Point of Care Testing in Emerging and Exotic Infections

30 October 2015

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MARIE BASHIR INSTITUTE FOR INFECTIOUS DISEASES AND BIOSECURITY
Ebola virus outbreaks

FIGURE 166-2 Locations of filovirus infections and outbreaks. BEBOV, Bundibugyo ebolavirus; CIEBOV, Côte d’Ivoire ebolavirus, MARV, Marburg virus; REBOV, Reston ebolavirus; SEBOV, Sudan ebolavirus; ZEBOV, Zaire ebolavirus. (From European Centre for Disease Prevention and Control. Epidemi-
Case numbers in Ebola Outbreaks

1976

2014
Control of Ebola Epidemic

- Case finding and diagnosis
- Patient Isolation and case management
- Contact tracing and quarantine
- Infection control
- Safe burial
### Table 2. Estimates of Epidemiologic Variables for Confirmed and Probable Ebola Cases, According to Country, as of September 14, 2014.

<table>
<thead>
<tr>
<th>Variable</th>
<th>All Countries</th>
<th>Guinea</th>
<th>Liberia</th>
<th>Nigeria</th>
<th>Sierra Leone</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no. of days</td>
<td>no. of patients with data</td>
<td>no. of days</td>
<td>no. of patients with data</td>
<td>no. of days</td>
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<tr>
<td><strong>Incubation period</strong></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Single-day exposures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observed†</td>
<td>9.4±7.4</td>
<td>500</td>
<td>10.7±8.7</td>
<td>35</td>
<td>9.5±6.6</td>
</tr>
<tr>
<td>Fitted‡</td>
<td>9.1±7.3</td>
<td>500</td>
<td>9.9±9.8</td>
<td>35</td>
<td>9.4±6.7</td>
</tr>
<tr>
<td>Multi-day exposures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Observed†</td>
<td>11.4±NA</td>
<td>155</td>
<td>10.9±NA</td>
<td>20</td>
<td>11.7±NA</td>
</tr>
<tr>
<td>Fitted‡</td>
<td>9.7±5.5</td>
<td>155</td>
<td>8.3±4.5</td>
<td>20</td>
<td>9.9±5.7</td>
</tr>
<tr>
<td><strong>Serial interval§</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Observed</td>
<td>15.3±9.1</td>
<td>92</td>
<td>19.0±11.0</td>
<td>40</td>
<td>13.1±6.6</td>
</tr>
<tr>
<td>Fitted§</td>
<td>15.3±9.3</td>
<td>92</td>
<td>19.0±11.2</td>
<td>40</td>
<td>13.1±7.8</td>
</tr>
<tr>
<td><strong>R0</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (95% CI)</td>
<td>—</td>
<td></td>
<td>1.71 (1.44–2.01)</td>
<td>1.83 (1.72–1.94)</td>
<td>1.2 (0.67–1.96)</td>
</tr>
<tr>
<td>Doubling time — days (95% CI)</td>
<td>—</td>
<td></td>
<td>17.53 (13.18–26.64)</td>
<td>15.78 (14.4–17.37)</td>
<td>59.75 (13.27–∞)</td>
</tr>
<tr>
<td><strong>R</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (95% CI)</td>
<td>—</td>
<td></td>
<td>1.81 (1.60–2.03)</td>
<td>1.51 (1.41–1.60)</td>
<td>1.38 (1.27–1.51)</td>
</tr>
<tr>
<td>Doubling time — days (95% CI)</td>
<td>—</td>
<td></td>
<td>15.7 (12.9–20.3)</td>
<td>23.6 (20.2–28.2)</td>
<td>NC</td>
</tr>
<tr>
<td><strong>Interval from symptom onset</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To hospitalization</td>
<td>5.0±4.7</td>
<td>1135</td>
<td>5.3±4.3</td>
<td>484</td>
<td>4.9±5.1</td>
</tr>
<tr>
<td>To hospital discharge</td>
<td>16±6.5</td>
<td>267</td>
<td>16.3±6.1</td>
<td>152</td>
<td>15.4±8.2</td>
</tr>
<tr>
<td>To death</td>
<td>7.5±6.8</td>
<td>594</td>
<td>6.4±5.3</td>
<td>248</td>
<td>7.9±8.0</td>
</tr>
</tbody>
</table>
› Rapid roll-out of dozens of testing laboratories offering RT-PCR across the 3 affected countries

› However, due to logistical issues and overwhelming demand, turnaround times were suboptimal, particularly at the peak of the epidemic

› 3 hours → >24 hours
Situation late June 2015

New cases* of Ebola infection per week
To July 5th 2015

Guinea

Liberia

Sierra Leone

Source: WHO

*Confirmed and probable

Economist.com
Suspected Ebola Virus Disease: Case Definition

- Laboratory and clinical treatment centre capacity was overwhelmed at the peak of the epidemic
- A good case definition was essential to be able to assess who needed to be quarantined and tested

Ebola virus: Patients turned away at Sierra Leone treatment centres

6 October 2014 Last updated at 23:05 BST
Suspected Ebola Virus Disease: Case Definition

Any person, alive or dead, suffering or having suffered from a sudden onset of high fever, and contact with:

- a suspected, probable or confirmed Ebola case; or a dead or sick animal

OR

Three of the symptoms below, and contact with a suspected, probable or confirmed Ebola case

OR

Any person with sudden onset of high fever and at least three of the following symptoms:

- headaches
- diarrhea
- aching muscles or joints
- breathing difficulties
- vomiting
- lethargy
- difficulty swallowing
- anorexia / loss of appetite
- stomach pain
- hiccups

OR

Any person with inexplicable bleeding or miscarriage

OR

Any sudden, inexplicable death (corpses should be taken directly to morgue via separate access route)
Differential Diagnosis?

› Ebola
› Malaria
› Gastroenteritis
› Dengue and other arboviruses
› Typhoid
› Bacterial Sepsis
› Leptospirosis
› Viral hepatitis
› HIV seroconversion
› Lassa Fever
A. 57 yo female ICU physician at a large hospital at Freetown
- 2 days prior to presentation, developed fever to 38 degrees, lethargy, poor appetite and diarrhoea. No response to artemether-lumefantrine (3 doses) or metronidazole (1 dose)

B. 52 yo female laboratory technician at a large maternity hospital in Freetown
- 1 day prior to presentation, developed fever to 38, abdominal pain, nausea
- 11 days prior to onset of illness, a patient at her hospital was diagnosed with ebola after a 6 day admission for postpartum haemorrhage. Several blood samples had been processed in the laboratory prior to diagnosis.

C. A 32 yo male nurse working in an ebola treatment centre
- 3 days prior to presentation developed abrupt onset of fever (39.4), headache, myalgia, arthralgia, anorexia and fatigue

D. A 39 yo male pharmacist at an ebola holding centre (suspected cases)
- 1 day prior to presentation developed fever to 38.2, weakness, anorexia, nausea and palpitations
- Centre had had no ebola cases for 100 days, pharmacist had little or no direct patient contact

E. A 34 yo male nursing student working at a maternity hospital
- Two days of sore throat, one day of nausea, diarrhoea and fatigue
- 24 days prior: Inserted a urinary catheter into a patient subsequently diagnosed with Ebola

**Diagnoses?**

A. Malaria
B. Malaria and ETEC
C. Ebola
D. Malaria
E. Ebola
Clinical features of patients isolated for suspected Ebola virus disease at Connaught Hospital, Freetown, Sierra Leone: a retrospective cohort study

Marta Lado, Naomi F Walker, Peter Baker, Shamil Haroon, Colin S Brown, Daniel Youkee, Neil Studd, Quaan Kessete, Rishma Maini, Tom Boyles, Eva Hanciles, Alie Wurie, Thaim B Kamara, Oliver Johnson, Andrew J M Leather

› 724 patients admitted to the Ebola Holding Unit for testing
<table>
<thead>
<tr>
<th>Risk factor*†</th>
<th>Sensitivity (95% CI)</th>
<th>Specificity (95% CI)</th>
<th>Likelihood ratio positive (95% CI)</th>
<th>Likelihood ratio negative (95% CI)</th>
<th>PPV (95% CI)</th>
<th>NPV (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk factor*†</td>
<td>21.6 (17.9-25.6)</td>
<td>84.6 (79.6-88.8)</td>
<td>1.4 (1.4-2.0)</td>
<td>0.9 (0.9-1.0)</td>
<td>714 (63.2-78.7)</td>
<td>37.7 (33.7-41.7)</td>
</tr>
<tr>
<td>Fever</td>
<td>85.9 (82.4-89.0)</td>
<td>16.4 (12.0-21.6)</td>
<td>1.0 (1.0-1.5)</td>
<td>0.9 (0.6-1.2)</td>
<td>65.1 (61.1-68.9)</td>
<td>39.0 (29.7-49.1)</td>
</tr>
<tr>
<td>Vomiting*</td>
<td>55.7 (51.0-60.4)</td>
<td>55.2 (48.8-61.5)</td>
<td>1.2 (1.1-1.5)</td>
<td>0.8 (0.7-0.9)</td>
<td>69.3 (64.3-74.0)</td>
<td>40.7 (35.4-46.1)</td>
</tr>
<tr>
<td>Haematemesis</td>
<td>21.6 (6.0-3.2)</td>
<td>98.4 (96.0-99.6)</td>
<td>1.0 (0.3-3.3)</td>
<td>1.0 (1.0-1.0)</td>
<td>63.6 (30.8-89.1)</td>
<td>35.5 (32.0-39.2)</td>
</tr>
<tr>
<td>Melaena</td>
<td>4.2 (2.5-6.5)</td>
<td>98.4 (96.0-99.6)</td>
<td>2.6 (0.9-7.6)</td>
<td>1.0 (1.0-1.0)</td>
<td>82.6 (61.2-95.0)</td>
<td>36.2 (32.6-39.9)</td>
</tr>
<tr>
<td>Diarrhoea*</td>
<td>44.9 (40.3-49.6)</td>
<td>64.0 (57.7-70.0)</td>
<td>1.3 (1.0-1.5)</td>
<td>0.9 (0.8-1.0)</td>
<td>69.4 (63.8-74.6)</td>
<td>39.0 (34.3-43.9)</td>
</tr>
<tr>
<td>Intense fatigue*</td>
<td>74.4 (70.2-78.4)</td>
<td>37.2 (31.2-43.5)</td>
<td>0.6 (0.5-0.6)</td>
<td>1.2 (1.1-1.3)</td>
<td>68.3 (64.0-72.4)</td>
<td>44.5 (37.6-51.5)</td>
</tr>
<tr>
<td>Anorexia</td>
<td>38.5 (34.0-43.2)</td>
<td>63.2 (56.9-69.2)</td>
<td>1.1 (0.9-1.3)</td>
<td>1.0 (0.9-1.1)</td>
<td>65.5 (59.5-71.2)</td>
<td>36.2 (31.6-40.9)</td>
</tr>
<tr>
<td>Abdominal pain</td>
<td>32.4 (28.1-36.9)</td>
<td>64.4 (58.1-70.3)</td>
<td>0.9 (0.7-1.1)</td>
<td>1.1 (0.9-1.2)</td>
<td>62.3 (55.8-68.5)</td>
<td>34.4 (30.1-38.9)</td>
</tr>
<tr>
<td>Chest pain</td>
<td>9.7 (7.2-12.8)</td>
<td>90.0 (85.6-93.4)</td>
<td>1.0 (0.6-1.6)</td>
<td>1.0 (1.0-1.1)</td>
<td>63.8 (51.3-75.0)</td>
<td>35.5 (31.8-39.4)</td>
</tr>
<tr>
<td>Muscle pain</td>
<td>23.0 (19.2-27.1)</td>
<td>72.8 (66.8-78.2)</td>
<td>0.9 (0.7-1.1)</td>
<td>1.1 (1.0-1.2)</td>
<td>60.5 (52.7-67.8)</td>
<td>34.3 (30.2-38.5)</td>
</tr>
<tr>
<td>Joint pain</td>
<td>18.3 (14.8-22.2)</td>
<td>74.0 (68.1-79.3)</td>
<td>0.7 (0.5-0.9)</td>
<td>1.1 (1.0-1.2)</td>
<td>56.1 (47.7-64.2)</td>
<td>33.3 (29.4-37.4)</td>
</tr>
<tr>
<td>Headache</td>
<td>17.0 (13.6-20.7)</td>
<td>76.8 (71.1-81.9)</td>
<td>0.7 (0.5-1.0)</td>
<td>1.1 (1.0-1.2)</td>
<td>57.0 (48.2-65.5)</td>
<td>33.7 (29.9-37.8)</td>
</tr>
<tr>
<td>Cough</td>
<td>7.1 (4.9-9.8)</td>
<td>92.8 (88.9-95.7)</td>
<td>1.0 (0.6-1.7)</td>
<td>1.0 (1.0-1.1)</td>
<td>64.0 (49.2-77.1)</td>
<td>35.5 (31.8-39.3)</td>
</tr>
<tr>
<td>Dyspnoea</td>
<td>5.5 (3.6-8.0)</td>
<td>94.8 (91.3-97.2)</td>
<td>1.1 (0.6-2.0)</td>
<td>1.0 (1.0-1.0)</td>
<td>65.8 (48.6-80.4)</td>
<td>35.6 (31.9-39.4)</td>
</tr>
<tr>
<td>Dysphagia</td>
<td>8.2 (5.8-11.1)</td>
<td>89.2 (84.7-92.8)</td>
<td>0.8 (0.5-1.2)</td>
<td>1.0 (1.0-1.1)</td>
<td>57.8 (44.8-70.1)</td>
<td>34.8 (31.2-38.7)</td>
</tr>
<tr>
<td>Sore throat</td>
<td>9.5 (6.9-12.5)</td>
<td>92.0 (87.9-95.0)</td>
<td>1.2 (0.7-2.0)</td>
<td>1.0 (0.9-1.0)</td>
<td>68.3 (55.3-79.4)</td>
<td>35.9 (32.2-39.7)</td>
</tr>
<tr>
<td>Jaundice</td>
<td>1.1 (0.4-2.6)</td>
<td>99.2 (97.1-99.9)</td>
<td>1.4 (0.3-7.0)</td>
<td>1.0 (1.0-1.0)</td>
<td>71.4 (29.0-96.3)</td>
<td>35.6 (32.0-39.3)</td>
</tr>
<tr>
<td>Conjunctivitis*</td>
<td>31.1 (26.8-35.5)</td>
<td>85.2 (80.2-89.4)</td>
<td>2.1 (1.5-2.9)</td>
<td>0.8 (0.8-0.9)</td>
<td>79.2 (72.5-84.9)</td>
<td>40.5 (36.3-44.8)</td>
</tr>
<tr>
<td>Rash</td>
<td>1.1 (0.4-2.6)</td>
<td>98.4 (96.0-99.6)</td>
<td>0.7 (0.2-2.5)</td>
<td>1.0 (1.0-1.0)</td>
<td>55.6 (21.2-86.3)</td>
<td>35.4 (31.8-39.1)</td>
</tr>
<tr>
<td>Hiccups*</td>
<td>11.7 (8.9-15.0)</td>
<td>93.6 (89.8-96.3)</td>
<td>1.8 (1.1-3.1)</td>
<td>0.9 (0.9-1.0)</td>
<td>76.8 (65.1-86.1)</td>
<td>36.9 (33.1-40.7)</td>
</tr>
<tr>
<td>Pain behind eye</td>
<td>0.9 (0.2-2.2)</td>
<td>99.2 (97.1-99.9)</td>
<td>1.1 (0.2-6.0)</td>
<td>1.0 (1.0-1.0)</td>
<td>66.7 (22.3-957)</td>
<td>35.5 (32.0-39.2)</td>
</tr>
<tr>
<td>Loss of conciousness</td>
<td>3.1 (1.7-5.1)</td>
<td>97.6 (94.8-99.1)</td>
<td>1.3 (0.5-3.3)</td>
<td>1.0 (1.0-1.0)</td>
<td>70.0 (45.7-88.1)</td>
<td>35.7 (32.1-39.4)</td>
</tr>
<tr>
<td>Confusion*</td>
<td>19.8 (16.3-23.8)</td>
<td>92.0 (87.9-95.0)</td>
<td>2.5 (1.6-3.9)</td>
<td>0.9 (0.8-0.9)</td>
<td>81.8 (73.3-88.5)</td>
<td>38.7 (34.8-42.8)</td>
</tr>
<tr>
<td>≥3 major symptoms*</td>
<td>57.8 (52.1-61.4)</td>
<td>70.8 (64.7-76.4)</td>
<td>2.0 (1.6-2.4)</td>
<td>0.6 (0.5-0.7)</td>
<td>77.9 (73.1-82.3)</td>
<td>47.5 (42.3-52.7)</td>
</tr>
<tr>
<td>WHO case definition</td>
<td>79.7 (75.8-83.3)</td>
<td>31.5 (26.0-37.6)</td>
<td>1.2 (1.1-1.3)</td>
<td>0.6 (0.5-0.8)</td>
<td>67.5 (63.4-71.4)</td>
<td>46.6 (39.1-54.2)</td>
</tr>
</tbody>
</table>
Case finding, isolation and laboratory testing: practical aspects
Supected Ebola Cases

› Suspected ebola cases admitted to “holding” facility while awaiting Ebola PCR test results
Need for faster case detection and verification

› 5 day delay from symptom onset to presentation at a treatment centre for testing and treatment
  - Ongoing transmission in the community

› Case definition lacked specificity and sensitivity
  - Potential transmission in the holding centres while awaiting testing
  - Further transmission from those released back into the community without testing

› Turnaround time for laboratory testing >24 hours
  › Potential transmission in the holding centres while awaiting testing
The figure illustrates the number of cases averted (×1000) over a range of EVD treatment centres (ETCs) and start dates. The lines represent different start dates: Oct 15, Oct 31, and Nov 15.

Using case ascertainment from Oct 31, 2014, and delayed until Nov 15, 2014, the figure shows the effects of expansions in EVD treatment centres at rates of 6 and 12 centres per week, respectively. The case-ascertainment rates are 1A: 0%, 1B: 25%, 2A: 50%, 2B: 75%, 3A: 100%, and 3B: 125%. The figure aims to show the effects under all modelled deployment schedules for EVD treatment centres.
Impact of time to diagnosis on control efforts

Average time from symptom onset to diagnosis is 5 days
Key role of EVD testing in outbreak termination

› Diagnostic test that is
  - Accessible
  - Rapid
  - Accurate

› Has the potential to
  - rapidly increase case ascertainment rates
  - reduce community transmission
  - Reduce holding centre transmission
  - Lead to termination of the outbreak

› Ideal scenario for the use of reliable POCT
Antigen detection POCTs for EVD

› Corgenix ReEBOV Antigen Rapid Test kit
› DSTL/BBI Rapid Diagnostic Antigen Test for Ebola Virus Disease
› Oraquick Ebola Rapid Antigen Test
› SD QLine Ebola Zaire Ag Rapid Test
Antigen detection POCTs for EVD

› Corgenix ReEBOV Antigen Rapid Test kit
› DSTL/BBI Rapid Diagnostic Antigen Test for Ebola Virus Disease
› Oraquick Ebola Rapid Antigen Test
› SD QLine Ebola Zaire Ag Rapid Test
ReEBOV Antigen Rapid Test kit for point-of-care and laboratory-based testing for Ebola virus disease: a field validation study

Mara Jana Broadhurst, John Daniel Kelly, Ann Miller, Amanda Semper, Daniel Bailey, Elisabetta Groppelli, Andrew Simpson, Tim Brooks, Susan Hula, Wilfred Nyoni, Alhaji B Sankoh, Santigi Kanu, Alhaji Jalloh, Quy Ton, Nicholas Sarchet, Peter George, Mark D Perkins, Betsy Wonderly, Megan Murray, Nira R Pollock
ReEBOV Antigen Rapid Test kit (Corgenix)

- Detects viral matrix (VP40) antigen in a ‘dipstick’ format
- Lateral flow assay with colloidal gold conjugated to anti-VP40 antibodies
- Results read at 15-25 minutes
- Capillary or EDTA blood
- Requires refrigeration
ReEBOV Antigen Rapid Test kit (Corgenix)

114 patients presenting with symptoms potentially consistent with Ebola virus disease

- 8 not tested by rapid diagnostic test or PCR
  - 3 died before testing
  - 3 tested previously
  - 1 judged ineligible
  - 1 unable to obtain blood sample

106 patients tested by rapid diagnostic test and RT-PCR

- 0 invalid by rapid diagnostic test
- 1 failed RT-PCR test

105 patients with paired rapid diagnostic test and RT-PCR results

- 28 patients were rapid diagnostic test-positive and PCR-positive
- 6 patients were rapid diagnostic test-positive and PCR-negative
- 0 patients were rapid diagnostic test-negative and PCR-positive
- 71 patients were rapid diagnostic test-negative and PCR-negative
### Table 1: Performance of the ReEBOV rapid diagnostic test versus real-time RT-PCR (altona) *

<table>
<thead>
<tr>
<th></th>
<th>ReEBOV rapid diagnostic test on fingerstick samples (point of care; n=105)</th>
<th>ReEBOV rapid diagnostic test on venepuncture whole blood samples (reference laboratory; n=277)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevalence (% of patients/specimens that tested positive by RT-PCR)</td>
<td>28/105 (26.7%)</td>
<td>45/277 (16.2%)</td>
</tr>
<tr>
<td>Sensitivity</td>
<td>28/28 (100%; 87.7–100)</td>
<td>45/45 (100%; 92.1–100)</td>
</tr>
<tr>
<td>Specificity</td>
<td>71/77 (92.2%; 83.8–97.1)</td>
<td>214/232 (92.2%; 88.0–95.3)</td>
</tr>
<tr>
<td>Negative predictive value</td>
<td>71/71 (100%; 94.9–100)</td>
<td>214/214 (100%; 98.3–100)</td>
</tr>
<tr>
<td>Positive predictive value</td>
<td>28/34 (82.4%; 65.5–93.2)</td>
<td>45/63 (71.4%; 58.7–82.1)</td>
</tr>
</tbody>
</table>

Data are n/N (\%) or n/N (\%; 95\% CI). RT-PCR = real-time reverse transcription PCR. *The altona real-time RT-PCR assay was done on fresh venepuncture plasma samples.

16 ReEBOV+/RT-PCR- samples retested by second PCR method – 6/16 positive by second PCR method (low Ct value)
ReEBOV Antigen Rapid Test kit (Corgenix)

Control line

Test line

<table>
<thead>
<tr>
<th>RT-PCR result (venepuncture plasma)</th>
<th>Positive</th>
<th>Negative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid diagnostic test result, reader 1/reader 2 (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positive/positive (30)</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>Negative/negative (70)</td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Positive/negative or negative/positive (5)</td>
<td>2*</td>
<td>3</td>
</tr>
</tbody>
</table>

Rapid diagnostic test, fingerstick samples (point of care; n=105)

Rapid diagnostic test, venepuncture whole blood samples (reference laboratory; n=277)

Rapid diagnostic test result, reader 1/reader 2 (n)
| Positive/positive (59) | 43 | 16 |
| Negative/negative (214) | 0 | 214 |
| Positive/negative or negative/positive (4) | 2* | 2 |

RT-PCR = real-time reverse transcription PCR. *All disagreements in this category were negative/1+ positive, resolved by third reader to 1+ positive.

Table 3: Interoperator agreement for ReEBOV rapid diagnostic test results
WHO Emergency Use Assessment and Listing (EUAL) procedure
- Sensitivity 91.8% (84.5-96.8)
- Specificity 84.6% (78.8-89.4)
- (vs RealStar Filovirus Screen RT-PCR Kit 1.0 - WHO-listed benchmark assay)
Nanozyme lateral flow assay

A

Absorbent pad
Control line
Test line
Nitrocellulose membrane

EBOV-GP (ng/mL)
0  0.1  1  10  100  1000

Standard Colloidal Gold Strip

B

EBOV-GP (ng/mL)
0  0.1  1  10  100  1000

Nanozyme Strip

Gold

MNP

EBOV
› POCT will still have a role in future EVD outbreaks

› Lessons learned will be applicable to other emerging infections

› Rapid pipeline for development and approval of POCTs crucial
Questions?

Lab testing for Ebola is quick and treatment is fast.

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