Psychological Effects of Patient Surge in Large-Scale Emergencies: A Quality Improvement Tool for Hospital and Clinic Capacity Planning and Response

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Abbreviations:
CQI = Continuous Quality Improvement
QI = quality improvement
REPEAT = Readiness for Events with Psychological Emergencies Assessment Tool

Abstract
Although information is available to guide hospitals and clinics on the medical aspects of disaster surge, there is little guidance on how to manage the expected surge of persons needing psychological assessment and response after a catastrophic event. This neglected area of disaster medicine is addressed by presenting a novel and practical quality improvement tool for hospitals and clinics to use in planning for and responding to the psychological consequences of catastrophic events that create a surge of psychological casualties presenting for health care. Industrial quality improvement processes, already widely adopted in the healthcare sector, translate well when applied to disaster medicine and public health preparedness. This paper describes the development of the tool, presents data on facility preparedness from 31 hospitals and clinics in Los Angeles County, and discusses how the tool can be used as a benchmark for targeting improvement. The tool can serve to increase facility awareness of which components of disaster preparedness and response need to be addressed through hospitals' and clinics' existing quality improvement programs. It also can provide information for periodic assessment and evaluation of progress over time.

Introduction

Although information is available to guide hospitals and healthcare clinics on the medical aspects of disaster surge, there is little guidance on how to manage a surge of psychological casualties. Despite the growing recognition and need to address the health response to large-scale public health events, consideration of the mental health impact in such disaster situations has received much less attention. However, experiences from previous events suggest that the mental health surge on a healthcare facility would be significant; the number of psychological casualties or those seeking help for emotional, behavioral, or cognitive reactions to a disaster could be from 4–50 times higher than the number of those seeking help for medical problems resulting from a disaster.[1–4] Therefore, hospitals and clinics need practical tools to better prepare them for a large surge of individuals requesting assistance with psychological concerns, including patients, family members of patients, and facility staff who may experience burnout.
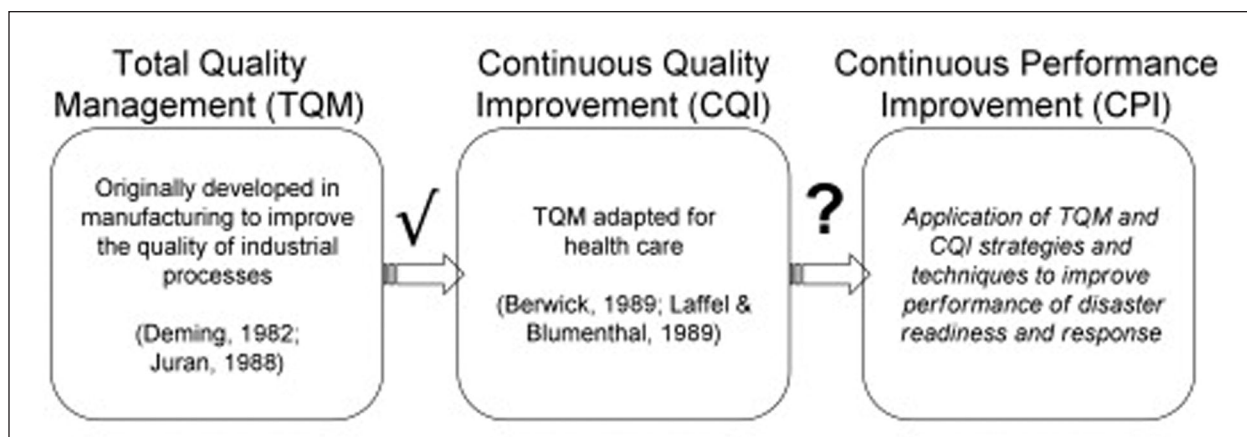
Quality improvement (QI) processes adapted from the manufacturing field to the healthcare sector may translate well to disaster medicine and public health preparedness. Figure 1 shows the evolution of QI beginning with Total Quality Management (TQM), developed to improve the quality of products at reduced cost and later to improve healthcare service delivery.[5,6] The adaptation

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Figure 1—Evolution of quality improvement: From widgets to healthcare quality to public health preparedness and response

to health, known as Continuous Quality Improvement (CQI), was initially used for administrative processes like appointment scheduling, record keeping, and billing. Later, it was adapted to clinical practices such as improving care for chronic illness[7] and increasing patient safety by translating research into practice through implementation techniques.[8]

Continuous Quality Improvement is characterized by five key principals or components. First, it is a systems-based approach, where quality depends on the complexity of interdependent systems with individuals working within those systems. A second component is its emphasis on needs, the goal of improving a product or outcome should address the needs of the "customer". Third, QI employs a multi-disciplinary team to incorporate multiple perspectives. Fourth, it is data-driven and uses quantitative methods to track improvement. Finally, QI is a cyclical process using continuous rapid cycles to incorporate feedback to inform practice changes.

Currently, CQI is used widely through a number of initiatives, including the improvement of depression care in primary care settings[9,10] and the Breakthrough Series of the Institute for Healthcare Improvements for improving chronic illness.[11] The Quality Enhancement Research Initiative of the Veterans Administrations (VA) currently is using CQI strategies to implement improvements for the care of patients with depression throughout the VA.[12]

These QI innovations have important relevance for public health, especially for mental health disaster responses in healthcare facilities. As with other applications, QI for hospital and clinic disaster responses likely will be successful if the objectives are defined clearly by a multi-disciplinary team, and that the team tracks progress over time. The tracking process necessarily integrates learning from past experiences (including disaster drills and exercises) when they occur. A recent study to understand public health emergency preparedness identified key themes to guide future QI efforts.[13] Although it was noted in case studies and interviews that little has been done to improve public health preparedness using CQI strategies, there were some informative findings. Implementation was limited to only some QI components. Measurement and systematic feedback were lacking, especially for public health preparedness.

Leadership support from management and the incorporation of QI strategies into daily activities facilitated implementation of QI principles, but the lack of incentives and resources reduced QI use for public health preparedness.

Some promising efforts to promote QI in public health exist,[14] however, few address public health emergency preparedness. A recent study examined the impact of QI in public health by adapting the QI learning collaborative model in order to bring about more rapid improvement in this arena.[15] The pilot was designed for public health organizations to apply QI methods to improve preparedness for an influenza pandemic. Team members demonstrated improved preparedness through moving directly from planning to implementation, lacking shortening the time for triage calls, increasing capacity, and developing key partnerships with both internal departments and external agencies. They also found that the QI process could be incorporated into routine practices and sustained over time even beyond the study pilot. Similar success with public health might be expected for healthcare delivery settings particularly if a QI mechanism already exists in a hospital or clinic.

A practical tool for hospitals and clinics was developed to use in planning for and responding to the psychological consequences arising from catastrophic events that involve a large surge of casualties presenting for health care. The tool development is described and data on facility preparedness from the 31 hospitals and clinics in Los Angeles County are described, and discusses how the tool that can be used as a benchmark for targeting improvement is discussed. The use of the tool serves to increase facility awareness, of which, components must be addressed for improved disaster preparedness. It also can provide information for the periodic assessment and evaluation of progress over time. Broad use of this tool across community healthcare facilities is recommended to encourage better response planning for the psychological consequences of disasters.

Methods

Quality Improvement Tool

The QI tool, the Readiness for Events with Psychological Emergencies Assessment Tool (REPEAT, see Appendix), was based on a conceptual framework developed in earlier

work by the study investigators. It was designed to help hospitals and clinics assess their level of preparedness to respond to a terrorist incident or other public health emergencies. Key members of hospital and clinic disaster teams (e.g., disaster coordinators, emergency department directors, mental health directors) completed the assessment.[16] Briefly, this organizing framework addresses the psychological consequences of large-scale disasters with large numbers of casualties. It represents a modification of Donebedian's (1966)[17] model for describing effective health services delivery (structure + process--> outcome). In this adapted model, "outcome" refers to appropriate mental health disaster responses on the part of hospitals and clinics. "Structure" includes all of the resources, skills, and mental health planning elements that are necessary for an effective mental health response to occur. "Process" refers here to the different types of evidence-informed, mental health activities that facilities can use to better manage a surge of psychological casualties (patients, their families, and staff). When the right structures are paired with the right processes, an organization will produce an appropriate disaster response.

Based on a review of the literature covering disaster preparedness and responses, three structure components and four process components that are critical to the appropriate disaster responses were identified. The REPEAT is organized around three structure components: (1) internal organizational structure and chain of command; (2) resources and infrastructure; and (3) knowledge and skills. The four process components include: (1) coordination with external organizations; (2) risk assessment and monitoring; (3) psychological support and intervention; and (4) communication and information sharing. The tool also draws upon an Institute of Medicine conceptualization that takes into account the stage of the event and response activities: pre-incident, during incident, and post-incident.[18] For each of these elements, the REPEAT lists preparedness and response activities along with a simple rating scale. The rating scale is: 0 = no implementation; 1 = some implementation; or 2 = full implementation, and a summed score identifies the overall extent of implementation to guide future planning and response.

Data from developing and evaluating the REPEAT are reported using a two-stage process that involved expert feedback panel meetings and actual training meetings. The study procedures were approved with exemption by the RAND Institutional Review Board.

Expert Panel Meetings
The first step involved obtaining data from experts who reviewed an earlier draft of the tool and provided systematic feedback about its utility. Two structured, facilitated, multi-stakeholder, expert panels were conducted. Panelists were recruited and sent "pre-work" materials in advance asking them to review and evaluate the training tool. They rated the tool on a 1–5 scale (not at all to extremely) on three dimensions: (1) usefulness; (2) feasibility of implementation; and (3) sustainability of implementation. Evaluations were returned to the study team prior to the Expert Panel meetings and results were summarized and presented at the meetings to guide discussion. Panelists discussed areas for improving the tool, and this expert feedback

was used to improve and revise the tool for inclusion with the full set of training materials (available for download at http://www.ladhs.org/ems/disaster/trainingIndex.htm).[19]

Training Meetings
The final REPEAT then was administered at the beginning of the training meetings to collect actual facility preparedness data. Data presented in this paper are from a convenience sample of healthcare facility representatives who attended two countywide train-the-trainer meetings in Los Angeles Count conducted during October and November, 2007. Representatives from each hospital in the County and in each of the clinics in the County network of community clinics were invited to participate. These facility representatives were encouraged to go back to their facilities and train staff locally.

Analysis
Simple descriptive statistics were used to tally the feedback responses from the panel participants in evaluating the utility of an early version of the tool. Descriptive statistics were used for summarizing the data forms collected from the anonymous participants following the training meetings. Summary data are provided on the central tendency and variation for each of the seven elements of readiness (3 structure and 4 process) for the total sample and also stratified by the type of facility. This paper highlights the strong and weak areas of preparedness and response to the psychological consequences of a large-surge presentation of individuals to healthcare facilities.

Results
Panelist Characteristics
Thirty-three experts, recruited with the assistance of Chief Executive Officers of hospitals and clinics in the Los Angeles County and County Departments of Mental Health and Emergency Management Services Agency participated in two panel meetings. One meeting included 14 non-mental health experts and another included 19 mental health experts. These experts had experience with supervising/managing clinical staff in delivering mental health care to persons experiencing the psychological consequences of a disaster (6 non-mental health staff and 11 mental health specialists), providing direct clinical care for disaster mental health (4 of the non-mental health experts and all 19 of the specialists), and with developing programs or policies for disaster mental health (3 and 10, respectively) (Table 1).

Ratings
Mean expert ratings were higher for usefulness than for feasibility and sustainability in both groups of experts. Mental health trained experts had lower ratings relative to the non-mental health experts. Table 2 contains these averaging ratings.

In all, 60 healthcare facilities received notice of the "train-the-trainer" meetings. Attendees represented 25 public and private hospitals and six clinics. Participants ranged from disaster coordinators and emergency department directors, safety officers, mental health staff, spiritual care, physicians, nurses, and other types of staff (non-licensed mental health, other clinical staff, and agency representa-

	Non-Mental Health Disaster Experts	Disaster Mental Health Experts
Supervising/managing clinical staff in delivering mental health care to persons experiencing the psychological consequences of a disaster	6	11
Providing direct clinical care for disaster mental health	4	19
Developing programs or policies for disaster mental health	3	10

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Table 1—Experience of the expert panelists (n = 33)

	Non-Mental Health Disaster Experts	Disaster Mental Health Experts
Usefulness	4.1	3.6
Feasibility of implementation	4.5	3.2
Sustainability of Implementation	3.9	3.9

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Table 2—Average ratings by expert panelists (n = 33) Ratings ranged from 1–5 where 1 indicated "not at all" and a 5 indicated "extremely" useful, feasible, or sustainable.

tives). Thirty-one of the 64 facility staff (54 hospital and 10 clinic) who participated in initial training sessions completed the REPEAT (RR = 48%). These data (Table 2) provide a snapshot of preparedness levels for those facilities. For the training participants who completed the REPEAT, the overall average implementation score was 5.6 on a scale of 0–14. This score is equivalent to being only 40% prepared for the psychological consequences of a large-scale disaster. Of the 31 facilities, none achieved a perfect "readiness" score of 14. Only 16.1% had scores of 10–13 (n = 5), 19.4% scored from 7–9 (n = 6), and the majority 64.4% (n = 20) had scores of <7 (the midpoint of the score range).

Among the "structure" elements, most facilities had implemented some components of *internal organizational structure and chain of command*, but fewer reported having adequate knowledge and skills in place. Some of the facility representatives also elaborated on the areas needing improvement at their hospital or clinic with more individuals highlighting the need for their facilities to have a trained multidisciplinary mental health team and more joint planning with resources. Facilities tended to be most prepared in terms of the *resources and infrastructure*; most facilities indicated some implementation. Some facility representatives specifically stated that they were not prepared for a mental health surge of up to four times the number of physical casualties, while a few representatives noted inadequate space, supplies that were not readily available, and having no formal relationship with the Department of Mental Health. Facilities scored the lowest among structure elements on *knowledge and skills*. Three representatives elaborated on the need for additional mental health staff with training on specific roles during a large-surge disaster. In terms of "process" elements of preparedness, average scores were all lower than for structure. On average, facilities were moderately prepared in terms of coordination with external organizations. A few facility representatives were uncertain about external coordination because community mental health stakeholders were not specifically

designated for facility mental health response. They were least prepared for risk assessment and monitoring with either no implementation or only some implementation of the recommended activities. Some representatives noted that staff were not educated about risk assessment and monitoring of patients and staff. They were most prepared in terms of having psychological support and intervention noting that they needed to work on the details regarding psychological support and intervention. They also were relatively well prepared for communication and information sharing. A few representatives noted limitations in terms of developing materials, a plan, and prepared statements.

Across all structure and process elements of preparedness and response, scores were higher for hospitals compared with clinics except for risk assessment and monitoring, which was higher for clinics.

Discussion

While some healthcare facilities may be ready to respond to medical needs, they likely are ill-prepared to address a surge of psychological casualties following disasters. The REPEAT presented here and part of a broader training curriculum and toolkit,[19] was meant to be used as both a disaster planning guide as well as a quality management process. Overall, the REPEAT addresses how healthcare facilities can assess their capacity to better manage a surge of patients who need psychological assessment, concerned family members, and overworked and burned-out healthcare providers, and to ultimately improve capacity. The REPEAT guides healthcare facilities toward having the capacity for an appropriate response to psychological surge through seven requirements. Facilities are encouraged to have leadership that recognizes the importance of addressing psychological consequences, have a clear reporting chain that includes mental health professionals, establish useful agreements with other agencies, have plans for adequate resources to address mental health surge, and train staff to become knowledgeable in disaster mental health response.

The REPEAT is useful because it provides a quick and simple means of setting benchmarks for targeting improvement. It is based on an adapted conceptual framework [17] for the seven key areas of structure and process. It can be used to identify planning deficiencies and can assist health-

TABLE 3 **AU: file was corrupted, please sent a PDF version**

Table 3—Descriptive statistics for healthcare facilities completing the REPEAT by facility type (25 hospitals; 6 clinics) **AU: please cite in text**

care facilities prioritize tasks that must be accomplished in order to attain the goal of appropriate disaster mental health response. Data from the 31 healthcare facilities in this sample suggest that facilities are ill-prepared to take-on a large surge of psychological casualties that will occur during a disaster. In particular, few of these facilities reported having mental health staff who are trained for roles in the command structure, such as managing the disaster mental health response, providing education and reassurance on typical reactions, assessments of those who require urgent and non-urgent mental health assistance, and planning for the delivery of early psychological intervention to support the needs of patients, their families, and facility staff. The data suggest that there is a strong need for a system of assessments and triage to rapidly identify those who are in greatest need for psychological intervention. Another wide gap in preparedness for most facilities is the lack of planned risk communication messages that can help to address psychological reactions of people seeking help in a medical facility, as well as the staff providing assistance or are reluctant to report to work following a disaster. It takes resources to be fully prepared for disaster mental health response and most healthcare facilities have many other priorities that they also must address. However, many of the objectives presented in the REPEAT do not have to be costly.

This work is the first, to the authors' knowledge, that used a systematic "quality management" approach to develop a practical tool that healthcare facilities can use to build the capacity to respond to the psychological aspects of large-scale disasters and public health emergencies. Nevertheless, there are several limitations. These data are based on a limited number of facilities in only a single county of one state, and thus, the reported readiness levels may differ across both counties within and across states. In addition, those individuals were volunteers constituting a sample of convenience and may not represent all of the facilities in the county. It also is uncertain whether the representatives who completed the REPEAT are the best spokespersons for their respective facilities. Finally, although the validity and reliability of the instrument has not been formally assessed, the content validity is adequate given the robust process we undertook to develop and review it with community input.

The REPEAT was not formally evaluated to determine whether increasing awareness of weaknesses, by completing the tool, actually leads to greater implementation over time. Ideally, baseline data on all facilities could be tallied and then reassessed periodically (e.g., annually) to determine whether facilities make changes to become more prepared for a future event. However, preparedness is contingent on a number of factors including resources to make the necessary changes and the incentive to prioritize changes to address psychological consequences of disasters over other competing hospital and clinic needs. Future work to examine the conditions under which facilities are better able to prepare would provide lessons for what mechanisms to put

into place in order to achieve full integration of the mental health component in facility disaster plans.

Conclusions

A practical tool for guiding hospitals and clinics to better prepare for a large surge of psychological casualties has been provided. This surge will include those affected by the disaster, persons who do not need urgent medical attention, but need some type of brief psychological support to alleviate concern about the incident, and facility staff who may experience burnout. To address this need, both structural changes and new disaster planning processes that specifically address mental health response issues are essential for healthcare facilities to maximize an effective response to the expected surge of individuals seeking help in healthcare settings.

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Appendix—Readiness for Events with Psychological Emergencies Assessment Tool (REPEAT) *(continued on page 130)*

Purpose: REPEAT is designed to help hospitaals and clinics assess their capacity to deal with the surge of psychological casualties resulting from large-scale emergencies (including terrorist incidents, natural disasters, and other public health emergencies). Key members of your facility's disaster team (e.g., disaster response coordinators, department directors) should complete this assessment periodically to identify which preparedness and response activities have been implemented. Results can be used to evaluatedisaster planning and to identify key areas to target for improving the facility's response capability.

Instructions: REPEAT is organized around three structural and four process elements (shown in the rows) that are necessary to ensure an optimal response to a surge of psychological casualties. For each psychological element, we provide an example for each level of implementation. Select the example and associated score, then circle the answer that comes closest to describing your facility's current capacity. Each team member circles the point value that he or she believes corresponds to the facility's level. After each individual team member completes the assessment, the entire team should review the individual ratings and agree on an assessment. Rate each element from 0–2: "0" indicates no implementation, "1" indicates some implementation, and "2" indicates full implementation. At the end of each section, enter the total score for that section. Then enter the score for your over-all level of preparedness. Finally, review the assessment to identify areas that need attention (scored as 0) or that need strengthening (scored as 1).

Psychosocial Element	Full Implementation (Score = 2)	Some Implementation (Score = 1)	No Implementation (Score = 0)	Your Score and Areas to Improve
Structure				
Internal organizational structure and chain of command	- The leadership recognizes the need to address psychosocial consequences - A disaster plan includes mental health (MH) in the incident command structure/job action sheets - A deployable multidisciplinary MH team is formed (psychiatrists, psychologists, social workers, nurses, technicians, chaplains, EAP) - Clear roles are identified for direct MH services to survivors, family, and staff - A lead is designated for public information efforts and media interface related to MH issues	Some of these structures are in place to address psychological consequences	There is no infrastructure to address psychological consequencnes.	2 1 0 _____ _____ _____
Resources and infrastructure	- Agreements with Disaster Resource Center Group, or other local organization and/or County Department of Mental Health - The disaster plan is reviewed to ensure availability of adequate contact (county DMH) - A resource list is available with information on whom to contact (county DMH) - Disaster supplies (PPE, medications, or other equipment) are available to reduce personal risk - The facility can handle a MH surge at least four times the number of physical casualties (including waiting areas for family)	Some but not all resources that would be needed for addressing MH are available	Resources available are inadequate should a disaster occur	2 1 0 _____ _____ _____
Knowledge and skills	- MH staff are trained for roles in command structure and familiar with job action sheets - Staff are educated about MH risks/consequences of exposure and about self-care principles - MH staff are trained in MH assessment and early psychological intervention—Psychological First Aid (PFA) - Volunteers receive basic disaster training - Staff receive hands-on training (exercises, drills) to test plans that include MH response	Some staff have received some training activities on MH reactions and responses	Staff have not received training on MH reactions and response	2 1 0 _____ _____ _____
Subtotal REPEAT score (structure: possible range = 0–6)				

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Appendix—*(continued from page 129)* Readiness for Events with Psychological Emergencies Assessment Tool (REPEAT)

Psychosocial Element	Full Implementation (Score = 2)	Some Implementation (Score = 1)	No Implementation (Score = 0)	Your Score and Areas to Improve
Structure				
Coordination with external organizations	- Staff have participated in joint planning with relevant community stakeholders to discuss MH planning issues - A list of MH resources in the community (including country DMH) is available - Alliances have been formed with existing and trusted MH partners; community relationships have been developed (with local churches, etc.) - Provisions have been made for off-site MH care (e.g., at schools, community clinics)	Some community planning and alliances have been formed or are being formed for MH	No concrete external coordination with the community has taken place	2 1 0
Risk assessment and monitoring	- Screening, risk assessment, and tracking protocols have been developed, including for high MH demand - There are risk monitoring tools for assessing psychological needs of staff (including burnout and exposure to trauma) - Staff know how to follow the MH triage tool to identify those who are in need of psychosocial intervention	Some MH risk assessment protocols are in place but not all	No protocol for risk assessment and monitoring has been established	2 1 0
Psychological support aid and intervention	- MH staff are available and prepared to deliver evidence-based interventions (including PFA) to those in need of MH support (including patients, family members, and staff) - Mechanisms for reducing the stress associated with social isolation are in place (e.g., because of contagious agents) - A plan is in place for providing MH support after the event, such as on the anniversary	MH professionals or other hospital or clinic staff can provide basic care in response to psychological reactions	Some staff can provide PFA, but no evidence-basaed protocol is in place	2 1 0
Communication and information sharing	- MH staff contributed to a comprehensive communication strategy - MH informational/educational materials are developed for dissemination during an emergency (in multiple languages and for special populations) - Preplanned risk communication messages are ready to use to address psychological concern	A MH communication plan that includes some of the psychological elements exists	No comprehensive communication strategy exists	2 1 0
Subtotal REPEAT score (process: possible range = 0–8)				
Total REPEAT score (process and structure: possible range = 0–14)				

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