Psychosocial and behavioural aspects of early incident response: outcomes from an international workshop

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ABSTRACT
The likelihood of major incidents and disasters has increased in recent years, due to climate change, urbanisation, and acts of terrorism. Effective management of such incidents is crucial to ensure that members of the public are able and willing to take appropriate protective actions. The workshop described in this paper brought together researchers, practitioners and policy makers with expertise in emergency planning, preparedness and response to generate recommendations for major incident management. Workshop participants agreed that understanding the psychosocial aspects of major incidents is crucial to effective incident response, and a number of key themes were raised during workshop discussions. Based on these themes, four key recommendations can be made for informing planning and preparedness for major incidents.

Introduction

The likelihood of major incidents and disasters has increased in recent years. Climate change has increased the risk of natural disasters occurring; urbanisation has increased the potential for populations to be exposed to technological disasters; and in war and terrorism, there is an increased willingness of state and non-state actors to use unconventional weapons (Mazzone, 2013; Meulenebelt & Nieuwenhuizen, 2015; North Atlantic Treaty Organization, 2015).

Major incidents are often frightening for members of the public. Incidents that involve unfamiliar and dreaded agents such as chemical, biological, radiological or nuclear (CBRN) agents are highly ambiguous, which is particularly likely to cause public anxiety, and reduces the likelihood that members of the public will understand appropriate protective actions to take (Cornish, 2007). Effective management of major incidents and disasters is crucial to ensure that members of the public are able (and willing) to take appropriate protective actions; failure to appropriately manage an incident may result in reduced public compliance with recommended protective actions, and reduced public cooperation with responder instructions (Carter, Drury, Amlôt, Rubin, & Williams, 2013a; Carter, Drury, Rubin, Williams, & Amlôt, 2014), which may ultimately lead to worse health outcomes. It is therefore essential that effective responder management strategies are developed, which take into account the needs of members of the public during major incidents. These strategies must be based on an understanding of likely public behaviour during disasters, and of the role which disaster management strategies can play in promoting positive public behaviour during the preparedness, response and recovery phases of a disaster.

When planning for major incidents, it is also important to consider the role of cultural factors, and how these might affect public behaviour and response. For example, during the Ebola outbreak response of 2014–2015, a range of factors complicated the response to the epidemic. For example, misperceptions associated with the effectiveness of response efforts (Yamanis, Nolan, & Shepler, 2016), tensions between funeral practices and infection control requirements (Richards, Amara, Ferme, Kamara, & Mokuwa et al., 2015), and suspicion regarding the intentions of overseas health workers (Gauntlett, Rubin, Greenberg, & Amlôt, in preparation), were all associated with lower adherence to public health guidance and interventions. Considering the cultural context in which a response operates is essential to the success of response efforts.
To facilitate effective incident management, a number of recent initiatives have sought to capture evidence-based best practice in education and training materials for crisis communicators, for example the ‘National health emergency risk communication training package’, published by the World Health Organization in (2018) ([http://www.euro.who.int/__data/assets/pdf_file/0020/380252/01-erc-eng.pdf?ua=1]). The need for better understanding of the psychosocial aspects of major incident response is also one of the priority themes highlighted within the Sendai Framework for Disaster Risk Reduction (UNISDR, 2015). The Sendai Framework is a voluntary agreement, endorsed by the UN General Assembly in 2015, wherein Member States express their commitment to leading on disaster risk reduction and resilience activities while sharing responsibility with stakeholders including local government and the private sector. The aim of the Framework is the substantial reduction of disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of person, businesses, communities and countries (Tsutsumi et al., 2015; Wahlstrom, 2015). This Framework highlights the need to develop public communication strategies, promote national strategies to enhance public disaster awareness, and enhance scientific work on disaster risk reduction. This includes the use of behavioural science to understand, support and facilitate processes of informal public resilience as a way of boosting disaster risk reduction. The Framework specifically recommends that planning in this area should focus on building, ‘the knowledge of government officials at all levels, civil society, communities and volunteers, as well as the private sector, through sharing experiences, lessons learned, good practices and training and education on disaster risk reduction’ (paragraph 24g).

In line with these recommendations, a workshop on behavioural and psychosocial aspects of major incident response was jointly run by the Chemical Events Working Group of the Global Health Security Initiative (GHSI) and the National Institute for Health Research Health Protection Research Unit in Emergency Preparedness and Response (EPR HPRU). The GHSI is ‘an informal, international partnership among like-minded countries to strengthen health preparedness and response globally to threats of biological, chemical, radio-nuclear terrorism (CBRN) and pandemic influenza’ (Global Health Security Initiative, 2017), and has various working groups/networks. The EPR HPRU is a partnership between King’s College London, Public Health England, the University of East Anglia and Newcastle University, which aims to conduct multidisciplinary research to minimise the health impacts of emergencies. The workshop brought together researchers, practitioners and policy makers from the UK, Canada, Israel, Japan and the United States involved in emergency planning, preparedness, response and recovery to generate recommendations for major incident management. This workshop had three objectives: 1) to explore evidence pertaining to likely human behaviour following a major incident; 2) to explore the operational aspects of early incident response; 3) to integrate knowledge regarding behavioural science and operational response, such that emergency response plans are optimised and mitigate risks to casualties, frontline responders, and the wider community. This paper presents key themes arising from the workshop, and outlines recommendations for further research in this area.

Methods

Workshop participants (n = 29) had expertise in planning for or managing major incidents, and were from a variety of different organisations, including: the World Health Organization, military organisations, health protection organisations, emergency service organisations and universities. Participants took part in expert discussion groups, based around a series of scenarios and case studies. Each group discussed each case study. Group facilitators used a series of pre-determined questions to prompt dialogue. The discussion guide included various questions relating to psychosocial aspects of early incident response during different case studies, including: the importance of understanding psychosocial aspects during emergency response (e.g. ‘How can an understanding of behaviour in emergencies help emergency responders to manage major incidents?’), facilitators and barriers to effective incident response (e.g. ‘What barriers to effective incident management might exist, and how might they be overcome?’), and potential ways to improve pre-incident preparedness for members of the public (e.g. ‘How can we better prepare the public for incidents and emergencies?’).

The case studies chosen were selected to represent a wide range of incidents, involving both intentional and non-intentional incidents, a range of different hazards, and a variety of different countries. Case studies were selected to represent a range of scenarios that would facilitate workshop discussion around a variety of different psychosocial aspects of early incident response. Scenarios were chosen that reflected different types of incidents (e.g. natural vs. man-made), different stages of response to an incident (short-term, medium-term, longer-term), and different types of multi-agency
response. Case studies presented included: wildfires in Fort McMurray, Canada (2016); the Lac Megantic train derailment in Canada (2013); the Tokyo subway sarin release, Japan (1995); the Boston Marathon bombings, US (2013); likely public perceptions of chemical and radiological incidents (2013) and a field experiment examining the effectiveness of communication strategies during a CBRN incident (2014). Summaries of case studies presented can be found in Supplementary Material 1, along with references to relevant publications. Participants were asked to consider a series of specific topics, including: how an understanding of behaviour in emergencies can help emergency responders to manage major incidents; how members of the public can be supported to take appropriate actions during the initial response to an incident; how effective communication with members of the public can be facilitated during the initial response to an incident; and what barriers might exist that could confound or contradict risk messaging. Group discussions were recorded and analysed, using an expedited framework approach. This approach has been found to be particularly useful when analysing data with implications for policy (Pope, Ziebland, & Mays, 2000), and so was selected as the most appropriate method of analysis for the data collected during workshop discussions. Data were coded to identify key themes, based on the aims of the study, and the relevant issues highlighted in previously published literature. Themes are presented below, and each theme is then discussed alongside relevant empirical and theoretical research.

Results and discussion

Four key themes were generated from this workshop: 1) the importance of understanding the factors, which affect public behaviour during major incidents; 2) the likelihood that people will want to help others during major incidents; 3) the lack of public understanding around different CBRN incidents and the potential of providing pre-incident public education about CBRN threats and 4) the need for more science, data and education about the psychosocial aspects of major incidents. Results are discussed in more detail under each of these headings; findings from workshop discussions are presented first, followed by relevant evidence from the academic literature. The exception to this is the final theme ‘More science, data and evidence is needed’. This theme specifically highlights the need for further research, and so discussion is limited to workshop outcomes. Recommendations for further research and improved incident management are also presented within each of the themes.

Importance of understanding the factors which affect public behaviour during major incidents

Workshop discussion outcomes

A key theme from this workshop was that understanding the factors which affect public behaviour is central to planning an effective response to major incidents. Experts agreed that various factors will affect the way in which members of the public respond to such incidents, including: the perceived effectiveness of communication from responders and authorities about the nature of the incident and the actions which people should take; whether people have prior knowledge, understanding or experience of such incidents; the nature of the information which is shared on social media about the incident; and the nature of the relationship between crowd members and emergency responders, including pre-existing relationships between responders and the local community. The way in which emergency responders and the authorities manage a major incident will play a key role in shaping likely public behaviour, and this will in turn affect the outcomes of the incident. If emergency responders communicate openly and honestly about the nature of the incident, keep the public informed about any actions which they are taking, and provide sufficient practical information to enable people to successfully take recommended actions, this is likely to result in increased public compliance and cooperation.

Relevant literature

While the importance of understanding likely public behaviour during major incidents was agreed by all, and is noted in the literature (Provitolo, Dubos-Paillard, & Muller, 2011), a concern raised in the workshop was that this is rarely reflected in guidance and training for the management of such incidents (Carter & Amlôt, 2016; Carter, Drury, Rubin, Williams, & Amlôt, 2013b). Where attempts have been made to consider public behaviour, there has been a reliance on common myths about disasters, such as public disorder and mass panic, which has led to a focus on the need to control members of the public. Such control management strategies involve withholding information from members of the public, for fear that they will behave irrationally, and failure to respect public needs (Carter et al., 2013b). These types of control management strategies may be counterproductive, in that they may create public disorder rather than preventing it. There is therefore a need for training and guidance for emergency responders to be updated to include information on the psychosocial aspects of managing major incidents (Carter & Amlôt, 2016). However, there is currently limited evidence as to
what form this training should take. This is an area which requires further research. We recommend that psychosocial factors should be considered at all stages of planning and preparation for major incidents, to ensure that an understanding of these aspects is central to the way in which such incidents are managed.

People are likely to help each other during mass emergencies and disasters

Workshop discussion outcomes
A second theme arising from workshop discussions was that in the immediate aftermath of a major incident, those affected will want to take action to help themselves and others; indeed, people will spontaneously take action, even if they are unsure of the appropriate actions to take. It is possible that this desire to help others provides a sense of control over the situation. Provision of information about appropriate protective actions will therefore enable members of the public to effectively help themselves and others.

Relevant literature
The idea that members of the public will pull together and help each other during disasters, wherever possible, is a consistent theme within the literature (Drury, Cocking, & Reicher, 2009a; Drury, Cocking, & Reicher, 2009b; Mawson, 2005). Although responder and authority actions are likely to affect the way in which members of the public behave, research shows that people want to help others during a disaster, and responders should see members of the public as a resource in this regard. Drury (2012) suggests that public helping should not only be supported by the emergency services, but actively encouraged. Not only will the help provided by members of the public assist emergency responders, but research has also shown that providing help and taking responsibility for one’s own defence and recovery during and after a disaster can have positive psychological consequences for those involved, by increasing the morale of the community which has been affected (Jones, Woolven, Durodie, & Wessely, 2006). However, large scale public helping following a major incident can present difficulties for emergency responders and authorities, if no system is in place to manage this help effectively (Aleccia, 2010; Molloy, 2017). For example, following a recent huge fire at Grenfell Tower, a block of flats in London, UK, community centres were overwhelmed by food and clothing donations (Molloy, 2017). It is therefore recommended that policy makers and emergency planners should prepare for the likelihood that members of the public will want to help each other during major incidents, and understand that this help is likely to emerge spontaneously (Whittaker, McLennan, & Handmer, 2015). This should be acknowledged in major incident plans. Further, planning should focus on ways to direct public helping in a meaningful way, so that help given by the public has as much benefit as possible.

Providing pre-incident public education around CBRN threats

Workshop discussion outcomes
A third theme arising from our discussions was the lack of public understanding around different CBRN risks, and the need to provide effective pre-incident information for members of the public. For example, expert discussions suggested that members of the public do not: differentiate between diverse CBRN risks; understand jargon; know what specific actions to take during CBRN incidents; or understand why different actions might be effective. There are key distinctions between different types of CBRN incidents, which would result in different protective actions being taken, such as sheltering-in-place versus evacuation. Increasing public knowledge about the distinct types of agents, and the effectiveness of different actions, might therefore be beneficial for helping them to take appropriate protective actions in the event of a CBRN incident.

It was agreed that during CBRN incidents, it will be important that those affected take protective actions as quickly as possible. Raising public awareness about these types of incidents in advance of the incident occurring might ensure that those affected, including those involved as spontaneous volunteers, are able to take protective actions immediately, without needing to wait for specialist responders and equipment. Further, if even a small number of those affected have a basic knowledge of CBRN incidents, and some understanding of actions which they should take, the desire for people to help others may result in this information being shared rapidly between those affected; therefore, if pre-incident education programmes reach even a small number of people, this could result in a significant reduction of the adverse health impact of such an incident.

Relevant literature
Evidence supports the suggestion that members of the public do not differentiate between CBRN hazards (Lemyre, Turner, Lee, & Krewski, 2007), are unsure which protective actions to take during CBRN incidents (Gibson, Lemyre, & Lee, 2015; Glik, Harrison, Davoudi,
Riopelle, 2004; Wray, Kreuter, Jacobsen, Clements, & Evans, 2004), find it difficult to understand jargon when receiving information about CBRN threats (Becker, 2004; Wray et al., 2004), react differently to different types of uncertainties (Markon & Lemyre, 2013), and don’t understand why different protective actions might be effective (Becker, 2004; Carter, Weston, Betts, Wilkinson, & Amlot, 2018; Henderson, Henderson, Raskob, & Boatright, 2004). Public knowledge about different types of CBRN threats could potentially be improved by providing pre-incident public education for CBRN incidents.

Research into the effectiveness of providing pre-incident public education is mixed, with some studies suggesting that basic pre-incident preparation (e.g. sending round a leaflet to households) is not effective (Hildebrand & Bleetman, 2007), while others have shown that leaflets may have some benefit in this regard (Pearce, Rubin, Amlot, Wessely, & Rogers, 2013). Studies which have examined the effectiveness of providing more engaging educational materials (for example informing members of the public through focus groups, or engaging them as participants in emergency preparedness field exercises) have showed more positive results (Carter et al., 2018; Taylor, Balfanz-Vertiz, Humrickhouse, & Jurik, 2009; Taylor, Balfanz-Vertiz, Humrickhouse, & Truitt, 2008). While it is not possible to engage all members of the population in such exercises and focus groups in the absence of a specific threat, there are other options, such as using organised events (e.g. adult and teen education programmes or sports events) to share such information (Spencer, Kindt, & Stans, 2012). Social media may also be used to share pre-incident information. Given the potential advantages of providing pre-incident public education, it is recommended that further research should be carried out into the potential of developing pre-incident public education for CBRN incidents.

More science, data and evidence is needed relating to the psychosocial aspects of major incidents

Workshop discussion outcomes
A key theme which arose during the workshop was the importance of continuing to carry out research and evaluation studies to generate evidence relating to the psychosocial aspects involved in the immediate aftermath of major incidents. Various types of research were presented during the workshop, including case studies, focus groups and emergency preparedness field experiments. While this research is useful in helping to develop an evidence-base for understanding psychosocial aspects of major incidents, there is a need for further research in this area, using a variety of research methods (e.g. analysis of data collected from real incidents, exercises, field experiments etc). This will facilitate triangulation, and ensure reliability and validity of results. As noted above, the Sendai Framework also recognises the importance of further research in this area, calling for increased use of science, including behaviour science, to understand, support and facilitate processes of informal public resilience as a way of boosting disaster risk reduction. It is therefore recommended that evidence from real incidents, exercises and experiments should routinely be shared to ensure that planning for major incidents is based on the most up to date research.

Limitations
A limitation of the workshop described here is that the case studies and scenarios discussed only related to high-income countries. This was because scenarios and case studies were chosen that related to workshop participants’ countries of origin, and the fact that literature around multi-agency response in low-income countries is more limited. We recognise that this may affect the ability to generalise the findings from this workshop to low-income countries, and this is an area that requires further focus and research.

Conclusion
The workshop described here brought together researchers, practitioners and policy makers involved in emergency planning, preparedness and response to generate recommendations for major incident management. Workshop participants agreed that understanding the psychosocial aspects of major incidents is crucial to effective incident response, and a number of key themes were raised, as described above. Based on these themes, we would make four recommendations for planning and preparedness for major incidents: 1) Psychosocial factors should be considered at all stages of planning; 2) Policy makers and emergency planners should prepare for the likelihood that members of the public will want to help each other during major incidents, and this should be included in major incident plans; 3) Further research and evaluation should be carried out into the potential of developing pre-incident public education for CBRN incidents and 4) Evidence from real incidents, exercises and experiments should routinely be shared to ensure that planning for incidents involving CBRN agents is based on contemporary research.

Overall, the workshop demonstrated the importance of increasing awareness about the psychosocial factors involved in the immediate aftermath of CBRN
incidents. An understanding of psychosocial factors is fundamental to the effective management of incidents involving CBRN agents, and this should be recognised when planning for such incidents. This workshop represented an important first step in bringing together policy makers, emergency responders and academics to discuss these factors. However, as indicated by the themes and recommendations presented here, there is still a long way to go in this regard.

**Author contributions**

All authors were involved in organising the workshop. All authors attended the workshop and took part in workshop discussions. HC wrote the first manuscript draft, with contributions from LG. All other authors provided comments on subsequent versions of the manuscript.

**Declaration of interests**

No potential conflict of interest was reported by the authors.

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**Louis Gauntlett** is a PhD Student at King’s College London and Public Health England, having previously completed a Master’s in Psychological Research Methods at the University of Southampton. The title of Louis’ PhD project is ‘Developing evidence-based risk and crisis communication strategies to promote protective health behaviours in nuclear incidents.’ Louis holds many years of practical experience in the field of clinical psychology in addition to public health research. This includes using qualitative and quantitative data collection methods to measure mental health outcomes for healthcare staff involved in supporting the recent Ebola response in West Africa. Additionally, he has used knowledge and expertise to make recommendations for improving psychosocial support for experts deployed in future overseas crisis responses. He has also developed training modules for emergency first responders to improve their skills in communicating with the public in preparation for, and during CBRN emergencies.

**Dr G. James Rubin** has worked in the area of disaster response for 13 years. His work has explored the psychological impact of being caught up in a disaster, either as a victim, member of the community or responder. He has published rapid reaction work on the 7 July London bombings, assassination of Alexander Litvinenko, two episodes of major flooding in the UK, swine flu pandemic, Ebola crisis, and Fukushima nuclear melt-down. International work in this field has included a major pan-European study on behavioural responses to the pandemic, collaborations in Germany and Poland to study the impact of chemical disasters, assessment of the impact of the 2011 triple disaster in Japan on British nationals present in the country and, most recently, ongoing development of an evaluation of mental health provision for Sierra Leone Ebola treatment centre staff.

**Prof David Russell** graduated as a Biophysicist from Cardiff University in 1983, before completing a Masters in Cardiovascular Physiology at The University of Leeds in 1984. David subsequently read Medicine at The Welsh National School of Medicine, graduating in 1989, before specialising in Medical Biochemistry. David then took up a career as an environmental toxicologist, becoming Medical Director of The National Focus for Chemical Incidents in August 2000. He combined this role with being appointed the Senior Medical Officer for Environmental Medicine for Welsh Government in 2001, before being employed as a Consultant in Environmental Toxicology by the Health Protection Agency in 2003. In 2009, David became the Director of the WHO Collaborating Centre for Chemical Incidents and is currently employed by Public Health England.

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Professor Peter Blain has been Director of the Joint Health Protection Agency (now Public Health England)/Newcastle University Medical Toxicology Centre since 2006 and honorary Consultant in Emergency Response Medicine to the Health Protection Agency and Department of Health since 2003. He is a Clinical Consultant to the Ministry of Defence and is involved in defence medical sciences research, operational military medicine and CBRN medical countermeasures. Peter is also an operational medical advisor to a military Medical Support Unit, including the provision of clinical care for CBRN casualties. His research interests are primarily in clinical toxicology and the translation of mechanistic toxicology research to clinical practice and population health protection. He has held major research funding (over £8M since 2006) for projects in neurotoxicology, population exposure biomarkers, skin permeability and decontamination, CBRN medical countermeasures and emergency response medical interventions.

Dr Mark Byers is a Military pre-hospital physician with over 25 years’ experience of delivering medical care in the most austere and demanding environments. With a special interest in CBRN and counter-terrorist operations he has gained valuable experience of the practical aspects of CBRN incident management during his service. His published works include articles on trauma and CBRN management as well as health care issues in extreme environments.

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