Epidemiologic and Clinical Aspects of the Ebola Virus Epidemic in Mosango, Democratic Republic of the Congo, 1995

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Twenty-three Ebola hemorrhagic fever (EHF) cases (15 males, 8 females) were identified in Mosango, Democratic Republic of the Congo; 18 (78%) of them died. Eight of the patients came from Kikwit General Hospital and were hospitalized at Mosango General Hospital, 10 acquired their infection at the Mosango hospital and were treated there, and 5 acquired their infection through contact with a hospitalized patient but were never hospitalized themselves. For most of the EHF cases, it was clear that they had been in contact with blood or body fluids of another EHF patient. The Ebola outbreak in Mosango remained relatively small, probably because hygienic conditions in this hospital were relatively good at the time of the outbreak and because as soon as the epidemic was recognized, barrier nursing techniques were used.

In April 1995 ~1 week after doing a surgical procedure on a 36-year-old Ebola (EBO) hemorrhagic fever (EHF)–infected laboratory technician at Kikwit General Hospital (Kikwit, Democratic Republic of the Congo [DRC]), several members of the surgical team became ill and died [1]. Health care workers and patients quickly realized that a deadly disease was spreading within the hospital, and some of those who were sick left the hospital to seek care in other facilities. Several of them returned home, and 8 others were admitted to Mosango General Hospital, where an outbreak ensued.

Mosango General Hospital is a 600-bed facility located 100 km from Kikwit on the road to Kinshasa. Mosango itself is a very small village with ~1000 inhabitants. The Mosango hospital is known to be the best hospital in the region, with better health care facilities than Kikwit General Hospital. In fact, sometimes instead of seeking health care closer to home, people from Kinshasa go to the Mosango hospital, which is run by the Diocese of Kikwit.

At the time of the EHF outbreak in Kikwit, the medical staff at Mosango General Hospital included 4 physicians (3 from DRC and 1 French surgeon [M.-J. Bonnet]) and Italian nuns, who were responsible for the nursing care of tuberculosis patients. The hospital has wards for internal medicine, surgery, obstetrics, pediatrics, and tuberculosis. These wards are located in different buildings, which are ~800 m from each other. The hospital also has radiologic facilities and a laboratory. Unlike the hospital in Kikwit, the Mosango hospital had running water and electricity during the EBO outbreak. In addition, the hospital has a good reputation for high-quality surgical interventions. During such interventions, gloves are always used, and during the outbreak, hygienic conditions at the hospital were quite good. Needles and syringes were re-used after being adequately sterilized. On May 10, when the EBO epidemic was recognized, barrier nursing techniques were instituted.

Herein, we describe the epidemiologic characteristics of the Mosango EBO outbreak and the clinical manifestations of the Mosango EHF patients.

Methods

Medical records and EHF surveillance questionnaires were reviewed. Only patients meeting the criteria of the clinical EHF case definition were included in this study [1]. Mosango health care workers were interviewed.

Results

Twenty-three EHF cases were identified in Mosango in April and May 1995: 15 were male and 8 were female, and they had a mean age of 36 years (56% were 21–40). Eight of these patients came from Kikwit General Hospital and were hospitalized at Mosango General Hospital. Ten patients acquired their infections at the Mosango hospital and were treated there. The remaining 5 EHF cases acquired their infections through contact with patients at the hospitals in Kikwit or Mosango but were never hospitalized themselves.

Epidemiologic description of the outbreak. On 7 April 1995, the first patient with EHF, a student nurse from Kikwit General Hospital, was admitted to the Mosango hospital. He died on 14 April. During his illness, his mother and sister became infected; his sister died, but his mother survived.

On 20 April 1995, an EBO-infected nurse (an Italian nun) was also transferred from the Kikwit hospital to Mosango General Hospital. Despite several investigations and intensive treatment, including intravenous infusions, she died on 25 April. However, before she died, 1 of her colleagues became infected.

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The body of the nun was disinfected with formol and transferred to Kikwit for a burial ceremony, during which hundreds of people touched the body, but nobody became infected.

On 25 April 1995, a second student nurse working at Kikwit General Hospital was also admitted to Mosango General Hospital. The nurse in charge of the care of this student nurse developed his first symptoms on 2 May 1995. He infected 2 other patients and 2 family members of other hospitalized patients during his pseudoremission phase (7 May 1995). After the EBO epidemic was recognized on 10 May, 9 other EHF patients were treated at the Mosango hospital, and 5 persons became infected through contact with a hospitalized patient but were never hospitalized themselves. No secondary infections occurred in the villages of these patients.

The mode of contamination for most of the Mosango patients was contact with blood of an EHF case. Two infected nurses were reported to have smoked a cigarette without washing their hands after having taken care of an EHF case. Four EHF cases had participated in traditional burial practices [1] for a person who died of EHF. The Mosango surgeon, M.-J. Bonnet, reported that on several occasions her hands had been in contact with the blood of the Italian nurse nun (who died with hemorrhagic manifestations) but that she always washed her hands after such contact because she suspected a potentially infectious disease. All EHF patients were hospitalized in the male medicine ward because the first patients were male. The ward was used as an isolation unit for EHF cases and their family members.

Clinical manifestations. In most patients, 2 clinical phases were observed, with a pseudoremission period of 24–48 h in between. In the first phase, the most frequent symptoms were fever, asthenia, abdominal pain, anorexia, diarrhea, nausea, headache, generalized arthralgia, mucosal redness of the oral cavity, dysphagia, and conjunctivitis (table 1). During the pseudoremission phase, a slight improvement of the clinical condition was noted: Patients started eating again, and some could stand.

The second phase of the disease was characterized by hemorrhagic manifestations, neuropsychiatric abnormalities, and oligoanuria. Patients who presented only with phase 1 symptoms survived. Most of the patients who developed hiccup, dyspnea, oliguria, hemorrhagic manifestations, and neuropsychiatric abnormalities died. The mean incubation period was 7.8 days (range, 2–19). Eighteen patients (78%; 12 males, 6 females) died.

Table 1. Clinical manifestations of the 23 Ebola hemorrhagic fever cases notified in Mosango.

Symptom	No. died (%) (n = 18)	No. survived (%) (n = 5)	No. total (%) (n = 23)
General symptoms			
Fever	18 (100)	5 (100)	23 (100)
Asthenia	18 (100)	5 (100)	23 (100)
Abdominal pain	18 (100)	4 (80)	22 (96)
Headache	18 (100)	2 (40)	17 (74)
Conjunctivitis	16 (89)	2 (40)	18 (78)
Anorexia	17 (94)	5 (100)	22 (96)
Vomiting	16 (89)	3 (60)	19 (83)
Nausea	14 (78)	3 (60)	17 (74)
Diarrhea	17 (94)	5 (100)	22 (96)
Dysphagia	10 (56)	1 (20)	11 (48)
Dyspnea	8 (44)	1 (20)	9 (39)
Hiccups	6 (33)	0	6 (26)
Oliguria	7 (39)	0	7 (30)
Oral redness	7 (39)	0	7 (30)
Arthralgia	4 (22)	1 (20)	5 (22)
Cutaneous eruption	1 (6)	0	1 (4)
Generalized pain	7 (39)	0	7 (30)
Neurologic symptoms			
Convulsions	2 (11)	0	2 (9)
Delirium	3 (17)	0	3 (13)
Neck stiffness	1 (6)	0	1 (4)
Hemorrhagic manifestations			
Petechia	5 (28)	0	5 (22)
Ecchymosis	6 (33)	0	6 (26)
Bleeding at injection sites	7 (39)	0	7 (30)
Gum bleeding	7 (39)	0	7 (30)
Hematemesis	7 (39)	0	7 (30)
Melena	10 (56)	0	10 (43)
Hematuria	2 (11)	0	2 (9)
Epistaxis	1 (6)	0	1 (4)

Discussion

A nosocomial outbreak of EHF occurred at Mosango General Hospital between April and June 1995. Because of the hospital's good reputation, several EHF patients at Kikwit General Hospital escaped to seek medical care at Mosango General Hospital. The EBO outbreak in Mosango remained small, most likely because the hospital had relatively good hygiene conditions (e.g., good sterilization of equipment, use of gloves during surgery). Once the EBO epidemic was identified, barrier nursing methods similar to those used at Kikwit General Hospital were used. Another factor that probably played a role in keeping the outbreak small was the relatively short time between the admission of the first EHF patient (7 April) and the day that the EBO epidemic was recognized as such (10 May). At the Mosango hospital, which has more patients but less personnel than the Kikwit hospital, only 2 health care workers (nurses) died; however, 43 workers died at Kikwit General Hospital.

Despite only modest assistance from the international community, this hospital was able, by itself, to stop the nosocomial outbreak. Laboratory activities were stopped during the epidemic, but medical care was never completely stopped. Between 150 and 200 patients remained in the hospital during the epidemic, and emergency surgical interventions were done. This in contrast with procedures at Kikwit General Hospital, where during the EBO epidemic, care was provided almost exclusively for EHF patients only.

The clinical manifestations observed in the EHF patients in Mosango were comparable to those observed in the overall epidemic [2]. Only slightly more neuropsychiatric symptoms and signs were reported among the Mosango patients. It may be that these were noted more carefully in Mosango because a relatively small number of EHF patients was intensively followed compared with the number of EHF cases seen in Kikwit. At Kikwit General Hospital, neuropsychiatric manifestations were also noted in 2 EHF patients who received blood transfusions from an EHF convalescent patient [3], and such reactions have been noted during previous EHF outbreaks [4, 5].

The control of the EHF outbreak in Mosango General Hospital shows that such outbreaks of EBO virus infection can be stopped by two relatively simple and inexpensive measures: barrier nursing and good hygiene.

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