

Injury, Violence, and Risk among Participants in a Mass Gathering of the Rainbow Family of Living Light

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Abstract: The Rainbow Family of Living Light (RFL), a large communal group with no centralized authority, has held an annual gathering on U.S. federal land for the past 34 years. In 2005, RFL held its annual gathering in the Monongahela National Forest in West Virginia. Surveillance for injuries was established at nearby emergency departments and participants were asked to complete a health and risk assessment.

We found that the majority of injuries resulted from outdoor activities and were not associated with violence. Assessments indicate that this is a medically underserved population and that participants would benefit from preventive and crisis services. We recommend early collaborative planning with RFL members to reduce the potential for burden on local emergency departments and to meet the health care needs of this group. Future host communities should consider providing minor care, health screening, and information or referral services near the main gathering site.

Key words: Violence, risk, underserved, substance use.

The findings and conclusions in this report are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

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The Rainbow Family of Living Light (RFL) is a large communal group with no centralized authority or spokesperson. For approximately two weeks each summer the RFL holds a national gathering on U.S. federal land, attracting participants from across North America. The annual gathering is held around July 4 at a different site each year, with the exact location of the gathering being announced on RFL-focused websites, discussion boards, and list serves in early June. The Centers for Disease Control and Prevention (CDC) has previously investigated a Shigellosis outbreak and conducted injury and illness surveillance at RFL gatherings.^{1,2} In 1999, the CDC conducted hospital-based surveillance in a 75-mile radius of the RFL gathering, reporting 115 hospital admissions from among the estimated 20,000 participants.¹

The 2005 gathering took place in the Cranberry Glade section of the Monongahela National Forest in West Virginia with an estimated 10,000 participants.³ Due to reports of disruptive and violent behavior at previous gatherings and from communities near the gathering location, the West Virginia Department of Health and Human Resources (WVDHHR) requested federal assistance to establish an injury surveillance system and to perform needs and risk assessment among participants at the meeting site.

An extensive review of previous studies of health care at mass gatherings identified several factors that influence medical care delivery and utilization that can be grouped into psychosocial, biomedical, and environmental domains.^{4,5} These studies have concluded that characteristics such as weather, the availability and expected use of alcohol and drugs, crowd density and attendance, event duration, event type, and crowd mood be considered when evaluating or planning for medical care at mass gatherings. While previous studies have documented important RFL event characteristics,^{1,2} these efforts have not collected information about participants' psychosocial and biomedical history such as risk behaviors, medical illness, and willingness to use health and social services. Because the RFL gathering occurs each year, information on the needs and characteristics of this group can help guide planning and service delivery at future gatherings.

This assessment had two main objectives. The first objective was to conduct surveillance for illness and injury at the RFL gathering using a triangulated method incorporating formal record reviews, semi-formal participant interviews, and informal observation of on-site medical care. The second objective was to advance understanding of individual psychosocial and biomedical characteristics that could affect health care needs at future RFL gatherings.

Methods

Data for this assessment were obtained from informal interviews with health care providers affiliated with the RFL, collectively known as the Center for Alternative Living Medicine (CALM), emergency department and emergency medical service records, and self-administered questionnaires distributed to a convenience sample of RFL participants during the annual gathering.

Members of CALM have previously agreed to participate in public health efforts, but have declined to keep records or to allow external recording of patient visits.¹ Surveillance during the 2005 gathering included informal interviews with CALM providers

(primarily emergency medical technicians, herbalists, and homeopaths) and daily visits to CALM treatment areas. During the 2005 gathering, CALM providers in treatment areas (primarily tents) were interviewed about commonly presenting conditions and their perception of health-related problems that could affect large numbers of participants. Treatment areas set up by CALM were identified through maps published in the on-site RFLG guide and signs posted near treatment areas. These visits were informal, without written records, and are not presented as results from this assessment.

Surveillance was conducted at 5 hospitals within 80 miles of the main gathering site from June 15, 2005 through July 15, 2005. Hospital administration and emergency department (ED) staff were asked to identify all records for RFLG patients, keep a daily log of those visits, and report to WVDHHR by fax or telephone the following day. Beginning on July 5, 2005, WVDHHR and CDC staff visited each participating facility and abstracted information from identified records. Diagnosis codes (ICD-9) were assigned to each record using blind double-entry, resulting in an initial agreement for 74 (73%) of the cases. Cases without agreement were then reviewed by data abstractors and recoded, increasing the agreement rate to 98%; remaining discrepancies were then discussed and resolved. West Virginia's Office of Emergency Medical Services contacted emergency medical service (EMS) providers in the areas surrounding the gathering site to identify reports from incidents involving RFLG members. Copies of all EMS reports for RFLG patients were compared with hospital records to identify patients either treated on site or transported to local emergency departments participating in the surveillance effort.

To assess the prevalence of health problems and risk behaviors among participants aged 18–39 years, a 38-item questionnaire was administered to a convenience sample of RFLG participants who were available in camping areas. The Cranberry Glade gathering area did not include any permanent structure sleeping areas (i.e., lodges, cabins, hotels). To reach as many RFLG participants as possible, the main gathering and camping areas were divided into similarly sized units with interviewers covering 2 to 3 units each day. Due to the observed prevalence of substance use, interviewers were instructed to restrict data collection to participants who did not appear to be impaired and who agreed to the consent statement. Questionnaire topics included current residence, interpersonal violence, health care access, previous health problems, substance use, depression, sexual assault, and childhood exposure to violence; the questionnaire was written at a 6th grade reading level. When possible, individual questionnaire items were adapted from existing surveys such as the Youth Risk Behavior Survey and Behavioral Risk Factor Surveillance Survey.^{6,7} Questions were grouped into three broad time periods: at some point in the respondent's life, in past 30 days, and in the past 12 months.

The assessment process was reviewed by the CDC and determined to be a non-research public health activity. A consent statement was read to each participant and verbal consent was obtained prior to questionnaire administration. All participants were informed that this was a CDC-sponsored assessment of health and risk behaviors and that participation was voluntary. Respondents were given the option of completing the survey on their own or having it read to them. The RFLG's guiding council was also provided with a copy of the questionnaire and informed of the goals of the assessment before data collection began. Participation was limited to adults aged 18 and older.

Results

Staff at participating EDs identified 102 RFLI-related visits during the assessment period, for a transport-to-hospital rate (TTHR) of 1.02 (102/10,000*100). Of these, 66 (65%) were identified as RFLI participants and 5 (5%) were involved in an incident (e.g., motor vehicle crash) with a participant in the gathering; the specific nature of RFLI affiliation could not be determined for the remaining 31 (30%) records. The median age of patients was 26.5 years (range: 1–65 years); 68 (67%) were male, and 71 (70%) provided no insurance information. Twenty-eight (27%) people required hospital admission. Alcohol use was suspected or confirmed for 10 (10%) ED patients, drug use was suspected or confirmed for 13 (13%), and both alcohol and drug use was suspected or confirmed for an additional 6 (6%) patients. Sixty-five visits (64%) were for an illness and 37 (36%) for an injury. Among those seen for an injury, 27 (57%) were for an unintentional injury (e.g., fall or sprain), 9 (24%) for injuries resulting from a fight or an assault, and 3 (8%) for self-inflicted injuries; 4 (11%) were for injuries of undetermined origin. Table 1 shows the most frequent illnesses and injuries among RFLI-associated ED patients.

West Virginia's Office of Emergency Medical Services identified a total of 26 EMS records involving RFLI members. Among all RFLI participants seen by EMS, 77% (n=20) were transported to a participating ED. Reports from EMS for those not transported to a local ED included 2 patients seen for minor injuries resulting from an assault, 2 patients seen for injuries resulting from motor vehicle crashes, 1 patient seen for injuries resulting from a fall, and 1 elderly male who was found deceased in

Table 1.

MOST FREQUENT ILLNESSES/INJURIES TREATED IN EMERGENCY DEPARTMENTS WITHIN 80 MILES OF THE 2005 RFLI GATHERING

| | N (%) |
|--|-----------|
| Illnesses | 65 (64) |
| Body lice ^a | 9 (14) |
| Cellulitis/soft tissue disorders ^a | 8 (12) |
| Asthma/respiratory conditions ^a | 6 (9) |
| Injuries | 37 (36) |
| Face/trunk contusions ^b | 6 (16) |
| Back/lower extremity sprain or strain ^b | 5 (14) |
| Toe/foot injury ^b | 4 (11) |
| Total | 102 (100) |

^aPercentage of all illnesses.

^bPercentage of all injuries.

a private residence in a town near the main gathering location. (Information on the cause of death or the individual's affiliation with RFL was not available.)

The health and risk assessment questionnaire was completed by 64% of the 136 participants approached. Approximately 99% of participants completed the survey without having it read to them. The median age of respondents was 23 (range: 18–39 years); 43 (50%) were male, 71 (83%) lived in a home or apartment, and 29 (34%) were attending their first gathering. Seventeen (20%) had received treatment in an ED at least once in the preceding year and 13 (15%) had been told by a doctor or nurse that they had asthma. In the past 30 days, 68 (79%) had consumed at least one alcoholic beverage and 65 (76%) had used a so-called recreational drug. Fifteen (17%) participants had been in a physical fight and 7 (8%) had seriously considered suicide during the last 12 months. Thirty-eight (44%) participants reported either currently or previously taking medication for depression. Twenty-five (29%) respondents were forced to leave or ran away from home before age 18 and 11 (13%) were physically abused by a parent or guardian before the age of 10. Thirteen (15%) had been forced to have sexual intercourse at some earlier point in their lives; of these, 7 (54%) had run away/were forced away from home before age 18. Gender differences in risk behaviors and exposures were minimal (Table 2). A significantly greater proportion of males reported binge drinking in the last thirty days (60% vs. 38%, $p < .05$) and a greater proportion of women reported lifetime sexual victimization (30% vs. 2%, $p < .05$). Seventy-six (88%) of the participants said they would be willing to use preventive medical services and 72 (84%) said they would be willing to talk to someone about their problems if services were offered at a nearby location.

Discussion

Despite the low number of identified ED visits, the 2005 TTHR rate of 1.02 is almost twice the 1999 rate of 0.58. The comparatively high rate of 2005 ED admissions highlights the importance of considering the influence that a yearly change in venue can have on a mass gathering. Arbon's 2004 *Conceptual Model of Mass Gathering Health* notes that health care during mass gatherings is a product of the interaction of psychosocial, biomedical, and environmental domains.⁵ This assessment identified several characteristics of the RFL gathering that should be relatively consistent across venues, including use of alcohol or drugs, participant activity levels, risk behaviors, and nature of the event that can be used when planning for future RFL gatherings. However, other characteristics, such as average age, reason for attendance, existing health needs, and terrain will vary each year. Early contact with RFL and CALM is encouraged and should include discussions of biomedical characteristics that could affect service delivery. Agencies and facilities planning for RFL gatherings should also assess the meeting location to identify environmental factors that might impede effective response and service delivery.

As with any large gathering, local health system utilization by participants will continue to affect institutional resources (e.g., staffing, supplies, diagnostic tests); however, RFL activities may mitigate use of such resources. Examples of RFL activities that may have contributed to lowering the number of hospital visits include the clear iden-

Table 2.**NUMBER AND PERCENTAGE OF
2005 RFL PARTICIPANTS SAMPLED WHO REPORTED
RISK BEHAVIORS AND EXPOSURES, BY GENDER**

| | Total n (%) | Male n (%) | Female n (%) | p value^a |
|--|------------------------|-----------------------|-------------------------|----------------------------|
| Substance use (last 30 days) | | | | |
| Drank alcoholic beverages | 68 (79) ^b | 33 (77) | 33 (83) | .52 |
| Binge drinking (5 or more drinks in a row) | 40 (47) ^c | 24 (60) | 15 (38) | .04 |
| Used "recreational" drugs | 65 (76) ^b | 34 (81) | 29 (73) | .37 |
| Interpersonal and self-directed violence (last 12 months) | | | | |
| Been in a physical fight | 15 (17) ^c | 10 (24) | 4 (10) | .10 |
| Seriously considered suicide | 7 (8) | 2 (5) | 5 (13) | .21 |
| Risk exposures and behaviors (lifetime) | | | | |
| Physically abused before age 10 | 11 (13) | 5 (12) | 6 (15) | .71 |
| Forced/ran away from home | 25 (29) ^c | 11 (26) | 13 (33) | .49 |
| Told by a doctor or nurse they are depressed | 38 (44) ^c | 16 (38) | 21 (53) | .19 |
| Forced to have sexual intercourse | 13 (15) | 1 (2) | 12 (30) | .001 |

^aChi square analyses were used to test the significance of differences by gender when cell size ≥ 5 ; Fischer's Exact tests were used when cell size < 5 .

^bGender information missing for 2 respondents.

^cGender information missing for 1 respondent.

tification of safe drinking water and latrine areas, free distribution of prepared food at community kitchens, availability of medical care through CALM providers, self-policing by volunteers provided with on-site training in conflict resolution, and cooperation with state and local public health agencies. To enhance capacity for prevention and disease outbreak identification, community preparations for future gatherings should include interactions with CALM members and plans to continue monitoring visits to treatment areas.¹

It is reasonable to expect relatively few ED visits from RFL gathering participants for violence-related or life-threatening injuries. Many of the injuries identified during this assessment were associated with participation in camping and other outdoor activities and similar patterns of injury should be expected during other outdoor mass gatherings. The high percentage of uninsured RFL patients treated in local EDs suggests that gathering participants may lack access to regular sources of care and, like other medically underserved populations, they may seek treatment for minor or chronic conditions in local emergency departments.⁸ Adopting outreach programs developed

for non-traditional settings to provide routine care for common complaints (e.g., lice) may reduce unnecessary burden and unpaid costs for EDs.⁹

The annual gathering may also provide an opportunity to reach individuals with a history of illness or other experiences that can significantly affect health (e.g., asthma, sexual victimization, depression, substance abuse disorders, and homelessness).^{10–12} While the provision of extensive services or long-term care is not feasible in this setting, services such as basic health screenings, brief counseling, or referral to crisis centers may improve health and reduce risk behaviors in this underserved population.

Because the gathering occurs annually, it provides a recurring opportunity to examine and address the needs of this unique population. In addition to the adult population, there are many child and adolescent participants. Future research might focus on understanding risk and protective factors among this population and determining whether the services available in and around the gathering are adequate for addressing their health needs.¹³

This assessment is subject to at least four limitations. First, due to several concerns, including the potential for records to be used in legal actions against providers or participants, our agreement with CALM prohibited analyses of formal records or the identification of patients treated by CALM. As a result, we are unable to quantify the number of patients seen in CALM treatment areas or formally estimate CALM's ability to manage participant health problems without transferring care to local EDs. Future efforts in similar settings should develop formal mechanisms to track patient volume and disposition in on-site treatment areas. Second, the identification of RFLM participants by ED staff and EMS responders was informal. While details of the gathering were provided to local care providers, the identification of RFLM members was based entirely on patient disclosure or questioning that was part of clinical care. It is likely that we have underestimated the number of RFLM participants treated in participating EDs or transported by EMS agencies. Third, estimates of risk behaviors and experiences based on the participant questionnaire are derived from self-reports and may contain deliberate or unintentional misreporting. Finally, our use of a convenience sample may influence estimates derived from the participant questionnaire. The prevalence of risk behaviors and experiences may be biased by respondent characteristics.

Our findings shed some light on the psychosocial and medical history of an underserved population with significant health needs and risk exposures. While CALM and the RFLM work to meet the needs of the participants during the annual gathering, the need for services is likely to extend beyond the availability of CALM providers. The annual gathering provides a unique opportunity to work with a nontraditional group, both to ensure the health and safety of participants during the gathering, and to provide outreach services to those without a regular source of care.

Notes

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