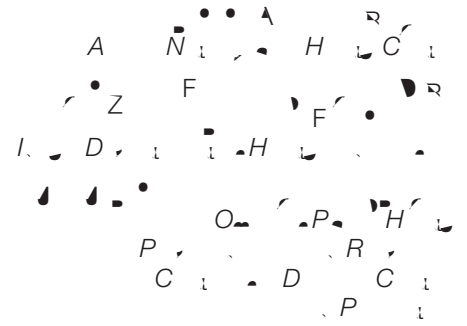


# Norovirus Outbreak at a Wildland Fire Base Camp Ignites Investigation of Restaurant Inspection Policies



Abstract: This study investigated the impact of restaurant inspection policies on the spread of norovirus in a wildland fire base camp. The study found that the implementation of a restaurant inspection policy significantly reduced the number of norovirus cases. The study also found that the implementation of a restaurant inspection policy significantly reduced the number of norovirus cases. The study also found that the implementation of a restaurant inspection policy significantly reduced the number of norovirus cases.

camping areas. Sanitary facilities consist of mobile shower units and portable toilets; water for drinking and bathing is provided from portable tanks. Meals in camp are provided by contracted mobile catering units. A camp might exist from a limited number of days to weeks, and accommodate less than 100 to more than 1,000 residents more than years. p.03fmr15ml5mle21 6sommodateb3t /MH re size and complexity.

ing crew reported no ill persons among the resource group. Definitive information about dinner location on September 1, 2011, was obtained for 13 (76%) of 17 resource groups who had arrived at the re camp by September 1. All resource groups categorized as ill reported having members who had eaten dinner at Restaurant A on September 1. Among resource groups who ate at Restaurant A, 89% were categorized as ill (Table 2). Resource groups with no members who had eaten at Restaurant A on September 1 had eaten at other restaurants or had eaten food brought from home. Subsequent food exposures were consistent across all resource groups when the contract caterer began service with breakfast on September 2. Individual food histories of responders who had eaten at Restaurant A were similar because re managers had arranged for service of a limited menu to responders. No food item was associated with an increased risk for illness.

Forty-nine persons who met the clinical case definition were identified; 46 persons were identified by the re camp medical unit and three were identified anecdotally. Among persons who met the clinical case definition, 47 (96%) were directly associated with the re response and two (4%) were emergency medical personnel who had responded to the outbreak. Among 47 persons for whom time of onset was known, five (11%) had onset 24 hours or more after the first reported onset, had no restaurant exposure, and were considered secondary cases. The overall attack proportion among all responders was about 27%.

Among 48 patients for whom sex was known, 41 (85%) were men; among 15 patients for whom age was known, the age range was 20–58 years. Among 24 patients for whom signs and symptoms were known, six (25%) reported vomiting; five (21%) reported diarrhea; 13 (54%) reported both vomiting and diarrhea; 12 (50%) reported nausea; three (13%) reported muscle aches; four (17%) reported chills; and six (29%) reported headache. Mild fever (<100.5°) was reported by seven (78%) of nine patients treated at any hospital. The incubation period was calculated from 7:00 p.m., the midpoint of dinner service on September 1, yielding a median incubation period of 31 hours (range: 21–55 hours; n = 42) (Figure 1). The estimated mean duration of illness was 32 hours (range: 13–44 hours; n = 42),

calculated from the reported time of onset to

Restaurant A manager as to whether any of the children observed in the food preparation areas on /CREO\_o54 BMC (10any)Tj EMTj C

ishment inspection as a result of the outbreak included lack of knowledge about safe food handling practices such as bare hand contact with ready-to-eat foods and improper sanitization of food contact surfaces, impeded access to hand-washing facilities, and incorrect food item storage to prevent cross contamination. In response to the query to the

inspection conducted as a result of the epidemiologic investigation.

A reopening inspection focusing on facility characteristics was conducted prior to Restaurant A opening in accordance with Idaho regulations, but no routine inspection was conducted shortly after establishment opening. If more frequent inspections had occurred, managerial and behavioral risk factors that contribute to foodborne illness might have been noted and corrected earlier, thus avoiding a major contributing cause of this outbreak.

One method advocated to improve foodborne illness knowledge and improve food safety behavior is to have an education or certification requirement for food service managers or food handlers. The 2009 FDA Food Code (Food and Drug Administration [FDA], 2009) and the Idaho Food Code (IDHW, 2008) require demonstration of knowledge; certification by an accredited program is one way to meet the requirement. Evidence varies, however, as to effectiveness of this strategy. A limited number of studies have reported that having a trained and certified food manager is associated with reducing or improving control of certain inspection violations or risk factors (Cates et al., 2009; FDA, 2010; Kassa, Silverman, & Baroudi, 2010).

One study conducted by the Environmental Health Specialists Network reported that the presence of a certified kitchen manager was associated with a reduced likelihood that the restaurant was associated with an outbreak (Hedberg et al., 2006). Training is not necessarily linked with consistent behavioral change as evidenced by one study where, in a group of food handlers with a high proportion who had received food hygiene training, approximately half admitted to not always adhering to food safety behaviors (Clayton, Griffith, Price, & Peters, 2010). Evidence of the effectiveness of routine inspection to reduce foodborne illness is limited, and some studies provide evidence that no difference exists in outcomes, either in violations or illness outbreaks on the basis of inspection frequency or scores (Mullen, Cowden, Cowden, & Wong, 2002; Newbold, McKeary, Hart, & Hall, 2008). Another study, however, indicated a substantial association between lower routine inspection score and likelihood of foodborne outbreak (Irwin, Ballard, Grendon, & Kobayashi, 1989). No research is

available that has specifically investigated the association of foodborne disease outbreaks with routine inspection within a defined time after a restaurant opens for business or changes ownership. Our surveys of state-level food safety regulators identified that although the requirement for and timing of postopening food establishment inspections varies by jurisdiction, an inspection during this time is considered sufficiently important that 13 (72%) of 18 states that chose to respond to our surveys have a rule or policy at the state level.

Although an outside restaurant was implicated as the illness source in this outbreak, food service provided in camp represents another possible avenue for the introduction of foodborne illness that must be evaluated in an outbreak investigation. Meals are often provided in camp by mobile food service units (MFSU) that are staged near where fires might occur for prompt dispatch. These units operate under a national contract that outlines requirements for equipment and certification of staff (NIFC, 2013). Each MFSU manager and supervisory cook must have a completion certificate for food service management, handling, and sanitation training. MFSU managers are responsible for training employees in safe food handling practices. Each MFSU is required to have a copy of the latest FDA Food Code available and is contractually obligated to meet those standards.

Toilet and shower facilities are other shared areas where contamination with norovirus could contribute to transmission among wildland responders and should also be evaluated during an outbreak. Toilet and shower facilities are portable units provided under contract. Portable toilets are contracted locally; sanitization frequency is at the discretion of incident staff. Sanitization frequency was increased from once per day to 2–3 times per day after the outbreak was identified. Shower facilities are provided under a national contract that details frequency and sanitization method. Hand-washing sinks are situated near portable toilets, showers, and food service areas to encourage appropriate hand hygiene.

Both the mobile shower contract and the MFSU contract provide for notification of local health authorities of the time, location, and type of services that are being performed. In the event of an illness outbreak among

responders at a base camp, a local environmental health specialist (EHS) might need to inspect camp facilities. The EHS should be aware that these service providers have a contractual obligation to meet applicable federal, state, and local laws and regulations and should work in partnership with incident managers to inspect these facilities to the same standard as other establishments within their jurisdiction.

Despite responder vulnerability to infectious disease transmission because of the closely shared quarters and challenging conditions for good hygiene, this is only the second norovirus outbreak reported at a wildland re base camp. In response to the first reported norovirus outbreak in a wildland re base camp during 2009

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