Entry and exit screening methodology
(based on the results of bibliographic review)

Training course on evidence-based best practices on entry/exit screening for infectious diseases in humans

“This document was produced within a framework contract with the Union, request for service 2017 72 06 on the Training on Entry-Exit screening and that the opinions expressed are those of the contractors only and do not represent the Contracting Authority's official position”.

30th -31st January 2019
Exit and entry screening protocols

- Technology for body temperature measurement
- Symptoms assessment
- Exposure assessment
Entry/Exit screening

Airports

Seaports

Ground crossings
Potential points of public health hazard detection (airport)

Entry screening

Exit screening

PoE departure

During embarkation

On board conveyance

During transit between flights or stopovers

At PoE of destination (disembarkation)

After travel

(WHO, 2014 – 2 guidances)
Primary screening

*Initial evaluation:*
- Public health questionnaire
- Visual inspection for signs /symptoms
- Temperature measurement

Secondary screening

*Further evaluation:*
- Public health interview
- Questionnaire
- Temperature measurement
- Medical examination
WHO Recommendations: exit screening

1. Planning
2. Communication strategies
3. Primary screening
4. Secondary screening
5. Medical referral
6. Travel restrictions
7. Data management
Consumers, Health, Agriculture and Food Executive Agency

Primary exit screening algorithm for Ebola virus disease

Traveller complete public health questionnaire, has temperature measured. Primary screening personnel assess visually for illness and review traveller public health questionnaire.

Is traveller exhibiting signs or symptoms of EVD?  
Has traveller answered yes on traveller public health questionnaire?  
Does traveller have temperature above 38°C?

If yes to at least one question, refer to secondary screening. Boarding is refused until evaluation is completed.

Traveller may continue to check-in if:
- All answers to questions on the traveller public health questionnaire are “no”
- They do not appear to exhibit any signs and/or report any symptoms of disease AND
- They do not have a fever of 38 degrees Celsius or 100.4 degrees Fahrenheit or higher

(WHO, 2014)
Consumers, Health, Agriculture and Food Executive Agency

Secondary exit screening algorithm for Ebola virus disease

Traveller referred for further evaluation. Secondary screening includes public health interview, completion of secondary screening form, additional temperature measurement. This may also include focused medical examination.

Public health interview and completion of secondary screening form by screening personnel + Temperature measurement + Focused medical examination

Evaluation by secondary screeners with guidance from public health authorities

Deny boarding to traveller. Refer to medical facility for treatment or public health observation or monitoring

Traveller may continue to check-in if:
- They have no known risks for EVD exposure as determined by the secondary screening public health interview
- They do not appear to exhibit any of the signs or report any symptoms consistent with EVD as determined by the secondary screening public health interview, AND
- They do not have a fever 38.6 degrees Celsius or 101.5 degrees Fahrenheit or higher, as verified during the secondary screening

(WHO, 2014)
Screening protocol

Symptoms assessment

- Visual inspection
- Fever screening
- Questionnaire

Exposure assessment

- Interview
- Questionnaire

Medical evaluation

- Clinical examination
- Laboratory confirmation
## Example of Health Declaration Card

**Personal data**

- **Flight/ship/train/ground vehicle number/name:**
- **Seat/cabin/coach number/name:**
- **Last (family) name:**
- **First (given) name:**
- **Passport country:**
- **Passport number:**
- **Arrival date:** Day: _Month_ Year Birth date: Day: _Month_ Year
- **Sex:** Male Female
- **E-mail address:**
- **Telephone number (include country code or country name):**
- **Home address:**
- **Addresses for next 21 days:**

**Symptoms**

- **Today or in the past 48 hours, have you had any of the following symptoms?**
  - **Yes**
  - **No**
  - a. Fever (38°C / 100°F or higher), feeling feverish, or having chills?
  - b. Vomiting or diarrhea?
  - c. Severe headaches or body aches?
  - d. Unexplained bruising or bleeding?

- **In the past 21 days, have you done any of the following?**
  - **Yes**
  - **No**
  - e. Lived in the same household or had other contact (e.g. friends, relatives) with a person sick with Ebola?
  - f. Worked in a health-care facility treating Ebola patients or a laboratory analyzing Ebola specimens, or reached a dead body in a country with an Ebola outbreak without using personal protective equipment?

**Exposure**

- **Countries Visited:**
  - **List all countries where you have been in the past 21 days (including airport and port transits and where you live). List the most recent country first (where you boarded). If you need more space, please use the back of the page.**

  1. ____________________________ 3. ____________________________
  2. ____________________________ 4. ____________________________

(©WHO, 2014)
### Example of secondary screening form (1/2)

#### Personal data

- **Family name:**
- **Other name(s):**
- **Age:**
- **Date of Birth:**
- **Passport #:**
- **Passport Country:**
- **Gender:**
- **Male**
- **Female**
- **Head of Household:**
- **Village/Town:**
- **Parish:**
- **Country of Residence:**
- **District:**
- **Sub-County:**
- **Location Where Traveller Either Became Ill or Had Exposure:**
- **Village/Town:**
- **District:**
- **Sub-County:**
- **If different from permanent residence, dates residing at this location:**
- **Date of Exposure:**
- **If Applicable:**

#### Symptoms

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Yes</th>
<th>No</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fever (≥38.6°C or ≥101.4°F):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vomiting/nausea:</strong></td>
<td></td>
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<tr>
<td><strong>Diabetes:</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Intense fatigue/general weakness:</strong></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Anorexia/loss of appetite:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Abdominal pain:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Chest pain:</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Muscle pain:</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Joint pain:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Headache:</strong></td>
<td></td>
<td></td>
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<tr>
<td><strong>Cough:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Difficulty breathing:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Difficulty swallowing:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sore throat:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Jaundice (yellow eyes/gums/skin):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conjunctivitis (red eyes):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Skin rash:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Pain behind eyes/sensitive to light:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Confused or disoriented:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unexplained bleeding from any site:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Yes:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bleeding of the gums:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bleeding from injection site:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nosebleed (epistaxis):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Blood or black stools (melena):</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Extracted from WHO, 2014)
Example of secondary screening form (2/2)

**Exposure**

**Triage & Response**

(WHO, 2014)
Temperature measuring devices

- Oral thermometers
- Rectal thermometers
- Axillary thermometers
- Infrared tympanic (ear) thermometers
- Non-contact infrared thermometers
- Thermal scanner cameras
Temperature measuring devices – advantages and disadvantages

- **Oral and rectal thermometers**
  - invasive and poorly tolerated
- **Axillary thermometers**
  - need to hold thermometer in axilla for 30 seconds or longer
- **Infrared tympanic thermometers**
  - easy to use
  - can be inaccurate due to ear wax or insufficient straightening of the ear canal

Non-contact infrared thermometers (NCITs) (1/3)

Advantages

1. Some NCITs approved for use as thermometers
2. Measurement of temperature without touching a passenger
3. As accurate as contact thermometers
4. Low cost
5. Easy training
6. Easy to use
7. More accurate than thermal scanner cameras
8. Number of different products available commercially

(ECDC, 2014)
Non-contact infrared thermometers (NCITs) (2/3)

Disadvantages

1. Measures skin temperature (not core body temperature)
2. Assessed to perform only moderately well in detecting fever
3. Requires more personnel for screening
4. Slower for screening large numbers of passengers
5. Some NCITs need a confirmation measurement of temperature to increase accuracy

(ECDC, 2014)
Non-contact infrared thermometers (NCITs) (3/3)

Very few studies on sensitivity and specificity; according to US CDC reports:

- **Sensitivity**: 80–99%, meaning that between 1 and 20% of the febrile passengers will not be detected (false negative)
- **Specificity**: 75–99%, meaning that between 1 and 25% of non-febrile passengers will be reported as febrile (false positive)

(ECDC, 2014)
Thermal scanner cameras (TSCs) (1/3)
(Infrared thermal cameras/Thermal scanners/Infrared thermoscaner)

Advantages

1. TSCs can measure temperature from a greater distance
2. TSCs can be used to screen large numbers of passengers
3. → Faster operations

(ECDC, 2014)
Disadvantages

1. Not evaluated for use as a primary diagnostic tool or for screening multiple individuals in an uncontrolled environment, such as an airport
2. Not as accurate as NCITs
3. Low specificity
4. More difficult to use effectively
5. None of TSCs are approved to be used alone to measure temperature
6. Significantly more expensive
Disadvantages

6. Require more advanced training for their use
7. More frequent calibration
8. Measuring skin temperature (not core body temperature)
9. Affected by changes in environmental conditions
10. TSCs tend to be used with higher thresholds for fever to avoid detecting too many false positive febrile passengers
11. TSCs require very strict application of standards in order to perform accurately

(ECDC, 2014)
According to bibliographic review findings (1/3)

Vector-borne, entry screening

<table>
<thead>
<tr>
<th>Country/PoE/Disease</th>
<th>Primary screening: Type of TMD</th>
<th>Secondary screening: Type of TMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taiwan/airport/Chikungunya infection</td>
<td><strong>Infrared cameras</strong></td>
<td><strong>Ear thermometer</strong></td>
</tr>
<tr>
<td>Taiwan/airport/Dengue fever</td>
<td><strong>Infrared cameras</strong></td>
<td><strong>Ear thermometer</strong></td>
</tr>
<tr>
<td>Taiwan/airport/Dengue fever</td>
<td><strong>Thermal scanning by non-contact infrared thermometers or infrared thermal camera</strong></td>
<td><strong>Ear thermometer</strong></td>
</tr>
<tr>
<td>Taiwan/airport/Zika</td>
<td><strong>Infrared cameras</strong></td>
<td><strong>Ear thermometer</strong></td>
</tr>
</tbody>
</table>
According to bibliographic review findings (2/3)

**Ebola virus disease, entry screening**

<table>
<thead>
<tr>
<th>Country/PoE</th>
<th>Primary screening: Type of TMD</th>
<th>Secondary screening: Type of TMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK/airport</td>
<td>Ear thermometer</td>
<td>-</td>
</tr>
<tr>
<td>UK/train station</td>
<td>Ear thermometer</td>
<td>-</td>
</tr>
<tr>
<td>US/airport</td>
<td>Non-contact infrared thermometers</td>
<td>-</td>
</tr>
<tr>
<td>Guinea, Liberia and Sierra Leone /airport</td>
<td>Non-contact handheld infrared thermometer</td>
<td>Non-contact handheld thermometer</td>
</tr>
</tbody>
</table>

**Ebola virus disease, exit screening**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Guinea, Liberia and Sierra Leone /airport</td>
<td>Non-contact handheld infrared thermometer</td>
<td>Non-contact handheld thermometer</td>
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</table>
According to bibliographic review findings (3/3)

Influenza Pandemic (H1N1) 2009, entry screening

<table>
<thead>
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<th>Primary screening: Type of TMD</th>
<th>Secondary screening: Type of TMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Japan/airport</td>
<td>Handheld infrared thermoscanner on board,</td>
<td>Ear or axillary thermometer</td>
</tr>
<tr>
<td></td>
<td>Fixed infrared thermoscanner at terminal</td>
<td></td>
</tr>
<tr>
<td>Singapore/airport</td>
<td>Thermal scanners</td>
<td>-</td>
</tr>
<tr>
<td>Taiwan/airport</td>
<td>Infrared cameras</td>
<td>-</td>
</tr>
</tbody>
</table>

SARS, entry screening

<table>
<thead>
<tr>
<th>Country/PoE</th>
<th>Primary screening: Type of TMD</th>
<th>Secondary screening: Type of TMD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia/airport</td>
<td>-</td>
<td>Ear thermometer</td>
</tr>
<tr>
<td>Australia/seaport</td>
<td>-</td>
<td>Ear thermometer</td>
</tr>
<tr>
<td>Canada/airport</td>
<td>Thermal scanners</td>
<td>Oral thermometer</td>
</tr>
<tr>
<td>Singapore/airport, seaport, road entry points</td>
<td>Thermal scanners</td>
<td>-</td>
</tr>
</tbody>
</table>

SARS, exit screening

<table>
<thead>
<tr>
<th>Country/PoE</th>
<th>Primary screening: Type of TMD</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Canada/airport</td>
<td>Thermal scanners</td>
<td>Oral thermometer</td>
</tr>
</tbody>
</table>
**SARS** (entry screening)

**Australia:** Ear thermometer
1.84 million arriving passengers checked: 4 suspected cases detected but not confirmed later; 5 probable cases and 20 suspected cases missed;

**Canada:** TSCs
6.5 million people screened: 9,100 febrile travellers detected (0.001% of all arrivals); 0 cases identified;

**Hong Kong:** TSCs
35.6 million people screened: 2 SARS cases identified;

**Singapore:** TSCs
0.4 million people screened; 0 cases detected;

(Samaan et al., 2004; St John et al., 2005; Advisory Committee on SARS and Public Health, 2003; Wilder-Smith et al., 2003)
H1N1 2009 (entry screening)

Japan: TSCs and ear or axillary thermometer
441,041 passengers and 30,692 airline crew members screened: 805 persons rapid diagnostic testing; 10 tested positive

Australia: TSCs
181,759 passengers screened: 118 (0.06%) fever identified

Korea: TSCs and ear thermometer
355,887 arrivals (61% of the total arrivals): 608 symptomatic arrivals (0.2%) including 6 febrile arrivals; fever prevalence = 0.002%
self-reported fever significantly positively associated with ear temperature (p<0.001)
difference between thermal camera temperature (36.83°C) & ear temperature (38.14°C) not statistically significant

(Zhang et al., 2012, Yu et al., 2012; Nishiura and Kamiya, 2011; Priest et al., 2013; McBride et al., 2010; Cho and Yoon, 2014)
**Ebola virus disease (entry screening)**

**United States: NCITs**
Overall, approximately 10,800 persons screened:
657 referred for additional evaluation;
0 EVD diagnoses

**UK: Ear thermometer**
3,388 passengers screened:
130 detected
0 EVD diagnoses

(Brown et al., 2014; Frieden and Damon, 2015; Koonin et al., 2015; Nunn et al., 2015)
Ebola virus disease (exit screening)

Guinea, Liberia, Sierra Leone: NICT
36,000 travellers screened: 77 detected
0 EVD cases confirmed

(ECDC, 2014; CDC, 2014a; CDC, 2014b)
Skin temperature as a proxy for body temperature

1. Skin temperature tends to under-estimate the body temperature

2. NCITs and TSCs use algorithms for more accurate body temperature measurement

3. Environmental conditions affect relation between skin and body temperature: a 10°C difference in air temperature may cause a 2°C difference in face/surface temperature in spite of a constant internal body temperature

(ECDC, 2014; Cho and Yoon, 2014)
Non-detection of incubating passengers

Using temperature measurement allows detection of febrile passenger;
Duration of incubation period affects likelihood of infected persons developing symptoms during flights;

- **Short incubation period**
  - **Influenza** (0.7–2.8 days)
  - Higher likelihood of disease progression during a flight

- **Longer incubation period**
  - **SARS** (2-14 days)
  - Small likelihood of symptomatic disease progression during a flight

- **Long incubation period**
  - **Ebola Virus Disease** (2-21 days)
  - Lower likelihood of disease progression during a flight

ECDC, 2014
Conclusions

1. Use of screening for infectious diseases ...
   - has **not proven** to be effective **to prevent or delay transmission** in past epidemics such as SARS
   - is able to detect travellers presenting with **high fever** with an appropriate level of performance when **using appropriate equipment** operated by **trained staff** and **requires protocols and resources** to further investigate possibly febrile passengers detected

2. Complementing temperature screening with visual inspection and health questionnaire (symptoms & exposure assessment) ...
   - may increase the performance of screening
   - may identify possibly contagious travellers missed by temperature screening e.g. due use of antipyretic drugs
   - may identify travellers with high-risk exposure and help to enrol them in monitoring schemes or quarantine
Thank you!
Measuring the temperature in the inner canthi

Source: https://www.testo.com/en-IN/medical-thermography
Difference core temperature – skin temperature
Comparing tympanic thermometry with:
- **Rectal thermometry** - overall pooled mean difference 0.22°C (95% limits of agreements [LOA] –0.44 to 1.30°C)
- **Oral temperature** - mean difference ranging from 0.05°C (95% CI 0.01 to 0.08) to 0.12°C (95% CI 0.07 to 0.17) depending of the investigator
- **Pulmonary artery catheter temperature** - mean difference within the ±0.2 °C range
- **Nasopharyngeal probe** - mean difference of 0.19°C (95% LOA –0.32 to 0.71) or 0.98°C (95% LOA 0.42 to 1.54) depending on the device

**Conclusions:**
- 2 Systematic Reviews (ST) in favor of the utilization of tympanic thermometry
- 1 SR poor accuracy (with an LOA spanning over 1.74 °C)
- 6 studies in favor of the utilization of tympanic thermometry
- 1 study the variability of measurements with tympanic thermometry was too high
- 1 study did not express conclusions in favor or against use of the device
Comparing infrared non-contact thermometers with:

- **tympanic thermometry** - sensitivities 4.0 - 89.6%, specificities 75.4 - 99.6% (this ST compared both skin thermometers and cameras)
- **rectal temperature** - mean difference of $0.029 \pm 0.01^\circ C$ and of $-0.02 \pm 0.277^\circ C$ depending of the model used or a mean difference of $-0.1^\circ F$
- **axillary temperature** - mean difference of $0.11^\circ C$
- **nasopharyngeal probe temperature** - mean difference of $0.66^\circ C$ (95% LOA $-0.15$ to $1.48$)

**Conclusions:**

- **3 studies expressed conclusions in favor of the utilization of infrared skin thermometry**
- **3 studies stated that this type of device is lacking accuracy**
- **1 SR poor scientific evidence available for the utilization of infrared skin thermometers and thermal scanners for mass screening**
The accuracy of thermal scanners (infrared cameras) for detecting febrile individuals

Comparing thermal scanners with:
oral thermometers - sensitivities 80.0–91.0%
oral, rectal or axillary temperature - sensitivities 85.7–86.3%
tympanic temperature - mean difference of −1.31°C
tympanic + oral temperatures - mean difference of −3.10°C

Conclusions:

- 4 studies expressed conclusions in favor of the utilization of thermal scanners for fever detection,
- 1 study stated that this type of device is unsuitable for this purpose due to a high proportion of false positives

Fever as a criterion for EVD screening

1. Onset of symptoms: sudden and generally includes fever
2. 87% of the more than 4,000 patients (3,343 confirmed and 667 probable Ebola cases) in Guinea, Liberia, Nigeria, and Sierra Leone as of 14 September 2014 presented with fever
3. → Fever is a relatively sensitive symptom for EVD-detection; 13% of symptomatic patients may not present initially with fever the course of the disease;
4. Fever: one of the most common symptoms of infectious disease
5. Taking unspecific symptoms like fever into account, the positive predictive value of a positive screening result for a rare disease is very low, particularly when the prevalence of other febrile infectious diseases among travellers is higher than that of Ebola (e.g. influenza, malaria)
6. Fever is a symptom that can be temporarily concealed by using antipyretic drugs; Passengers aware of presenting with fever may conceal it for fear of being prevented from boarding a flight (exit screening) or entering the country (entry screening);
Example: Fever as a criterion for influenza screening (1/2)

- Christchurch International Airport, New Zealand
- Cross-sectional study
- H1N1 Influenza 2008
- Health questionnaire, temperature testing and respiratory sampling

(Priest et al., 2013)
**Fever as a criterion for EVD screening (2/2)**

### TABLE 3—Sensitivity, Specificity, and Positive Predictive Value of Symptoms and Other Screening Criteria for Identifying Influenza in Arriving International Airline Travelers, Christchurch International Airport, New Zealand, Winter 2008

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Sensitivity, % (95% CI)</th>
<th>Specificity, % (95% CI)</th>
<th>Estimated PPV, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any symptom</td>
<td>84.0 (70.3, 97.6)</td>
<td>83.6 (83.0, 84.2)</td>
<td>5.5</td>
</tr>
<tr>
<td>Cough</td>
<td>59.6 (44.9, 74.3)</td>
<td>93.1 (92.6, 93.5)</td>
<td>9.0</td>
</tr>
<tr>
<td>Sore throat</td>
<td>25.0 (15.5, 34.4)</td>
<td>96.2 (95.9, 96.5)</td>
<td>7.0</td>
</tr>
<tr>
<td>Fever, self-report</td>
<td>11.3 (5.4, 17.1)</td>
<td>99.5 (99.4, 99.6)</td>
<td>20.5</td>
</tr>
<tr>
<td>ILI, self-report</td>
<td>11.5 (5.6, 17.3)</td>
<td>99.6 (99.5, 99.7)</td>
<td>24.7</td>
</tr>
<tr>
<td>Measured temperature $\geq 37.8 , ^\circ \text{C}$</td>
<td>2.6 (0.5, 4.8)</td>
<td>99.9 (99.9, 100.0)</td>
<td>$\ldots^a$</td>
</tr>
<tr>
<td>ILI, using measured temperature</td>
<td>2.5 (0.4, 4.6)</td>
<td>100</td>
<td>$\ldots^a$</td>
</tr>
<tr>
<td>History of contact with someone who was coughing or sneezing</td>
<td>43.2 (30.8, 55.5)</td>
<td>75.5 (74.9, 76.2)</td>
<td>2.0</td>
</tr>
<tr>
<td>Any symptom or contact</td>
<td>86.4 (74.4, 98.3)</td>
<td>67.2 (66.4, 67.9)</td>
<td>2.9</td>
</tr>
<tr>
<td>Any symptom and contact</td>
<td>33.5 (22.2, 44.7)</td>
<td>92.0 (91.6, 92.5)</td>
<td>4.6</td>
</tr>
<tr>
<td>Any symptom and contact with someone visited, worked, lived, traveled, or stayed with</td>
<td>29.8 (19.3, 40.3)</td>
<td>92.4 (92.0, 92.8)</td>
<td>4.3</td>
</tr>
<tr>
<td>Any symptom and age &lt; 25 y</td>
<td>14.6 (7.2, 22.0)</td>
<td>94.6 (94.3, 95.0)</td>
<td>3.0</td>
</tr>
</tbody>
</table>

**Note.** CI = confidence interval; ILI = influenza-like illness (fever and cough or sore throat); PPV = positive predictive value.

$^a$At near 100% specificity, the PPV cannot be reliably estimated.

(Priest et al., 2013)
Conclusions

3. For EVD, even the best temperature screening scheme will:
   • miss up to 20% of febrile symptomatic EVD cases (sensitivity of measurement)
   • miss travellers concealing their fever
   • miss two-thirds of infected cases, still incubating and not yet presenting with symptoms
   • detect cases of fever related to many other infectious diseases such as malaria or influenza

4. TSCs allow rapid temperature screening of large number of travellers
   • relatively low specificity
   • can be used as a first-line screening tool
   • temperature screening alone will only identify at most 25% of all infected travellers
   • need to be complemented by a more accurate measurement of temperature