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PERSONS UNDER INVESTIGATION

THE BELLEVUE HOSPITAL EXPERIENCE WITH EVD SCREENING

Laura Evans, MD MSc

Associate Professor of Medicine, NYU; Medical Director of Critical Care, Bellevue Hospital

Nate Link, MD, MPH

Associate Professor of Medicine, NYU School of Medicine

Chief Medical Officer, HHC-Bellevue Hospital Center

EMORY MEDICINE

University of Nebraska Medical Center

Nebraska Medicine

HHC New York City Health and Hospitals Corporation Bellevue South Manhattan Healthcare Network

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Objectives

- Review eight cases of Persons Under Investigation (PUIs) – individuals who required isolation on the Bellevue Ebola Virus Disease (EVD) Unit while undergoing assessment for possible EVD
- Present clinical features and management of each case
- Review the process for establishing a diagnosis and the decision to remove EVD precautions
- Summarize important lessons learned

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1. Index Case

July 31, 2014

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1. Index Case - History

- A 32 yo male arrived at JFK airport from Liberia on July 28.
- Upon landing, he was immediately arrested for an outstanding warrant on a parking ticket.
- While in police custody, he developed fever, headache, palpitations, myalgias, and epigastric pain.
- On July 30, he was taken to the Bellevue Hospital ED and was admitted to the isolation (TB) ward. The staff wore gowns, gloves, and masks. There was no specific accommodation for PUIs.
- The patient reported a history of malaria and intestinal worm infection requiring treatment 6 months earlier.
- He reported no known contacts with EVD patients.

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1. Index Case - PE and Labs

Physical Exam

- Temp - 98.6, Pulse – 102, BP - 134/88
- Normal mental status
- RUQ tenderness

Laboratory Data

- Hgb – 13.6 g/dL, WBC – 5.1, Plts – 178k
- Lytes – normal
- AST – 88 U/L, ALT – 157 U/L, Coags normal
- Lactate – 1.4 mmol/L
- Thin smear positive for P. falciparum malaria (0.001%)

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1. Index Case - Hospital Course

- Within 12 hours of admission, temperature rose to 102.8, sysBP decreased to 96, and pulse increased to > 140.
- Repeat thin smear was positive at 0.14%.
- The patient was infused with a total of 6 liters of saline, started on Malarone, Ceftriaxone, Ciprofloxacin, and Flagyl, and transferred to the MICU on hospital day 2 - initially remaining in isolation.
- On day 3, the patient defervesced and subsequently all symptoms resolved.
- Antibiotics were discontinued when bacterial cultures were negative.
- On day 7 he was discharged in good condition with a diagnosis of Malaria.

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1. Index Case - Lessons Learned

- Although the patient was initially well-appearing, 24 hours of observation revealed a significant degree of illness.

- The patient was transferred to the ICU because our isolation unit lacked capability for advanced care- this exposed staff and patients in the ICU to the risk of EVD.

- This case was the impetus for developing a protocol for care of patients with suspected or confirmed EVD. The protocol included provisions for safe transport, mechanical ventilation, dialysis, and care by pulmonary-critical care attendings.

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2. DUTCH UNICEF WORKER

September 22, 2014

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2. Dutch UNICEF Worker - History

- 48 yo Dutch national UNICEF worker referred by DOHMH (NYC Department of Health and Mental Hygiene) for fever of 100.4 noted in follow-up clinic one day after arriving from Liberia.
- She was brought to Bellevue by FDNY (EMS) using an EVD protocol and was admitted to the EVD isolation unit.
- She reported exposure to a child ill with EVD in an orphanage several days earlier. She approached to about 3 feet from the child but did not have direct contact.
- Her only symptom was a “scratchy throat”

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2. Dutch UNICEF Worker - PE and Labs

Physical Exam

- Temp – 96.9, Pulse – 80, BP – 110/70
- Healthy appearing
- Abdomen benign

Laboratory Data

- Hgb – 14.4 g/dL, WBC – 3.9, Plts – 188k
- Lytes – normal
- LFTs - normal

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2. Dutch UNICEF Worker - Hospital Course

- During 24 hours of observation, the patient remained afebrile and clinically well.
- At 24 hours, the patient was cleared and released without any studies being performed.

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2. Dutch UNICEF Worker - Lessons Learned

- 24 hours of observation revealed no significant degree of illness.
- Blood testing is not always essential to rule out EVD.

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3. TANZANIAN GOOD SAMARITAN

October 13, 2014

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3. Tanzanian Good Samaritan - History

- 37 yo Tanzanian man was arrested upon arrival at JFK for an outstanding warrant related to a domestic dispute.
- In police custody, he reported symptoms of vomiting and diarrhea and a history of exposure to a sick child in Uganda so he was taken to an outside hospital where he underwent lab tests, a malaria smear, and CXR, all reportedly normal, and then placed back into police custody.
- After vomiting again, he was transported to Bellevue Hospital and directly admitted to the isolation unit.
- He stated that he had been living in East Africa for several months.
- Three days earlier, while in Uganda, he helped transport a child with diarrhea and vomiting to a hospital via car, and subsequently cleaned up the vomit in the car. While on his flight to the US, he developed subjective fevers, vomiting, and diarrhea.

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3. Tanzanian Good Samaritan - PE and Labs

Physical Exam

- Temp – 96.9, Pulse – 80, BP – 110/70
- Healthy appearing
- Right lower quadrant tenderness

Laboratory Data

- No laboratory tests were obtained

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3. Tanzanian Good Samaritan - Hospital Course

- The patient was accompanied onto the ward by police officers wearing Tyvek suits with firearms strapped to the outside. The firearms were confiscated and quarantined until the patient was released.
- Upon completion of initial assessment, the patient was considered not to be at risk of EVD because of the timing of his symptoms and lack of geographical exposure. He was immediately downgraded from EVD precautions to standard contact precautions.
- Over the next 48 hours, the patient's symptoms resolved and he was discharged back into police custody with a final diagnosis of viral gastroenteritis.

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3. Tanzanian Good Samaritan - Lessons Learned

- Pre-screening can prevent unnecessary activation of the unit. Subsequent to this case, all potential transfers were screened in advance by DOHMH.
- PUIs may come from virtually any source. The transferring entity might not be competent in EVD precautions. Subsequent to this case, all transfers were handled by FDNY (EMS).
- 24 hours of observation revealed no significant degree of illness.
- Do not land at JFK if you have an outstanding police warrant.

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4. MSF PHYSICIAN WITH FEVER

October 23, 2014

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4. MSF Physician with Fever - History

- 33 yo male physician reporting temperature of 100.3 while being monitored by DOHMH after returning from Guinea 6 days earlier.
- The physician was working for Medicine sans Frontiers (MSF) in an EVD unit – actively caring for patients ill with EVD.
- He reported no breach in use of PPE.
- He was compliant with malaria prophylaxis.
- He had noted fatigue for several days after returning to the US. On the day of presentation he had the low-grade temperature noted above, and a loose stool.

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4. MSF Physician with Fever - PE and Labs

Physical Exam

- Temp – 98.6, Pulse – 86, BP – 132/70
- Healthy appearing
- Abdomen benign

Laboratory Data

- Hgb – 14.4 g/dL, WBC – 2.1, Plts – 61k
- Lytes – Normal
- AST – 42 U/L, ALT – 187 U/L
- EVD PCR positive on day of admission

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4. MSF Physician with Fever - Hospital Course

- Six hours after admission, the patient became febrile to 104.4. He remained continuously febrile for the next seven days (range 100.4 to 103.3).
- One day after admission, the patient developed decreased appetite but was otherwise largely symptom-free.
- Two days after admission, the patient developed diarrhea which progressed to abdominal cramping and frequent watery stools.
- Three weeks after admission, the patient's viral load cleared and he was taken off EVD precautions and discharged in good health.

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4. MSF Physician with Fever - Lessons Learned

- This initial presentation of EVD was entirely benign.
- The markedly abnormal CBC was the first clue to the diagnosis.
- In this case, the EVD test was positive at presentation.
- In this case, the patient rapidly progressed within 24 hours to high fever and within 48 hours to GI symptoms.

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5. YOUNG BOY FROM GUINEA

October 27, 2014

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5. Young Boy from Guinea - History

- A 5 yo African-American male was brought to the ED by his family with a fever of 102.6 two days after returning from a one month visit to Guinea.
- The child reportedly had stayed within a village compound for the entire month and had no known contact with any ill person. ‘
- His only symptom was a mild sore throat.

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5. Young Boy from Guinea - PE and Labs

Physical Exam

- Temp – 100.4
- Healthy appearing
- Pharynx clear with shotty cervical lymphadenopathy
- Several impetiginous lesions on extremities

Laboratory Data

- Hgb – 12.0 g/dL, WBC – 20.7 (left shift), Plt – 366k
- Lytes – normal
- LFTs – normal
- EVD PCR – negative on day 1
- Rhino/enterovirus PCR positive on day 1
- Malaria smear negative

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5. Young Boy from Guinea - Hospital Course

- Because a confirmed EVD case occupied the isolation unit and there was a shortage of pediatric nurses trained for EVD care, this patient remained in an isolation room in the ED for the duration of his stay.
- His mother remained in the room with him, wearing a gown, gloves, and a mask – not full PPE.
- He was started on Clindamycin for impetigo.
- Fifteen hours after admission, he had a fever to 102.2 and remained intermittently febrile for 48 hours.
- Three days after the presentation, the patient defervesced and his WBC decreased to 7.1.
- He was discharged with a diagnosis of upper respiratory syndrome.

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5. Young Boy from Guinea - Lessons Learned

- A single negative EVD PCR was not sufficient to rule out EVD in a patient with continuing fever.
- Alternative explanations for fever were not sufficient to rule out EVD until the patient improved. If he had continued to be febrile, he would likely have required a second EVD PCR three days after admission.
- It is more difficult to staff for the coverage of a pediatric patient. Lack of staffing led to the undesirable treatment of the patient in the ED.
- Children present the additional problem of parents needing to be in the room. Subsequent to this case, we developed a policy requiring parents to wear full PPE to be in the room with the patient.

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6. DIALYSIS PATIENT FROM BAMAKO

November 20, 2014

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6. Dialysis Patient from Bamako - History

- A 56 yo Malian man contacted EMS because of dyspnea and cough, six days after returning from Bamako, Mali. He was brought to the Bellevue Hospital EVD unit from his home using the FDNY protocol for safe transport.
- The patient stated he was a dialysis patient but had not had dialysis for two weeks because of disruptions in care related to travel. He was not able to provide further details in his history because of an altered mental status.
- He was admitted to the EVD isolation unit with fever because, at that time, Mali was included on the list of countries with active EVD.

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6. Dialysis Patient from Bamako - PE and Labs

Physical Exam

- Temp – 101.3, Pulse – 100, BP – 180/90, O2 sat 92% RA
- Awake and responsive to verbal stimuli, cooperative and able to follow commands but not conversant in his medical history and with poor short term memory
- JVP 6 cm above sternal notch
- Portable ultrasound suggestive of pulmonary edema
- Patent fistula for chronic dialysis

Laboratory Data

- Hgb – 6.2 g/dL, WBC – 17k, Plt – 245k
- BUN 164 mg/dL, Creat – 20.0 mg/dL, K – 4.9, HCO3 – 11
- LFTs – normal
- Malaria smear – positive at 0.1% parasite load

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6. Dialysis Patient from Bamako - Hospital Course

- The working diagnosis was altered mental status and volume overload secondary to end-stage renal disease and lack of dialysis.
- During the first few hours after admission, the patient's oxygen requirement worsened, requiring advancement of supplemental oxygen to a 40% facemask.
- Continuous veno-venous hemofiltration (CVVH) was begun through a central line several hours after admission to treat renal failure.
- Overnight, 3.1 net liters of fluid were removed with improvement in oxygen saturation.
- Broad spectrum antibiotics were started for possible sepsis and Malarone was started for treatment of malaria.
- Multiple attempts to reach the patient's son were unsuccessful.
- Initial EVD PCR was negative.
- Because of fever, the patient remained on EVD precautions.

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Hospital Course Continued

- On day 3, the patient was taken off EVD precautions after his fever resolved and EVD PCR was negative x 3.
- CVVH was discontinued and the patient was started on hemodialysis.
- Malaria treatment was completed and broad spectrum antibiotics were discontinued after all cultures were negative.
- The patient slowly improved and regained his mental status.
- He was discharged to home after a 15 day stay.
- Final diagnosis was altered mental status secondary to advanced renal failure, and fever secondary to malaria.

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6. Dialysis Patient from Bamako - Lessons Learned

- Lack of history or collateral information presents a challenge that requires a conservative approach in discontinuing EVD precautions.
- Malaria may co-exist with virtually any presenting condition.
- EVD precautions present barriers in the management of patients requiring advanced care.

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7. NYC PHYSICIAN FROM LIBERIA

December 23, 2014

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7. NYC Physician from Liberia - History

- A 58 yo male was brought to Bellevue because of an altered mental status.
- He had arrived in the US from Liberia two days earlier with no symptoms or complaints. Screening at the airport showed that his temperature was 99. His family reported that he appeared normal on the day of arrival.
- On the day of admission, his family found the patient at home with an altered mental status, nude, and covered in feces. They called 911, and the patient was transported to Bellevue via protocol.
- The patient was unable to provide any medical history. His family stated that he was a physician from NYC who was working in Liberia but did not take care of EVD patients.

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7. NYC Physician from Liberia - PE and Labs

Physical Exam

- Temp – 102.6, Pulse – 120, BP – 110/70, RR- 25, O2 sat 100% on NRB mask
- Unresponsive to verbal stimuli, only to pain
- Examination otherwise normal

Laboratory Data

- Hgb – 10.7, WBC – 10.7, Plt – 35k
- BUN 42 mg/dL, creat – 2.0 mg/dL, HCO3 – 17, Lactate – 6.5 mmol/L
- AST – 459 U/L, ALT – 319 U/L, T Bilirubin – 3.9 mg/dL
- Malaria smear – positive at 3.5% parasite load

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7. NYC Physician from Liberia - Hospital Course

- The working diagnosis was altered mental status and multi-organ failure from infection: Malaria (most likely) vs. EVD vs. Bacterial sepsis
- The patient was cultured and started on vancomycin and cefipime for possible bacterial sepsis, and quinidine and doxycycline for malaria.
- He was intubated for airway protection by the critical care attending.
- A triple lumen catheter was placed for central venous access.
- He received 3 liters of IV saline for possible sepsis.
- EVD PCR was negative on day 1.
- Following the negative PCR, the patient was taken off EVD precautions and transferred to the Medical ICU. The negative test was felt to be reliable given the patient's advanced state of illness.
- Antibiotics were discontinued when cultures were negative, and the patient gradually improved with treatment of his malaria. He was transferred to rehab 12 days after admission.

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7. NYC Physician from Liberia - Lessons Learned

- A PUI may present in extremis from any of a wide variety of conditions and require urgent application of advanced care while using EVD precautions. This presents a challenge in preparedness for the health care system.
- Interpretation of the EVD PCR result requires the full context of the patient's presentation.
- EVD precautions present barriers in the management of patients requiring advanced care

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8. YOUNG GIRL FROM SIERRA LEONE

February 25, 2015

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8. Young Girl from Sierra Leone - History

- A 5 yo girl was noted to have a fever of 101.4 when screened at JFK Airport upon arrival from Sierra Leone.
- She had been living there for 4 years with her grandfather and was traveling to the US with her 2 brothers to be reunited with her mother, who had driven all day from her home in Ohio to pick up the child at the airport.
- She had no symptoms of illness except for a runny nose. She had no known contact with any ill person prior to travel.
- The history was obtained via cell phone contact with the grandfather in Sierra Leone through a family member present at Bellevue. The phone interpreter service did not provide coverage for the dialect of Creole spoken by the grandfather.

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8. Young Girl from Sierra Leone - PE and Labs

Physical Exam

- Temp – 99.1, Pulse – 102, BP – 100/60,
- Sleepy but otherwise healthy appearing
- Examination - normal

Laboratory Data

- Laboratory testing was not performed

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8. Young Girl from Sierra Leone - Hospital Course

- Because the patient was afebrile and appeared well, laboratory testing was not performed.
- DOHMH arranged for the patient's family to be put up at an area hotel.
- The mother remained in the hospital, sleeping in an unoccupied room. She was told that she would need to wear full PPE to be in the room with her child. Since her child slept comfortably in her absence, the mother never entered the room.
- The patient remained afebrile through the night so plans were made to discharge her in the care of her family to drive back to Ohio.
- The Department of Health in Ohio was contacted and expressed reservations about the plan for discharge.
- A compromise was reached in which the patient remained in the hospital for a full 24 hours of observation before release.

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8. Young Girl from Sierra Leone - Lessons Learned

- PUIs traveling from abroad present special logistical challenges, including language, communication, and family needs.
- Decisions to remove EVD precautions should involve all affected parties including the Department of Health if the patient is being discharged.

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Top Ten Lessons Learned

- PUIs may present with any of a wide variety of conditions, so the receiving hospital must be adaptive to a broad range of needs
- PUIs may require advanced levels of care, so the receiving physician should have appropriate competencies (e.g., critical care training).
- PUIs may present special challenges for language interpretation and communication.
- Cases may arise anywhere in the community, so pre-transport screening is essential to filter out cases that do not require EVD precautions.
- The transport system must have protocols to provide safe transfers and hand-offs using EVD precautions.

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Top Ten Lessons Learned (cont…)

- 24 hours of observation provides a good opportunity for conditions to become evident, but is not always sufficient to settle the issue.
- Malaria is a common competing diagnosis but may not sufficiently explain the presenting complaints even when established as a diagnosis.
- EVD PCR testing may be useful in patients with advanced symptomatology but is often not helpful at the time of presentation.
- Decisions to remove EVD precautions should involve consensus of all relevant parties and should err on the conservative side until more is known about the early stages of EVD.
- Effective management of PUIs requires strong collaboration between public health officials, EMS services, and hospital systems.
- Do not land at JFK airport if you are on the wrong side of the law.

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Questions…

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