

Medical Care for a Mass Gathering: The Suwa Onbashira Festival

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Abbreviations:

AED = automated external defibrillator
EMS = emergency medical services
MUR = medical usage rate
PPTT = patients per 10,000

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Abstract

Introduction: The Suwa Onbashira Festival is held every six years and draws approximately one million spectators from across Japan. Men ride the Onbashira pillars (logs) down steep slopes. At each festival, several people are crushed under the heavy log. During the 2004 festival, for the first time, a medical care system that coordinated a medical team, an emergency medical service, related agencies, and local hospitals was constructed.

Objective: The aims of this study were to characterize the spectrum of injuries and illness and to evaluate the medical care system of this festival.

Methods: The festival was held 02 April–10 May 2004. The medical records of all of the patients who presented to an on-site medical tent or who were treated at the scene and transported to hospitals over a 12-day period were reviewed. The following items were evaluated: (1) the emergency medical system at the festival; (2) the environmental circumstances; and (3) patient data.

Results: All medical usage rates are reported as patients per 10,000 attendees (PPTT). A total 1.8 million spectators attended the festival during the 12-day study period; a total of 237 patients presented to the medical tent (1.32 PPTT), and 63 (27%) were transferred to hospitals (0.35 PPTT). Of the total, 135 (57%) suffered from trauma—two were severely injured with pelvic and cervical spine fractures; and 102 (43%) had medical problems including heat-related illness.

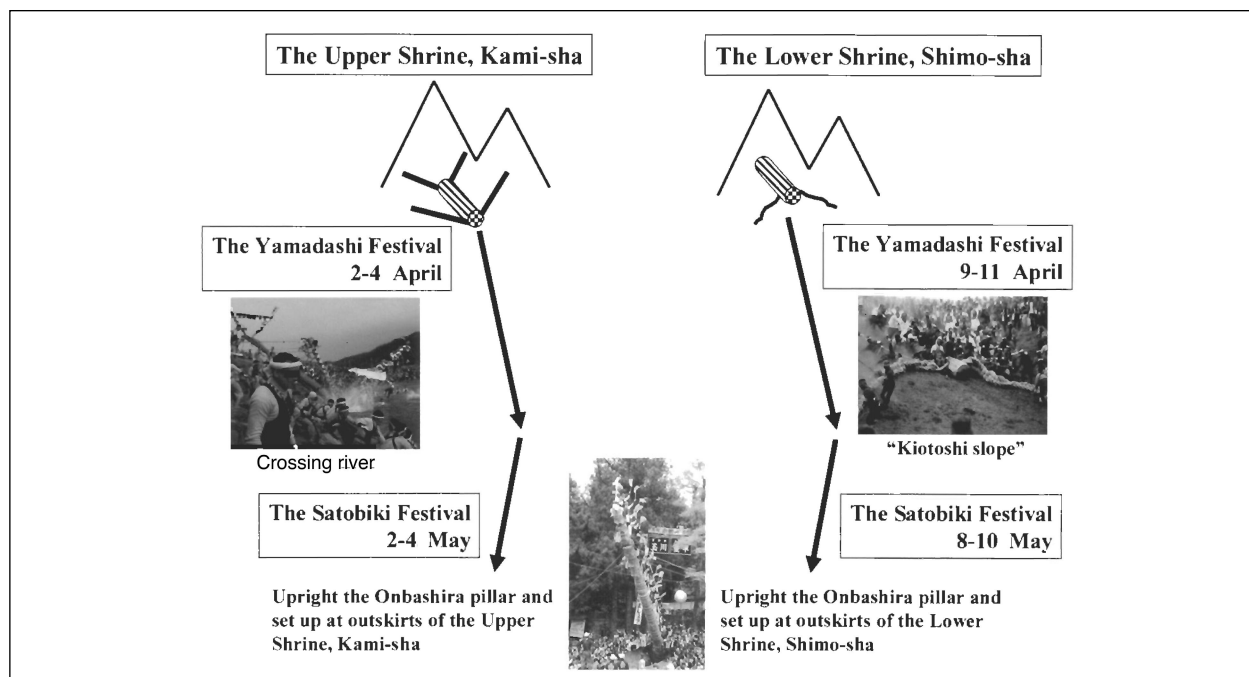
Conclusions: Comprehensive medical care is essential for similar mass gatherings. The appropriate triage of patients can lead to efficient medical coverage.

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Introduction

For >1,200 years, the Suwa Onbashira Festival has been held once every six years at the Suwa Grand Shrines in Suwa City, Nagano, Japan. The basic purpose of this festival is rooted in Shinto, the indigenous religion of Japan. In the Shinto tradition and belief system, gods live in the natural environment that surrounds human beings. Large fir trees, called “Onbashira logs” that represent symbolic gods, are brought down from the mountains, carried into town, and displayed outside of the Suwa Grand Shrines, which include the Upper Shrine (Kami-sha) and the Lower Shrine (Shimo-sha).^{1,2}

The two-part festival occurs over a two-month period. The first and most famous phase is the Yamadashi Festival. During this festival, huge fir trees, about 17 meters in length, one meter thick, and weighing up to 13 tons are carried down from the mountain. During the Yamadashi Festival of the Upper Shrine (02–04 April), the logs are dragged in and across a river, with people holding on to large V-shaped wooden pegs five meters long. Often, during this feat, people are sent flying into the water that still is cold from the recently melted snow. During the Yamadashi phase at the Lower Shrine (09–11 April), young men ride the Onbashira logs down a slope with an incline of a maximum 40 degrees over a distance of 100 meters—this part of the festival is the most dangerous. During each festival, several people have



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Figure 1—Outline of all the festivals and their relationships. The Onbashira pillars are dragged in and across a river, a highlight of Yamadashi Festival of the Upper Shrine, Kami-sha. Whereas Onbashira pillars slide down a steep slope, “the Kiotoshi slope” in the case of the Lower Shrine, Shimo-sha. About one month later, the Satobiki Festival takes place. Finally, the pillars are set-up at outskirts of each shrines with men still riding them.

been injured or killed from being crushed underneath the heavy logs. Due to a lack of data, the specific details of these injuries or deaths are unknown. The logs are rested for a month until the second phase, the Satobiki Festival (02–04 May for the Upper Shrine and 08–10 May for the Lower Shrine), when they are taken to the respective shrine precincts in colorful parades. Finally, they are raised to the vertical position with men holding on to ropes tied around the pillar. A large number of people come from all over Japan to attend this festival. An outline of the festivals appears in Figure 1.

For the first time at the 2004 festival, an emergency medical care system was constructed. It coordinated a medical team, emergency medical services (EMS), and police and related agencies.

Methods

The most recent Onbashira Festival was held 02 April–10 May 2004. The total number of spectators was about 1.8 million during a period of 12 days. The following items were evaluated at both the Upper and the Lower Shrines: (1) emergency medical care; (2) the environmental circumstances; and (3) patient data. Data were collected using patient report forms that were completed by the patients and staff. This data included the date, location, patient name, contact information (address and telephone number), birth date, gender, age, and narrative text for the chief medical complaint, diagnosis, and treatment. However, no record was kept for patients who were treated in a first-aid tent at another hospital for the Upper Shrine.

Results

The Upper Shrine, Kami-sha

The Yamadashi Festival (02–04 April, Friday–Sunday)—The Suwa Red Cross Hospital and Suwa Central Hospital in Chino City each constructed a first-aid tent. One doctor, two nurses, and one administrator staffed the Suwa Red Cross Hospital first-aid station with an ambulance on stand-by. During the festivals, the weather changed drastically, being rainy on the first day, sunny the second, and an unseasonable snowfall during the third. The temperature also varied; the third day was quite chilly, with a maximum temperature of 3.6°C (38.5°F) and a minimum temperature of 1.0°C (33.8°F). A total of 460,000 spectators attended the event. Nineteen patients (0.41 patients per 10,000 spectators (PPTT)) were treated during these three days. One severely injured patient experienced a pelvic fracture from falling from one of the V-shaped pegs (Table 1).

The Satobiki Festival (02–04 May, Sunday–Tuesday)—The Suwa Red Cross Hospital established a first-aid station with the same staff formation during the Yamadashi Phase. During these three days, the weather was cloudy, and 390,000 attended the festival. A total of 25 patients (0.64 PPTT) presented to the first-aid station. Four people were transported to the hospital: two for disturbances of consciousness, one for alcohol-related problems, and one experiencing acute abdominal problems (Table 1).

The Lower Shrine, Shimo-sha

The Yamadashi Festival (09–11 April, Friday–Sunday)—During the Yamadashi Festivals, an organized medical care system involving six nearby hospitals was constructed. Two

Date	The Yamadashi Festival			The Satobiki Festival		
	02 April (Friday)	03 April (Saturday)	04 April (Sunday)	02 May (Sunday)	03 May (Monday)	04 May (Tuesday)
Weather	rainy	sunny	rainy-snowy	cloudy	cloudy	cloudy
Spectators	50,000	310,000	100,000	68,000	250,000	95,000
Traumatic injuries	0	8	5	1	8	3
basic-level	0	6	4	1	8	3
advanced-level	0	2	0	0	0	0
life-threatening level	0	0	1	0	0	0
Medical Problems	0	3	3	2	4	7
basic-level	0	2	3	2	2	5
advanced-level	0	1	0	0	2	2
Total	0	11	8	3	12	10
Transported patients	0	9	4	0	2	2

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Table 1—Results of the Upper Shrine, Kami-sha

Date	The Yamadashi Festival			The Satobiki Festival		
	09 April (Friday)	10 April (Saturday)	11 April (Sunday)	08 May (Saturday)	09 May (Sunday)	10 May (Monday)
Weather	sunny	cloudy	cloudy	sunny	rainy	rainy
Spectators	58,000	260,000	300,000	120,000	225,000	45,000
Traumatic injuries	27	32	33	15	2	1
basic-level	24	28	28	14	1	1
advanced-level	3	4	4	1	1	0
life-threatening level	0	0	1	0	0	0
Medical Problems	10	27	17	15	5	9
basic-level	9	23	16	14	5	9
advanced-level	1	4	1	1	0	0
Total	37	59	50	30	7	10
Transported patients	9	18	9	6	3	1

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Table 2—Results of the Lower Shrine, Shimo-sha

first-aid stations were established in order to accommodate ambulance movement; one just under the Kiotoshi-slope and the other near the gate, located 400 meters from the Kiotoshi-slope. Each station was staffed by two doctors, three nurses, one emergency crew, and one medical technician. Each was equipped with a first-aid kit, a ventilator, a backboard, and an automated external defibrillator (AED). Three ambulances that could be used to transport patients were on stand-by. One bus was prepared for use in case of disasters and/or mass casualties. Approximately 50 Red Cross volunteers and a group of medical students were present to assist with the transport of patients and during emergencies. The weather was mild, with temperatures of 17–21°C (63–70°F). Approximately 618,000 spectators attended. A total of 146 patients were treated during the three-day period (2.36 PPTT). Ninety-two patients presented with traumatic injuries (63%), and 54 patients had medical problems (37%). Thirty-six patients (0.58 PPTT) were transported to a hospital; 18 cases were categorized as requiring advanced-level care, and 12 suffered from traumatic injuries, including extremity fractures and abrasions. Six patients presented with medical illnesses (three with dehydration, two experiencing chest pain, and one with asthma). The remaining 18 patients were classified into basic-level care categories, including headache, heat-related complaints, and lower back pain (Table 2).

A 62-year-old man (suspicion of cervical spine dislocation), classified as life threatening, was transported to the Suwa Red Cross Hospital with full spinal immobilization. His final diagnosis was an anterior fracture-dislocation of C4, and an anterior-posterior fusion was performed two days after admission.

The Satobiki Festival (08–10 May Saturday–Monday)—The weather was fair on the first day of the final part of the festival (23°C, 73°F), but on the latter two days, it rained and the temperature dropped to 14°C (57°F). About 390,000 persons attended, and 47 patients were treated during the three-day period (1.21 PPTT). Thirty patients (64%) presented the first day. All were mild cases, except for two (one abdominal contusion and one acute alcohol poisoning), who were transported to a hospital. Of the mild cases, most suffered from abrasions, while others experienced medical problems caused by heat or alcohol. During the remaining two days of the festival, 17 patients presented to the first-aid station: three with injuries (abrasion, fractured leg, sticking finger with a toothpick), nine had heat-related complaints caused by standing in the crowd for a long time, two were alcohol-related, and three had other complaints (abdominal pain, asthma, arrhythmia).

Discussion

Mass-gathering organizers must develop suitable plans for the provision of medical care.³ For the 2004 Onbashira Festival of the Lower Shrine, a comprehensive medical care system was constructed, the first such provision in the 1,200 year history of the event. This festival has had a tendency to exclude medical personnel due to a superstition that outsiders, such as medical staff, corrupted the Onbashira pillar, the “god”. But the Organizing Committee

recognized the need for the provision of appropriate medical care for this large-scale event and requested aid from the local hospitals and EMS agencies. However, an over-dependence on the local EMS system could result in an inability of the system to respond to routine calls, which may deprive the local community of the care it needs. Thus, not overloading the local EMS and hospital system also is an important consideration in determining the degree of on-site care.^{4,5} Physicians from six surrounding hospitals were enrolled in shifts every day, and three ambulances and crews each were supplied from three nearby areas.

On the other hand, in spite of all the efforts to persuade otherwise, the organizer of the Upper Shrine Festival refused to allow a comprehensive medical care system to be created. The Onbashira parade route of the Upper Shrine extends over two cities, which may be one of the reasons for the refusal. The route made it inevitable that the two hospitals needed to establish individual first-aid stations.

The use of family practitioners and medical students to provide care at mass gatherings is not a new concept. Local residents have exceptional experience and can gain an understanding of mass-gathering medical care.⁶ During this festival, Red Cross volunteer groups with first-aid training and several medical students played important roles.

Specific mass gatherings, including air shows, boat races, and automobile races, carry high risks for producing major traumatic injuries.^{7–10} The Onbashira Festival is no exception; every time it occurs, several participants are injured severely. Indeed, one participant died under the Onbashira pillar during the previous festival. Thus, it is essential that physicians are on-site for such events. In 2004, two participants were injured severely (pelvic fracture and cervical dislocation). Both cases were treated by a physician on-site and then transported (with full spinal immobilization) to an emergency hospital. This attendance of doctors was meaningful because of the current restrictions related to emergency medical technicians in Japan. Emergency medical technicians are approved to perform orotracheal intubation and inject epinephrine only for cardiopulmonary arrest cases.

It also has been noted that on-site physicians reduce the number of ambulance transports.^{11,12} During these festivals, a total of 63 of 237 patients (0.35 PPTT) were transferred to hospitals, a transportation rate of 27%. For the three days of the Yamadashi Festival at the Lower Shrine, 36 patients were transported (25%; 36/146). This was lower than the last festival (54% (33/61)).

Many patients came to the first-aid station immediately after falling off of the Onbashira log. Most of them presented with minor injuries and complaints. It is important to note that frequently, physicians were absent from the first-aid station or had gone to the hospital with a patient, and thus, were unable to dispense on-site medical care. Nurses could not maintain the station for the entire time. To overcome this problem, a potential strategy would be to develop protocols for use by technicians and nurses to treat and release patients under close medical supervision.

Important variables that can affect the levels and types of medical needs include: (1) weather, including maximum daily temperature and humidity; (2) event type and duration; (3) the respective ages of the attendees; (4) crowd mood

and density; (5) number of attendees; and (6) alcohol and drug use.^{13,14} Weather greatly influences casualty rates; hot and humid conditions produce high numbers of casualties.^{4,15} Cold weather produces a different range of casualty types, and generally, the casualty rate is lower.¹⁶ Recent literature suggests that the medical usage rate (MUR) at events held when the temperature was 20°C (68°F) is significantly lower than that at events conducted at temperatures <27°C (80°F).¹⁷ A consequence of bad weather is that it reduces spectator numbers, especially for outdoor events like this festival. At the Upper Shrine, the MUR when the weather was sunny was higher than that during cloudy or rainy days (4.44 vs. 1.62 PPTT).

Alcohol use by spectators also was an important factor in determining the casualty load.¹⁵ Forbidding spectators to use alcohol is impossible during this festival. However, the riders who sit astride the Onbashira log and go down the slope are strictly prohibited from drinking alcohol.

Two major types of care that must be offered at a mass gatherings: (1) emergency care; and (2) non-emergent treatment of minor complaints.¹⁸ Equipment should include a defibrillator, advanced airway supplies, immobilization devices, and cardiovascular and pulmonary drugs. Though true medical emergencies are infrequent at mass

gatherings, the system must be capable of providing rapid response and intervention when such a situation arises.^{19,20} This rapid response may be enhanced with the use of AEDs.^{4,21} One AED was placed in each first-aid station at the festival, but none of them were used.

The financial costs of providing medical care have been discussed; two reports suggest that event sponsors ultimately are responsible for the costs.^{18,22} However, in smaller, more locally oriented events, the local EMS agency, hospitals, or Red Cross frequently may be tasked with providing care. Since these entities usually rely heavily on volunteers, personnel costs can be kept to a minimum. In the event discussed here, each hospital individually provided all the necessary medical preparations. The event sponsor provided lunches for the medical volunteers and staff.

Conclusions

The 2004 Onbashira Festival ended without any serious incidents, thanks to the comprehensive emergency medical care system. The adequate medical coverage of the crowd and participants required planning, equipment, and personnel suited to the task. Based on these experiences, better efforts to enhance medical services for future disaster and mass-casualty incidents can be developed.

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