

A Team Approach to Staff Safety during CDC's Ebola Outbreak Response Operations, Sierra Leone, November 2014

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Abstract

Background: In November 2014, during the West Africa Ebola epidemic, a driver contracted by the Centers for Disease Control and Prevention (CDC) in Sierra Leone developed Ebola virus disease, potentially exposing other Ebola-response staff and possibly jeopardizing outbreak response efforts.

Methods: In addition to an epidemiologic investigation with contact tracing and monitoring to limit possible Ebola virus transmission, the investigation team reviewed policies and procedures that may have contributed to the incident.

Results: The incident, investigation, and response activities occurred in Bombali, Tonkolili and Western Districts of Sierra Leone during a period of wide-spread community transmission of Ebola virus in all three districts. The driver did not immediately report his illness to relevant public health authorities, his employer, or CDC leading to a prolonged period of exposure for CDC staff and other Ebola responders. Review of policies and procedures identified a number of barriers for reporting illness during the response. To address these issues CDC Sierra Leone adopted a one team approach to ensure that all team members, regardless of employer or contracting mechanisms, were prepared to promote team safety while in the field. We also implemented new training for drivers on Ebola virus transmission and prevention measures, promoted hand hygiene in vehicles, ensured drivers stayed in accommodations approved for CDC staff and worked with vehicle companies to reduce disincentives for illness reporting.

Conclusions: The CDC Sierra Leone field teams were comprised of team members from a variety of cultural backgrounds and hired through different employment mechanisms. Not all employers promote a safe environment for illness reporting and there may be disincentives for reporting illness. A one team approach to staff safety should address these barriers.

Keywords: Ebola; Sierra Leone; Africa; Outbreak; Safety; Emergency response

Abbreviations: CDC: Centers for Disease Control and Prevention; DHMT: District Health Management Team; EVD: Ebola virus disease; IPC: Infection prevention and control; PPE: Personal protective equipment

Background

During 2014-2016, Ebola outbreak in West Africa, the Centres for Disease Control and Prevention (CDC) deployed a large number of staff to Guinea, Sierra Leone, and Liberia to live and work alongside Ministry of Health and Sanitation staff and response personnel from other agencies [1]. CDC teams included international and local staff and drivers contracted through local companies who supported epidemiological investigations among other response activities [1].

By September 2014, Sierra Leone was experiencing widespread community transmission of Ebola virus in 13 of 14 districts [2]. CDC considered staff safety a priority and provided pre-deployment training to CDC staff on Ebola virus transmission, epidemiology, risk reduction measures, and illness management while deployed.

Here, we describe CDC's experience in Sierra Leone when a contract driver developed Ebola virus disease (EVD), resulting in potential exposure of CDC staff and other response personnel; lessons learnt from this incident; corrective measures put in place as a result; and, broader implications for CDC staff safety during field operations.

Three members of a CDC field response team working and residing

in Bombali and Tonkalili Districts reported illness on November 30. Two team members were CDC employees and they reported mild illness (loose stools, abdominal cramping, and one reported a temperature of 37.7 degrees Celsius), which resolved the next day. The third team member (SM), who was a contract driver, who worked with the other two team members, had a more pronounced illness (fever, nausea, vomiting, headache) and was evaluated by the Bombali District Health Management Team (DHMT). SM was referred to an Ebola care facility where SM tested positive for infection with Ebola virus. SM survived and was discharged on December 11.

Methods

Epidemiologic investigation

Bombali DHMT led the investigation to identify SM's possible exposures to Ebola virus and identify contacts whom he may have

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exposed. The investigation included the Tonkolili and Western District DHMTs because SM also worked or resided in these districts during the 21 days before his illness onset. District staff interviewed SM, his colleagues, and family to identify SM's daily activities. Because of the logistical challenges of establishing exposure dates for the large number of contacts, especially drivers, investigators monitored contacts in Bombali for the development of any single symptom of EVD for 21 days following the date of SM's isolation on November 30. No list of potential contacts with SM from Tonkolili could be compiled.

CDC staff in Sierra Leone were also queried about contact with SM. Because of approaching international travel for exposed CDC staff completing their missions, they were evaluated using CDC's Interim US. Guidance for Monitoring and Movement of Persons with Potential Ebola Virus Exposure (Table 1) [3]. Recommended public health actions were based upon the assigned exposure risk category.

Review of safety procedures

To identify weaknesses in CDC's safety procedures, the CDC Leadership conducted interviews with staff and contract drivers deployed to Bombali and Tonkolili Districts and conducted site visits to both districts. The leadership team also met with the management of the contracted vehicle company to review their policies and procedures.

Results

The investigation

SM reported nausea, vomiting, fever and fatigue, starting on November 16. When he vomited on November 16, SM received assistance from three contract drivers using improvised personal protective equipment (PPE). No one reported his illness. SM continued to work through November 29.

The investigation did not reveal a source of SM's infection. Although SM reportedly used a Bombali guesthouse, he also slept in his vehicle in a hotel parking lot, a common practice among the Ebola-response contract drivers. The hotel housed dozens of Ebola-response staff from multiple agencies, including CDC, World Health Organization, and the African Union. No EVD cases were reported among Hotel patrons, staff, or drivers; within the guesthouse and immediate surrounding community; or among SM's family in Freetown. SM frequently drove

CDC staff to Ebola-affected villages to interview contacts, but he usually remained in the vehicle. SM also spent time at the Tonkolili DHMT where the CDC team was based; the DHMT shared its compound with a busy health clinic without adequate Ebola screening measures and poor hygiene and sanitation facilities. A member of the Tonkolili DHMT response team had recently been diagnosed with EVD, but SM denied contact with him. No other Tonkolili DHMT staff or drivers who congregated at the DHMT reported illness.

Forty contacts were identified among Ebola-response workers (37 drivers in Bombali and three CDC staff). Thirty-four drivers were considered low-risk contacts because they ate, socialized, or shared a communal bathing space with SM at the hotel. The three drivers who provided assistance using improvised PPE were considered high-risk contacts. Thirty-one of 37 (84%) driver contacts completed 21 days of monitoring; five could not be located and one was lost to follow-up. Drivers on temporary trips outside Bombali District were monitored by staff from contracting agencies (e.g., CDC). Cross-district notifications were made for drivers who returned to Freetown for the remainder of their monitoring period. Two of three high-risk driver contacts were excluded from work during the monitoring period. The third high-risk driver had transferred to a different company in another district and underwent daily monitoring by the new clients; however, he was lost to follow up on monitoring day 17, when he stopped working for these clients. Low-risk drivers were permitted to continue working as long as they reported for daily monitoring.

Three CDC staff were identified as some-risk because they traveled in a vehicle with SM multiple times for at least 30 minutes during November 16-29. All three returned to the US on a non-commercial flight and completed 21 days of monitoring.

SM's family in Freetown and 8 guesthouse contacts in Bombali were assessed and monitored, but information about risk-level and monitoring completion is not available.

There were no known secondary cases of EVD among those who were monitored.

Review of safety procedures

In addition to CDC staff pre-deployment training on risk reduction measures, the CDC Sierra Leone in-country team ensured

Exposure Category	Description	Public Health Actions
High-risk	Direct exposure to blood or body fluids of or skin-to-skin contact with SM while he was symptomatic, without using recommended PPE	Direct active monitoring for 21 days following last reported contact with SM During 21-day active monitoring period: <ul style="list-style-type: none"> Controlled movement, including exclusion from long-distance travel on commercial conveyances Coordinated travel with public health authorities to ensure continuance of direct active monitoring Exclusion from public spaces and congregate activities
Some-risk	Close prolonged contact with SM while he was symptomatic; close prolonged contact was defined as being within 1 meter (approximately 3 feet) of SM for ≥ 30 minutes without using recommended PPE	Direct active monitoring for 21 days following last reported contact with SM During 21-day active monitoring period: <ul style="list-style-type: none"> Controlled movement, including exclusion from long-distance travel on commercial conveyances Coordinated travel with public health authorities to ensure continuance of direct active monitoring Exclusion from public spaces and congregate activities
Low, but not zero risk*	Brief (≤ 30 minutes) close contact with SM while he was symptomatic without using recommended PPE	Direct active monitoring for 21 days following last reported contact with SM No travel restrictions

PPE: Personal protective equipment.

*All CDC staff completing deployments in Guinea, Liberia, and Sierra Leone were categorized as low, but not zero risk because they served in countries with widespread transmission with uncertain control measures; as a result, they underwent active monitoring for 21 days following their deployments, but did not have travel restrictions applied [3].

Table 1: Exposure risk categorization scheme used during the evaluation of asymptomatic CDC staff for possible exposures to SM and Ebola virus. From CDC's interim US guidance for monitoring and movement of persons with potential Ebola virus exposure [3].

that hotels housing CDC staff implemented measures to limit ill hotel staff or guests from exposing others. However, these measures were not provided for contract drivers. Drivers had little training about Ebola virus, risk reduction measures, and illness reporting. There were perceived disincentives for drivers to report exposure or illness, including stigma, loss of income, and reduced opportunities for future employment. Also, drivers were responsible for organizing their own accommodation using cash payments provided by the vehicle company and it was common for drivers to rent communal lodging or sleep in their vehicles to save money; no assessment of Ebola virus exposure risk was performed in these locations. In addition, the Tonkolili DHMT lacked entrance screening and recommended infection prevention and control (IPC) procedures for staff and patients.

Safety planning for CDC had not considered a scenario in which one of the drivers developed symptoms compatible with EVD while driving staff members.

Conclusions

EVD in a driver contracted by CDC went unreported for 13 days, jeopardizing the integrity of the response and the health of individuals exposed.

Staff safety during deployments requires a team approach, whereby the safety of the team is a shared responsibility. This approach should account for the different cultures of team members and issues that may arise from different employment arrangements. It should also ensure that all members have the appropriate training and resources to maximize safety.

Not all employers promote an environment encouraging illness reporting. Workers may experience financial or other pressures to continue working while unwell making them unwilling to report illness in themselves or co-workers. Lost wages and reduced opportunities for future work may be further disincentives.

As a result of these findings, the CDC Sierra Leone office implemented several measures. We provided specially developed

training for drivers on Ebola risk reduction. All team members were encouraged to ask about illness if they suspected someone was unwell. Drivers were given thermometers to record their temperature twice daily. Alcohol-based hand rub was placed in all vehicles and drivers were empowered to encourage hand hygiene when passengers entered the vehicle. CDC worked with the vehicle company to ensure that drivers would not lose wages for sick days or be penalized for reporting illness. CDC arranged for drivers to stay in the same hotels approved for CDC staff. CDC was proactive about sharing this experience with other agencies operating in Sierra Leone. Several organizations requested the training materials, indicating that there was an interest in addressing similar gaps.

Controlling infectious disease outbreaks may put response teams at risk of exposure. Pre-deployment training should focus on risk reduction from exposure to patients or community cases as well as other team members who are sick. When teams are composed of individuals from different agencies or engaged through different contract mechanisms, it is important that prevention measures are equally applied to all team members. Leaders responsible for deployments should adopt a team approach that may require addressing cultural and employment barriers to prompt illness reporting.

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