass a wide range of events and vary greatly in their size, composition and length. Consequently the level of risk and type of health risks will vary depending on event type.

The risk associated with communicable diseases is not only to attendees of the MG, but also the host population and their 'home' populations when MG attendees return to their place of origin. The most well-known example of the latter are the large meningococcal outbreaks that have originated during the Hajj; MGs have also led to international exportation of other communicable diseases including measles and norovirus.

What is the best type of public health surveillance system(s) to use?

Multiple types of surveillance system have been used in MGs ranging from complex systems using multiple data sources to relatively low impact enhancements of routine notifiable diseases systems. The difficulty of comparing different systems used in different contexts with inherently different risks means there is insufficient evidence to state what is the best type of system to use. The key attributes of a robust surveillance system are timeliness and sensitivity.

In addition to the risks from the MG, it is important to take into account the strength of the underlying surveillance system and its flexibility to adapt to a MG. For example,

during the 2006 Fédération Internationale de Football Association (FIFA) World Cup Germany, public health authorities relied primarily on enhancing a strong pre-existing notifiable diseases system and decided not to introduce syndromic surveillance. This is in contrast to the more intensive efforts undertaken for the International Cricket Council (ICC) Cricket World Cup West Indies 2007 or 2010 FIFA World Cup South Africa, for example. In both of these cases awareness of potential weaknesses in pre-existing systems led to an intense effort in preparing surveillance for the MG.

What are the special considerations for outbreak or public health response?

There are a number of generally accepted factors that make responding to outbreaks difficult in MGs, including a greater number of people in one place, rapid population movement, potential language and cultural barriers, and media interest. A further important consideration is that increased surveillance is likely to require temporarily increased response capacity to verify and investigate potential signals in the surveillance system.

Experience from some MGs has highlighted the importance of the laboratory for case and contact management, specifically having adequate access to timely diagnostic facilities to ensure that potential cases can be rapidly diagnosed and treated.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

The basic principles of public health surveillance during the MG are the same as for any other context. Systems must be sensitive enough to detect potential public health events in a timely manner to prevent unnecessary morbidity and mortality in MG attendees, the host population and populations where attendees will return to after the MG. Systems should also be flexible enough to cope with rapidly changing demands such as an outbreak. Such a system may be achieved via enhancing usual notifiable diseases surveillance (for example increasing timeliness of data transmission) but is likely

to require additional data sources such as syndromic or event-based surveillance.

The principles of outbreak response also remain the same as in a non-MG setting, however with populations on the move and the potential for greater numbers of people exposed, the public health response needs to be more rapid, comprehensive and on alert.

For both disease surveillance and outbreak response, the importance of an integrated system that involves all stakeholders cannot be overstated.

What to conduct surveillance for

Two guiding principles should be used:

- 1) Systems should be geared towards detecting those conditions and events most likely to affect and / or have high consequences for the MG
- 2) Systems should only collect information that will be useful, reviewed and where necessary, acted upon.

The definition of 'likely to affect the MG' is frequently used to encompass not just public health threats (increased morbidity and mortality) among MG attendees, but also events that might cause disruption to the event through negative media or political attention, or public concern. For example, a relatively small cluster of gastrointestinal disease occurring among spectators at the Olympic and Paralympic Games may not be disruptive to the event overall but the same occurrence amongst participating athletes may impact the Games considerably.

The risk assessment should determine what conditions should be under surveillance; the assessment must take into account characteristics of the event itself and the attendees, and experiences at previous MGs.

Experience from previous MGs suggests that

diseases with the following characteristics should be considered for surveillance:

- Have outbreak potential
- Have modes of transmission enhanced in the MG (e.g. respiratory spread)
- Are known to be of particular potential use as bioterrorism agents
- May cause severe illness and require investigation and / or the application of control measures even for a single case
- Imported diseases not usually seen in the host country (especially drug-resistant organisms and unusual serotypes)
- Endemic diseases for which event attendees may have no immunity
- Highly infectious diseases (e.g., norovirus or measles)
- Diseases or events that need to be reported under the IHR (2005).

Non-communicable diseases and conditions should also be considered. The major demands on healthcare resources at MGs appear to be due to relatively minor, non-communicable illnesses, such as heat stroke. Surveillance for such conditions should take into consideration both the public health importance of the condition and the potential to prevent or mitigate it. For example, the immediate impact of injury surveillance was evidenced by

events at the World Youth Day Sydney 2008; environmental health officers observed a number of people falling over unsecured cables and steps, which correlated with surveillance data of injuries due to falls coming from on-site medical facilities. To prevent further injury, public health authorities implemented improved lighting, securing of hazards and trip-hazard warnings.

Data sources used at MGs has included:

- Notifiable disease surveillance systems
- Medical encounters at on-site medical centres and emergency departments
- Mobile health units or first aid posts
- Food safety and environmental health reports
- Media monitoring
- Laboratories
- Toxicological centres
- Over the counter pharmaceutical use
- Vector surveillance
- Mortality data
- Data from ports of entry screenings
- Calls to telephone helplines.

Both case-based and event-based surveillance are frequently used during MGs.

Case-based (or indicator) surveillance refers to structured systems for counting and recording individual patients either diagnosed with a

specific condition or who have symptoms of a particular syndrome.

Event-based surveillance usually refers to less structured systems aimed at capturing any events (which can include clusters of disease or potential risks to health such as disruptions to sanitation in MG facilities) that may have negative consequences for the MG. Event-based surveillance can be used to detect events in the area where the MG is taking place and also for gathering international intelligence. It may incorporate a range of informal and formal sources including media, ad hoc or regular reports issued by international bodies such as the WHO or national governments, and rumours of reports of unusual events from key informants on the ground including surveillance staff and health workers.

Surveillance attributes

In general, high levels of timeliness and sensitivity are considered essential attributes for the MG surveillance system. While sensitivity is very important, this is often a trade off with specificity; more sensitive systems tend to generate a large number of signals that need to be investigated, and these systems become resource intensive. Flexibility, particularly being able to adapt to outbreaks, is another important system attribute.

Table 1: Examples of conditions included in surveillance at two previous MGs

For the ICC Cricket World Cup West Indies 2007 the following syndromes, which were included in the 'usual' reporting requirements, were reported daily:

- Acute flaccid paralysis
- Fever and haemorrhagic symptoms
- Fever and neurological symptoms
- Fever and respiratory symptoms < five years and > five years
- Fever and rash
- Gastroenteritis < five years and > five years

In addition the following conditions were added to the MG specific surveillance syndrome:

- Fever and jaundice
- Heat stroke
- Injuries

For the 2000 Sydney Olympic and Paralympic Games, an iterative risk assessment process led to the following conditions for surveillance via emergency departments and on-site medical clinics:

- Injury occurring outside the home
- Vomiting
- Pneumonia
- Diarrhoea
- Influenza-like illness
- Illicit drug-related
- Febrile illness with rash
- Meningitis
- Bloody diarrhoea
- Pertussis
- Acute viral hepatitis
- Other (Olympic family members only)

Table 2: Frequently used systems for MG surveillance

System type	Details	Strengths	Weaknesses
Enhancing routine notifiable diseases systems	- Increased frequency of data transmission from weekly to daily and / or - Including new diseases / syndromes to be reported and / or - Incorporating new fields into notifiable diseases reporting (e.g. to identify if an individual is involved in MG)	- Relatively low resources required - Uses 'tried and tested' system	Requires a strong routine notifiable diseases system in place prior to the MG (If no other components to MG surveillance system)
Syndromic surveillance (case-based)	- Uses clinical case features (that precede definitive laboratory diagnosis), to classify a patient into a 'syndrome' of illness e.g. 'fever and rash' or 'acute watery diarrhoea' - Can be used to notify individual cases for follow-up (similar to notification of probable or non-laboratory confirmed cases through routine notifiable diseases surveillance) and / or - Provide early warning of outbreaks via alerts that increased numbers of people with a particular syndrome are presenting to hospitals, on-site medical venues etc. Aggregate data is reviewed manually either routinely or when the number of presentations exceeds a 'trigger' or number usually defined by a statistical algorithm	- More sensitive, and more timely than waiting for laboratory confirmation - Aggregate systems can demonstrate the lack of an observed increase. This can reassure that an outbreak is not occurring (that is being missed by other less sensitive systems)	- Particularly for systems examining aggregate numbers, a high number of signals (including false positives) are generated that require increased resources to follow-up - No reports from MG where automated systems have improved timeliness of outbreak detection - Difficult to determine baselines or alerts thresholds given fluctuating populations
Sentinel	Case based (frequently syndromic) surveillance where enhanced surveillance occurs at a chosen number of health sites (e.g. local emergency departments, on-site medical venues, other primary healthcare centres) which act as 'sentinels' for the entire health facilities network	Less resource intensive and therefore more feasible than aiming for 100% detection via all health sites	Less sensitive than aiming for 100% ascertainment. Need to ensure Sentinel sites are representative of all sites
Laboratory based systems	- Regular review of laboratory activity can provide warning of outbreaks - Confirmation or exclusion of cases based on laboratory diagnosis is absolutely critical to guide public health action	May detect cases not notified through other means (i.e. when clinician requests test)	Should not be used as 'stand-alone' surveillance system due to relative lack of timeliness and representativeness
Screening	Screening of attendees has been instituted as some MGs on a relatively small scale (such as at camps) to extremely large events (the Hajj)	Potential to prevent outbreaks from occurring via early isolation and quarantine or other public health measures	Unlikely to be feasible for most MGs
Epidemic intelligence	Generally event-based surveillance. Data sources include media reports, pro-med postings and IHR announcements. Ideally also involves sharing information with international organizations and public health authorities in other countries. Generally used for international surveillance, however media monitoring can also be used to supplement other in-country systems	- Highly sensitive. Encourages all-hazards approach - Allows gathering of regional / international epidemic intelligence	Widely used but not systematic evidence of usefulness for MGs

Case study: London 2012 Olympic and Paralympic Games

One of the first activities was a risk assessment of the public health threats and the operational delivery requirements, including surveillance and reporting systems. The Health Protection Agency's (now Public Health England) surveillance, reporting and intelligence systems are well-established and effective but this process identified gaps and opportunities for enhancing them. The aim was to use multiple surveillance sources to provide assurance about any health protection issues affecting athletes, visitors and UK populations.

Data collected included clinical notifications, laboratory reporting, monitoring of environmental and chemical hazards, data from Games venue medical facilities and media reporting. Major enhancements were the expansion of the syndromic surveillance systems, from the National Health Service Direct tele-health calls and general practice surveillance to include two new systems, which are continued as part of the legacy:

- Data on unscheduled, emergency care undertaken in hospital emergency departments
- Primary care (general practitioner) out-of-hours data from walk-in centres and out-of-hours centres.

Extra fields were added to data collection forms / systems to enable practitioners to identify links to Games events. Additionally a new surveillance system for undiagnosed serious infectious illness in sentinel hospitals in the London and South East was developed, and deployment of rapid tests for organisms causing some of the more common illnesses e.g. influenza and food poisoning.

When events related or potentially related (due to political or media interest) to the Games were reported, the normal response was enhanced to enable quicker investigation, using standard processes but with smarter and lower thresholds. This included:

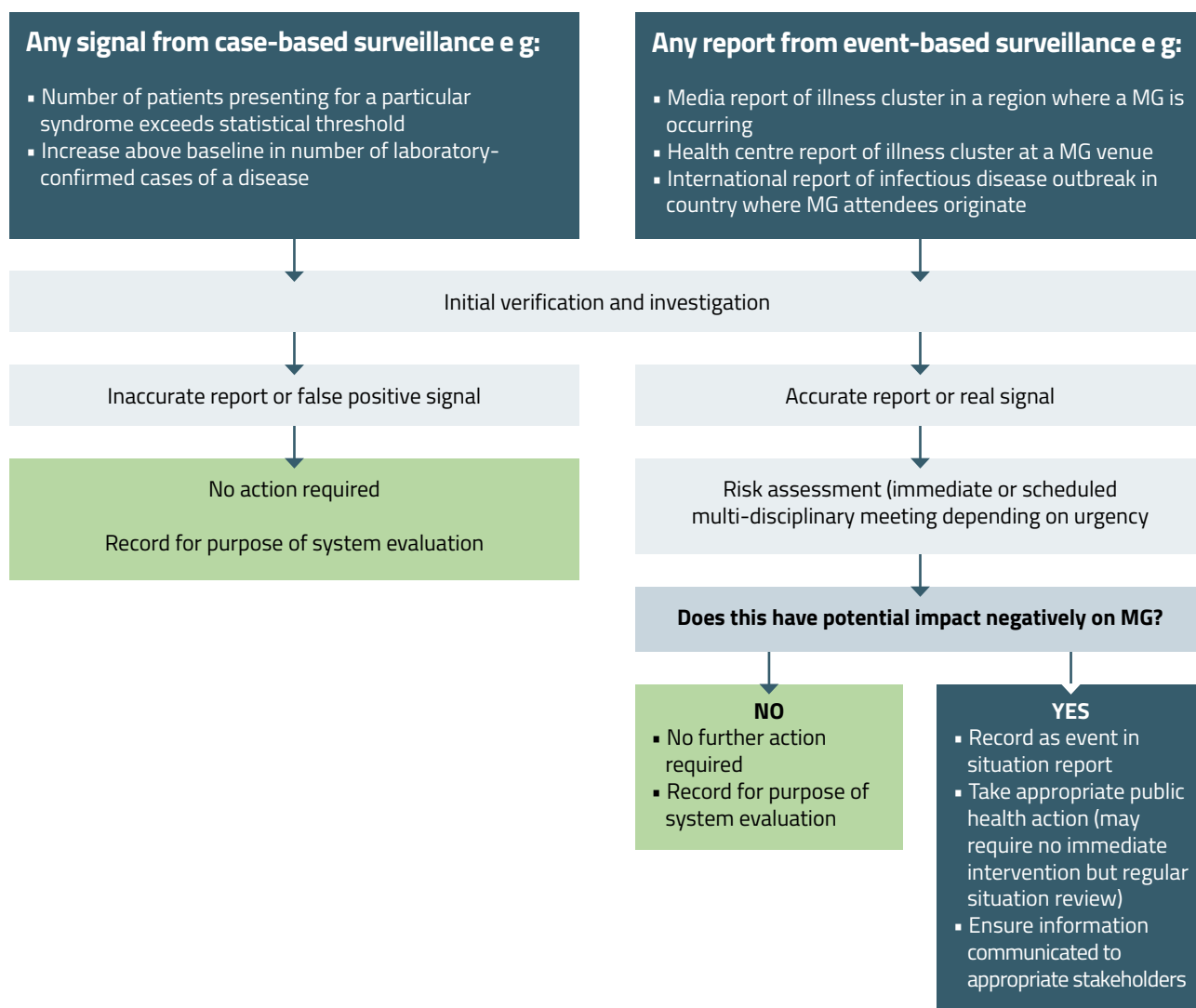
- Risk assessments to identify additional Games risk
- Expert advice and information with consideration of the Games context
- Sharing of information across key partners.

Data transfer and review

Organizers should aim for a timely transfer of information to a central level where staff can review and take any necessary public health action. This involves developing a system where all signals from case-based data and reports from event-based surveillance are ultimately reported to a centralized body. Verification of both signals and reports is a key step and the

level(s) at which these processes occur will vary depending on how centralized the MG surveillance system is and the resources and expertise available at different (e.g. local and national) levels. Figure 1 shows a simplified schematic of this type of system.

*Figure 1: Simplified schematic of different pathways and integration of surveillance data during a MG.
Verification and risk assessment may occur at more than one level (local, regional, central) depending on system organization and available resources.



Integration

Integration of surveillance and response needs to occur both vertically throughout the system(s) in place and horizontally between all health and non-health stakeholders. Vertical integration, from on-the-ground staff to the national level, is important due to the need for both local response and to detect and respond to widespread outbreaks or other health events. Horizontal integration, involving health stakeholders from non-surveillance and response areas (such as emergency medicine and health promotion) and non-health stakeholders (such as the police, military and event organizers) is particularly important at the central level to contribute to

public health intelligence and risk assessment as well as to coordinate control measures in a complex event.

Integration should also involve forming links with international bodies and / or other national or regional health authorities to facilitate sharing of information on communicable diseases that may be imported or exported by MG attendees. This can be through formal channels such as IHR National Focal Points, or less formal bilateral relationships and sharing through channels such as pro-med postings or announcements on publicly accessible websites.

Case study: Integrating surveillance and response for the 2010 FIFA World Cup South Africa

Review of the surveillance and response system in South Africa prior to the 2010 FIFA World Cup identified weaknesses of a lack of communication between key health stakeholders and lack of surveillance data completeness. To overcome these, public health authorities adopted the following systems:

- Clinician reporting of 13 'priority conditions' (based on clinical case definitions) from designated hospitals and medical clinics to local public health operations centres. Reports containing the total number of presentations with priority conditions, and any 'other relevant' events sent daily to the national health operations centre. Zero reporting was instituted to ensure daily reports were transmitted from each level to the next
- Laboratory reporting of laboratory-confirmed priority conditions from both government and private laboratories and

communicated daily to the National Health Operations Centre (NHOC).

A key part of this system was strengthening links between surveillance and response stakeholders (including environmental health, media spokespeople and international organizations) through daily meetings at the NHOC. At these meetings, a joint risk assessment would be undertaken on any events reported, a situation report written which was then disseminated both upwards to overall event managers as well as to those public health and other health personnel working in the provinces and districts. A senior representative from the NHOC would also represent public health at daily meetings of the overall health cluster and at overall event-coordination briefings.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

For large international MGs, preparations for surveillance should commence several years before the event. For small to medium-sized MG events requiring less widespread surveillance efforts, preparations may start later however it is still important to ensure adequate time to put working systems into place and to test them. The points below should be considered and these are detailed in the remainder of this section.

- Assess the existing surveillance system
- Conduct a risk assessment to prioritize conditions for surveillance
- Determine resources required and resources available
- Develop plans for surveillance, including:
 - Objectives
 - What data will be collected (conditions under surveillance)
 - Where data will be collected from
 - Who will collect data, how they will do this and how data will be transmitted
 - How data will be reviewed and what constitutes a signal requiring further investigation
 - How data will be reported
 - How long systems will operate for
- Identify and train stakeholders
- Test and evaluate any systems.

Assessing the existing system

Review the existing surveillance system(s) including strengths, weaknesses and opportunities for legacy, including:

- Timely, complete collection, transmission and examination of data at each level (i.e. at point of collection; local, regional and national)
- Sensitivity to detect outbreaks and individual cases of important diseases in a timely fashion
- Flexibility to function well under outbreak conditions
- Capacity for timely laboratory confirmation of suspected cases of important diseases, particularly in the case of an outbreak
- Clinical training in identifying and reporting conditions under surveillance
- Adequate legislation to collect and disseminate data, and how flexible / adequate is this legislation in the event of an emergency
- Sustainable improvements for the long-term benefit of the host population.

Special considerations

It is not ideal to design an entirely new system only for the duration of the MG; this requires a huge amount of resources for relatively short term gains. Rather it is better to build on and strengthen existing systems and incorporate new data sources where possible. Relatively simple measures can lead to large improvements, for example if a lack of reporting is identified as a problem, instituting zero reporting (with follow up if this does not occur) can be very effective. Similarly, if timeliness is an issue, identifying the reason(s) for this and increasing frequency of data transmission is useful. If systems are particularly weak it may be necessary to design a new system, however it is particularly important that the system is planned and tested well in advance, and as this is resource intensive that it is sustainable beyond the period of the MG.

Developing surveillance plans to use any systems, whether enhanced routine surveillance, entirely new systems or adding new data sources, the following points need to be determined and then documented in operational documents such as SOPs.

- Objectives of the surveillance system: For example, aiming for detection of every event with potential to impact on the MG versus detection of more significant events will help decide system sensitivity. While an objective such as 'determining level of individual risk from various conditions will necessitate collecting more detailed data on individual patient presentations; sustainability should also be considered
- Conditions under surveillance, and data collected on cases: For indicator surveillance it is imperative to have robust case definitions for those collecting and interpreting the data. Reports from event-based surveillance are still considered data and while case definitions are not usually relevant guidelines for internet searches, for example, they are useful to develop
- Geographical: For events spread over multiple regions, data should be collected from at least some sites in all regions, however also consider collecting / collating data from regions not directly involved to ensure situational awareness. International or regional surveillance is also important for MGs with international attendance, both of potential diseases imported to the host country, and diseases to be exported when attendees travel home
- Data collection sites: Including on-site medical venues, other areas where attendees may seek healthcare (e.g. primary healthcare providers, hospitals)

and also sites such as pharmacies or ambulance hotlines. If group accommodation is involved (such as camps) it may also include reporting from accommodation organizers and / or group leaders

- Who: Dedicated surveillance officers if either posted at or making regular visits to on-site medical venues, for example, are likely to greatly improve reporting completeness, however this can be resource intensive. To improve reporting from clinicians it is important to have clear and regular communication with key groups and individuals as well as training in what and how to report and why it is important. Automating reporting systems can limit resources expended on data collection, however this frequently leads to increased resources in the follow up of potential cases and other signals
- Data collection and transmission: Web-based or mobile phone systems that allow data to be entered and collated at point of contact have the advantage of allowing real-time analysis. Lower technology back-up systems should always be considered, for example line listing patient presentations and aggregated results sent by text message or fax to a central location
- What constitutes a signal: For systems collecting large amounts of case-based data, particularly automated syndromic systems, consider incorporating pre-determined thresholds where numbers above these (alert thresholds) will trigger active investigation. However, setting alert thresholds is challenging; population influx makes calculating accurate rates extremely challenging while new data sources may not have sufficient data to determine what is normal. Reports from event-based surveillance can be triaged through an initial screening mechanism (e.g. a checklist of criteria or 'red flags')
- Who will review the data and how: This

occurs at several levels depending on the size of the event, data sources and how many different levels are involved in the surveillance. In general, the first (and crucial) step is verification of signals or reports (to establish their accuracy) and then rapid risk assessment related to the MG. For a large MG spread over multiple regions or authorities, it is ideal to have aggregation and interpretation of data at various levels from local health service to provincial or state to national. Review (ideally risk assessment) of surveillance data at the national level is important even for events focused in one region due to the potential for attendees to travel, as well as coordination with other national and international organizations

- Reporting: Standardize reporting templates including situation reports, and agree who will receive these and frequency; non-health sector stakeholders will find situation reports useful while those working locally will benefit from seeing the overall situation
- How long enhanced systems will be operated for: MG components of a surveillance system should start operating weeks before the event both to help establish baselines, understanding of current situation and to rectify any last minute problems. Length of surveillance after the event will depend on how long visitors are expected to stay, what has happened during the MG, and the incubation periods of those conditions being monitored.

Response

Assessing the existing communicable disease control response system prior to a MG is crucial. Health authorities should document and outline their roles and responsibilities, in steady state and as part of emergency arrangements in the country; and identify existing surge capacity in workforce and logistics. If there are no clear surge capacity resources, it is important to address and plan how a response would be scaled up if necessary; through national or international partnerships, across government and non-government agencies or in the healthcare system.

For any verified signal the response should rely on standard public health principles taking into account the MG context. Standard operating procedures or protocols should be adapted (or developed) that specify the response to any signal (i.e. who needs to be alerted and how quickly) as well as the response to anticipated specific signals (e.g. an individual case of fever and rash in an MG attendee).

Planning for response activities should be considered some time before the event following the steps below:

- Assess the existing response system
 - Surge capacity
 - Laboratory capacity
 - Legislation

Laboratory capacity

A common challenge in large outbreaks is ensuring adequate laboratory capacity for diagnosis, especially when management of cases and contacts depends on the laboratory diagnosis such as for infectious diseases with non-specific signs and symptoms.

Laboratory capacity might be enhanced by developing / providing rapid diagnostic tests for important pathogens at or near venues – but limitations with regard to sensitivity and specificity and the need for quality control of such tests must be considered in the interpretation of results. Also, understanding the factors

- Consider pre-event risk mitigation
- Develop response plans and procedures
- Test the system.

Special considerations for response at a MG include: surge capacity in workforce, laboratories and logistics; coordination of multiple agencies involved in response efforts, public communication and managing the potential diversity of people affected by the outbreak (cases and contacts).

The following need to be considered for both case and contact management:

- The need for multilingual health information for both individuals, and higher level public communication
- Plans for emergency accommodation and / or isolation facilities
- Managing a potentially highly mobile population
- The need for mobile dispensing of prophylaxis and / or vaccination
- Contact tracing arrangements for those returning home overseas.

Developing links with health promotion and communications specialists prior to the MG is important.

that affect turnaround time for confirmatory laboratory tests and reducing this time (such as minimizing specimen transport times, or batching tests in bulk testing rounds) might be required.

It is important to ensure sufficient surge capacity is available to 'ramp up' in the case of an event, and identify which laboratories have adequate physical containment and diagnostic facilities to test for pathogens associated with bioterrorism.

Policies and procedures

Policies need to be in place to manage suspected cases and contacts with or without laboratory results and assess the feasibility of self-isolation, quarantine or other infection control measures (e.g. mask wearing) during the MG. This requires familiarity with existing public health legislation and considering whether other legislation needs to be developed. There should also be a clear plan in place for communication with other

countries and international organizations of for example, potentially infected travellers. This may be done through the IHR National Focal Point. Also consider mechanisms to coordinate with owners and managers of accommodation facilities, establish contact with embassies of foreign nationals, and access foreign language interpreters.

Developing response plans

Public health management guidelines will normally exist for important diseases and these should be reviewed, and adapted if necessary, for the MG context. Special consideration should be given to developing plans for conditions under surveillance and plans need to be flexible to allow for a range of scenarios of transmissibility and severity of disease.

Outbreak response plans should:

- Describe governance and administrative arrangements for the health sector
- Identify supporting legislation that might be utilized in a national emergency, identify roles and functions of the key health body
- Identify the roles and functions of local or regional health bodies
- Provide guidance to high level communications, including coordinated public health messages
- Authorise an operational health sector planning hierarchy and mechanisms to activate the plans (for example, the definition of an outbreak of a certain disease)
- Identify key contacts in an outbreak, collate their contact details and ensure this information has been disseminated
- Contain specific, evidence-based response strategies for likely scenarios.

Testing systems

It is important to allow adequate time for testing surveillance and response systems. At least one exercise, involving all stakeholders, should

be covering both steady state and emergency response conditions.

During the event

During the event, the aim of surveillance is to rapidly identify relevant events, communicate information about them and respond appropriately. A regular situation report that summarizes surveillance activity, events being followed (including risk assessment) and any public health response should be produced and disseminated to stakeholders. Consideration should also be given to regular communication with the public, such as via a regularly updated

website, even if no significant events are occurring.

For most MGs at least some minor event will occur that will require a public health response and there are also likely to be a number of public health events that may not be linked to the MG but will require public guidance or reassurance. Extensive preparation will assist with the management of these, however unforeseen

difficulties are almost inevitable and therefore systems must be flexible enough to adapt quickly to the unexpected. For example, this includes capturing extra data fields such as case and contact management.

Communication with the public during significant health events is absolutely vital with a key media spokesperson identified and communication strategies to individuals (such as the adoption of personal protective behaviors).

For the purposes of system evaluation, documentation of the following needs to occur throughout the MG:

- Surveillance data: Numbers of cases and any other data captured by system components
- Data handling and review: how data were analyzed / reviewed and how, why and when decisions were made around investigation and response
- System performance: timeliness, completeness and accuracy of received data. Problems or challenges with surveillance and response, both major and minor
- Resources: staff hours and other resources both during planning and operational phases.

After the event

There are two main considerations for surveillance and response after the MG. The first is how long to continue surveillance for and

the second is how to evaluate the success of the systems that were in place.

Post-event surveillance

Postevent surveillance needs to take into account how long visitors are expected to remain, the length of any incubation periods of conditions being monitored and whether any significant events have occurred that require ongoing surveillance and response. Where significant public health events have occurred, surveillance needs to continue as long as these continue. This includes considering the potential for MG attendees to return home with infectious

diseases which can then transmit to their local population or who need to be followed-up. Communications with 'home' countries should include: raising awareness for early diagnosis of non-endemic diseases and systems for contacting exposed individuals. Formal channels such as the IHR National Focal Point can be used, as well as sharing information through informal channels such as pro-med postings or announcements on national websites.

TOOLS AND RESOURCES

The sections in the MG Toolkit (developed by Public Health England and the World Health Organization) on surveillance and outbreak response, contain a checklist that public health authorities will find useful when preparing for a MG.

A mobile phone application has recently been developed which incorporates an integrated assessment toolkit for the enhanced surveillance of and response to all hazards at MGs.

Chapter 10 – Preventing and controlling infection

KEY CONSIDERATIONS

- Infection prevention and control (IPC) measures and guidelines for their implementation should be based on existing IPC guidelines and the MG risk assessment
- IPC measures should consider pre-event advice, hand and respiratory hygiene, early detection and isolation of cases, vaccination or post-exposure prophylaxis, social distancing and in some rare cases use of quarantine. The decision to apply these measures should be based on the MG public health risk assessment
- Postponement or cancellation of events or requesting that certain people do not attend (e.g. those more likely to have severe or fatal illness) should be considered depending on the nature of the infectious risk
- Collaboration at all levels (local, regional, national and international) is an important part of IPC before, during, and after MGs. Testing IPC plans and training, including for volunteers, is essential
- Ensure access to information and good communication between IPC professionals, stakeholders and the general public.

INTRODUCTION

MGs require excellent infection control and prevention measures due to the increased risks from large numbers of people in close contact. Participants have diverse immunological status, the specific practices that may be carried out at the event (e.g. mass shaving at religious events such as the Hajj), and the potential limited access to high quality food and water suppliers can all affect risk. For most MGs, the main risks are respiratory or gastrointestinal diseases, and the focus of IPC should be on preventative measures before the event such as raising food safety and hygiene standards and providing vaccination advice for visitors and host country residents.

Measures to stop the spread of communicable diseases (e.g. early diagnosis, notification, isolation, treatment, contact tracing, immunization, chemoprophylaxis, quarantine, disinfection, etc.) may involve disruption of aspects of the MG or can lead

to restriction of an individual's movement to prevent transmission of diseases. Sometimes it is difficult to find the balance between the benefit to the population and the individual as some measures required to respond to communicable disease may impinge on an individual's rights. Measures used should be effective, proportional to the risk and taken for the least amount of time needed. However, health professionals should act promptly to contain any threat.

What do we know?

There are two key questions when dealing with a case of communicable disease: where did the case get infected and are they likely to pass it on?

Determining where a case was infected can help identify a probable common source e.g. a contaminated water or food source, which could result in new cases. Identifying the source rapidly will enable IPC measures to be carried out and so decrease the number of cases, stopping potential outbreaks. Quick identification allows for effective contact tracing and rapid assessment of the need for any treatment: isolation, immunization,

prophylaxis and / or advice etc. Sometimes it is difficult to determine whether the disease has been imported or whether it has been passed on from the local community. Estimation of the incubation period and clinical and epidemiological data can help with these issues.

Determining how infectious a patient may be is a crucial trigger for IPC measures for the case. Sometimes advice to the patient will be sufficient (e.g. good personal hygiene or vaccination), but in other situations isolation may be necessary.

Case study: European Youth Olympic Festival, Spain 2008

An example of appropriate IPC measures taken during a MG is seen in the response to a case of invasive meningococcal disease in a participant in the European Youth Olympic Festival in Spain 2008. In this case, the close contacts of the case were identified rapidly and provided post-exposure prophylaxis.

There was no risk to the other 1,500 participants so the local health authority and the national public health authority of the patient's country advised against further measures being set for the rest of the athletes and officials.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

The scope of communicable diseases that could occur during MGs is large and a risk assessment at each individual MG should lead to the development of IPC standards and procedures relevant to each event. Once a risk assessment has been conducted, MG planners should assess existing IPC measures and decide whether these measures need to be amended or new ones introduced. Standard measures should include early

recognition and reporting, environmental and engineering controls (e.g. availability of hand washing stations, toilet and food preparation facilities), training and advice on best practice, and personal protective equipment.

IPC measures and guidelines should be continuously adopted according to the actual epidemiological situation at the host site and globally; easy access to knowledge and

information, including information collected through surveillance, should be provided to IPC professionals.

Communication between professionals responsible for IPC and organizers of the event and all other services involved in MGs should be clear and accessible, with clearly defined roles and responsibilities and mechanisms to share information on any infection including providing prompt information to the event

organizers and all other relevant services in the MG and community. All professionals involved in IPC should be adequately trained in how to implement guidelines and IPC measures prior to MGs.

Publishing health promotion material is an essential step for preventing infections and should be communicated to attendees at the event; the material should be in the appropriate languages and culturally sensitive.

MG-specific risks

IPC measures can be divided into preventive, and control measures for patients, contacts and the immediate environment. For practical reasons these can include:

- Early detection and treatment of cases to reduce the probability of passing illness on to others and can improve the outcome for cases by ensuring appropriate care is provided in a timely manner
- Contact tracing of those exposed to the source of infection or case in order to provide advice, immunization and / or prophylactic treatment. This should be followed by action to prevent others being exposed to cases (including isolation) or contacts (including quarantine)
- Identification of the source of infection so that control measures can be implemented and monitored.

Proactive prevention messages ahead of the MG can lead to reduced risk. For example, literature suggests protective practices among travellers to the Hajj (social distancing, hand hygiene, contact avoidance) could lead to a lower risk of respiratory infection among pilgrims.

At MGs several specific risks could occur that are rarely observed in the general population. Mass shaving after the Hajj provided by non-registered barbers could lead to exposure to hepatitis B, hepatitis C and HIV infection.

Vaccine preventable diseases can occur at MGs where large numbers of people are in close contact and there are unvaccinated attendants. In 2010 in Taize, France a measles outbreak occurred among adolescents and young adults attending a Christian pilgrimage. Five out of 13 primary cases resulted in seventeen secondary and seven tertiary cases. All but one primary, secondary and tertiary case were reported to be unvaccinated. This highlights the need to understand the risks of vaccine preventable diseases in the home country of participants and the immunization status of participants.

A limited number of good quality food and water suppliers used by large numbers of participants could be grounds for a common source outbreak and limited availability of soap and water for hand hygiene and showers could lead to person-to-person outbreaks, including shigellosis or hepatitis A.

There has been a focus of prevention activities at MGs in recent years. Crowded places and close contact with numerous people is an important risk for transmission of respiratory viruses such as influenza.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before a MG there needs to be an exchange of information on applied measures and their effects, experience and consultations with previous event organizers, and an understanding of endemic risks as well as risks relating to

where attendees come from. During the MG it includes early warning, detection and response to identified issues. After the MG it includes ongoing communication of issues associated with the event.

Before the event

- Preparation includes an initial risk assessment, identification of IPC measures already in place, any amendments or additional measures that may be needed (e.g. memorandums of understanding or service level agreements), training and coordination of health professionals on the measures, and a communication strategy to ensure they can be implemented effectively. A legal basis for IPC measures may also be needed. Plans should be in place before the event to ensure appropriate processes are developed, and tested, including engaging the event organizers and local public health officials to adequately respond should an issue arise
- Integrated risk assessment: IPC professionals should be involved in an integrated risk assessment from the start. That will allow them to adapt, develop and adopt IPC guidelines relevant to the actual situation and allow for a day-to-day modification of guidelines and IPC measures as needed
- Assessment of legal framework: For most IPC measures, a legal basis must exist, including basic standards for food hygiene. Clear legal procedures will allow those responsible for implementing IPC measures to act immediately and appropriately if needed
- Economic assessment: Many IPC measures can be costly. Even when the majority of IPC measures are necessary, countries could face insufficient budgets to implement recommendations. A cost-effectiveness analysis should be carried out that also considers elements such as reputation and political and media interest. The most efficient measures should then be prioritized and additional resources requested if needed in a timely manner
- Assessment of the public health service and other services involved in IPC: Public health at the MG is usually provided by experts from the host country who are routinely involved in the public health system. During MGs other threats in the community will continue and also regular activities of public health professionals that cannot be stopped due to the MG in their community. Thus an assessment of existing public health IPC capacities should be done and if necessary public health professionals from other areas or institutions can be engaged. Activities that require public health specialists should be carefully considered and for those where it is not necessary to have highly qualified personnel then external assistants such as non-governmental organizations (NGOs) and volunteers could assist the public health workforce
- International collaboration: The international community should be included in all phases of the MG IPC; to assist in risk assessment, benchmarking, supervision, review of documents, access to information, rapid communication and consultations. This also involves the sharing of information and experience from the MG with the international community; given data about effectiveness of applied IPC measures are limited

- Mitigation measures include activities like pre-event immunization, assessment of health status prior to the MG, setting up of sanitation stations etc. All stakeholders must understand the risks from potential communicable diseases and also those that could result from the implementation of more restrictive IPC measures including implications for the MG on public opinion, political, economic, psychological consequences and human rights
- Management: Appointing an IPC manager as a member of the MG management team can make IPC more efficient.

This person should be devoted solely to IPC management, coordination and communication throughout the MG

- Free access to information: It's essential that all public health professionals involved in IPC planning and implementation have full access to all relevant information, including global, national and local data on health risks. These should be available in electronic form and posted on the internet (with free or limited access, depending of the type of the document) and to be shared with all relevant professionals involved in IPC.

Case study: US Centers for Disease Control and Prevention (CDC) Interim recommendations regarding large public gatherings in the context of the 2009 H1N1 flu outbreak

- People with influenza like illness should be advised to stay home until at least 24 hours after they are free of fever or signs of a fever without the use of fever-reducing medications
- Persons who are at high risk of complications from influenza infection (for example, persons with certain chronic medical conditions, children less than five years, persons 65 or older, and pregnant women) should consider their risk of exposure to influenza if they attend public gatherings in communities where influenza virus is circulating
- All persons should be reminded to use

appropriate respiratory and hand hygiene precautions

- For non-healthcare settings where frequent exposures to persons with flu are unlikely, masks and respirators are not recommended
- Make widely available at the event hand washing facilities with soap and running water, hand sanitiser, and tissues
- Provide on-site medical assessment and care for persons with influenza like illness
- Provide alternative options and venues for participation (e.g. remote web-based viewing sites) and simultaneously reduce crowding.

- Development of general guidelines according to international recommendations. General guidelines for implementation of IPC measures should be developed for each MG and should be regularly updated according to existing knowledge, available information, rapid communication and on-going evaluation. Every country should adopt international recommendations and

guidelines adapted to the local situation and regularly update them

- Ensuring existence of national guidelines for IPC of specific infectious agents, transport of patients, isolation, quarantine guidelines for specific infectious agents should be in place as normal business and reviewed for the MG
- Modelling: The use of mathematical models

for predictions of MGs and the effects of the implementation of various IPC measures under different scenarios should be promoted as a useful tool

- Communication strategy: Public health professionals should be included in the information chain from the beginning. Communication in all phases should be simplified so that it can happen rapidly and efficiently. Contact lists should be available and tested on a regular basis.
- Training: This is one of the most important elements of IPC. Training other MG staff (e.g. point of entry staff, security, emergency medicine, first aid,

environmental health staff responsible for hygiene) as well as healthcare professionals (in hospitals, emergency departments) prior to the MG will make implementing IPC measures more efficient. It will also allow public health professionals to concentrate on those measures that are more complicated and may require legal authorities. Increased numbers of trained staff and awareness of IPC can be an important part of the legacy from the MG.

Case study: The effects of meningococcal vaccine use during the Hajj

The largest meningococcal outbreak among pilgrims occurred in 1987 with meningococcal serogroup A affecting pilgrims in Mecca and internationally. After implementing a requirement for all participants attending the Hajj to be vaccinated with the bivalent A and C meningococcal vaccine no further outbreaks due to serogroup A occurred. In

the years 2000 and 2001, however, two large outbreaks of meningococcal serogroup W135 occurred among pilgrims and their families in Saudi Arabia and internationally. The Hajj pilgrimage requirements were then changed to the quadrivalent (A,C,Y, W135) meningococcal vaccine and no further meningococcal outbreaks have occurred.

- Testing of plans: All plans developed for implementation of IPC measures should be tested before the MG and modified if needed based on the test results.
- Supply stocks: Before the MG it is important to regularly check supplies of equipment and utilities that will be used in IPC (vaccines, antimicrobials, disinfectants, etc.) and to ensure there are sufficient quantities that are easily accessible for the size and duration of the MG
- International collaboration: International collaboration is important for rapid communication and alert about potential threats, and access to expertise and laboratory tests etc. Plans and protocols

should be developed prior to the MG to ensure this can be done efficiently.

During the event

- Access to healthcare: Free access to healthcare should be provided to all participants. This allows for better assessment of communicable diseases and other risks during the MG and makes identification and response to a potential infection more rapid
- Provision of information to participants: Provide all visitors with written information about prevention of illness, signs and symptoms to be aware of, what care is available and how to access it and other risks at the MG. This could be done during border crossing, on tickets or pre-event materials, near toilets and other public places. All information should be available in the languages most used by attendees at the MG
- Immunization of contacts: When immunization is offered for post-exposure prophylaxis of contacts (e.g. measles exposure) this should be done by healthcare professionals trained to properly provide immunization, and only with consenting individuals. In addition, written protocols about management of contacts who refuse immunization should be developed prior to the MG
- Monitoring of close contacts: Monitoring is the practice of close medical or other supervision of contacts to permit prompt recognition of infection or illness but without restricting the movements of the individual. This may include temperature measuring, following contacts' symptoms and daily updates about their health condition
- Transport of cases should follow detailed protocols and established chains of communication performed by the staff trained in IPC. For some infectious agents transport of cases requires specific modes of transport due to their need for isolation
- Isolation and quarantine: Isolation is applied to individuals known to be contagious; quarantine is applied to people who have been exposed to a communicable disease, but are not yet ill. Procedures to place an individual in isolation or quarantine should follow host legal guidelines regarding these procedures.
 - Isolation could be organized as home isolation or isolation in specially assigned facilities. In the preparedness phase those facilities should be fully equipped and have staff trained in IPC. Isolation or quarantine may be voluntary or compelled by law.
 - The effect of quarantine to stop the spread of communicable diseases is variable and dependant on the disease. Home quarantine under the ongoing supervision of healthcare and public health professionals should be prioritized whenever it is possible.
 - The implementation of public health measures such as social distancing and local communication strategies (strategies to inform participants about potential signs and symptoms and need for application of personal measures such as hand washing should be considered as an alternative to, or in conjunction with, legislated isolation and quarantine measures).
- Prevention: In countries where there is a risk of vector-borne infections, vaccinations, use of repellents and bed-nets should be promoted as appropriate. Epidemiologic situational awareness is critical as vector-borne diseases are increasingly spread worldwide. New pathogens have emerged in areas previously unaffected, such as the appearance of chikungunya virus in the western hemisphere in 2013
- Response: Hand hygiene, wearing of face masks, cough etiquette, social distancing and contact avoidance are the most common measures that could be used in many infectious diseases. They are followed by advice for social distancing, contact avoidance and staying away from others when ill. These measures can be

used with other agent-specific protective measures such as immunization

- Care for staff: Provision should be made to ensure that staff have the tools they need to manage the situation and are able to get adequate rest, food and support if needed. Staff should be monitored for signs of stress or inability to cope with the evolving situation
- Communication with general public: Plans for communication should be established in advance of the event. IPC staff members may be asked questions by cases, their

contacts, partners, team members and other visitors. Staff should be trained in communication and to have rapid access to support from a communication specialist and MG management.

After the event

- Ongoing situational awareness to ensure any information linked to the spread of communicable diseases from the MG after the event is reported rapidly and an appropriate response undertaken. This may involve the international community for a large MG
- International collaboration after the event should include exchange of knowledge and experience.

TOOLS AND RESOURCES

Link to WHO Infection Control publications

<http://www.who.int/csr/resources/publications/infectioncontrol/en/>

A WHO meeting report on public health measures during the 2009 pandemic includes a chapter on MGs. A web link to the report: <http://www.who.int/iris/handle/10665/70747> .

The report mentions a systematic review on influenza transmission and restricting MGs; it was later published and this is the link to the full article:

<http://www.sciencedirect.com/science/article/pii/S2210600611000062>

Chapter 11 – Environmental health considerations

KEY CONSIDERATIONS

- Management of environmental threats for MGs require clear, effective, and early inter-sectoral engagement and collaboration / coordination, particularly between local environmental and health authorities
- Environmental health capacities, systems, and structures should be strengthened as a result of event preparation
- Due to the changing nature of MGs taking an iterative and flexible approach to allow for continuous evaluation quality improvement and adjustment in risk management measures are essential
- Undertaking an early risk assessment of potential environmental health threats is critical for identifying potential prevention and mitigation measures and for the establishment of related monitoring and surveillance systems for use before, during, and after the MG event
- Establishing good sanitation and hygiene is one of the most fundamental defences against infectious diseases.

INTRODUCTION

Environmental health measures range from health promotion activities (e.g. related to prevention of heat related illnesses) to the delivery and management of potable (safe to drink) water supplies and sanitation services.

Environmental Health (EH) departments and Food Safety agencies (FS) have key roles to play in the prevention and control of communicable disease at MGs. Large numbers of people can be exposed to environmental health hazards if appropriate controls are not in place. They ensure proper identification, control and management of EH and FS issues, and monitor facilities such as food preparation and food outlets. Sufficient water quality and waste disposal are key in the prevention of cases and outbreaks of common disease.

Early assessment of environmental health threats is critical for identifying

prevention and mitigation measures and for the establishment of related monitoring and surveillance systems for use before, during, and after the MG event. This assessment should start from prior environmental impact assessment studies and environmental management plans developed as part of the planning and construction of MG facilities and related infrastructure, particularly if social impact assessments were undertaken. A range of environmental health issues may have been identified during these assessments, e.g. implications of land use, changes on vector-borne disease patterns, any environmental legacy issues requiring remediation (e.g. chemical contamination of the event site, climate change, related weather concerns, etc.).

Characteristics of the setting, including the physical environment

Location and infrastructure are important factors in an environmental risk assessment. Urban settings have very different contextual considerations to rural settings. Holding the MG, for instance in derelict industrial areas as part of efforts to combine preparations for the event with urban renewal activities can have important environmental management implications. Other factors

such as availability and quality of water and sanitation facilities; cooling and ventilation facilities and infrastructure (e.g. shade); and general environmental conditions such as climate and thermal conditions all influence environmental health risks.

Visibility and political significance of the event

Due to heightened scrutiny of planning and implementation activities, there may be positive pressure to address environmental and social concerns; making MGs more “green” and “sustainable”. Two notable examples include the decision by the

Australian Government to stage the first “green games” at the Sydney 2000 Olympic and Paralympic Games and the “Green Goal 2006” campaign launched by the German Government as hosts for the FIFA World Cup.

What do we know?

Significant opportunities exist to promote and protect health and these should be integrated into the design of plans and policies for MGs. These include things such as the design of facilities and how this addresses weather and temperature-related issues (i.e. use and siting of

ventilation systems, existing shelter / shade from exposure to the sun / weather). Decisions about water and sanitation infrastructure and services at MG can impact the availability and quality of drinking water, as well as potential health risks associated with inadequate sanitation and hygiene.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

While important and useful lessons can be drawn from past MG events, each event requires its own specific planning and intervention measures. Due to the diverse nature of MG events and behaviour of attendees, the use of iterative evaluation approaches, for example that follow a “plan, do, check, act” model, can allow for ongoing flexibility.

It is important to collaborate planning and

assessment activities with other authorities and agencies (transport, environment, labour, and construction, etc.). The following can be addressed as part of environmental health monitoring in MG events:

- Water quality
- Accommodation or lodging
- Travel sites, monitoring should cover sanitation, waste disposal, etc.
- Transportation
- Waste management

- Vector / pest control.

Key to the development and implementation of environmental health plans are the following:

- Clarity about which organizations, e.g. government agency, event sponsors, etc. have overall responsibility for carrying out environmental health measures including at which points in the event cycle (planning, implementation, closure)
- Establishment of a compliance monitoring and reporting framework to ensure required measures are

implemented

- Definition of actions to be taken in the event of an unforeseen circumstance
- Provision for regular review and updating of the environmental risk management plan.

These should be supported by SOPs. For example SOPs for environmental health surveillance would specify sampling methods, laboratory tests to be used, and response procedures for identification of contaminated sources.

MG-specific risks

Key environmental issues should be considered as part of the strategic risk assessment, including: heat / cold exposure, air quality, noise pollution, water and sanitation and the potential for an extreme weather event.

It may be useful to review any available environmental impact assessment (EIA) reports prepared during earlier planning, design and construction phases. Studies may have been conducted, for example on air quality or surface water quality, that give insight into environmental health risks for the event.

Cultural characteristics and religious practices of MG participants should also

be considered. For example the ritual of mass bathing in rivers at religious festivals has been shown to adversely impact water quality and increase the risk of infectious disease spread (e.g. cholera), particularly in areas where there are pre-existing concerns about water quality.

Lack of awareness among MG participants about infection prevention measures to address environmental health issues is important, particularly in sensitive / fragile environments. In these settings, a breakdown in the most basic of measures can have a devastating effect on the spread of infectious diseases.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

All environmental risk management measures taken in a given MG context should be based on normal practice and will

need to comply with existing national or sub-national regulations and requirements.

Before the event

The majority of the work will be undertaken before the event to ensure the capacity to deliver environmental health plans.

- Surveillance, monitoring and reporting systems: As set out in chapter 9 these should be based on normal practice but need to consider any additional MG-specific needs based on the risk assessment, such as air quality issues at sporting events or the political pressure for a rapid response.

Monitoring and reporting systems should encompass all aspects of data collection, verification, evaluation and reporting and include any surveillance activities (routine and non-routine), as well as early warning and alert activities. These should be integrated into a wider surveillance system to eliminate duplication and reduce the risk for breakdowns in communication. Environmental health specialists should be involved in data collection, analysis, and interpretation. Good inter-sectorial coordination and communication are required to ensure that environmental health risks are detected and addressed.

- Laboratory services and sampling: Environmental sampling should meet the purpose of the investigation; this includes the sampling method and number of samples to be taken. The following should be considered:
 - Access to building plans, managers and technicians (e.g. information about fans, filters, ductwork, air conditioning systems, and so on)
 - Areas covered by sampling and the location of goods that need to be sampled
 - Percentage of negative controls ("field blanks"), and how these will be obtained
 - Procedures for obtaining bulk samples to characterize the presence of contamination (e.g. spores on building materials, dust cakes on

air filters). Procedures should include appropriate precautions (such as double-bagging of samples) to prevent secondary spread

- Defined detection limits
- Surface sampling with wipes or swabs
- Collection of air samples.
- Planning and design phase: EIAs examine the specific environmental health impact as it relates to the hosting of the MG including human health. Health representatives should be involved to have any influence. This allows health authorities or other stakeholders to draw attention to specific health risks or associated health promotion opportunities
- Strategic environmental assessments: This can be used to consider cumulative impacts of multiple projects that would be considered most likely in major MG
- Preparedness: Environmental health / sanitation and food safety specialists should be involved in the assessments are needed to determine the capacity of the agencies involved in EH and FS issues to meet the additional demands of a MG. They can also identify potential gaps in existing institutional structures and systems, including core functions such as environmental / food inspections and monitoring, surveillance, laboratory testing, inspection and enforcement of regulations especially in the area(s) immediately affected by the event. Assessments and associated findings may have considerable financial implications and may also require additional training, changes to regulations, reconstruction or renovation.

Case study: Atlanta 1996 Olympic and Paralympic Games

Several environmental health regulations were either strengthened or created in anticipation of potential risks. These included the issue and suspension of food service permits; provision and management of potable water and

sanitation facilities; strengthening of standards for accommodation including for surplus arrangements such as bed and breakfasts; and a strengthening of water quality standards for swimming pools and recreational waters.

To reduce the risk of an environmental health issue additional inspections of venues and activities that will impact attendees need to be undertaken. These should be identified by a proper risk assessment, including any previous

issues at the venues to identify high risk premises that will need particular attention.

Specific areas for consideration:

Heat and cold related illnesses

Heat-related illnesses (e.g. heat stroke, blisters and sunburn) are the most commonly identified environmental health issues for MG events. Use of the heat index (a combined measure of temperature and humidity) is considered to be the most important weather-related determinant and is often used for modelling potential demand for medical services.

The demographic characteristics of MG attendees need to be considered. For instance, children and the elderly are known to be more vulnerable to heat-related

illnesses as are individuals with pre-existing illnesses, particularly cardiovascular and pulmonary. Also “visiting” populations can be less prepared and more susceptible to climate conditions (heat, cold, humidity) and altitude.

Heat-related illnesses are commonly monitored using syndromic surveillance. In order for this to be effective, medical and emergency personnel need to be appropriately trained to recognize signs of heat-related illnesses, particularly among sensitive populations.

Example good practice measures	Type of intervention	Before event	During event
Heat-related illnesses			
Avoid dehydration, maintain adequate intake of fluids, and reduce / avoid alcohol consumption	Health promotion		X
Wear appropriate clothing and use sunscreen	Health promotion		X
Provision / establishment of air conditioned locations, e.g. cooling shelters	Infrastructure	X	
	Operations management		X
Ensure adequate access and availability of safe drinking water	Infrastructure	X	X
	Operations	X	X
Provision of shade / shelter	Infrastructure/ Design	X	
Ensure adequate air circulation / flow, including through the use of fans	Infrastructure/ Design	X	
	Operations management		X
Monitor signs of heat-related illness e.g., using syndromic surveillance systems	Surveillance		X
Ensure adequate communication to the public, including through the media, about measures to reduce risk of heat-related illnesses, e.g. use of sunscreen, water consumption, wearing of hats, etc.	Health promotion	X	X

Air pollution

The most common health outcomes associated with exposure to air pollutants at MGs are acute respiratory inflammations among children and young adults. In some

instances impacts on cardiovascular diseases, in particular heart rate variability, were also documented.

Example good practice measures	Type of intervention	Before event	During event
Air pollution			
Promote use of public transport to reduce an increase in the circulation of private vehicles	Health promotion		X
Restrict the number of private vehicles on the road in and around event locations	Transport policy	X	X
Use of “green” energy to power events, e.g. solar power	Energy policy	X	
Avoid use of diesel fuels	Energy policy	X	

Noise

Noise pollution in the context of MG events has been identified primarily in connection

with music festivals, car races, and events sited in densely populated residential areas.

Example good practice measures	Type of intervention	Before event	During event
Noise			
Ensure that event staff and event participants have access to adequate personal protective equipment	Procurement	X	X
Raise awareness about health risks associated with exposure to excess noise	Health promotion		X

Water and sanitation

Water pollution: Accidental release of sewage effluent and chemical substances from temporary sanitary facilities could result in significant water and soil contamination.

The use of specific materials or substances as part of ceremonial activities can also impact water quality. For example, powders thrown into the air as part of Holi ceremonial celebrations are often manufactured from synthetic materials, some of which contain heavy metals and chemicals. The negative impact of the use of these on surrounding ecosystems and water sources has been documented.

Toilet facilities: It is essential that these have adequate capacity, are conveniently located, and readily accessible throughout the site. Toilets must be constructed and maintained so that they remain hygienic and usable and will not, whether by leakage or seepage, contaminate a water supply, surface water, or adjacent ground surfaces.

Separate toilets should be provided for men and women, with at least one toilet seat for every two hundred females and at least one toilet seat for every three hundred males. The location of all toilets should be plainly signposted throughout venues to direct attendees. Additional signage should be posted to discourage participants from openly urinating or defecating.

Hand-washing facilities should have adequate clean (pressurised) running water, soap, and paper towels or other approved hand-drying methods. Facilities should be available near each group of toilets and near each food service area. Adequate disposal of water and paper towels should be provided.

Sewage disposal should never be discharged to the ground surface or into any watercourse.

- Chemical toilets should be readily accessible by service vehicles, and be serviced often. Waste material should

be disposed of in a public or community sewerage system, according to local directives

- Water-carried sewerage facilities should be connected to a public or community sewerage system with wastewater treatment facilities of adequate capacity to treat the additional wastewater from the MG
- Any toilet or sewage disposal system should be constructed and located to avoid polluting any source of drinking water or watercourse, or creating a public health hazard
- Easily cleanable receptacles should be provided for waste materials
- Waste receptacles should be covered.

Solid waste collection and disposal facilities should be provided.

- All solid waste should be collected and stored in leak-proof, non-absorbent containers, removed daily or more frequently, and disposed of in a community solid waste disposal facility, or in an appropriate landfill to be constructed in the area
- Approved solid waste receptacles should be provided at convenient locations throughout the site, and at each food service facility
- If bulk solid waste storage containers are used, at least two four-cubic-yard containers should be provided per 1,000 persons in the case of once-daily removal, or two two-cubic-yard containers per 1,000 persons in the case of twice-daily removal. These containers should be located so as to be accessible to service vehicles.

Example good practice measures	Type of intervention	Before event	During event
Water and sanitation			
Develop and implement a Water Safety Plan to provide a comprehensive approach to evaluating hazards and risks and to support the development and implementation of effective management procedures	Infrastructure	X	X
	Operations	X	X
Reduce consumption of potable water for operation of toilets, e.g. through recycling of grey water, use of rain water capture systems	Infrastructure design	X	
Promote active recycling and waste separation to reduce amount of solid waste generated	Health promotion		X
Ensure adequate supply and appropriate placement of waste bins, and ensure they are regularly cleaned and emptied	Operational management	X	X
Provide adequate facilities, e.g. bins, for recycling and separation of waste streams	Procurement	X	
Use covered containers, particularly for food waste, especially in warm outdoor settings	Procurement, operations	X	
Compost food waste and ensure effectiveness of practices	Policy (food vendors and sub-contractors)	X	X
Regularly test / monitor drinking water and recreational waters quality, including in lakes, rivers, swimming pools, hot tubs, etc.	Inspection / surveillance		X
Toilets and sewage disposal systems should be constructed and located so as to avoid polluting drinking water sources, surface water, watercourses	Infrastructure and operations	X	X
Ensure availability of / access to hand washing and sanitation facilities at all food service points and based on the expected number of MG participants	Infrastructure and operations	X	X
Promote hand hygiene and safe sanitation practices	Health promotion		X
Monitor toilets, rubbish bins, and waste processing and storage sites	Inspection / surveillance		X
Ensure that solid waste is stored in leak-proof, non-absorbent containers which are collected at least daily	Operational management		X
Ensure solid waste is disposed in community solid waste facilities or in a sanitary landfill constructed near the event area	Operational management		X

Solid waste

Material associated with MG events typically includes: paper and packaging waste, food waste, metal cans, glass bottles, plastic packaging, etc. The inadequate management

(storage, transport and disposal) of solid waste can have a number of implications for health (e.g. vector-borne diseases and pests).

Example good practice measures	Type of intervention	Before event	During event
Pest and vector control			
Mosquito species present in and around MG sites should be identified and a mosquito abatement program should be developed and implemented	Planning and operational Management	X	X
Ensure judicious use of pesticides and other chemicals for vector and pest control	Operational management	X	X
Drain areas of stagnant water so as to reduce availability of vector breeding sites	Public health	X	X
Raise awareness about appropriate measures to reduce spread of vector and pest-borne diseases, e.g. use of insect repellent	Health promotion	X	X

During the event

This largely involves implementation of the environmental health risk management plan and related monitoring, surveillance (and inspection) and response activities. The most important element will be coordination across public health practitioners and other

MG stakeholders, particularly regarding the sharing of information and data. Public health practitioners should also complete a rapid investigation in the event of any environmental health event linked to a MG.

After the event

In an environmental health risk management context, most post-event activities will immediately focus on addressing risks associated with clean-up efforts, especially waste management activities. If there have been any issues associated with vandalism, post-event activities would also involve repair and refurbishment of damaged infrastructure.

For some environmental health issues, such as waterborne and food-borne diseases, surveillance activities will continue after the event. This is to detect and monitor potential threats and issues disseminated by travellers. Post event surveillance activities and systems used to conduct them are described in more detail in chapter 9 on disease surveillance and outbreak response.

TOOLS AND RESOURCES

Link to WHO guidelines on Environmental Health

http://www.who.int/publications/guidelines/environmental_health/en/

Chapter 12 – Protection of food and water

KEY CONSIDERATIONS

- Prevention, preparedness and response measures to ensure the safety of food and water sources from hazardous biological, chemical and physical agents are an integral component of any public health strategy for the MG
- Food and water authorities should be fully integrated into the MG outbreak alert and response team both before and during the MG
- Food and water authorities should assist with the creation and review of plans for the provision of food and water for MG participants, staff and spectators, including adequacy, accessibility, suitability and affordability
- Mass catering must only be delivered by reliable, experienced caterers; medium- and small-scale catering should be conducted by trained and certified vendors
- Assessment of food and water safety should begin during the planning process and extend over the entire supply chain from production to final consumption
- Because of their cost and complexity, adequate food and water analytical capacity should be established well before the MG
- All food handlers must receive training in personal hygiene and food safety and defence before the MG
- Food service establishments should be monitored during the MG to immediately identify and address any food safety problems.

INTRODUCTION

Inadequate responses to what would normally be a routine diarrhoea and vomiting outbreak during a MG can have major health, economic and reputational consequences. Many outbreaks at MGs have been caused by contaminated food and water. Such diseases disproportionately affect children, the elderly, pregnant women and the immunocompromised. Visitors are often more vulnerable to food and waterborne diseases. Crowd density can also increase the spread of certain pathogens such as norovirus.

Food safety is a multi-sectorial and multidisciplinary activity involving expertise in (but not limited to) epidemiology, chemistry, microbiology, toxicology, agriculture, food science and technology, risk analysis, risk communication, veterinary medicine, food

production, manufacturing and distribution, food service and catering, environmental health, and quality assurance and control.

Food safety includes food defence, which addresses the intentional contamination of food or water by individuals or groups. The risk of this will be identified in the threat assessment conducted in coordination with security authorities.

GUIDING PRINCIPLES AND BEST PRACTICE

Safe food and water are fundamentally important for successful and safe MGs. If not safe they can cause severe public health, economic and reputational impacts for organizers. Food and water safety authorities have critical public health roles to play before, during and after any MG.

Food producers and caterers have the responsibility for ensuring the safety of food being offered, including compliance

with applicable laws and regulations. Health authorities and relevant agencies should guide the food sector in meeting their responsibility to provide safe food by education, oversight, inspections and if necessary, enforcement action.

Organizers may consider having a specific working group to address food safety issues; outbreak surveillance is an essential component.

Foundations for food safety during a MG

A national food safety programme is the foundation for any planning. MG organizers should consider existing food safety programmes, nationally and at the location of the MG and identify gaps and weaknesses that need to be addressed.

In preparing for the MG event, governments should apply the “production to consumption”, i.e. “farm to fork” food safety principle. Each step of the food supply chain should be assessed to check that adequate food protection measures are in place. Guidance has been developed by the WHO for evaluating the components of national food safety programmes, including:

- Food safety legislation
- Inspection and enforcement
- Sampling and analysis of food and

surveillance of food-borne diseases

- Responding to food safety emergencies
- Communication with the public, the food industry and other stakeholders concerning food safety matters.

While the food industry has the primary role in assuring food safety, its involvement in the planning for the MG is often overlooked. Many governments require certain food establishments to develop and implement risk-based preventive approaches, such as the Hazards Analysis and Critical Control Points (HACCP) system, because they anticipate and prevent possible hazards before the food reaches the consumer. A risk-based approach should be considered for all potentially hazardous food served at a MG.

Foundations for water safety during a MG

The WHO Guidelines for drinking-water quality recommends that a water safety plan (WSP) be produced before the MG. The WSP uses a risk-based preventative strategy to managing drinking-water safety from catchment to consumer. It is also a quality assurance tool that provides a mechanism for the objective assessment of efforts in water safety planning. It aims to support the development, implementation and assessment of WSPs by identifying opportunities for improvement.

The context of a MG has major implications on providing safe water. An early assessment should be conducted so that appropriate measures can be taken. Temporary water distribution systems may have to be used and can become a source of waterborne disease. Proper planning, design, operation and maintenance, monitoring, sanitary inspection and surveillance of temporary water supplies is essential for assuring safety during a MG.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

The MG risk assessment should provide the basis for implementing food and water safety measures. The plan should include assessments of food and water safety capabilities at the national, provincial, and local levels.

MG organizers should formulate a food and water safety plan well in advance and in consultation with all stakeholders, including:

- National, provincial and / or local public health authorities
- Food and water regulatory authorities, including those in health, agriculture, fisheries, and commerce and trade
- Food industry, including local food service providers
- Epidemiology / surveillance experts / emergency response services
- Hospitality and tourism sectors
- Law enforcement
- Media relations.

Epidemiological data on food and waterborne outbreaks in the host country and MG location are critical. This data should include the potential

hazard (e.g. *E. coli*), the source, and factors contributing to transmission (e.g. inadequate sanitation infrastructure). Information on the host population's vaccination coverage of food and waterborne diseases, such as hepatitis A, is also important.

Estimating requirements for safe food and water distribution requires consideration of a number of factors, including:

- Number and types of participants (players, speakers, performers, spectators and support staff, including volunteers)
- Disease profile of participants, countries of origin, vaccination coverage, etc.
- Venue and its infrastructure (electricity, water supply, toilets, hand-washing facilities)
- Nature and duration of the MG
- Number and types of meals both at the venue and off-site
- Type and scale of catering
- Preparation and handling of the food to be offered.

Operations

A food and water safety lead should be identified and integrated into C3 operations. This person should provide a 24/7 contact point for food and water safety.

The food safety plan should be based on existing capabilities and practices in the host community. This should include consideration of the following:

Food safety legislation

Food safety is based on a comprehensive 'farm to fork' concept. Depending on the host, multiple government agencies may have authority over

food safety at different stages. Coordination of agencies involved in food safety is essential to identify gaps and overlaps in coverage.

Inspection and enforcement

Where responsibilities for food safety are fragmented, coordination is necessary between different inspection and enforcement authorities at national, provincial and local levels. Municipal health authorities often have the responsibility during the MG to ensure

the safety of catering operations and local food service establishments. Preliminary inspections, educational activities and training should begin well in advance of the MG. As the event approaches, inspection frequency should be increased.

Sampling and analysis of food and surveillance of food-borne diseases

Laboratories with sufficient capabilities to analyze for chemical and biological agents in both food samples and human specimens should be identified. Preparations should include validation of methods and stocking of sufficient reference materials and reagents to rapidly test a large number of samples for priority pathogens. Monitoring of food before and during the MG is essential for detecting and responding to food-borne pathogens. Surveillance of food-borne diseases and the pre-event risk assessment can provide information on likely biological agents that may be encountered during a MG and can

set baseline levels of food and waterborne infections in the community. Explicit consideration of food-borne diseases in the national disease surveillance programme is essential for identifying priority pathogens and their associated foods.

For chemicals and toxins, the collection and evaluation of monitoring data, such as from total diet studies, can provide information on baseline levels of contaminants in the food supply and identify priorities for monitoring of food during the MG.

Caterers and food handlers

Catering for large numbers of people must only be attempted by reliable and experienced caterers. Even established hotels and canteens may not be able to accommodate the increased scale of food service required by certain events. Event organizers, in consultation with the food and water safety lead and other relevant stakeholders, should give careful consideration to the available options for providing participants with safe food.

In general, the evaluation of mass catering operations should include inspection of facilities, water supplies, refrigeration, toilets and hand-washing facilities, sinks, lighting and ventilation, equipment and utensils, hygiene control programmes, storage and disposal of waste, animal and pest control and storage of hazardous substances. For potentially hazardous foods, a HACCP-like plan should be developed by catering operators. Current training of food safety managers and employees also needs to be evaluated and improved to address any identified gaps.

Small-scale operations may be used to provide food for MGs, and may do so without permission from the relevant authorities and food may be prepared by volunteers or street food vendors who lack basic food safety knowledge. Facilities may be inadequate and such operations pose public health risks. Inspection education and

training should be conducted with the goal of certifying operations prior to the MG.

Organizers may have to set policies for unlicensed food vendors operating at or near event venues. Where there is a reasonable possibility of inspecting and controlling the safety of what is being sold, these vendors should be included in any food and water safety plan. If not, educational material and training should be used to promote safe practices.

Often food handlers at MGs are recruited on a temporary basis. Training should be provided before the MG to ensure that food handlers understand basic food safety measures, particularly how they can avoid contaminating food. They should also understand their own responsibility should they become ill: they must report to their supervisor if they experience vomiting, diarrhoea, fever, or sore throat with fever. Anyone known or suspected to be suffering from the below conditions should be excluded from work:

- Diarrhoea (3 or more loose stools in 24 hours)
- Vomiting
- Hepatitis A (planners may consider mandatory immunizations for food handlers)
- Jaundice of unspecified etiology.

Event-based surveillance and response to food safety emergencies

While prevention is one of the major goals of food and water safety, responding to food safety emergencies is equally important. Surveillance and response plans can ensure timely and effective response in the event that emergency actions are required. Event-based surveillance using internet media search engines (e.g. Google), specialized media (ProMED or HealthMap) and social networking sites (e.g. Twitter) can provide the first alerts on food or waterborne outbreaks. MGs may also have designated “hotlines” for complaints and reports of food or water-related illness to provide another source of

real-time information.

The MG public health response team must have expertise in food-borne disease outbreak investigation. Food samples will need to be taken and analyzed for possible pathogens. If a particular food is implicated by epidemiologists or identified by laboratory testing, rapid trace back of distribution and product recall can prevent additional illnesses. Contingency planning for replacing contaminated food may need to be considered. International guidance for food safety emergency planning has been developed.

Case study: Event based surveillance using twitter during the London 2012 Olympic and Paralympic Games

An example of a food safety focused approach using social media platforms occurred during the London 2012 Olympic Games. Tweets started appearing from the public regarding the Australian and Canadian badminton teams becoming ill from food poisoning. These rumours led to an investigation that identified norovirus as the agent.

However, in this instance, the cause was not

from a food source. Through monitoring of Twitter trends, the UK Food Standards Agency was able to quickly address rumours and provide accurate updates from the UK Health Protection Agency. This exemplifies the utility of Twitter, not only for disseminating messages, but also for obtaining information from the public through two-way communication.

Communication with the food industry concerning food safety matters

Communication with the food industry should emphasize the need for heightened vigilance, with the understanding that government oversight will be increased before and during the MG. Information should be provided to the primary production and food processing sectors about priority biological and chemical agents that need to be considered in their risk management programmes.

The WHO Five Keys to Safer Food manual may be used as the basis for such a programme. With guidance and support from food authorities, food science and technology departments in academic institutions may implement these education and training programmes. General food safety promotion campaigns may also be useful to reinforce training messages, especially just before the event.

Communication with consumers concerning food safety matters

Communication with MG participants, staff and spectators on how they can protect themselves against acquiring a food-borne

disease should be considered. Information can be made available through leaflets, websites (public health or event), and the media.

Assuring water safety

Depending on the number of participants and location of the event, drinking water demands may require that existing water sources be upgraded or expanded. This is especially important if the event is taking place in a hot climate where dehydration is likely. Adequate supplies of potable water are needed for supporting infrastructures and services, such as toilets, hand washing facilities, and wastewater disposal.

In urban areas, water supplies are more likely to be drawn from existing infrastructure, and preparations for the MG are logistically simpler. If the venue is in a rural area or is otherwise not connected to the community water supply, a temporary water supply is required.

Temporary water supplies are often provided by a private entity. The most important issue

for drinking-water safety is water quality management, including the locations and frequency of water quality monitoring. MG organizers should require that the water supplier inspect the sanitary condition of the water supply system and monitor water samples on a regular basis during the MG. Relevant government authorities may also be involved.

Transportation of treated water by tank truck and / or provision of bottled water may be considered at heavily trafficked or difficult to service locations, although both bring additional challenges. Water tankers must be adequate to provide water that is safe for consumption, for example chlorine levels must be maintained throughout distribution. Bottled water can be expensive, and bottles must be properly disposed of afterwards.

During the event

The lead person responsible for implementing the food and water safety plan during the MG should be clearly identified and fully integrated into the C3 operations of the MG. Inspection of food venues / caterers should intensify throughout the MG to ensure safety. In particular, proper cooking and holding temperatures should be monitored to avoid survival and growth of pathogens.

Disease surveillance should be carried out during the MG and findings communicated with those responsible for food and water safety as early as possible. Any potential food or waterborne outbreak should be rapidly investigated, including sampling and analysis of suspected sources.

Water safety

Routine inspection of water supply infrastructure is very important. If any problem related to water safety or quality arises, actions should be taken promptly. All water supply facilities should be thoroughly inspected at least every day during the MG and water samples analyzed. Basic parameters

include pH, conductivity, turbidity, colour, chlorine levels and *E. coli* (or alternatively, thermotolerant coliforms). Service taps should be accompanied by signs with instructions on what the water can and cannot be used for (i.e. potable or non-potable).

Food and water defence

MGs have become potential targets for malicious threats. Such threats are the main focus of national security and law enforcement bodies at all levels of government. Food and water provide opportunities for contamination at various points in the supply chain from production to consumption, with the potential for rapidly impacting a large number of people. In the event of a potential threat, and in conjunction with a threat assessment, plans should be developed which balance the practicalities of providing large numbers of people with food and water with the assurance that food and water are safe.

Food and water defence needs to be part of the overall food and water safety plan and should address the following issues: security and coordination, threat assessment, vulnerability

assessment, emergency planning and management and law enforcement aspects.

The WHO publication “Terrorist threats to food: Guidance for Establishing and Strengthening Prevention and Response Systems” offers guidance regarding prevention, surveillance, preparedness and response. This publication contains an annex that offers practical suggestions for the food industry to help prevent intentional contamination. The US Food and Drug Administration (FDA) and US Department of Agriculture (USDA) have also developed a vulnerability assessment tool called CARVER + Shock to evaluate potential vulnerabilities in the food supply chains of specific foods and food processes.

Practical application

- Facilities: One of the most important defence considerations is to prevent unauthorized people from being able to access food establishments. Security of food facilities includes locks on doors, windows and other entry points; chemicals (for example, cleaning and sanitizing agents and pesticides) should be accessible to only authorized staff and stored securely
- Food: Any evidence of tampering, “counterfeiting” or other malicious, criminal, or terrorist acts should immediately be reported to the appropriate law enforcement and public health authorities. This includes monitoring of public areas, including self-service areas such as salad bars, condiments and open bulk containers, for suspicious behaviour and possible tampering
- Personnel: Checking identification badges of food handlers, limiting access to critical areas and restricting personal items are important measure during a MG. All personnel should remain alert for any unusual circumstances and behaviour.
- Water supplies: In addition, to the above advice, water disinfection systems, such as chlorination, must be inspected and monitored. Water supplies should be monitored for protection against intentional contamination with biological and chemical agents. As far as it is practical, access to water supplies must be limited, especially temporary reservoirs established for the MG.

After the event

There is an opportunity to have enhanced food and water safety systems and processes through:

- Larger cadre of trained and experienced personnel
- Enhanced standards for food and water safety.

TOOLS AND RESOURCES

Food Defence Plan Builder. US Food and Drug Administration

<http://www.accessdata.fda.gov/scripts/fdplanbuilder/>

Food Related Emergency Exercise Bundle (FREE-B). US Food and Drug Administration

<http://www.fda.gov/Food/FoodDefense/ToolsEducationalMaterials/ucm295902.htm>

An overview of the Carver plus shock method for food sector vulnerability assessments. US Food and Drug Administration

<http://www.fda.gov/food/fooddefense/fooddefenseprograms/ucm376791.htm>

Vulnerability Assessment Software. US Food and Drug Administration

<http://www.fda.gov/Food/FoodDefense/ToolsEducationalMaterials/ucm295900.htm>

Tool for the Development of a Food Safety Programme for Catering and Retail Premises, Queensland Health, Australia

<http://www.health.qld.gov.au/ph/documents/ehu/30373.pdf>

WHO Guidelines for drinking-water quality

http://www.who.int/water_sanitation_health/dwq/guidelines/en/

WHO framework for developing national food safety emergency response plans.

http://www.who.int/foodsafety/publications/emergency_response/en/

WHO Five keys to safer food manual

<http://www.who.int/foodsafety/publications/5keysmanual/en/>

Chapter 13 – Event Medical services

KEY CONSIDERATIONS

- Planning for MG events should use internationally recognized emergency management concepts. These include the all-agencies approach (or integrated approach), the comprehensive approach (addressing prevention, mitigation, preparedness, response and recovery phases), and an all-hazards approach with the plan, resources and tactics suitable for addressing all possible scenarios. Healthcare planners should consult local emergency management colleagues when planning for an event
- A key decision in planning for Event Medical Services (EMS) is to provide a comprehensive general healthcare service. This includes primary care and treatment of minor injuries and illnesses. This can prevent the typical increase in presentations to local hospitals that may result from a MG event, improve response times, and free resources for urgent medical cases. EMS can typically expect to handle minor injuries or illness, but have the scalability and triage capacity to handle a large surge in cases should an adverse event occur at the MG
- A restricted service designed to deliver time critical medical response should be provided. For patients requiring urgent medical attention, planning should focus on establishing and maintaining the “chain of survival” (i.e. the series of actions that, when put into motion, reduce the mortality associated with cardiac arrest)
- Planning should focus on good risk assessment that takes into account local circumstances. For example, a relatively small MG may have the potential to produce many more casualties than a larger event when local rivalries, political or cultural, and other factors are considered. Several planning tools can help predict the number of patients who may use emergency services and determine the required resources. These tools are helpful but must be used with care due to differences in context between MGs
- Plans must consider how the EMS can adapt and respond to support local disaster response plans and agencies should a catastrophic event occur.

INTRODUCTION

Definition of event medical services

For the purpose of this chapter, event medical services (EMS) are defined as healthcare services which provide care to those injured or ill at an event or in the immediate vicinity. Healthcare professionals providing such services may include physicians, nurses, ambulance workers / paramedics / emergency medical technicians and first aid trained individuals. These services may be

coordinated and / or provided by jurisdictional health departments, hospitals, ambulance services or other systems.

The MG difference

There are very few models to assist us in understanding the drivers for and consequent resource and response requirements of EMS for MGs. Two useful models are based on the idea that MG health can be understood as an inter-relationship between three areas: (1) the biomedical; (2) the environmental; and (3) the psychosocial. Key features that influence

the rate of injury and illness characterize each area. These key features are more or less well understood and combine to produce an effect on the patient presentation rate, and a response to the health plan. The latent potential for injury and illness is a useful concept to assess the health risks associated with MGs.

What do we know?

Respiratory illnesses, minor injuries, heat-related injuries and minor problems (headaches, blisters, sunburn) make up the majority of injuries (80-90%).

Chapter 1 details the importance of understanding the context surrounding a MG and conducting a risk assessment. This data contributes significantly to estimates of potential adverse health events associated with MGs. For example, outdoor events produce more environmentally related injuries such as lacerations and sunburn. Events such as rock concerts, produce more

alcohol and drug related problems. The latest studies have shown cardiac arrests to occur infrequently at a rate of 1:500,000. Early access, on-site resuscitation and early defibrillation can significantly improve survival rates. Presentation types are, broadly speaking, similar across countries and commonly reported in the international literature. Differences that do occur appear to be closely associated with key features of events such as weather, the event site and the nature of the activity.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

The level and type of EMS provided during MGs is dependent to a large degree on the judgement of clinicians and the MG context. MG events are, surprisingly, more hazardous than would be expected: they generate a higher incidence of injury and illness than that found in the general population, even though MG attendees are typically 'well persons'. In addition, MGs may be subject to catastrophic accidents or attacks resulting in large numbers of people injured or dead.

For EMS, a MG is a situation where there is

the potential for a delayed medical response to emergencies because of limited access or other features of the environment and location. This potential delay requires planning and preparation to limit the impact of the MG on the health of attendees and the host community, and to ensure timely and appropriate healthcare is available.

The principal goals of EMS at MGs include: provision of onsite minor injury and illness care, establishing rapid access and providing triage, effective and timely stabilisation and

transport of patients, and establishment of a mass casualty plan. The decision to provide on-site care for minor problems is complex. However, influencing factors may include those events which cover a large geographical area, events with a captive audience or events where the local hospital system could be overloaded.

On average at least 1–2% of a crowd will access some type of first aid or medical care. Of those, around 10% will need ongoing care on-site, and a further 1% will require transport to hospital by ambulance. These proportions will increase where there are

high-risk activities such as participation in endurance events or crowd surfing, moshing and alcohol consumption at some concert events. External factors such as weather conditions, access to the event, and the local terrain also contribute to patient presentations.

In addition the likelihood and potential consequences of catastrophic incidents such as the collapse of a spectator stand or terrorist attack need to be considered.

MG-specific risks

Several of the features of MGs which have been discussed in the literature, are well-recognized and considered important influences on the demand for EMS. These key characteristics include: the weather (temperature and humidity), duration of the event, whether the event is predominantly an outdoor or indoor event, whether the crowd is predominantly seated or mobile within the venue, if the event is bounded (fenced or contained) or unbounded, the type of event, the crowd mood, the availability of alcohol and drugs, the crowd density, the geography of the event (or terrain / locale), previous history of similar events, proximity to definitive care and the average age of the crowd. This is not an exhaustive or complete list of the characteristics of MGs that might need to be considered in the development of health plans and in improving our understanding of how these events work. Nonetheless it is clear that sufficient evidence is being developed encouraging a higher level understanding of MGs and the typical event medical presentations that can be expected.

The evolving idea that we need to truly investigate how health status is challenged during MG events and to apply some thought to the treatment of causation (to prevention

or mitigation) has led EMS providers to consider other novel features of events and to apply new criteria in their event plans. Examples of new planning concepts emerging from the research literature include the following:

- Assessment of the difference between Patient Presentation Rates (PPR) inside event venues versus presentations outside event among non-attendees
- Analysis of the influence of ease of access to the venue on health
- Use of real-time surveillance
- Providing as much of the 'Chain of Survival' as possible at an event site.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

Requests for EMS

Requests for MG medical support can come from many sources. In most cases these events require some level of local government approval. Planners should be familiar with the relevant legal, regulatory, and internal processes for risk assessments

and the associated commitment of resources. Understanding the context of the event and something about those who are likely to attend is essential in assessing risks and planning for the best EMS structure.

Is there an obligation to provide extra care?

Some events attract relatively small crowds and, thus, only slightly increase risks to the general public in the vicinity of the event. However, the nature of the event may place participants, spectators or bystanders at significantly increased risk. The location of

an event can adversely impact the response time of EMS through increased distance and restricted access and exit. Special arrangements may need to be made.

Determining the number of first aid and healthcare professional staff

Data from the MG's risk assessment should be used to determine the number of first aid and healthcare professionals required. Identifying the required EMS resources is a more complicated undertaking often based

on expert opinion and careful assessment of the risks associated with the event. A widely used method for estimating the required resources is published by the Health & Safety Executive (HSE) in the United Kingdom.

Operational plans

Operational plans should include information on coordination and command of medical services. It would normally include the following elements:

- Comprehensive event description and brief history of previous events
- Location of first aid and medical services
- Communications plan
- Emergency access / exit routes
- Credentials
- Standard site plan
- Modes of operation
- Escalation procedures
- Contact lists
- Support services, e.g. police /

ambulance / fire / event staff / security

- Data management plans, including casualty records
- Contingency plans.

The SMEAC format below provides a standard approach to the development of briefing notes for operational commanders and involves:

- **S**ituation
- **M**ission
- **E**xecution
- **A**dministration and logistics
- **C**ommunications.

Case study: Planning

World Youth Day (WYD) was established as an annual program of the Roman Catholic Church in 1986. Every few years it includes an international pilgrimage and week-long event in a major world city. World Youth Day 2008 was held in Sydney, Australia. New South Wales Health worked with partner agencies to provide medical services via on-site medical units at key event venues. Planning was challenging because of the lack of detailed analyzes of the issues for health services and

the typical presentations for care at previous WYD events. The health service published a post-event review of medical records from the on-site medical units which indicated 465 patient presentations, consisting largely of infectious respiratory symptoms and general primary care health concerns. An outbreak of influenza was also managed. Subsequent WYD events benefitted from this baseline data and planning for the event when it is held in new host cities was improved.

Communications

An effective and reliable medical communications system is essential.

Working with other organizations

Multi-agency planning meetings should be held in time for formulating integrated plans and agreed upon by all concerned.

The key objectives of any planning meeting are to ensure that:

- All agencies have access to the same information; timings, places, scale of the event, the principal organizations and key personnel involved, budgeting, mapping, documentation and reporting procedures
- The statutory emergency services (fire,

police, ambulance) and licensing / local government authorities are involved and that any plans created meet their requirements

- Interpersonal relationships are fostered which facilitate greater mutual understanding of the tasks to be carried out and benefit coordination for the duration of the event
- Any distinctive features of the event are fully considered.

First aid posts and medical centres

Organizers should provide suitable aid posts and facilities should be reviewed as part of the risk assessment. Where fixed posts are unavailable or inadequate, consideration may be given to

the use of tents, marquees, mobile treatment centres (vehicles / caravans) and inflatable shelters. Sustained access to electricity, potable water, and waste disposal are required.

Electrical safety

Local electrical safety standards must be met or exceeded. These include:

- How electrical cabling must be routed between generators, electrical distribution boxes and appliances
- The requirements for the testing and tagging of electrical equipment, including mobile distribution boxes, mains-rated cables and power boards
- How power cables must be run to avoid tripping or choking; cables should be protected from weather and other hazards. Aerial cables must be fixed securely and be clearly visible
- Backup power generation for essential equipment, such as communications, may need to be provided.

Medical and first aid posts

The number of aid stations and the level of care available at each is determined by careful risk assessment and (where possible) review of previous events. The location of medical centres will often establish them as a central referral point to review cases seen by tertiary aid posts; more advanced facilities can then provide more advanced care. These tertiary aid posts should be positioned throughout the venue, depending on the size, layout and number of attendees.

The following can be considered:

- A separate medical centre may be required for the use of certain participants (such as players or drivers) and officials
- Access to medical centres and posts should be clearly marked; they should be accessible to wheeled stretchers and wheelchairs
- All medical centres and posts should be easily accessible to ambulances to facilitate the referral of patients to hospitals
- Sufficient power outlets and lighting in medical centres are essential, with spot lighting in the resuscitation area (if established)
- All medical centres and medical posts should have at least one wash hand basin with hot and cold running water and access to a sluice facility with the appropriate drainage system
- Waste facilities should be available in all areas for general, non-sharp waste and sharp waste to facilitate proper waste segregation. The smallest containers appropriate and available should be used. EMS planning must incorporate methods for appropriate removal of biohazard and non-biohazard waste.

Managing medical staff needs on duty

Often the logistical problems associated with access to events result in medical staff being required to work long shifts. Shift duration is also an important consideration for volunteer staff who may have already worked a full day in their regular employment prior to reporting to the event. Staff should have access to a rest area where they can eat and drink out of public view. Only in cases

of an absolute emergency should members have their break time interrupted and all staff should be required to take breaks to limit fatigue.

Emergency planning and response

Emergency planning is an integral part of the planning process. The larger the event, the greater the need to have effective emergency plans; emergencies are unpredictable and can happen anywhere.

The list below is recommended as a guide to some of the matters which need to be considered:

- Familiarity with existing emergency / disaster plans
- Ensure that the event operational plan describes response plans to major incidents

- Assess the venue, noting potential hazards
- Consider previous incidents which have occurred at a venue or event
- Prepare instructions to brief medical staff on their role in an emergency response
- Plan for evacuation and re-establishment of EMS at a secondary location in the event of a catastrophic emergency.

During the event

Delivery of EMS during events is complex and it is essential that an evidence-based framework underpins deployment of medical services. The key components of this framework

are described below. You will also need to consider infection control recommendations, as these are an important part of EMS. More information can be found in chapter 10.

Pre-deployment briefing

Personnel should be briefed prior to the event to ensure they understand their duties and expectations. A written operational plan used as a basis for the briefing will ensure that all personnel receive the same information.

The event organizers and other key stakeholders should be briefed where necessary on the following elements of EMS delivery:

- Event medical and event management command structures
- Communications infrastructure and plan
- Medical aid post locations / set-ups and resources located within each post
- Clinical support on site
- Advanced medical care availability (location, etc.)
- Illness / injury reporting mechanisms, surveillance mechanisms
- Expected response times
- Regular reports on numbers injured and site safety issues

- SOPs, such as: media management, responsibility for notification of external emergency services and patient movement arrangements.
- SOPs for personnel including dress code, decorum, meals, and leaving designated posts.

Setting up the event

Depending on the type of event and the facilities available, considerations should include:

- The phased opening of first aid posts to ensure coverage as event staff / service providers arrive and depart at the end of shifts
- The maintenance of any aid posts and procedures for reporting deficiencies
- Ensuring that all required equipment has been received and is operational
- Ensuring that accreditation and security passes allow access to areas where medical teams may need to respond.

Iterative evaluation of the operational plan and dynamic risk assessment

An iterative risk assessment and evaluation process can help ensure the safety of medical staff and the effectiveness of EMS. Findings from these evaluations can lead to changes, such as relocating personnel to a different

position or agreeing to new operational rules in response to a situation. All changes must be documented and communicated to all staff and partner agencies.

Documentation and record keeping

Record keeping provides the basis for post-event evaluation, contributes to research and, occasionally, may be required for investigation following a critical incident or complaint. A record of staff attendance, including levels of qualification, days and shift times, should be maintained. Patient medical records should include the details of any treatment and advice and a standard record form should be used; local standards regarding medical record privacy must be met or exceeded. A copy of the medical record should be provided to the patient at

the end of their treatment and, if appropriate, handed to ambulance or hospital staff. The concept of medical confidentiality is widely recognized and every patient who receives treatment has the right to confidentiality. Treatment details can generally only be disclosed to third parties with the consent of the patient or by virtue of some overriding lawful authority. All treatment must be conducted with the consent of the patient wherever possible and within the limits set by local laws.

Emergency planning and response

All those in a command or coordination role need to be aware of any specific event emergency response plan. As required, there may be a need for a medical service representative in the Emergency Operations Centre (EOC).

Should a serious incident occur:

- Ensure the activation of the SOPs for major incidents
- Ensure the safety of all staff
- Ensure regular communication of clear instructions
- Ensure that documentation of an incident is collected
- Facilitate a 'hot' debrief of members to capture important or urgent issues
- Consider the need for critical incident debriefing or other counselling of staff.

After the event

Standing down

At the end of the event it will be necessary to ensure that there is a structured 'take down' of the infrastructure that has supported it. Considerations may include the phased

closure of EMS posts, phased departure of personnel and repair of the site, including proper disposal of medical waste.

Debriefing

Following any event, it is important to consider the lessons learned. Debriefs should be held as soon as possible after the event and can be broken down into three distinct phases:

- The 'hot' debrief provides an opportunity to discuss the event with staff

- The critical incident debrief deals with any specific and potentially traumatic event
- The formal debrief which may be conducted away from the event and incorporate other partner organizations.

Reporting and recording

All incidents and dangerous occurrences occurring during the event should be thoroughly investigated. Critical tasks to be completed to include collation of data and

written records, such as critical incident reports, attendance records, radio logs, and patient presentation statistics.

TOOLS AND RESOURCES

Events Health and Safety: <http://www.hse.gov.uk/event-safety/>

START Adult Triage Algorithm: <http://chemm.nlm.nih.gov/startadult.htm>

Major Incident Medical Management and Support (MIMMS): <http://www.alsg.org/uk/MIMMS>

UK Health & Safety Executive (HSE) guidance: <http://www.hse.gov.uk/guidance/index.htm>

Chapter 14 – Disasters preparedness and contingency planning

KEY CONSIDERATIONS

- Disaster preparedness includes risk assessments and planning to manage crowds, event access points, fire safety measures, environmental risks, medical preparedness and emergency response
- Disaster preparedness plans should be tested before the event
- Plans for the safe evacuation from venues and access to emergency services, with clearly-marked and unobstructed exit routes are needed and clear, concise messages to participants to assist with evacuation
- There should be a mass casualty management plan with staff trained to respond to this if a major incident occurs. The plan should include a mass casualty management plan for on-site management of multiple medical casualties, the transportation of patients to healthcare facilities and the evacuation of the event medical service (EMS) in order to re-establish themselves in a safe zone with coordination by regional disaster response authorities who may assume overall command
- The assessment of security threats to the event should be coordinated with the police, other law enforcement agencies, and emergency services.

INTRODUCTION

A disaster is defined as a serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources (United Nations International Strategy for Disaster Reduction (UNISDR) (2009).

Disaster preparedness and contingency planning are critical when preparing for a MG.

Disasters often happen due to a combination of:

- The presence of a hazard or danger
- A lack of the necessary means to cope with the likely negative results.

Disaster impacts may include the following:

- Loss of life, injury and disease

- Negative effects on human physical, mental and social wellbeing
- Damage to property, destruction of assets, loss of services, and disruption to economic and social infrastructures.

What do we know?

This chapter is based on a review of several literature reports of disaster incidents at MGs. Analysis of these reports has helped to identify several learning points for disaster prevention and emergency response

that will be discussed. Even with the greatest preparation, disasters may occur, overwhelming healthcare systems and affecting the ability to provide an adequate emergency response.

GUIDING PRINCIPLES AND BEST PRACTICE

What should we do?

MG event organizers, medical resource planners, and emergency services, including local hospital emergency departments, face many challenges in order to provide a safe event. Analyses of the risks involved of previous disasters indicates that guiding

principles are needed, which includes early detailed planning of crowd policies, evacuation procedures, and implementation of major incident and mass casualty plans involving emergency services.

MG-specific risks

Historically, peer-reviewed literature has concentrated on crowd variables that affect the level and types of medical need at a MG event. Despite the lack of evidence analysing specific crowd disasters, it has been possible to analyze previous disasters at MG events and the lessons identified to provide considerations when planning for future events. To reduce morbidity and mortality associated with a disaster at a

MG, careful consideration of the following themes is vital:

- Overcrowding (crowd density)
- Event access points (entry and exit)
- Fire safety measures
- Environmental risks, weather hazards
- Medical preparedness
- Emergency response.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

- Pre-planning should include risk assessment, health management and major incident planning
- Event planning should include:
 - Training of event representatives and security staff in crowd management and evacuation
 - An adequate ticketing system and crowd boundaries to limit overcrowding
 - Specified entrance and exit points to an event to help the management of crowd flow
 - A public information system that includes information on emergency evacuation before and during the events.

During the event

- Adequate crowd security and EMS need to be provided at MGs; planning should take into account crowd size and factors such as event type and external environmental conditions
- Evacuation plans, including fire safety, should be available for all MG events with clear information provided for attendees. Attendees may require messaging in multiple languages and methods (e.g. pictures, announcements, brochures)
- Exit routes should be clear and free from obstructions; plans should be in place for coordinated and safe evacuation.

After the event

- In the event of a disaster there should be a review process (planned prior to the event) including a review of any emergency services involved
- Lessons learned should be documented for use by the host of the MG when planning for future events or improving general public health preparedness. Findings should also be shared with other MG organizers.

The following section addresses key considerations in planning and managing the risk of disasters associated with MGs including crowding, fire, event access points, environmental hazards, medical preparedness, and emergency response.

Managing crowd risks

There are two kinds of fatal consequences of crowding: trampling and crushing. Planners must have a thorough understanding of crowd behaviour and the relevant safety systems. The combination of high crowd density and difficult access points is a major risk factor for a catastrophic stampede or trampling disaster. More information on this is in chapter 16.

The lethal potential of crowds has been illustrated by many major crowd incidents, and planners should ensure they have adequate C3 systems for immediate notification and access to triage systems. This will enhance the capability to respond to a human crush and stampede.

Several case studies have highlighted crowd members trying to gain access despite venues being at full capacity, either due to overselling of tickets or by people turning up

just before or after the start of the event; on some occasions this has resulted in multiple deaths and injuries.

Case study: Stampede at Ellis Park Stadium, Johannesburg

In April 2001 at Ellis Park Stadium in Johannesburg, South Africa, 47 deaths occurred in a stampede due to overcrowding at a football match. There was already a 60,000 capacity crowd in the stadium and a further 30,000 fans tried to gain entry to the football ground. A commissioned inquiry later the same year found:

- Tickets were oversold for the event but new arrivals were still admitted
- Untrained security staff fired tear gas into the crowd, intensifying panic
- A poor public communication system to the public was unable to inform and guide attendees
- No joint operational command centre was set up at the incident.

Key Considerations

- Identify an appropriate number of spectators for a venue and adequate ticketing systems; limit crowd size accordingly
- Use crowd monitoring measures that provide real-time information on crowd numbers that can be incorporated into an operational command centre
- Implement public communication systems in all areas of a venue
- Develop plans for safe evacuation from a venue; these should be visible and clearly marked.

Managing fire risks

Fire safety has become an important part of emergency planning. Fire disasters at indoor events often have several characteristics in common. Consideration of the factors below will help event planners eliminate many of the key risk factors for a fire-related disaster:

- Crowds of people in a closed space
- Presence of flammables (e.g. furnishings, clothing, fuels)
- Unguarded areas of a venue where fires have historically started
- Delay in raising the alarm
- Failure or delay of emergency services response
- Delayed evacuation due to psychological factors (e.g. crowd panic)
- Fire escape routes that are insufficient, locked or blocked (entrapment)
- Panicked behaviour or disorientation

- due to toxic fumes / intoxication
- Medical and emergency response overwhelmed.

Case study: Fire disaster, Gothenburg

On 29 October 1998, a fire occurred in a discotheque in Gothenburg, Sweden. A party was organized for 375 young people, aged between 12 and 25. A fire originated in the stairway facing the venue's emergency exit

making that exit unusable. A single stairway was the only route available for escape. 63 people died and 213 were hurt, of whom 50 were seriously injured. The fire department judged the venue as capable of holding 150 people.

Key Considerations

- Follow fire safety protocols, including the prevention of overcrowding at venues
- Design full site fire evacuation plans, including signage to evacuation points
- Ensure several emergency exits are available at any event
- Ensure emergency exits are free from obstructions, functioning properly, and with appropriate signage
- Assign specific duties to perform in the event of a fire to event employees, with regular emergency drills held on the premises
- Develop an event major incident plan with a fire emergency plan with pre-planning in cooperation with local burn-care trauma networks to ensure rapid triage of patients
- Ensure adequate stock and maintenance of resuscitation equipment specific to management of burn injuries.

Event access points

One key structural element to an event venue is the provision of adequate site access, not only for participants but also for emergency services.

Adequate access points at the MG event will facilitate the management of crowds and fire incidents.

Case study: Overcrowding at the Love Parade, Duisburg

On 24 July 2010, the Love Parade – a music festival and parade – was held in Duisburg, Germany. It was situated in a closed-off area with a series of underpasses and tunnels meeting at a single ramp which served as the only entrance and exit point for the festival. Due

to overcrowding, those entering and exiting the event converged. Continuous arrivals of people at the rear of the tunnel led to a crowd surge that resulted in the deaths of 21 people, with a further 510 injured. Reports cited crowd control measures as the main problem.

Key Considerations

- Clear identification of specific entrance and exit points at all event sites
- Flow of attendees that occurs in one direction
- Adequate access points for emergency services vehicles should be in place
- Event personnel trained in crowd control and crowd security.

Managing environmental risks

Each MG has its own risk of extreme weather events and other natural hazards. While not all contribute to emergencies or disasters, they do need to be considered when planning for emergencies and the potential influx of patient presentation to nearby hospitals. Only a few studies have highlighted the environmental effect on disasters at MG events.

As part of the risk assessment process an environmental hazard assessment of MG event sites should be carried out, considering measures to counteract extreme weather conditions (e.g. early warning systems, shelter, hydration, etc.). This will inform the need for following the steps below when preparing for

natural hazards (including extreme weather conditions) and to protect against extreme events:

- Assessment of extreme weather vulnerability
- Development and testing of evacuation plans
- Implementation of early warning systems
- Provision of adequate shelter on event sites if required
- Provision of access to water for hydration
- Passing information to event attendees in a clear and concise way.

Heat-related illness

Warm weather conditions and heat-related illness in particular has been the subject of most literature studies of patient presentation to health centres during MG events. Heat-related

illness is shown to be more common at events where crowds are tightly packed together (e.g. rock concerts) and where access to water and shade may be limited.

Case study: The Hajj and heat-related illness

A similar relation between heat-related illness and poor health outcome has previously been noted during the Hajj. Those embarking on the Hajj to Mecca are expected to experience ambient temperatures of up to 45° C, with lack of acclimatisation, arduous physical rituals and exposed spaces with limited or no shade, all of which are major factors for heatstroke.

The government of the Kingdom of Saudi Arabia has taken responsibility for improving the healthcare infrastructure and public health awareness. During the Hajj there are over 140

healthcare centres and 29 hospitals in the immediate vicinity all with the latest emergency management systems and specialized emergency personnel. Along the route taken by pilgrims there is increased provision of air-conditioned facilities, establishment of shaded roads and rest areas, provision of drinking water and spraying areas. Importantly the dissemination of educational information to all pilgrims prior to and on arrival to the country has been paramount to minimizing heat exposure.

Key Considerations

- Assessment of local risks and preparation for response to natural hazards, including extreme weather conditions
- Having an up-to-date, planned layout of the event site with hazard mapping
- Weather surveillance and early warning systems should be made available
- Healthcare professionals should be staffed and sufficiently trained with adequate equipment relating to the risk of potential natural hazards
- Major incident management manuals should include local natural hazard risk and local emergency response measures
- to be incorporated with evacuation plans
- Adequate means of telecommunication should be used between the organizers, police, civil protection, healthcare professionals and other emergency providers
- Adequate provision of shelter and cooling systems for warm weather conditions
- Adequate provision of water for hydration
- Inform attendees of potential dangers so that they can be more prepared to face them, including the need for evacuation
- Collaboration with the media for informing the general public.

Medical preparedness

Provision of on-site physician-level medical care at MGs has been shown to significantly reduce the number of patients requiring transport to hospital and therefore reducing the impact on the local ambulance services.

A patient presentation model has been devised, which generates the potential for a scoring system based on the variables of weather, number of participants, presence of alcohol, crowd mood and age of the crowd.

Paediatric risks

Planners should ensure that children are given special consideration. When planning disaster response systems for a MG, consider:

- Children rarely carry personal identification, making it difficult to establish the identity of an unconscious or lost child
- Due to anatomic and physiological differences, effects such as dehydration or exposure to noxious chemicals can cause illness at a faster rate
- Children with specific healthcare needs may be especially susceptible to environmental conditions, or could have indwelling medical devices that may not have replacements readily available
- Paediatric-sized emergency equipment must be available on site
- Healthcare professionals need paediatric-specific education and training
- Potential for long-term psychosocial intervention of post-traumatic stress disorder following MG disaster.

Case study: Children attendances at outdoor music festival

McQueen (2010) reviewed the attendances of children to medical centres at a large outdoor music festival in the United Kingdom and examined their care requirements. Findings suggested that 15% of total attendances were children, and that they were more likely than adults to present for medical attention following crush injuries, after a collapse or syncopal

(fainting) episode, or complaining of nausea and vomiting.

Despite no critical care incidents being documented during the event, this experience highlights the increasing need for specialist paediatric care at all MG events.

Case study: Stampede at a FIFA 2000 World Cup qualifying match

In July 2000 during a World Cup qualifying match a bottle was thrown on to the pitch from a supporter hitting a player on the head. Surrounding police responded by throwing tear gas in to the crowd and a stampede ensued where 13 people died and many were injured. The Clinical Audit and Quality Assurance Committee of the local hospital found that the response was sub-optimal as reported by Madzimabuto (2003):

- Emergency department only became aware when the injured people first arrived
- No major incident plan was prepared which led to the emergency department being overwhelmed
- A hospital command centre was not set up
- Staff reinforcements were unable to be contacted
- Medical teams were not organized to prioritize mass casualty care

- The media arrived, distracting emergency department personnel
- Supporting hospitals were not involved in a timely manner.

Main learning points found by the committee included:

- Integration of pre-hospital emergency service with hospitals
- A telephone hotline in the casualty department to the ambulance switchboard
- The need to develop the emergency department with appropriately trained medical leadership and major incident planning.

Importantly, despite the scarcity of resources these changes were viewed as the only way to effectively face potential future disaster challenges.

Key Considerations

- Medical services should be provided that are adequate to cope with the size of the crowd and potential risk factors specific to the event
- When planning disaster response systems children should be given special consideration
- Medical personnel should have appropriate training and experience in disaster medicine
- A standardized and well-rehearsed emergency management plan should be implemented, including rapid and timely deployment of trained personnel
- In the event of disaster, triage and emergency treatment should be started at the disaster site, and should continue at the designated receiving hospital
- A joint emergency command centre should be set up, to which all first responders at the disaster scene provide a structured report when communicating
- Nearby hospitals and emergency departments should have major incident plans that are activated when a local disaster is declared
- Hospitals should be designated primary receiving and standby hospitals
- Event staff should receive training and be briefed on their role and expectations should an emergency occur.

Emergency response

If a disaster does occur during a MG, a multidisciplinary approach is necessary to address emergency medical and emergency public health needs.

Key Considerations

- First responders should at the scene provide a structured report when communicating to the major incident command centre (Box A):

Box A: Examples of reporting a major incident to command centre	
METHANE	CHALETS
M: Major incident declared E: Exact location T: Type of incident H: Hazards –present & potential A: Access routes safe to use N: Number of casualties E: EMS present and required	C: Casualties – number and type H: Hazards present A: Access routes safe to use L: Location E: EMS present and required T: Type of incident S: Safety

- Coordination of emergency response activities should be organized under an Incident command system:
 - Utilises a unified command system
 - It should be started early before the incident gets out of control
 - Promotes coordination and communication
 - Minimises duplication of work effort
- The use of public warning systems and the media will be critical to inform the community about the nature of the incident and the appropriate measures that they can take to protect themselves
- Medical record keeping and documentation of the incident is essential and an accurate log must be maintained and accounted for

- Emergency responders should use Personal Protective Equipment (PPE). In the case of possible Chemical, Biological, Radiological and Nuclear (CBRN) incidents this should be specialist equipment
- Triage
 - Triage should be conducted by appropriately trained personnel
 - A system of triage should be used such as Simple Triage And Rapid Treatment (START) method. Paediatric triage varies from adults. Advanced Life Support (ALS) measures should be initiated if needed
 - Casualty collection sites should be at a safe distance from the disaster
- Local emergency department preparedness
 - All emergency department personnel should be trained in major incident management
 - Hospital disaster plans should include CBRN incidents
 - Non-critical patients should be transferred or discharged from the emergency department
 - Additional staff should be mobilized as required
 - Emergency departments should be well-stocked with supplies and antidotes
 - Decontamination may be required in a demarcated area
 - Laboratories should be prepared for surge capacity of samples
- Public health response
 - Disasters have the potential to impact on the local public health and medical infrastructure. Several factors should have already been considered:
 - What are the health and medical consequences of the event?
 - Can the health infrastructure cope with the added population?
 - Is a public health surveillance system in place?
 - Is the local community able to respond to the event?
 - Is the appropriate assistance being provided?
 - Is outside assistance needed?
 - Increased public health surveillance post-incident could be required specially if a suspected CBRN release has occurred which include:
 - Informing healthcare professionals at local sites
 - Liaising with the local public health authority
 - Consistent information passed to the general public
- Post disaster mental health. The association between disaster exposure and psychological problems, such as anxiety, depression and post-traumatic stress disorder has frequently been documented showing a positive relation. However, very little has been recorded of mental health following disasters at MGs. The psychological and social impacts of MGs event disasters may be acute in the short-term, but they can also affect the long-term mental health and psychosocial wellbeing of the affected population. Emergency planners should prepare for and provide post-disaster mental healthcare including:
 - Specialists in identification of mental health issues should be part of the disaster response team to enable ongoing quality of care and referral to an appropriate service provider
 - Assessment of the psychological and psychosocial wellbeing of the local affected population and responding emergency healthcare professionals
 - Facilitation of community self-help and support of staff who participate in the disaster response
 - Allocation of necessary resources for long-term healthcare support.

TOOLS AND RESOURCES

WHO guidance on mass casualty management:

http://www.who.int/hac/techguidance/MCM_guidelines_inside_final.pdf

Disaster Risk Management for Health:

http://www.who.int/hac/events/drm_fact_sheet_mental_health.pdf

Disaster risk management for health MGs factsheet

<http://www.who.int/hac/techguidance/preparedness/factsheets/en/>

WHO Toolkit for assessing health-system capacity for crisis management developed to help countries assess the capacity of their health systems, identify gaps and respond to various health threats.

http://www.euro.who.int/_data/assets/pdf_file/0008/157886/e96187.pdf

Chapter 15 – Chemical, Biological and Radionuclear risks to public health

KEY CONSIDERATIONS

- Conduct a risk assessment to prioritize and plan CBRN capacity during the MG, taking into account resources and budget available
- Build on existing CBRN preparedness and response system. If no system exists, a risk assessment of the CBRN risk should be undertaken
- Ensure collaboration and coordination: any CBRN event at a MG will demand a significant response from the public health sector but this contribution is often not recognized in the initial planning unless public health has a “seat at the table”
- Surveillance systems need to be adequately sensitive to detect and identify the agent and its effects as early as possible to implement a rapid and effective response
- Ensure that a strong command, control and communication structure is in place and understood by all stakeholders.

INTRODUCTION

CBRN planning for a MG should function on the basis that an existing mechanism for dealing with accidental and deliberate dispersal of CBRN agents is present in the country and they identify the necessary enhancements / adjustments. If no mechanism exists, a risk assessment of the CBRN risk to the country should be undertaken. Although the probability of a CBRN attack on a MG is usually low, the impact is so great that an understanding of how an attack would be managed is almost always necessary.

Host countries often perceive an elevated risk of a CBRN event occurring during a MG. While there is no precedent for a deliberate CBRN attack at a MG, MGs have been target for attacks using conventional explosives such as those used in 2013 during the Boston Marathon and attacks on Shia pilgrims on their way to Karbala. With the increased spread of life science capabilities with the potential for harmful use and a wide range of dangerous chemicals available on the market, the possibility of a CBRN attack is a risk that planners must manage, although the probability of an event may be low.

The perception of risk is fuelled by weighing the likelihood of a CBRN event occurring against

the potential health, political, and economic consequences for the host. This risk assessment is described below in terms specific to the CBRN risk. This CBRN risk assessment should drive the MG planning process in this area.

The complexity of a CBRN attack at a MG is enhanced by the increased: density of people, movement through the community, and potential international participation. Furthermore, if the event is caused deliberately there may be more than one “incident” at different locations in a short period of time.

Preparedness for a CBRN event largely depends on current public health capacities for detection, alert, response and recovery. This chapter discusses how particular aspects of that system can be enhanced to manage more specifically the CBRN threats. However, a fundamental component to managing the deliberate CBRN risk is the inter-sectorial collaborations that the host community has in place, particularly between health and security authorities. For countries that have not previously invested in CBRN capacity, MGs may provide an opportunity to do this, even if the risk assessment has not specifically identified a CBRN threat.

GUIDING PRINCIPLES AND BEST PRACTICE

Any CBRN event will result in substantial visibility, particularly if it happens near a MG. It is fundamental that consideration is first given to standard practice within the host country and that this is reviewed for the MG so that within

the capacities and resources available to the planners implementation of the response is fluid and effective.

Guiding principles of effective CBRN preparedness

- Prioritizing and planning CBRN capacity for MGs should be driven by the host country stakeholder risk assessment; this also needs to reflect the resources and budget available. This assessment will vary from country to country and between MGs within a country. The process should be dynamic and continuous throughout the planning and the MG
- Rapid response: surveillance systems, including enhanced event-based surveillance, need to be able to detect and identify an agent or its effects on people or the environment, as early as possible in order to implement a public health response and manage clinical cases
- Intersectoral coordination: in many countries the assets and human resources needed to respond to a CBRN event are separated from the Ministry of Health. Mapping resources across sectors is a very important activity. The coordination needed to ensure that CBRN plans are inter-operable and that teams can work together requires early planning and discussion and testing. Coordination among security and law enforcement is particularly important
- The key to a rapid and effective CBRN response on-site and at hospitals is a strong organizational structure for which chains of communication and decision-making are understood and exercised by all entities involved
- Effective risk communication, which may need to consider international participation at MGs, is needed to both

decrease panic and inform the population of recommended actions to be taken (e.g. seek medical attention)

- Building on existing systems, rather than building a new one, increases the likelihood that any capacity that is developed for CBRN response is maintained as part of a lasting legacy. Incremental improvements to existing systems, particularly in low resource settings, commensurate with identified risks will build robust public systems that can manage CBRN threats as well.

Consideration should be given to human resources and financial investment. This includes thorough and appropriate capacity building activities through training and the provision of equipment to ensure that a workforce is able to respond appropriately while protecting their own health.

Risk assessment for CBRN events at MGs

The principles of public health risk assessment, as described in chapter 1, apply similarly to the analysis of CBRN threats. The risk assessment will inform all public health planning the prevention and mitigation of CBRN risks during the MG.

Public health involvement in the risk assessment process is essential to provide input on the consequences to identified threats and to plan a response capacity which reflects the characterization of risk. The security sector can provide information related to threats, capabilities of would-be terrorists as well as targets or locations considered as high priority.

A CBRN risk assessment may already exist for the host; these are often driven primarily by the security and intelligence sectors and are the starting point for any additional assessment for the MG. A key activity for the health sector will be to establish links with security and other sectors to understand the risks identified and the methodology used for the risk assessment. A single CBRN risk assessment for the MG should be prepared with a continuous process for sharing information related to changes in risks or threats.

The risk assessment should include the

identification of vulnerabilities which could be exploited as part of an intentional CBRN release. Such an assessment of vulnerabilities could include:

- The location and susceptibility to sabotage of chemical industry
- The location and susceptibility to sabotage of industry using radioactive material
- The location and susceptibility to sabotage of high security laboratories.

A valuable tool to assess risk is the use of exercise scenarios to identify vulnerabilities and existing capacities related to releases of CBRN material. Spatial and temporal modelling, based on distribution patterns, vaccinations rates and available prophylaxis can further inform the risk assessment and facilitate planning for the MG.

Finally, as with other areas of CBRN preparedness during the MG, collaboration with international partners such as the World Health Organization (WHO), International Atomic Energy Agency (IAEA), United Nations Environment Programme (UNEP) and Organization for the Prohibition of Chemical Weapons (OPCW) among others may facilitate risk assessment and risk management planning.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

Implementing new legislation or temporary legislative changes for MGs is not uncommon. If CBRN risks are assessed to be significant, MG planners should determine whether:

- Existing CBRN legislation and operational plans are sufficient, or
- Existing CBRN legislation and operational plans should be adjusted for specific use at MGs, or
- Additional CBRN legislation and operational

plans are needed and should be incorporated into other national emergency or disaster plans.

Even if local authorities have overall responsibility for the coordination of disaster management, they may not have the required resources or capability to meet such a responsibility, especially in the context of a MG. Planners should consider the assistance,

where required, of national resources. Early coordination is needed to ensure plans are interoperable, and in most countries, any terrorist event, conventional or CBRN, will be escalated to a national response level.

In addition, where MGs take place in different regions, there should be coordination among local authorities and possibly sharing of

resources where necessary.

Responding to acute public health events, including a deliberate or accidental CBRN event, that have potential international concern will trigger obligations for the host country under IHR, as described in chapter 2. The national focal point (NFP) for the IHR should be involved in planning and response activities.

CBRN emergency management plans

Planning and preparing for CBRN events at MGs requires a system-wide approach based on existing plans and resources.

Emergency management preparedness requires identifying the measures to be implemented before and during the MG itself. Preparedness should consider the following:

- Incident site plans and procedures for high risk areas: Plans should include an exclusion area (hot zone), decontamination area, command posts, access and crowd control, entry / exit points for emergency responders, and guidance for weather related factors in case of radioactive particles, chemical vapours / gases, or aerosol release
- Prepositioned or mobile response teams: specialized deployment of CBRN response teams may be considered where available
- CBRN-capable ambulance services: ensure that sufficient emergency services are provided, and procedures

are put in place to ensure they are not contaminated and rendered a hazard

- Hospital surge and mass casualty plans for CBRN agents: hospitals should have clear procedures for the clinical management of priority agents, including for the management of cases of unknown aetiology; hospitals must also have policies and procedures in place to ensure staff are not exposed and facilities are not contaminated
- Onsite management and triage: past CBRN events have resulted in large numbers of “worried well” patients. Efficient triage and management protocols can facilitate the management of such patients
- Communication plans: informing the public of protective measures, where to go for treatment, decontamination or evacuation.

Decontamination

The release of certain CBRN agents may require that casualties, first responders, equipment, and environments are decontaminated in order to prevent continued contamination or transmission. Decontamination is a complicated process which requires training and carefully developed plans.

Decontamination capabilities may be housed in civil defence (e.g. fire service or military) rather

than within the Ministry of Health. The Ministry of Health should discuss with partners what decontamination capabilities exist and how they will be deployed during the MG.

A decontamination plan for the MG should be prepared with identifies roles, responsibilities and resources, including:

- Decontamination procedure(s), including triage, management of casualties, etc.

- Deployment strategies including mobility, time to set up, throughput capacity, etc.
- Personal Protective Equipment (PPE) available to first responders, healthcare providers offsite, including hospitals
- Communication strategies and educational material to help patients understand and comply with procedures
- Procedures for managing waste (e.g.

- contaminated water or clothing)
- Other resources available such as clothing, towels, blankets, etc.

Hospitals in the vicinity of the MG site and specialized ambulances that may be deployed in response to a CBRN event may also be equipped with a decontamination capacity.

Workforce and training

A workforce with the knowledge, materials, and plans necessary to detect, report and respond to CBRN events, whilst protecting the health of those involved in any response, is needed during a MG. If this workforce is already available it will likely be highly specialized, centralized, and not necessarily within the Ministry of Health.

Some countries routinely run formal training programs for the public health workforce in emergency management. This training, combined with field exercises and experience in smaller events or events with a lower profile can enhance the workforce awareness and competence. They also provide a long term preparedness and response benefit for future MGs or large-scale public health emergencies.

Training should target a broad range of public health professionals in order to reflect the diverse preparedness measures described above. A MG CBRN workforce should always include, healthcare practitioners, surveillance officers, first responders (e.g. fire brigade, ambulance services), laboratory workers and risk communication staff. Depending on the context and scale of an event, the MG CBRN may also involve military or civil defence or other specialized agencies. Planners should carefully consider who would be involved locally, regionally and nationally and who would be in charge.

Taking into account resources available locally, training should include some, or possibly all, of the following areas:

- Command, control and communication

- Event detection and recognition
- Medical triage and patient flow procedures
- Safety and protection of responders, PPE needs
- Decontamination (immediate and as part of long term recovery)
- Isolation
- Treatment
- Transportation
- Sampling
- Fatality management
- Psychological management
- Recovery activities
- Environmental health management.

It is important to provide CBRN training through exercises. These exercises can identify weaknesses in plans, test the ability to conduct effective crisis communication, and improve coordination among the different responding sectors.

Inter-sectoral coordination

Due to the national security aspect, the management of CBRN risks inevitably involves a significant degree of coordination across government sectors. Many of the activities of detection and response will involve public health resources, and public health representation is needed. Any CBRN event at a MG, regardless of its scale or impact, will demand a significant response from the public health sector but this contribution may not be recognized by traditional CBRN leadership (e.g. military) in the initial planning unless public health has a “seat at the table”.

CBRN stakeholders include ministries / entities responsible for:

- Health
- Environment
- Disasters
- Defence or national security
- Host government leadership (e.g. Prime Minister or Presidential cabinet)
- Private industry.

At the national or regional levels, inter-agency or multisectoral committees should be formed. The composition and decision-making power of such committees should be carefully considered to balance both strategic and operational aspects of planning and preparedness.

Command and control

Command, control and communications systems should plan for CBRN specific issues, particularly as authority for such events may vary. In some countries, the army may have the overall lead in responding to such events, but this may not be appropriate in a MG context, nor does it necessarily incorporate other services such as public health. The public health response in reducing the impact of a CBRN release must be recognized by all stakeholders.

Should CBRN response plans not exist or are not considered appropriate for the MG, it maybe beneficial to address CBRN risks by adapting other emergency frameworks, such as

disaster plans at the provincial or national level. Whatever the command and control frameworks employed, public health must be incorporated. The specific roles and responsibilities of public health authorities and other agencies should be assigned in the CBRN plan. The plan should define information flow and clearly identify decision-making processes. From the public health perspective, taking into account the need to collaborate with other sectors, the management of a CBRN event should diverge as little as possible from the management of naturally occurring acute public health events so as not add unnecessary complexity.

Information sharing

Information regarding CBRN risks and hazards is often tightly held within certain government agencies and not shared with public health authorities. The spectrum of CBRN hazards included in a public health risk assessment depends on information shared between government agencies.

Inter-agency planning meetings and the co-

location of planning divisions and national committees can facilitate this process. Local leaders and senior management will need to be informed on a regular basis. The preparation of information products will be need to be in proportion with the urgency or severity of the situations and recognising that this level is heightened by the MGs.

Early detection and investigation of a CBRN material release

Public health surveillance systems for a MG will likely detect CBRN releases. However, the political pressures associated with the MG and the public health consequences of a CBRN release require that detection and response is

rapid. Early detection of a CBRN release at MGs should involve enhanced surveillance systems in accordance with the risk assessment.

Biological

A deliberate or accidental release of a pathogen may pose serious challenges during an MG especially as a result of delayed detection of cases depending on the incubation time of the agent.

To detect a biological release, organizers may consider including primary biological weapon agents in the list of pathogens for mandatory reporting and sensitising medical personnel on their clinical and laboratory diagnosis. An intentional or accidental release may initially be detected and treated as a routine outbreak, especially if the attack is carried out covertly. Enhancing the sensitivity in the surveillance of unknown or unusual illness may increase the capacity to detect deliberate releases. Awareness of epidemiological, clinical, and molecular indicators to differentiate between deliberate and natural or unintentional release is essential to guide any response.

Laboratory preparedness for the main biological weapon agents should be considered; for the increased capacity and reagents for a higher volume of samples during the MG may be needed. Agreements with reference laboratories should be established where samples can be transported if national laboratories are unable to process unusual pathogens or the additional sample load.

If an aerosolised biological event is considered a high risk for the MGs, organizers may consider stand-alone strategically placed bio-detection systems

for real-time environmental surveillance. These systems may allow early detection of a biological agent release, decreasing response time. False positives do occur with these systems and organizers must understand the strength and weaknesses of each system. Field testing before the start of the MG can offer a clearer picture of performance. Understanding the limitations of the system and the implications of false positives is an important contribution to MG planning, as is the ability to triangulate results from the detection systems with other surveillance systems. Plans should be developed for triggering a public health and / or security response based on positive signals from these units, such as coupling positive signals from bio-detection systems with other surveillance streams to increase confidence in detecting an actual biological agent release.

Chemical surveillance

In general, a chemical agent release will produce casualties in a shorter period of time, which will be readily identified by medical or security services, especially if accompanied by an explosive device or another mechanism of dissemination. Depending on the agent and the dose, other epidemiological patterns and signals may go unnoticed. Sensitising medical personnel to the signs and symptoms of intoxication with chemical agents identified during the risk

assessment may be considered. Information sharing with other sectors such as the security, environment (air and water sampling) and agriculture (deaths in animals) will aid this.

Environmental sensors for testing water or air samples are also available and can be installed at strategic locations identified for chemicals of concern.

Radionuclear surveillance

Stand-alone detection systems for the release of radioactive / nuclear material are available and can be installed in strategic locations. As with other detection systems, false positives are a possibility and organizers should review the strengths and weaknesses of each system. If these systems are installed and monitored by another Ministry other than health, it is vital that the Ministry of Health is aware of

operating procedures for each system and that there is a plan for what to do if the system triggers an alert.

In addition, organizers may consider raising awareness among clinicians of the signs and symptoms of radiation poisoning in order to detect a covert release of radioactive material.

During the event

Public health response to CBRN event

The public health response to a suspect or confirmed CBRN event during a MG must be rapid and efficient. The ability to identify a CBRN threat on its own or at the same time as an explosive device is key to initiating specific CBRN response plans.

Because of the time lag with biological agents, victims may leave the incident site unaware that they have been contaminated. They risk not receiving necessary medical treatment and contaminating other people and environments. They may also seek medical support at health facilities which may not have a capacity to manage CBRN risks.

In the unlikely event of a CBRN attack, decontamination of the area to remove acute risks to health should begin immediately. The long term impacts on health should also be evaluated and measures should be undertaken to ensure the protection of health as people return to their homes.

If an alert is determined to be authentic, medical support needs to be delivered to casualties that are on site or presenting to hospitals or other medical facilities. Depending on the agent, specific treatment, vaccination, or post-exposure prophylaxis may need to be administered to a large amount of people in a short period of time. This requires both the stockpiling of

this treatment and a plan to dispense it, taking into account the diverse and unusual population that makes up the participation at the MG as well as the local population. The decision to stockpile medication or vaccination should be based on the risk assessment. In addition, a system is needed to assess if treatment and prophylaxis have reached the target population and if they are effective in preventing illness.

It is critical to protect healthcare workers throughout the response and planners may consider ensuring they are vaccinated against priority diseases when possible.

Hospitals, as during any emergency, must be notified that an event has taken place and provided with stockpiles of treatment and prophylaxis to manage the immediate aftermath.

Risk communication

When appropriate, onsite communication is needed to encourage people to self-decontaminate, to avoid leaving the area so they can be decontaminated by specialized unit, or to present at a specific health centre for treatment. These messages can largely be prepared in advance as part of the decontamination and CBRN response plans.

Communications activities are needed to reduce panic and limit the presentation of “worried well” at healthcare facilities. Transparent and credible communication about the agent, the response and recommended health behaviours for MG participants, through credible spokespersons and websites may include preventive measures and how, where, and when potentially affected individuals can obtain treatment or prophylaxis.

After the event

CBRN preparedness measures implemented for the MG may offer broad opportunities to increase national preparedness for CBRN events as a part of legacy. It may also support and

improve preparedness for large scale natural events such as outbreaks of emerging infectious diseases.

TOOLS AND RESOURCES

The WHO Manual for the Public Health Management of Chemical Incidents

http://www.who.int/environmental_health_emergencies/publications/Manual_Chemical_Incidents/en/

Chapter 16 – Psychosocial considerations

KEY CONSIDERATIONS

- The psychosocial factors affecting audience behaviour should be considered when developing strategies to minimize risk to those attending planned events
- Risk and harm minimization strategies should be in place and communicated to key organizational and operational event staff prior to the event
- Audience behaviour should be monitored in real time at the event and action taken pre-emptively to minimize the influence of factors (environmental and / or psychosocial) that are likely to lead to inappropriate or risky behaviours
- Building on the event risk assessment to identify the demographic of the audience and the type of planned event and its program is critical to understanding the kinds of behaviours that are likely to occur at a planned event
- Observation of audiences at a broad range of planned events is critical to the development of measurement scales that will be more applicable to a particular planned event
- How audience behaviour is monitored has to be planned for before the event and managed during the event
- Rather than react to behaviours it is much more effective to monitor a broad range of factors at the event in real time and then pre-emptively manage behaviour through real-time positive intervention (RTPI).

INTRODUCTION

There is a need to understand audience behaviour to support its appropriate and timely management during an event. Management of planned events therefore needs to consider psychosocial elements in the planning and monitoring of events to ensure public safety.

Management of planned events should incorporate psychosocial elements and audience behaviour has to be planned for before the event, managed during the event, and reflected upon once the event is over. Psychosocial elements and audience behaviour should be given equal priority in the development of the MG body of knowledge. However we cannot only think of the audience as just a collective entity. We need to know why the individual attends

the event and their expectations (motivation and predispositions), which is crucial to managing this group audience behaviour. The psychosocial domain is affected by a range of factors including, for example, the nature of the activity, motivation of the audience, security presence and protocols, weather, site layout and environment, the nature of the event's program and audience density.

What do we know?

- The size, composition (psychographic and demographic) and motivation of the audience and the type of event (e.g. rock concert or political rally) can have a marked impact on the workload of emergency services
- There is still a large theory-to-practice gap relating to audience psychology and the psychosocial at MGs
- Obstacles to understanding audience behaviour include differences in data collection and reporting formats, and poor definition and inconsistent application of terminology and concepts.
- Current knowledge also lacks theory development and adequate conceptual analysis.

GUIDING PRINCIPLES AND BEST PRACTICE

The evaluation and management of audience behaviour at MGs is based on the following guiding principles:

The psychosocial factors affecting audience behaviour should be considered when developing strategies to minimize risk to those attending planned events.

- How the audience responds to the various stimuli provided by the event experience is much harder to predict without an understanding of the psychosocial factors which influence and can modify that behaviour
- The event site environment (and its program) can impact on an audience. Environmental factors such as: prevailing wind speed (km/hr) and direction; sound pressure levels (dB) and beats per minute (bpm) of the music programmed; density of the audience (persons/m²); temperature; humidity; and light levels (lumens), can impact on the audience and influence how they behave
- These variables can be easily identified and measured at an event
- Demographic and psychographic information about the audience provides insights into what the audience might bring to the event
- Observation of behaviours matched to the event's program provides further clues, as does identifying other

psychosocial factors including: sense of enclosure; shape of the event site; and the timing and build of the program

- The audience then goes from being a 'known unknown' to a more robust data point that is as easily measured as temperature or decibels.

Risk and harm minimization strategies should be in place and communicated to key organizational and operational event staff prior to the commencement of the event.

- Risk and harm minimization strategies must be established based on the known audience demographic, and historical behaviour
- These strategies must be part of the induction on site and signed off within the entire risk analysis, risk management and emergency response planning portfolio
- Ensure that key staff understand the proposed strategies
- Undertake table top exercises based on these strategies prior to the event to determine any areas of weakness in the planning
- Key staff must be familiar with the principles of audience behaviour and how to accurately observe such behaviour on site.

Audience behaviour must be monitored in real time at the event and action taken pre-emptively to minimize the influence of factors (environmental and / or psychosocial) that are likely to lead to inappropriate or risky behaviours.

- Prediction of audience behaviour is an important factor that requires assessment and monitoring to underpin management actions at events
- Understanding audience behaviour enables the event organizers to develop strategies that are based on the audience demographic
- The event managers should monitor a broad range of factors (as mentioned above) in real time and then, when any factor or combination of factors reaches a critical point, take action pre-emptively to influence and modify audience behaviour before negative and / or unsafe behaviours are initiated
- Real time intervention allows for positive, pre-emptive intervention. Therefore rather than reacting to behaviours the event is modified to avoid any negative and / or unsafe behaviours.

The use of an event checklist to identify the demographic of the audience and the type of planned event and its program is critical to understanding the kinds of behaviours that are likely to occur at a planned event.

- Use an event checklist, either paper based and / or spreadsheet, or via purpose built software on a laptop on the event site. Its use removes the need for the event organizer to remember the broad range of data that needs to be captured at each event and provides the information on which the event diagnostic of audience behaviour can take place
- The checklist should be divided into three discrete stages: before the event; during the event; and after the event
- Each stage needs to be considered for effective planning and preparation and proactive intervention at the event

- Different variables will impact on the audience in different ways at each of these stages.

Observation of audiences at a broad range of planned events is critical to the development of measurement scales that will be more especially applicable to a particular planned event.

- How the audience is motivated to attend an event is different to how individuals can be influenced by the audience once at the event
- The degree to which an audience influences an individual depends on the how much that individual identifies with the audience
- Drivers and motivations that cause people to go to events or behave in particular ways can be measured through responsive interviews and participant observation
- Recommendations for appropriate action in response to the prevailing indicators should be provided in an event specific context.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

The real-time positive intervention approach

The real-time positive intervention (RTPI) approach involves monitoring a broad range of factors at the MG in real time and then pre-emptively managing behaviour. The greater the understanding of the factors that impact on an audience, the greater the ability of the event organizer to implement a RTPI strategy to diminish risk while not affecting the audience's experience of the event.

The key to RTPI is in understanding (at least) the following three factors:

- **Factor 1:** the nature of the event and the environment within which it takes place
 - Event type
 - Program
 - Density
- **Factor 2:** the makeup of the audience
 - Culture
 - Motivation
- **Factor 3:** audience behaviour
 - Audience type
 - Audience mood
 - Audience size.

Factor 1: the nature of the event and the environment

Event type and program

The type of event and program influence how the audience behave. For example, rock concerts manifest more traumatic injuries than for other types of events. This higher incidence could be associated with several factors, including audience segmentation (mosh pits), particular activities (e.g. audience surfing), audience mobility; event

duration; audience age; and the use of alcohol and / or drugs. This knowledge means efforts can be made to prevent injury: for example, security measures at these events can reduce incidents of stage diving, turning water bottles into missiles, and using blankets to launch attendees into the air.

Case Study: Outdoor music concert

This focuses on two outdoor planned music events where the behaviour of the young people in the audience was modified by changes in the event's musical program; one unintentionally, one intentionally by the event designer.

Unintentional

In 1997, approximately 30,000 people attended the annual Womadelaide (world music and dance) event in Adelaide, South Australia. The event is ticketed, attracting a young audience over 3-4 days of programmed music performances. The audience has been described as gentle and relaxed with a "hippy" feel. In 1997 a British based multi-ethnic hard core political hip hop group was on the main stage in the middle of the day. Their music was performed at a high volume and tempo and its presentation was both more aggressive and overtly political than that of all other performers on the program at the 1997 event (or any of the previous events).

Within less than a minute of the start of the performance, the audience was observed to cease their gentle, swaying dancing and form a 'mosh pit' with all its associated aggressive and overt behaviours. At the conclusion of the performance, the audience took some time to return to the gentler dancing. Audience members approached commented that they felt 'embarrassed' by their behaviour during the act. Similar genre acts have never been programmed since.

Intentional

In 2014, approximately 16,000 attended the annual Soundwave (metal, hard core) event held in Adelaide, South Australia. The event is ticketed, attracting a young audience over a single day of programmed music. A hard core metal / rock band was on stage in the middle of the day. Their music was performed at a

high volume and tempo and its presentation was 'aggressive' like the majority of the bands on the program. Early in the band's set, they set up what is known as the 'wall of death'. The audience was urged to split into two halves and back away from each other to either side of the audience area or mosh pit. The audience were 'held' in this position by the encouragement of the lead singer until a point in the song where the audience was encouraged to 'Have at it!' and the two halves rushed rapidly, head-on at each other until they met and a crash and crush of bodies ensued.

What is the RTPI approach in this example?

- Work alongside the event organizer to ensure the event program allows for the audience 'come down' at regular intervals. This tension and release (the 'event curve') provides an optimal experience for the audience while influencing behaviour to remain within set parameters
- As the data come in and variables indicate a trend towards a higher ranking risk level, the event organizers can insert a longer gap between acts or, if pre-arranged as it would be advisable, a slightly longer gap between the songs of the act or even a change in the beats per minute (bpm), decibel level and style of song being performed. In this way the audience is unaware of any significant change in the program or any diminution of experience, but are provided with the time to reduce the level of their behaviour (albeit unaware that they are doing so). This is an approach that has been observed at events including Big Day Out in Australia and concerts by the international rock act, Rage Against the Machine.

Density

It is important to collate density data and audience behaviour together to measure how each influences the other. Crowded events may give attendees feelings of “audience syndrome”, claustrophobia and paranoia, and a densely packed audience with poor access to an event is more likely to be frustrated and inclined to be violent.

Both of these effects will increase the latent potential for injury and illness. However, it is worth noting that density affects people in a variety of ways and that it is context specific; what might be high density for an orchestral concert outdoors might be perceived empty inside a mosh pit.

Factor 2: the makeup of the audience

Culture

Culture (in an event safety context) can be simply defined as: what the audience brings with them to the event. Culture plays an important part in predicting audience behaviour and how to plan appropriately for the event. Many are based on cultural influences, whether sporting, religious or artistic; and the culture of event provides a unique way of seeing, thinking, and knowing. While all MGs are to some extent cultural, the

psychosocial aspects of audience behaviour at explicitly ‘cultural’ events may be different from other planned events. Finally, culture can also include (in a broader sense) what the audience brings to the event, for example, any alcohol and drug consumption (‘pre-loading’). The following is an example of how culture is inextricably woven into the event and into the likely outcomes in terms of audience behaviour.

Case Study: Outdoor music concert

Bernar Tomic, is a German-born Australian citizen whose cultural heritage is Croatian-Bosnian. At tournaments where he plays in Australia, a section of the audience in support of Tomic use Croatian flags, rather than the Australian flag. At these matches a certain segment of the audience is made up of those sympathetic to the Serbian cause. This latter segment of the audience also uses flags, colours and Serbian symbols to oppose Tomic and his supporters. At the Australian Tennis Open there have been increased incidents of poor behaviour within the tournament confines and aggressive and sometimes violent behaviour outside the venue.

What is the RTPI approach in this example?

- Keeping people from different groups separated as best as possible in advance of their entry onto the site
- Using volunteers as an RTPI (audience behaviour) team to target areas where behaviour is deteriorating and reinforcing positive messages and assisting those exhibiting early signs of distress.

Motivation

Understanding the motivations of why people attend events is also an important part of determining likely behaviours and outcomes. Motivations may include but are not limited to, the particular circumstances of the attendees and the nature of event itself. Some motivation factors

are, however, specific to the event. For example, socialisation and the desire and willingness to meet with others highlights that attendance can be more than just destination oriented.

Factor 3: Audience behaviour

In addition to all the factors mentioned throughout this chapter, audience behaviour is also influenced by the audience type (e.g. participatory, aggressive), audience mood (e.g. passive, active) and audience size.

Audience behaviour is the most obvious psychosocial element of a MG that requires continuous assessment to inform on-going management actions. In rock concerts it

has been observed that when audience members are particularly excited about a song they can go from relative calm to extreme excitement in seconds. Another phenomenon is audience fatigue, which can be caused by feelings of claustrophobia, shortness of breath and heat exhaustion, leading to negative health outcomes of the audience.

Data Collection

Key to understanding the factors that inform a RTPI approach is being able to efficiently and effectively collect data before the event,

during the event (and, in some case, after the event).

Before the event

There is a range of data that can easily be obtained before the audience enters, even in the weeks and days prior to the event being staged, to identify these environmental and

psychosocial factors pertaining to the event. These pre-event factors are event specific and entirely dependent on the context of the event, for example:

Before the event data points (Factor 1: The event)

Item	How is data obtained
Host organization	Questionnaire of host organization
Event's core values ▪ Why? – what is the key rationale for the event? ▪ Who? – what is the event's target audience? ▪ What? – what is the basic concept for the event (e.g. what happens, what is the program)? ▪ Want? – what are the measurable outcomes set for the event?	Questionnaire of host organization
Situational/SWOT analysis	Questionnaire of host organization
Event type	Questionnaire of host organization
Program ▪ Content (e.g. music, ballet) ▪ Style (e.g. jazz, death metal) ▪ Scale (e.g. international act, local act, known, unknown) ▪ Active vs passive elements	Questionnaire of host organization
Duration ▪ Day(s) / week(s) ▪ Day / night ▪ Season (e.g. summer) ▪ Overall event (hours) ▪ Each program element (hours or minutes)	Questionnaire of host organization
Event site design ▪ Indoor / outdoor ▪ Bounded / unbounded ▪ Shade / shelter ▪ Natural structures ▪ Existing structures ▪ Built structures ▪ Temporary structures	Questionnaire of host organization
Staffing ratios ▪ Front of house ▪ Catering ▪ Event management ▪ Security ▪ Police ▪ First Aid / Medical	Questionnaire of host organization
Location ▪ Permanent site ▪ Temporary site ▪ Central business district ▪ Metropolitan ▪ Regional ▪ Remote	Questionnaire of host organization

Before the event data points (Factor 2: Audience makeup)

Item	How is data obtained
Demographic ▪ Age ▪ Gender ▪ Postal code ▪ Income ▪ Educational level ▪ Interests	Face-to-face survey on entry
Culture	Face-to-face survey on entry
Motivation	Face-to-face survey on entry

During the event

During the event data points (Event site environment)

Item	How is data obtained
Temperature ▪ Ambient (site) ▪ Specific (e.g. inside the mosh pit)	Data sensor (degrees Celsius)
Humidity ▪ Ambient (site) ▪ Specific (e.g. inside the mosh pit)	Data sensor
Wind ▪ Speed (average and peak) ▪ Direction	Data sensor (kilometres per hour)
Light Levels ▪ Ambient (site) ▪ Specific (e.g. shaded areas / under shelters)	Data sensor (lumens / lux)
Sound Pressure Levels ▪ Ambient (site) ▪ Specific (e.g. inside the mosh pit) ▪ Metres from stage ▪ Outside the venue	Data sensor (decibels)
Density ▪ Overall site ▪ Specific sites	Observation (or image capture) and count (persons per metres squared)
Incidents ▪ General (e.g. a fire) ▪ Behaviour (e.g. fighting) ▪ Patient presentations ▪ Hospital transports	Reporting from event organizers and / or security and / or medical personnel

During the event data points (Audience)

Item	How is data obtained
Location	Data sensor (GPS) on individual audience members (wireless transmission)
Type	Observation (or image capture)
Mood	Observation (or image capture)
Behaviour	Observation (or image capture)
Arousal Levels (bio-medical) ▪ Heart rate ▪ Galvanic skin response ▪ Respiration rate ▪ Pupil dilation	Data sensor on individual audience members (wireless transmission)
Arousal Levels (self-reported)	Data sensor and / or smartphone app. With Likert scale for level of arousal / satisfaction / emotion, etc.

Data Ranking and Analysis

Data, even at a basic level, can be ranked in a rudimentary scale to identify areas of risk and / or action of staff, for example:

Item	Colour Code	How is data obtained
1	Watch & wait	Low risk, no action required
3	Standby	Pending risk, continuous observation, action identified, staff standby
5	Act	High risk, immediate action required

Data, even at a basic level, can be ranked. Having a measurement scale that enables real-time identification of changes in audience behavior allows an event designer or event manager to modify the existing setting or

program to influence change in audience behaviors to assist with the audience control and risk management in a rudimentary scale to identify areas of risk and / or action of staff.

After the event

- Data collected after the event provides information on the impact of any action taken on the audience and informs the next event
- Review data after the event- including recommendations for future actions to ensure continuous quality improvement.

Chapter 17 – Use of modern technologies in mass gathering planning and operations

KEY CONSIDERATIONS

Modern Technologies (MT) at MGs have the potential to:

- Increase the speed of surveillance and information sharing
- Enable better communication between the authorities and the public, such as via rapid alerts and messages
- Incorporate geospatial tools and data into the C3 system to promote health and prevent enormous post-disaster repair costs.

INTRODUCTION

MT can facilitate information dissemination and health responses during MGs through better identification, mapping, sharing, and analysis of available data. MG organizers

and MT experts must ensure the timely delivery of accurate and precise information to the right person.

The MG difference

The availability of accurate real-time data about the current situation and communication strategies that can help facilitate timely and effective responses are critical. The lack of timely and efficient communications has been described as the “Achilles heel” of disaster response in MG events; communications are also crucial in

the provision of medical care at MGs.

MT can help MGs through:

- Data being received in a timely way, and rapidly sharing daily reports
- Integration with other surveillance systems to create a more complete picture of health threats or events
- Communications with stakeholders.

What do we know?

MT may enable MG planners to deal with environmental, psychosocial, and biomedical factors as part of the planning, risk assessment and response to any public health incidents during the MG. It can also assist with disease surveillance and

monitoring of crowd behaviour to identify potentially critical situations at an early stage. MT has significant potential for the dissemination of health information to a large group of users, such as those that might be attending a MG event.

GUIDING PRINCIPLES AND BEST PRACTICE

Creation of real-time surveillance and management of health threats

MT surveillance systems should allow the rapid detection and appropriate management of communicable and non-communicable diseases in order to reduce morbidity and mortality. The diversity of threats and health conditions that may take place during a MG requires an easy

and quick way of managing these risks (real time managing). MT allows real time management based on data from Geographic Information Systems (GIS) and the use of mobile technology (e.g. cell phones, tablets, laptop computers).

Geospatial location information

Location information is a key piece of data for rapid decision making systems in emergency management. Geospatial tools can help determine best evacuation routes, areas of danger, and location of resources, and then rapidly relay the information to relevant stakeholders. Geographic Information Systems (GIS) have been used in public health as a tool for processing, analysing, and visualizing data. It allows for

the integration of multiple data sources, visual representations of complex data patterns, and the application of various spatial analytic techniques to answer a variety of questions during a MG event (e.g. where things are or population densities).

Modelling: improving the response

Modelling provides evidence-based analyzes and advice to inform preparedness and response to threats from bioterrorism and infectious diseases. Rapid modeling on the potential spread of infections or deliberate releases enables public health responders to focus their activities and potentially reduce the public health impact. Modelling can estimate the likely size of an outbreak, location of source, and the

spatial extent. It can also contribute to the location and treatment of cases, and to the assessment of potential public health impacts and the likely benefits of different mitigation strategies.

Communication

Good communication technology is particularly important when stakeholders may be using different systems (networks or hardware) and may have different levels of security working together. Multiple, reliable, discrete forms of communication technology are essential to effective on-

site medical and disaster responses. Social media has enabled the very rapid sharing of information across global networks, and may even comprise the first reports of public health issues.

PRACTICAL SUGGESTIONS AND IMPLICATIONS

Before the event

Building on existing systems provides a greater benefit for host countries than developing new or 'drop-in' systems that will not be used after the MG. Any new system should be in place for a sufficient length of time prior to the MG to allow baselines to be determined, assessments

of the effectiveness of collection, analysis and interpretation of the data, and the availability of backup systems. This ensures people have been trained and are familiar with the system, as well as contributing to the MG legacy.

Surveillance

The MG risk assessment will determine whether changes to MT systems are needed. The benefits can include:

- Contact tracing, field interviews and data collection from personnel working in the field using tablet computers that can transfer data in a matter of minutes
- Increased flexibility such as rapidly adding fields for new / emerging diseases or "suspicious" incidents

- The ability to gather and analyze syndromic surveillance data
- Improved information sharing networks to allow for rapid communication and dissemination of information
- Use of social media applications to report event based surveillance, e.g. FIFA 2014 World Cup in Brazil.

Communications

A number of factors should be considered during the planning, including:

- Network capacity to handle an unusually large number of users that may place unprecedented loads on the existing network
- Accessibility for people from many different cultures and countries
- Adequate availability of technical support

- Training in MT related procedures, policies and requirements
- Procurement of large quantities of new and potentially unfamiliar devices as needed
- Use of smart phone technology for text-based communications.

Case study: Study to evaluate the performance of text-based communication at MG events with High Level Ambient Noise (HLAN) in Canada and USA (2010)

A feasibility study was undertaken to evaluate the acceptability and effectiveness of using text-based communications in parallel with standard audio radio communications at MG events with high level ambient (HLAN) noise. The majority of health care providers and medical dispatchers who participated in the study not only felt comfortable using text based communications as an alternate form of communication, but also felt that use of

text-based messaging improved their ability to communicate when in areas of HLAN. Other benefits of the text-based systems included the ability to communicate with team members over large geographic distances (whereas radios previously had been limited), the inclusion of GPS data to track the location of and coordinate health care workers, and the historical record generated through the printable, time stamped account of communications.

During the event

Communications

MT can facilitate the communication between different stakeholders and also enable messages to be rapidly disseminated in the event of a public health issue, such as text messages to inform the public. Social media can be monitored to identify potential public health events. The general public and participants are more likely than ever to post

information using social media even before they contact primary care services. Also, MG organizers and health authorities may use social media to get information to the public and also to address rumours. For example the FIFA 2014 World Cup in Brazil used Whatsapp to share alerts and information in real time across health.

Location information

High resolution imagery and image analytics can help rapidly identify issues and solutions. These technologies can also enable C3 to employ crowdsourcing to help monitor

events. Responders are empowered to rapidly act to prevent an undesirable event, or to minimize its footprint.

Surveillance

Real time data collection through the use of mobile technology enables a more timely response to public health incidents and improves public safety during the event.

Field personnel equipped with tablets computers can also be helpful if they are properly trained.

After the event

MT can provide information for post-MG surveillance through the continued use of established MT surveillance systems and data sharing. MT can contribute to MG legacy

through the development of infrastructure to support MT, the training of staff on the use of MT, and the creating of sustainable surveillance systems.

TOOLS AND RESOURCES

User-friendly interfaces like Google Maps (www.maps.google.com) and Ushahidi's Crowd Map (www.crowdmap.com; www.ushahidi.com) have enabled the emergence of participatory maps created by the crowd.

Crisis Maps visually display aggregated SMS messages from people on the ground reporting their real-time needs. The complicated, micro-level real-time event data can help operational surveillance, analysis, early warning, alert, text-back messaging, or to facilitate peer-to-peer connections. For example, when a cholera epidemic threatened Haiti, HealthMap worked with the volunteer Crisis Mapping community to ensure the information on the map was constantly updated and was the most reliable source of information for first responders and healthcare workers in the field (<http://healthmap.org/haiti/>).

New tools using direct SMS messaging in remote areas can help bridge gaps in healthcare delivery systems. Medic Mobile (<http://medicmobile.org/>) offers information by text to users that can help them even when they can't make it to the hospital.

Chapter 18 – Considerations for particular contexts and further research

KEY CONSIDERATIONS

- Regardless of the location and size of the MG, the same principles mentioned throughout this manual should be applied; that is, there should be an initial review of what is already being done and already in place in the host country / town, and a thorough risk assessment should be conducted. This will inform what public health interventions, systems and procedures need to be introduced and / or adapted
- The range of measures put in place for a MG will depend on the context where it takes place as well as the size and nature of the MG. The next section outlines the main challenges, opportunities and strategies presented by MGs in low and middle income countries, small and medium size MGs, and unplanned MGs.

Low resource settings

MGs in low resource settings can have specific challenges including weak surveillance and response systems and resources for scaling up systems. In addition, some of the risks facing MGs such as the potential for political unrest and those related to water and sanitation and air pollution are already high in low income countries.

The lack of evidence to inform MGs planning is particularly acute in low income settings; for example, most tools for disaster management are developed in high income countries and they may need further development and validation when applied to low income countries, including consideration of resources and technology to apply these.

As well as challenges, MGs can present significant opportunities to strengthen the health system for the host country and should be a key determinate of the sustainable legacy and a significant benefit from a MG.

The political, financial and media investment associated with MGs can be useful drivers to address pre-existing weaknesses and improve public health systems.

To harness the potential benefits of hosting MGs, the following strategies should be considered:

- When planning MGs in low income settings, public health interventions should be prioritized and focus on those with proven effectiveness. For example, infection control and prevention measures should include: access to healthcare for cases, access to information, adequate safe food and water supplies and access to hand hygiene
- To improve epidemiological surveillance systems, taking simple steps such as; reviewing and focusing case definitions, increasing the frequency and accuracy of reporting using usual channels, training staff on what to report, who to report to and how frequently to do this. These can all lead to large improvements at very low cost
- Sharing knowledge with other countries and learning from other studies, such as requesting technical expertise and resources from high income countries or key organizations, such as WHO should also be considered
- Make the most of the resources available in the community: consider using volunteers instead of paid staff.

It is also useful to consider that many low income countries will already have had 'real experiences' such as responding to typhoons and floods. The learning and experience from these should be reviewed and used to inform the MG planning.

Case study: International Cricket Council Cricket World Cup in the West Indies, 2007

For the MG the Caribbean Epidemiology Centre (CAREC) and its member countries adapted the routine communicable diseases surveillance system in order to detect events that might require intervention, including non-communicable conditions such as heat related illness and injuries. Major adaptations included increased frequency of data transmission (from weekly to daily) from sentinel sites to National Surveillance Units and CAREC, active reporting throughout the MG and an additional 4 conditions added to the usual 7 syndromes for routine reporting.

The implementation of this system required identification of considerable additional human and financial resources. Initially local financial resources were very limited and so resource mobilization included collaborating with regional and international partners, networking with potential donors and developing a grant proposal that secured funds from the Canadian Department of Foreign

Affairs and International Trade. Additional technical support (20 epidemiologists) was secured from a number of organizations across the world.

Capacity building activities included training sessions in outbreak investigation, laboratory diagnoses, vector control, food and environmental health safety and the establishment of a multi-country Caribbean Regional Health Emergency Response Team.

There has been a significant long-term legacy from this system, including the establishment and continuing reporting of surveillance data to a central authority, increased laboratory capacity and better trained and equipped public health staff across the nine participating countries and the entire Caribbean community. In addition, the capacity to detect and respond to emerging health threats was increased, as evidenced by the response to Dengue and Chikungunya in the Caribbean.

MEDIUM SIZED AND SMALLER MGS

Medium sized and smaller MGs may include weddings, summer camps, and annual festivals. Some specific challenges faced by medium sized and smaller MGs are that these may be organized by non-professionals and volunteers and that the need to implement public health measures in these settings may be underestimated. At

the same time, many medium sized and smaller MGs are repeated every year which provides an excellent opportunity for strengthening collaboration amongst stakeholders as well as learning and improving the planning and delivery of future MGs.

Case study: Tamworth music festival in Australia

The Tamworth music festival in Australia highlights the potential benefits of annual local festivals. Continued collaboration with Local Government over more than a decade has led to formal co-operative agreements and delineation of complementary tasks between the Public Health Unit and Local Government. As an officer said: 'Our relationship with Local Government is now really strong, we share information freely and help each other out.'

The annual nature of the festival means vendors tend to return each year. Close liaison between Local Government, emergency services and public health has led to the development of a list of vendors that require close monitoring during each festival, and the banning of several vendors that have been consistently non-compliant with safe practices.

UNPLANNED MGS

MGs can be unplanned events and include those arising from natural disasters such as tsunamis, floods and man-made disasters such as political unrest and wars. Under this scenario, overall responsibility for the event can be less evident than in planned MGs and would most likely fall to the local or national government "hosting" the event.

Unplanned and to some extent unforeseen events are challenging to plan and respond to. However, the response to unplanned events should follow existing emergency response plans. Thus, to effectively respond to unplanned events it is critical that emergency plans exist, that stakeholders know them and have trained and practised these plans, that mechanisms

for increasing surge capacity and for resources are known, and that memorandums of understanding for obtaining assistance from nearby unaffected areas exist, are valid, and are known. Also important, is to train and educate the citizens for community disaster preparedness which will provide knowledge and skills that can be of great help in both a disaster and a spontaneous MG.

Planned MGs can improve public health response to unplanned MGs and vice versa; particularly if more research is conducted to improve the evidence-base for policy making and learning from planned MGs is documented and shared.

Case study: Funeral for Pope John Paul II in 2005

During the mass funeral for Pope John Paul II in 2005, city authorities in Rome had to deal with the influx of more than 1 million pilgrims during a period of 72 hours. Extraordinary security and traffic control measures had to be introduced

on extremely short notice to facilitate MG activities in and around St Peter's Square and the Vatican City. In these contexts, the approach taken was similar to the response taken for an environmental health emergency.

Case study: Unplanned settlement camps

A specific form of unplanned MG is a spontaneous or informal settlement. In the context of emergencies, this usually occurs, when a larger number of people are forced to leave their area of residence, most often due to a hazard, like a natural disaster or an armed conflict. Over time, these can evolve or be replaced by a more formal camp setting with a fully established camp management structure according to international standards and guidelines, depending on various factors, like local capacities.

By definition, refugees have crossed an internationally recognized state border and are therefore outside their country of nationality or habitual residence, internally displaced persons (IDPs) are displaced within their country of nationality or residence.

Issues related to the preparedness for MGs inside a camp population are very similar to those for MGs in other contexts and include:

- Epidemiological surveillance and response to communicable disease outbreaks
- Crowd control
- Access to the site
- Fire safety
- Medical preparedness
- Emergency response
- Environmental issues, including water and sanitation, waste management, livestock etc.

Crowd control can be particularly difficult during distribution of relief items. This can be prevented through a well-designed and suitable distribution system and careful planning.

Other potential reasons for security incidents include:

- Demonstrations and riots

- Crime and violence, particularly gender based violence
- Tensions between the displaced community and the local population outside the camp
- Conflicts between different groups within the camp
- Infiltration by militant groups
- General breakdown of law and order.

In the case of a newly formed spontaneous settlement, where a formal camp management structure was not yet established, event-specific preparedness and surveillance activities, based on a formal, comprehensive risk assessment are not feasible. The focus here lies even more on the generic capacities of the country hosting the displaced population.

In addition to preparedness capacities, the early detection of a spontaneous, unplanned MG, timely alerting of all relevant partners involved in the response and the conduction of rapid needs assessments are the most important factors that influence the mitigation of an emergency.

FUTURE RESEARCH FOR CONSIDERATION

Whilst a great deal more research has been published over the last few years, there is still a lack of sufficient evidence to inform public health interventions and policy in MGs. The main

limitations of the literature published so far include the lack of adequate evaluation of public health interventions, differences in disease detection and publication bias.

Lack of adequate evaluation of public health interventions in MGs

- Few public health interventions in MGs have been rigorously evaluated
 - Relatively few of the published surveillance systems used in MGs have undergone a formal evaluation according to recognized guidelines
 - While there are a reasonable, and growing, number of reports on surveillance systems used for MGs, it is still difficult to state the 'best' type of system to use in any one situation. This is largely due to the different contexts of MGs and different priorities placed by public health authorities on
- system attributes such as the ability to pick up any MG associated disease event (high sensitivity) versus major disease events only (lower sensitivity)
- The evaluation of public health interventions in MGs should include cost-effectiveness analysis.

Differences in disease detection and reporting

Comparisons between MGs to determine how their characteristics (e.g. type / size / attendees) are associated with overall or specific health risks are difficult to make due to differences in how health events are detected and reported. This is particularly the case for MGs which are unplanned and / or medium-sized and / or take place in lower resource settings.

It is intuitive that MGs with more sensitive surveillance systems will generally report higher rates of disease. Furthermore, differences in how patient presentations are coded at health services (e.g. on-site medical posts) and later collated for reporting make comparisons difficult.

Publication bias

Much of the literature reports specifically on communicable diseases surveillance and response, rather than overall disease burden. This makes the risk of non-communicable versus communicable disease difficult to establish. Also the overall risk of any disease is difficult to establish as publication bias is towards those MGs where significant health events occur or they are large high profile MGs.

In addition to these issues, it is worth noting that humanitarian disasters can lead to MGs (e.g.

military conflict that causes mass displacement and gatherings of people). Thus far, the literature on MGs is biased towards planned events and has largely ignored the vast amount of literature in the humanitarian context, refugee health being one such example.

In the future MGs research should address both planned and unplanned events including how public health strategies designed for planned events may be adapted for unplanned events and vice versa.

Future specific research could include

- In order to develop this research agenda and increase the applicability of findings into policy, interdisciplinary research and international collaboration should be promoted
- Developing a framework to identify and quantify factors and risks associated with MGs, the level of individual risk of certain conditions, how different factors interact and subsequent health outcomes
- For example, in the disaster literature, the current focus is on categorizing patient presentation rates or medical usage rates and not exploring other factors such as specific illnesses, potential transportation to hospital and further hospital information regarding length of stay and overall mortality. Explanatory variables from the environmental, behavioural and psychosocial elements, in combination with patient presentation rates and transfer / referral to hospital rates, should be included in any conceptual model of risk analysis and enhance the predictive nature of illness and injury at MGs. The future study of crowd dynamics is equally as important
- Developing indicators to measure key areas in MGs
- Standardizing data collection and reporting formats
- Conducting systematic reviews of existing public health interventions in MGs; for example, isolation and quarantine measures for infection control and prevention
- Focusing on vulnerable populations: more work is required to understand the health impact of MGs for more vulnerable attendees of the event. Groups including the aged (older persons), children and those where risk of harm is associated with disabilities, such as reduced mobility, or where the location of the MG results is a specific concerns, such as exposure to extreme weather conditions. Consideration should be given to the emergency medical requirements of these potentially vulnerable populations
- How best to organize and allocate resources, including human resources, in a cost-effective way which also has sufficient flexibility and robustness to manage any likely risk.

TOOLS AND RESOURCES

WHO mass gathering planning and assessment toolkit (online resource)

Online assessment toolkit for public health professionals responsible for the management of communicable disease alert and response during mass gatherings. To request access, please contact massgatherings@phe.gov.uk

FURTHER READING

World Health Organization. (2008). Communicable disease alert and response for mass gatherings: key considerations. Geneva: WHO.

http://www.who.int/csr/Mass_gatherings2.pdf?ua=1

International Health Regulations (2005).

<http://www.who.int/ihr>

Mass Gatherings and Public Health: The experience of the Athens 2004 Olympic Games.

http://www.euro.who.int/__data/assets/pdf_file/0009/98415/E90712.pdf

The Health Legacy of the 2008 Beijing Olympic Games: Successes and Recommendations.

http://www.olympic.org/Documents/Commissions_PDFfiles/Medical_commission/The_Health_Legacy_of_the_2008_Beijing_Olympic_Games.pdf

Learning from London 2012: A practical guide to public health and mass gatherings

http://webarchive.nationalarchives.gov.uk/20140714084352/http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317138422305

London 2012 Olympic and Paralympic Games: Summary Report of the Health Protection Agency's Games Time Activities

http://webarchive.nationalarchives.gov.uk/20140629102627/http://www.hpa.org.uk/webc/HPAwebFile/HPAweb_C/1317137705751

Assessment of health-system crisis preparedness

Part 1: user manual, available from:

<http://www.euro.who.int/en/publications/abstracts/strengthening-health-system-emergency-preparedness-toolkit-for-assessing-health-system-capacity-for-crisis-management-part-1-user-manual>

Part 2: assessment form, available from:

<http://www.euro.who.int/en/publications/abstracts/strengthening-health-system-emergency-preparedness-toolkit-for-assessing-health-system-capacity-for-crisis-management-part-2-assessment-form>

Lancet series on mass gatherings health

<http://www.thelancet.com/series/mass-gatherings>

GLOSSARY, ACRONYMS AND ABBREVIATIONS

The glossary contains the definitions of various terms used in this document. Terms are listed alphabetically, with the exception of two central key definitions ("Mass gathering" and "Event"), which are defined immediately below.

Key definitions

Mass gathering (MG)

A gathering of persons usually defined as "more than a specified number of persons (which may be as few as 1,000 persons although much of the available literature describes gatherings exceeding 25,000 persons¹) at a specific location for a specific purpose (a social function, large public event or sports competition) for

a defined period of time". In the context of this document, an organized or unplanned event can be classified as a MG if the number of people attending is sufficient to strain the planning and response resources of the community, state or nation hosting the event.

Event

The word "event" can have two types of meaning depending on the context.

An "event" could mean a type of **mass gathering**, such as:

- **An organized occasion**, such as a social function, sports competition, or political, religious or cultural gathering
- **A series of individual competitions** within the sports world conducted together under one ruling body, such as the Olympic Games, IHF World Championships, or Pan American Games
- **An individual sports contest**, such as a race, or another contest that is part of a larger sports occasion such as the Olympic Games

Alternatively, "event" can mean a manifestation of disease or an occurrence that creates a potential for disease (as defined by the International Health Regulations (2005).

In this document, "event" will generally be used to indicate an outbreak (as in the IHR 2005), and "mass gatherings" (MG) will be used to indicate large spontaneous or organized occasions.

¹ <http://journals.cambridge.org/action/displayAbstract?fromPage=online&aid=8434500&fileId=S1049023X00037857>

Other definitions relevant for MG

After action report (AAR) – The document describing the response to an incident and findings relating to performance of the health system response during an incident.

Avian influenza (or avian flu/bird flu) – A highly contagious viral disease, with up to 100% mortality in domestic fowl, caused by influenza A virus subtypes H5 and H7. All types of birds are susceptible to the virus, but outbreaks occur most often in chickens and turkeys. Viruses may be carried by migratory wild birds, which may show no signs of disease. Humans are only rarely affected.

Bioterrorism, deliberate event – The intentional use of micro-organisms, toxins, genetic material or substances derived from living organisms to produce death or disease in humans, animals or plants.

Case – A person identified as having a particular disease, health disorder, or condition under surveillance or investigation. Cases may be further classified as confirmed, suspect, or probable.

Case definition – The criteria that describes a case (i.e. patient) under surveillance or investigation. The IHR (2005) contain case definitions for four diseases, cases of which must be reported to WHO. These are: smallpox; poliomyelitis due to wild type poliovirus; human influenza caused by a new subtype; and severe acute respiratory syndrome (SARS). Other events are also notifiable to WHO under specific circumstances.

CBRN (chemical, biological or radionuclear) event – The intentional use of micro-organisms, toxins, genetic material, radioactive material or chemical substances to produce death or disease in humans, animals or plants.

Cohort – a group of individuals with a common defining characteristic (e.g. exposure to disease). The term does not imply spatial grouping.

Cohorting – grouping individuals into a cohort.

Contagious (disease) – A disease that can spread from one person to another by contact with an infectious agent. Contact may be through bodily fluids, droplets (liquid particles made by coughing or sneezing), contaminated objects such as food utensils, airborne inhalation, vector-borne contact, or ingestion of water or food. The IHR (2005) define “disease” very broadly, as “an illness or medical condition, irrespective of origin or source that presents or could present significant harm to humans”; this term hence covers diseases of biological, chemical or radionuclear origin.

Crisis – An unstable or crucial time or state of affairs in which a decisive change is impending, especially one where a highly undesirable outcome is distinctly possible.

Disaster – A serious disruption of the functioning of a community or a society, often accompanied by widespread human, material, economic or environmental losses that exceed the ability of the affected community or society to cope using its own resources.

Disaster risk reduction – The planning, approaches and methods undertaken and instituted in order to minimize vulnerabilities and disaster risks throughout a society, in order to avoid (disaster prevention) or limit (mitigation and preparedness) the adverse impact of hazards, within the broad framework of sustainable development.

Dispensing – Preparing and distributing medicine.

Early warning system – A detection and notification system with three primary tasks:

1. Forecasting impending events
2. Processing and dissemination of warnings to political authorities and populations
3. Undertaking appropriate and timely action.

Emergency – A sudden occurrence demanding immediate action, which may arise as a result of epidemics, natural or technological catastrophes, civil strife, or other human-generated causes.

Emergency management – A range of measures to manage risks to communities and the environment that are caused by emergencies.

Emergency operations centre – The facility from which a jurisdiction or agency coordinates its response to major emergencies/disasters.

Epidemiologist – A professional skilled in disease investigation. Epidemiologists design and conduct epidemiological studies, analyze data to detect patterns and trends in disease, establish and maintain surveillance systems, monitor health status, and evaluate the performance and cost-effectiveness of public health programmes.

Epidemiology – The study of the distribution and determinants of disease and other adverse health factors in human populations, and analysis by time, place and person.

Event medical care – The provision of preventative measures, definitive primary care, or triage/hospital referral to persons attending or participating in mass gathering events.

Exercise (e.g. emergency planning exercise) – A scripted scenario-based activity designed to evaluate a system's capacity to achieve overall and individual functional objectives, and to demonstrate its competencies for relevant response and recovery tasks. Exercises help determine a valid indication of future system performance under certain conditions, and to identify potential system improvements.

Hazard – An action, event or phenomenon which may cause loss of life or injury, property damage, social and economic disruption, and / or environmental degradation.

Hazard Analysis and Critical Control Point (HACCP) – a food safety system that helps business operators examine food handling practices and introduces procedures to ensure food is safe to eat.

Health alerts – Urgent messages to health officials that require immediate action or attention.

Herd immunity – The resistance of a group of people to infection with and spread of disease, based on the resistance of a high proportion of individual members of the group. Resistance is a product of the number susceptible and the probability that those who are susceptible will come into contact with an infected person.

Host – The entity or entities responsible for organizing a MG. May refer to the physical site (i.e., city, region, country) or an organizing body (i.e. 2016 Rio Olympic Committee).

Incident – A situation occurring during a planned event that requires a response by the relevant authorities. Incidents may result in injury, illness, death or the need for law enforcement or other responsive actions.

Incident command system – A direction and control scheme used by first responders and other agencies to manage emergencies.

International Health Regulations 2005 (“IRH (2005)” or “Regulations”) – The international legal agreement, binding on 194 state parties globally, to prevent, control and respond to international spread of disease.

Isolation – A state of separation between persons or groups deliberately imposed in order to prevent the spread of disease (usually applied to those infected or thought to be infected).

Joint information centre – A central point of contact for all news media during a MG or adverse event, such as a large-scale disaster.

Legacy – The assets or capacity developed as a result of hosting a MG. Examples of legacy include improved infrastructure or increased training of local staff.

Mitigation – Structural and non-structural measures undertaken to limit the adverse impacts of natural, human-generated or technological hazards.

National IHR focal point (NFP) – The national centre or agency, designated by each state party to the IHR (2005), that must be accessible at all times for communications with WHO IHR contact points concerning the Regulations.

Non-governmental organization (NGO) – An entity with an association that is based on interests of its members, individuals or institutions and that is not created by a government, but which may work cooperatively with governments.

Outbreak – Often used synonymously with “epidemic”, usually to indicate localised as opposed to generalised epidemics. Typically defined as two or more people with the same health condition, at the same time and in the same place.

Pandemic – A worldwide outbreak of a disease in humans in numbers clearly in excess of normal.

Preparedness (e.g. for outbreak, crisis, disaster) – Arrangements to ensure that, should a situation occur, all necessary resources (e.g. financial, human, technical), expertise and services that may be required to cope with the effects of that situation can be mobilized rapidly and deployed (includes the issuing of effective early warnings and the temporary removal of people and property from threatened locations).

Prevention – Activities to provide outright avoidance of the adverse impacts of hazards and the means to minimize related environmental, technological and biological disasters.

Prophylactic – A medical procedure or practice that prevents or protects against a disease or condition (e.g. vaccine, drugs).

Public health security – The activities required, both proactive and reactive, to minimize vulnerability to all public health hazards endangering the collective health of populations.

Quarantine – The compulsory physical separation, including restriction of movement, of populations or groups of healthy people who may have been exposed to a contagious disease. This may include efforts to segregate these persons within specified geographic areas.

Recovery – The coordinated process of supporting disaster-affected communities in reconstructing their physical infrastructure, and restoration of emotional, social, economic and physical well-being.

Resilience – The capacity to withstand and / or recover successfully from loss and damage.

Response – Actions taken before, during and immediately after the occurrence of a disaster, to ensure that the effects of that disaster are minimized and people are given immediate relief and support.

Risk – The probability of harmful consequences or expected losses (deaths, injuries, damage to property and livelihoods, disruption of economic activity and environmental damage, etc) resulting from interactions between natural or human-induced hazards and vulnerable conditions. (Risk = hazard x vulnerability).

Risk assessment – The process used to determine risk management priorities by evaluating and comparing given levels of risk to pre-determined standards, target risk levels, or other criteria.

Risk communication – The interactive exchange of information and opinions concerning hazards, risks and risk-related factors.

Risk management – A systematic approach to identifying, addressing and reducing risks of all kinds associated with hazards and human activities. Risk management is divided into risk assessment, risk communications and risk preparedness / response.

Risk preparedness – Planning, organizing and implementing activities to prepare for or mitigate a risk.

Risk response – Directing and managing the activities involved in responding to a risk.

Sentinel surveillance – A surveillance system in which a pre-arranged sample of reporting sources agrees to report all cases of one or more notifiable conditions.

Strategic national stockpile – A national cache of drugs, vaccines and medical supplies (e.g. stockpiles of anthrax vaccine in the USA) that can be deployed in response to public health emergencies, including bioterrorism events.

Surge capacity – Ability of institutions such as clinics, hospitals, or public health laboratories to respond to increased demand for their services during a public health emergency.

Surveillance – The systematic ongoing collection, collation and analysis of data, and the timely dissemination of information to those who need to know it in order for action to be taken.

Syndromic surveillance – The use of health-related data based on clinical observations rather than laboratory confirmation of diagnosis (e.g. influenza-like illness or acute watery diarrhoea). Such data can be used to signal sufficient probability of a case or outbreak to warrant further public health investigation and response.

Vulnerability – The degree to which a community is susceptible to hazards. This is the result of physical, social, economic and environmental factors.

Weapons of mass destruction (WMD) – Generally refers to chemical, nuclear, or biological agents or explosive devices that could be employed against civilian populations, and which are capable of causing mass casualties.

WHO IHR contact point (CP) – The unit within each of the each WHO Regional Offices that is accessible at all times for IHR-related communications with IHR national focal points. The IHR contact point contact information, including email, telephone and fax details, for each WHO IHR CP has been provided to all of the state's parties to the IHR (2005), and is available on the WHO IHR event information site.

Zoonoses – Diseases that are transferable from animals to humans (e.g., brucellosis).

Acronyms and abbreviations used in this document

AAR	After Action Report
A&E	Hospital Accident and Emergency department (emergency room)
AFCON	Africa Cup of Nations
ALS	Advanced Life Support
ARO	Alert and Response Operations (WHO)
BT	Bioterrorism
BSL	Biosafety Level
CAREC	Caribbean Epidemiology Centre
CBRN	Chemical, Biological, Radiological and Nuclear. This term is most consistently used in the context of a deliberate release of such agents.
C3	Command, Control and Communication
CC	Collaborating Centre
CD	Communicable Disease
CDC	Centers for Disease Control and Prevention, USA
CONOPS	Concept of Operations
CP	Contact Point
DE	Deliberate Event
DPHO	District Public Health Officer
EC	European Commission
EH	Environmental Health
EIA	Environmental Impact Assessment
EOC	Emergency Operations Centre
EMS	Event Medical Services
EMG	Event Management Group
EPIET	European Project on Intervention Epidemiology Training - a project co-financed by the European Commission
EPR	Epidemic Preparedness and Response (a WHO department)
ER	Emergency Room
EU	European Union

FDA	Food and Drug Administration (USA)
FIFA	Fédération Internationale de Football Association
FIMS	Field Investigation Management System
FS	Food Safety
FSA	Food Standards Agency (UK)
GCAR	The Global Capacity Alert and Response Department (WHO)
GIS	Geographic Information System, may also refer to geographical information science or geospatial information studies
GHSAG	Global Health Security Action Group
GOARN	Global Outbreak Alert and Response Network
HACCP	Hazard Analysis and Critical Control Point
HAV	Hepatitis A Virus
HAZMAT	Hazardous Material
HBV	Hepatitis B Virus
HCW	Healthcare Worker
HIV	Human Immunodeficiency Virus
HQ	Headquarters
IAEA	International Atomic Energy Agency
ICC	International Cricket Council
ICS	Incident Command System
ID	Infectious Diseases
IHR	International Health Regulations (2005)
ILI	Influenza-like Illness
INFOSAN	The International Food Safety Authorities Network
IOC	International Olympic Committee
IPC	Infection Prevention and Control
JOC	Joint Operations Centre
LSHTM	London School of Hygiene and Tropical Medicine
MAA	Mutual Aid Agreement
MCE	Mass Casualty Event
MCI	Mass Casualty Incident
MERS CoV	Middle East Respiratory Syndrome Coronavirus
MG	Mass Gathering
MMR	Measles, Mumps and Rubella (vaccine)
MoD	Ministry of Defence
MoH	Ministry of Health
MOU	Memorandum of Understanding
MSF	Medecins Sans Frontieres (Doctors without Borders, an NGO)
NATO	North Atlantic Treaty Organization
NGO	Non-Governmental Organization
NFP	National Focal Point
NHOC	National Health Operations Centre
OPCW	Organization for the Prohibition of Chemical Weapons
PCR	Polymerase Chain Reaction - refers to a molecular biology test used in identifying biological agents
PH	Public Health
PHC	Public Health Cluster
PHEIC	Public Health Emergency of International Concern
PHO	Public Health Officer or Public Health Official
PPE	Personal Protective Equipment
PPR	Patient Presentation Rates

PSS	Psychological Support Service
RT-PCR	Real Time-PCR - an enhanced diagnostic method for biological agents
RTPI	Real Time Positive Intervention
SARS	Severe Acute Respiratory Syndrome
SLA	Service Level Agreement
SOP	Standard Operating Procedure
SP	State Party (to the IHR)
START	Simple Triage and Rapid Treatment
TA	Technical Assistance
T&E	Testing and Exercising
UC	Unified Command
UEFA	Union of European Football Associations
UN	United Nations
UNEP	United Nations Environment Program
UK	United Kingdom
USA	United States of America
USDA	United States Department of Agriculture
VIAG	WHO Virtual Interdisciplinary Advisory Group on Mass Gatherings
WHO	World Health Organization
WMD	Weapons of Mass Destruction
WR	WHO Representative (in a country)
WRO	Office of the WHO Representative
WSP	Water Safety Plan



World Health
Organization