ARTICLE

Mass-Casualty Events at Schools: A National Preparedness Survey

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ABSTRACT

OBJECTIVE. Recent school shootings and terrorist events have demonstrated the need for well-coordinated planning for school-based mass-casualty events. The objective of this study was to document the preparedness of public schools in the United States for the prevention of and the response to a mass-casualty event.

METHODS. A survey was mailed to 3670 school superintendents of public school districts that were chosen at random from a list of school districts from the National Center for Education Statistics of the US Department of Education in January 2004. A second mailing was sent to nonresponders in May 2004. Descriptive statistics were used for survey variables, and the χ^2 test was used to compare urban versus rural preparedness.

RESULTS. The response rate was 58.2% (2137 usable surveys returned). Most (86.3%) school superintendents reported having a response plan, but fewer (57.2%) have a plan for prevention. Most (95.6%) have an evacuation plan, but almost one third (30%) had never conducted a drill. Almost one quarter (22.1%) have no disaster plan provisions for children with special health care needs, and one quarter reported having no plans for postdisaster counseling. Almost half (42.8%) had never met with local ambulance officials to discuss emergency planning. Urban school districts were better prepared than rural districts on almost all measures in the survey.

CONCLUSIONS. There are important deficiencies in school emergency/disaster planning. Rural districts are less well prepared than urban districts. Disaster/mass-casualty preparedness of schools should be improved through coordination of school officials and local medical and emergency officials.

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Key Words
disasters, emergency aid, school health, terrorism

Abbreviations
NCES—National Center for Education Statistics
MSA—metropolitan statistical area
EMS—emergency medical services

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SCHOOLS ARE PLACES of daily mass gathering. In many communities, more people are gathered in school settings than in any other location in the community on any given day. As such, the possibility of a mass-casualty event at a school has long been recognized.[1–7] Recent events have emphasized the importance of school preparedness. Widely publicized school shootings[8–13] at Westside Middle School in Jonesboro, Arkansas, at Columbine High School in Littleton, Colorado, and in other cities have called attention to the need for a coordinated emergency response to a school-based mass-casualty event. The more recent terrorist events, including the events of September 11, 2001, and the occupation of the school at Beslan, Russia,[14] in 2004 have further heightened the need to plan for the unwelcome possibility of a mass-casualty event at a school.

The ability of the school system and the emergency medical system to respond to school-based emergencies has been questioned.[15–17] For example, in a single-state survey in 2001, only one quarter of schools had a school nurse present on campus full time, more than one third of school personnel had received no emergency training, and only 11% of school nurses were involved in community disaster planning.[15] Little is known about the existing plans and preparedness of schools to prevent or respond to manmade or natural disasters that result in mass casualties. The purpose of this study was to document the preparedness of public schools in the United States for the prevention of and response to a mass-casualty event.

METHODS

Review of the Web site of the National Center for Education Statistics (NCES) of the US Department of Education (http://nces.ed.gov) demonstrated that there were ~14 000 public school districts in the United States in 2004. Public school district addresses were downloaded from the NCES Web site in January 2004. A survey that focused on school preparedness for mass casualty was developed and piloted using a sample of Arkansas school districts in 2003. The survey was revised and mailed to the superintendents of a random sample of public school districts in the United States from the NCES list. Vocational-technical, alternative, and special education school districts were excluded. Using a random-number generator, a random sample of 3670 school districts (26% of total) were selected. Each survey document had 23 questions and was labeled with the name of the school district. The survey was mailed to the superintendent of the sampled school districts in January 2004. A second mailing was sent to nonresponders in May 2004. The results of all questions are reported in this article except for a question that asked the superintendent whether he or she would like a copy of the results and a model plan. The purpose of the study was described to the school superintendents in the cover letter that accompanied the survey. In addition, the cover letter assured the superintendents that no individual responses would be released and that only aggregate data would be published. The study protocol was approved by the University of Arkansas for Medical Sciences Institutional Review Board and deemed exempt from formal informed consent.

Survey data along with information about the locations of the districts relative to a metropolitan statistical area (MSA) available from the NCES were entered into an Excel (Microsoft Corp, Redmond, WA) spreadsheet. Statistical analysis was performed by using SPSS 12.0 (SPSS, Chicago, IL). Descriptive summary statistics were used to characterize the responses to survey questions. The χ^2 test was used to compare urban and rural district preparedness.

RESULTS

Responses were received from 2148 districts; 11 surveys indicated that the superintendent refused to complete the survey. Therefore, there were 2137 usable responses (response rate: 58.2%).

Prevention

Table 1 lists the survey items that focused on mass-casualty prevention. The majority (57.2%) of school districts reported that they have a written plan for the prevention of a terrorist or mass-casualty incident, but a substantial minority (42.8%) reported having no written prevention plan. Most (66.2%) school districts reported that they do not use any form of student identification (badges, cards, or other). Almost half (48.5%) of school districts reported that they do not use any form of teacher or staff identification. Most (71.9%) school districts do not use any form of vehicular access restriction (eg, fences, gates).

Preparedness for Mass-Casualty–Event Response

Several survey questions focused on preparedness for the response to a school mass-casualty event, summa-

TABLE 1 **School Mass-Casualty–Incident Prevention**

Question	Yes, *n* (%)	No, *n* (%)
Does your school district have a written plan for the prevention of a terrorist or mass-casualty incident at your facilities?	1222 (57.2)	915 (42.8)
Does your school have restricted vehicular access to school grounds?	600 (28.1)	1537 (71.9)
Does your school district have a parent reunification form or student release form (a form signed by the parent or guardian listing who can pick up the student in the event of an emergency)?	1788 (83.7)	349 (16.3)
Does your school district use some form of student identification card or badge?	723 (33.8)	1414 (66.2)
Does your school district use some form of teacher and staff identification card or badge?	1101 (51.5)	1036 (48.5)

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rized in Table 2. Almost all (95.6%) schools have a plan for the evacuation of the school if necessary. Superintendents were also asked how the school would be evacuated should it be necessary (Table 3). The preponderance (77.9%) of superintendents reported that their evacuation plan included specific provisions for children with special health care needs, such as children in wheelchairs or with other mobility problems. Although almost all schools reported having an evacuation plan, 30% of the superintendents reported that they had never conducted an evacuation drill. Most (92.4%) schools also reported having a plan for lockdown of the school (to prevent entrance or exit during an emergency situation). Superintendents were asked who was designated to decide whether an evacuation or lockdown would be implemented (Table 4).

Most (98.7%) school districts reported keeping a master list of students. Most (91.8%) schools reported keeping the student master list at individual schools, but fewer than half (42.5%) reported keeping such a list at an off-campus location, such as a school district office, where it might be accessed in case of emergency or destruction of the on-site offices. Most (83.3%) school districts reported that they have made arrangements for off-campus buildings to serve as emergency shelters in the event of evacuation. Superintendents were asked whether the school district informs parents where students would be evacuated in the event of an emergency; approximately half (53.5%) do so. Superintendents were asked whether they have a written policy for the release of students to parents or guardians after an emergency event; 75.1% reported having such a written plan. The majority (75%) of schools reported having a plan for subsequent in-school counseling or referral of troubled students after a mass-casualty or terrorist incident.

TABLE 2 **Mass-Casualty–Incident Response**

Question	Yes, *n* (%)	No, *n* (%)
Does your school district have a written plan for responding to a mass-casualty event (eg, a terrorist incident, a bombing, a shooting, or a biological organism release)?	1845 (86.3)	292 (13.7)
Are there written plans for the evacuation of your schools if it were necessary?	2044 (95.6)	93 (4.4)
If you have an evacuation plan for your district, have you conducted a drill?	1434 (70)	612 (30)
If you have an evacuation plan for your schools, does it include provisions for children with special health care needs (eg, children in wheelchairs or with other mobility problems)?	1654 (77.9)	469 (22.1)
Do you have a written plan for doing a "lockdown" of your schools (closing all entrances, preventing entrance or exit from the school) in the event of emergency?	1967 (92.4)	162 (7.6)
Is an updated master list of students kept in your schools?	2102 (98.7)	27 (1.3)
Do you have arrangements for back-up buildings to serve as emergency shelters in the event a school had to be evacuated?	1774 (83.3)	355 (16.7)
Do parents in your district know where students would be evacuated in the event of a terrorist incident?	1139 (53.5)	991 (48.5)
If there were a mass-casualty incident at your school, do you have a written plan or procedure for releasing students to their parents?	1601 (75.1)	530 (24.9)
If you have a written plan for a mass-casualty or terrorist incident, does it include plans for subsequent in-school counseling or referral of troubled students to mental health professionals?	1594 (75)	532 (25)

TABLE 3 **Method of Student Evacuation**

If You Have a Written Evacuation Plan, How Would Students Be Evacuated?	No. of Districts Using Method (%)
On foot	1501 (70.2)
By school bus	1326 (62)
By parents	384 (18)
Other methods	94 (4.4)

Superintendents could choose >1 answer.

TABLE 4 **Decision for Evacuation or Lockdown**

If You Have a Plan for Evacuation or Lockdown, Who Would Decide When Such a Procedure Would Be Implemented?	No. of Districts (%)
Superintendent of schools	1205 (56.6)
Principal of individual schools	1486 (69.8)
Local law enforcement or EMS	394 (18.5)
Other person or agency	87 (4.1)

Superintendents could choose >1 answer.

Coordination With Local Emergency Agencies

Several survey questions focused on planning for coordinated emergency response with local emergency agencies. Superintendents were asked whether any school officials had met with local law enforcement to discuss preparedness for a terrorist or mass-casualty event. Although the majority (53.1%) reported having met with local law enforcement once or twice, more than one quarter (27.1%) reported never having met with local law enforcement to discuss emergency planning. Only 19.9% reported holding regularly scheduled meetings with local law enforcement to discuss emergency planning. Most (78.3%) school districts have provided copies of floor plans to local emergency agencies. Superintendents were asked whether any school officials had met with local emergency medical services (EMS; ambulance) officials to discuss planning for the response to a terrorist or mass-casualty event. Almost half (42.8%) of the superintendents reported that they had never met with local EMS officials to discuss response to a terrorist

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or mass-casualty event at the school. A number (42.7%) of superintendents reported that they had met once or twice with local EMS officials, and 14.5% reported holding regularly scheduled meetings for disaster planning purposes.

Preparedness by Urban Versus Rural Setting

Data from the NCES Web site indicated whether the district was located within an MSA. Responses were fairly evenly distributed between the MSA (urban/suburban) and non-MSA (rural) areas: 1022 (48%) of the survey responses came from MSA school districts, and 1115 (52%) came from districts outside an MSA (rural). There was no statistically significant difference in the proportions of responders and nonresponders in the urban versus rural settings. Certain preparedness responses were compared to determine whether urban/suburban (within an MSA) or rural (outside an MSA) schools were more or less prepared. These results are summarized in Fig 1. In essentially all prevention and response parameters, urban/suburban school districts were better prepared than rural school districts.

DISCUSSION

As places where children gather on a daily basis, the importance of school health long has been recognized.[18,19] For example, as early as 1829, William A. Alcott recognized the importance of safe and sound school buildings in his publication *Construction of School Houses*.[19] Initially, school health efforts were focused primarily on hygiene; however, in recent decades, the concept of school health has broadened to include school-based clinics, health screening, mental health treatment, and wellness promotion activities.[20–24] The need for school emergency planning was also recognized long ago,[3–6] but until recently, most efforts were aimed at preparation for natural disaster events (eg, fires, tornadoes, earthquakes).[3,4,7] With a series of widely publicized school shootings in the late 1990s, attention was directed to the need for school emergency planning and the importance of coordinated disaster response to a school-based mass-casualty incident.[8–14,25,26] The terrorist events of the past 4 years (September 11, the anthrax mailings, and the Beslan school occupation) have raised even more serious and complex preparation issues for schools that were not previously anticipated or even imagined. Thus, those who are responsible for school health must not only consider hygiene, infection control issues, and general health promotion but also the possibility of a terrorist or mass-casualty event in their school health planning.

School disaster planning is important for a number of reasons. First, schools are places of frequent mass gathering. An estimated 53 million children in the United States attend public or private schools each day.[27] As mass gathering places, schools are prone to mass injury in a natural disaster and unfortunately may serve as a terrorist target. The massacre at the school in Beslan, Russia, demonstrated the vulnerability of schools to terrorism. In addition, schools have special and distinct disaster planning needs because of the unique needs of children in a disaster.[27] Children are more vulnerable in a disaster or terror situation than adults for several reasons. Children have increased susceptibility to chemical agents that are absorbed through skin or via inhalation, increased propensity to dehydration or shock from bio-

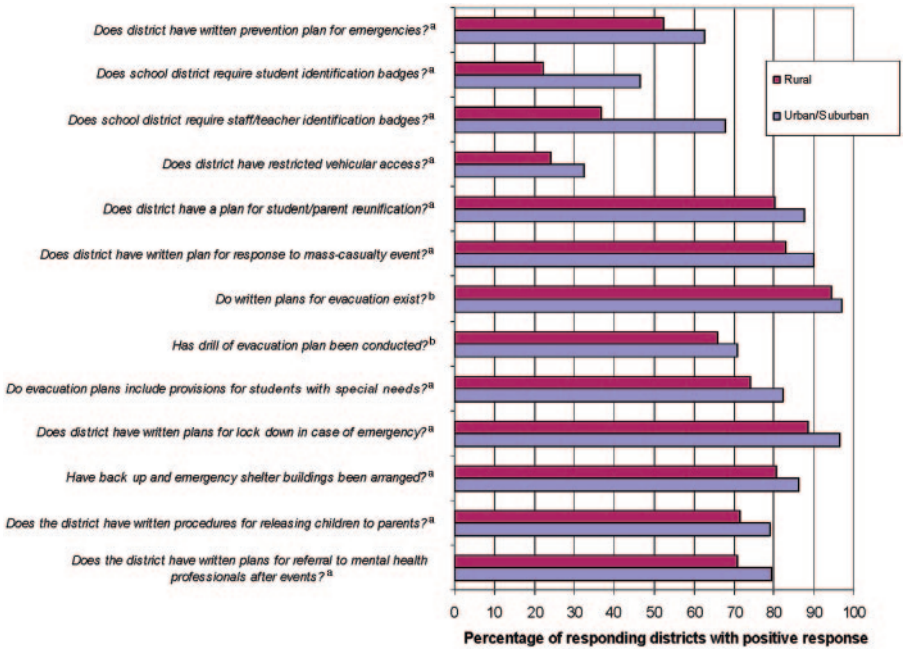

FIGURE 1
Mass-casualty preparedness for rural and urban school districts: United States, 2004. [a] Significant, $P < .05$. [b] Not significant, $P > .05$.

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logical agents, differing medications and/or doses of antibiotics or toxin antidotes than adults, increased susceptibility to radiation exposure, and unique psychological vulnerability.[28] Disaster planning also must take into account the important *in loco parentis* role of schools. This guardianship role requires special means to provide for students' care as well as procedures to release children correctly to their family members in a crisis situation.

School health officials certainly cannot prevent most natural disasters. Manmade disasters, such as terrorist or violent events, also may not be completely preventable. However, schools can take certain steps that may prevent or at least ameliorate such an event. In the current survey, almost half (42.8%) of the school superintendents reported that they do not have a prevention plan for a terrorist or mass-casualty event. Physical security of schools can be improved through several measures. For example, access control is important in building security. Because many schools were initially designed with fire safety in mind (with multiple exterior exits for use in egress), schools often have multiple entry points for unauthorized people. The use of a panic-bar system (locked from the outside but opened by pressing a panic bar that activates an alarm when opened on the inside) on exterior doors can provide a means to prevent unauthorized entry and still provide safe exit in case of fire or evacuation.[29] Vehicular access to school grounds is also an important access control issue. In the present study, most school districts do not use any sort of vehicular access restriction. Some school districts use vehicle identification permits or stickers. Others have suggested the use of physical barriers, such as fences, gates, or other structural barriers, to prevent unauthorized vehicles on the school campus.[30] The average school building in use today is 40 years old, and structural security considerations were not as widely used in older school buildings as they would be in school structures that are built today.[31] Other structural design elements that may enhance security include lighting, landscaping that allows easy surveillance, closed-circuit television monitoring, 2-way communication systems, and panic buttons.[31] Making such structural changes can be expensive, and the cost for making structural changes to improve security may be a limiting factor as school superintendents try to balance security concerns with direct educational expenses within a limited budget.

The use of identification badges has been suggested as a means of rapidly identifying those who are not authorized to be on school grounds.[29,31] In the current study, most (66.2%) school districts reported that they do not use student identification badges, and only half of schools use teacher and staff identification badges. Identification badges are used extensively in hospitals[32] and other security-sensitive settings to identify those who are present properly in a facility. Compared with other security measures, such as structural changes, identification badges are relatively inexpensive. Because of the difficulties associated with getting children to wear identification badges, identification badge use in a school can be problematic and may require regular and consistent enforcement.[29]

Even if school districts cannot prevent many mass-casualty events, all school districts and school health officials can plan for a well-coordinated disaster response. In this study, the vast majority of schools have a written plan for response to a mass-casualty event, but, surprising, 13.7% reported that they do not have such a written plan. Previous community-based planning is essential to well-coordinated response to any mass-casualty event, particularly with the special considerations associated with schools. For example, Columbine High School in Littleton, Colorado, did not have a crisis plan before the mass shootings that occurred there on April 20, 1999.[33] The Governor's Columbine Review Commission report noted that the special weapons and tactics teams that responded to the Columbine massacre had never considered a school-based scenario in their planning and drills as they believed it to be "too far fetched to serve as a realistic training scenario."[33] The report also describes major coordination problems that could not be resolved in the midst of crisis. For example, the teams that entered the high school had little knowledge of the building layout, and some officers depended on hastily drawn sketches that were done on the scene. In addition, the school fire alarm system was not turned off until 6 hours after the event; the noise was cited as 1 of the problems in radio communication among those who responded to the school. The Review Commission report recommended that each school develop a crisis plan that is well coordinated with local law enforcement and emergency response agencies.[33] The events at Columbine High School demonstrated the need for well-coordinated, multiagency emergency and crisis planning involving schools.

School emergency plans should include provisions for both evacuation and lockdown of the school building. In some emergencies, such as fires, bomb threats, or the finding of a suspicious package, evacuation of the school may be warranted. In other situations, such as an external threat, lockdown may be appropriate. Our results show that although most school districts reported having plans for evacuation and lockdown of the school, nearly one third reported that they had never conducted an evacuation drill. In addition, nearly one quarter of the schools reported that there were no special provisions for children with special health care needs in their evacuation plan. Conducting periodic drills is an important part of any emergency plan. School emergency/disaster/mass-casualty drills have been recommended broadly by several experts.[27,28,34]

Designation of emergency shelters is another important aspect of preparedness. Most superintendents in this

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study reported that they have designated specific buildings to serve as emergency shelters in the event of evacuation. Approximately half of the superintendents reported that the parents in the district had been told where these emergency shelters were located. Announcing in advance where students would be taken in the event of emergency evacuation is controversial, as some believe that the students would be safer if the location of evacuation shelters was not publicly known. Also, little attention has been given to the possibility of quarantine or sheltering-in-place in the event of a biological hazard in many school emergency plans. Schools and the local emergency care system should have the ability to care for students and school staff for up to 72 hours in a quarantine situation.[27]

In the event of an emergency, correctly identifying and releasing children to their parents, guardian, or family is a critical role of school officials. A parent reunification or student release form is used by some districts to allow the parent to indicate who may pick up the child in the event of an emergency. If a district does use such a form, then getting those forms to emergency shelters and designating who will be responsible for releasing children to their parents are important. In this study, most school districts indicated that they have a written plan for release of students to parents or guardians in the event of a mass-casualty incident, although almost one quarter have no such written release plan. Although almost all schools reported keeping a master list of students for use in an emergency situation, fewer than half reported keeping a copy of the list in an off-campus location for access in case school facilities were destroyed.

A well-coordinated response among local emergency agencies is imperative in a school mass-casualty event. Of concern, we found that only one fifth of superintendents reported holding regular meetings with local law enforcement officials to discuss preparedness for a terrorist or mass-casualty event. In fact, more than one quarter of respondents reported that they had never met with local law enforcement to discuss such plans.

Good coordination with local EMS agencies is important in emergencies because of the limited training and experience of school personnel in handling medical emergencies.[7,15,35] For example, 1 survey showed that one quarter of schools never have a school nurse on the premises.[15] In 1 informal survey, typical community emergency departments did not have any formal relationship with the local school system.[7] We found that only 14.5% of superintendents reported conducting regularly scheduled meetings with local EMS officials for emergency response planning purposes, and nearly half reported that they have never met with local EMS officials. In some locales, community disaster management is coordinated by either designated emergency management officials (ie, an office of emergency management) or local public health officials. In communities in which there are designated emergency management officials, they should be involved with school officials in preparing response plans. In addition, public health officials play an important role in a variety of disaster planning activities, such as bioterrorism preparedness, and should likewise be involved in school emergency planning. This survey did not ask superintendents whether they had met with either emergency management or public health officials.

Meeting the emotional and psychosocial needs of children after a mass-casualty or terrorist event can be a major challenge for a school district and community. In addition, school staff members may be in need of psychological support or mental health care after a school disaster. A disaster or mass-casualty incident can have significant psychological effects on children, including anxiety, feelings of loss of control, depression, sleep disturbance, developmental regression, and symptoms of posttraumatic stress disorder.[36,37] Provision of appropriate counseling and referral is important in the return toward normalcy for some children after a disaster. In the present study, 75% of the superintendents surveyed reported that their plan included provision for either in-school counseling or referral of troubled students to local mental health professionals. However, this survey did not expand further on such plans. Plans that specify only sending the troubled child to an emergency department or a local mental health center may not provide adequately for the child's mental health needs in such a situation. The capacity of the school health and community mental health system to address psychosocial needs of children after disaster is an area of preparedness that requires additional study.

In almost all prevention and preparedness parameters, schools districts that are located within an MSA were better prepared than those that are located outside an MSA. The factors underlying these differences are not clear but may relate to differences in perceived vulnerability to a terrorist event or in a difference in availability of funding sources for preparedness activities between urban and rural schools. Certainly, rural schools are at risk for both natural and manmade disasters. Increased attention should be given to rural schools in emergency/disaster planning efforts.

This study is limited by factors that are inherent in survey research. Questions may be interpreted by the respondent in a manner that differs from that intended. For example, the question about plans for response to a mass-casualty event might be answered "yes" if a school has only a bomb threat plan but no plans for other events. Likewise, the survey question about having a plan for referral of students for counseling might have been answered "yes" if there were only a plan for referral to a community mental health center (which might not actually be prepared or able to care for a mass influx

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of troubled children). Therefore, this survey may overestimate the actual state of preparedness. In addition, superintendents who have an interest in crisis management or who have done more preparedness activities might have been more likely to respond; again this effect would tend to make these results overestimate the actual level of preparedness. Although the cover letter with the survey assured individual survey confidentiality, some superintendents might not have responded because of liability or security concerns. In fact, 11 surveys were returned with an indication that the superintendent would not complete the survey because of security concerns. Liability concerns or social desirability bias might have influenced survey responses among the responders even with the assurance of confidentiality. There is only limited information on the nonresponders in the study. No statistically significant difference was found in urban versus rural setting between responders and nonresponders in the study sample. It is not clear whether those districts would be better or less prepared than the responders.

CONCLUSIONS

The concept of school health now must be broadened to include preparedness for a mass-casualty event. This study demonstrates that there are several important preparedness deficiencies in school disaster plans in the United States. Although most schools have a written response plan, almost half do not have a prevention plan. Within existing school plans, there are several important deficits, including coordination with local law enforcement and EMS, the care of children with special health care needs, parental reunification planning, planning for postdisaster counseling, and the performance of regular school emergency drills. Rural schools are less prepared than urban schools for mass-casualty events. Particular attention should be directed to improving the emergency preparedness of rural school districts. Good disaster response planning requires broad involvement of several community groups. Pediatricians, local school officials, school nurses, school physicians, local public health officials, and local emergency officials should work together to improve the preparedness of schools for the unwelcome possibility of a mass-casualty event.

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