COVID-19 Surveillance Seminar - July 6, 2020

Leveraging Systems for COVID-19 Surveillance
Integrated Disease Surveillance and Response (IDSR), Malaria, and Polio

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John Painter, Division of Parasitic Diseases and Malaria
Wilbrod Mwanje, African Field Epidemiology Network (AFENET), Uganda

cdc.gov/coronavirus
Integrated Disease Surveillance and Response (IDSR)

- Integrates common surveillance activities across diseases
  - Identify, Report, Analyze and Interpret, Investigate and Confirm, Prepare, Respond, Communicate, Evaluate
  - Activities linked across community, district, and national levels of the health system
- Reporting on country identified priority diseases (e.g. case based, aggregate)
- Standardized data collection tools and data reporting to district level
- Thresholds defined for public health response
- Improved data use through routine data analysis
Incorporating COVID-19 into IDSR

- Include COVID-19 on country priority disease list
- Develop COVID-19 reporting tools
  - Individual case report, aggregate reporting form, contact tracing form
- Train surveillance focal points
  - Case identification using standard case definition
  - Immediate reporting of suspect cases
- Case-based reporting of cases and deaths (aggregate if resources constrained)
- Initiate response strategies based on threshold, for example
  - Investigation and contact tracing for each individual case
  - Population level interventions for clusters and outbreaks
Leveraging Other IDSR Data

- Monitor existing disease surveillance for signals
  - Influenza
  - Malaria
  - Other fever producing diseases

- Indicators to analyze
  - Case and death counts
  - Trends
  - Geographical spread
  - Completeness
  - Timeliness
Leveraging Other Disease Surveillance Strategies

- Identify potential signals overall or by region where there might be missed COVID-19 cases
  - Malaria surveillance
- Incorporate COVID-19 into existing disease surveillance activities
  - Poliomyelitis / AFP surveillance
  - Country example from Uganda
Malaria and COVID-19 Surveillance in sub-Saharan Africa

Leveraging routine health facility data for signs of COVID-19

John Painter, DVM, MS
Malaria Surveillance Team, CDC-PMI
Outline

- Routine surveillance for malaria
- Indicators of potential COVID-19 in the community
- Keys for interpreting routine surveillance data
Routine surveillance data for malaria
### Routine Health System Data

#### Patient register

**MINISTRY OF HEALTH AND SANITATION**

**PHU MONTHLY SUMMARY OF MORBIDITY - PHUF 1**

**PHU MORBIDITY CASES (refer to tally sheets PHUT 1a & 1b)**

<table>
<thead>
<tr>
<th>AGE GROUP</th>
<th>0 - 11m</th>
<th>12 - 59m</th>
<th>5 - 14y</th>
<th>15y+</th>
</tr>
</thead>
<tbody>
<tr>
<td>DISEASE</td>
<td>N</td>
<td>F</td>
<td>N</td>
<td>F</td>
</tr>
<tr>
<td>Rapid Diagnostic Test for Malaria</td>
<td>Positive</td>
<td>2357</td>
<td>3795</td>
<td>1002</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>917</td>
<td>948</td>
<td>393</td>
</tr>
<tr>
<td>MALARIA treated at PHU with ACT</td>
<td>&lt; 24hrs</td>
<td>2248</td>
<td>231</td>
<td>2587</td>
</tr>
<tr>
<td></td>
<td>&gt;24hrs</td>
<td>1848</td>
<td>175</td>
<td>2966</td>
</tr>
<tr>
<td>MALARIA treated at PHU without ACT</td>
<td>&lt; 24hrs</td>
<td>239</td>
<td>36</td>
<td>210</td>
</tr>
<tr>
<td></td>
<td>&gt;24hrs</td>
<td>228</td>
<td>39</td>
<td>209</td>
</tr>
<tr>
<td>DIARRHOEA without severe dehydration</td>
<td>481</td>
<td>70</td>
<td>599</td>
<td>101</td>
</tr>
<tr>
<td>DIARRHOEA with severe dehydration</td>
<td>51</td>
<td>19</td>
<td>69</td>
<td>14</td>
</tr>
<tr>
<td>DIARRHOEA with blood (Dysentery)</td>
<td>74</td>
<td>75</td>
<td>11</td>
<td>26</td>
</tr>
<tr>
<td>ARI treated without antibiotics (cough)</td>
<td>668</td>
<td>89</td>
<td>621</td>
<td>93</td>
</tr>
<tr>
<td>ARI treated with antibiotics (Pneumonia)</td>
<td>2648</td>
<td>265</td>
<td>2516</td>
<td>189</td>
</tr>
<tr>
<td>CLINICAL MALNUTRITION</td>
<td>223</td>
<td>140</td>
<td>581</td>
<td>281</td>
</tr>
<tr>
<td>ANAEMIA</td>
<td>97</td>
<td>15</td>
<td>182</td>
<td>13</td>
</tr>
<tr>
<td>MENINGITIS / severe bacterial infection</td>
<td>2</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>MEASLES</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TETANUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NEONATAL TETANUS</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACUTE FLACCID PARALYSIS (AFP)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LASSA FEVER</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Routine Health System Data

- For most countries in sub-Saharan Africa (SSA)
  - Collected on paper form and entered into electronic platform such as District Health Information Software *DHIS2*
  - Possible to modify data collection forms to collect new information
    - May require printing new paper forms
Indicators of potential COVID-19 in the community
COVID-19 Impact on Malaria Programs

- Roll-Back Malaria’s Monitoring and Evaluation Reference Group (RBM-MERG) providing guidance for evaluating change to essential programs

Indicators of potential COVID-19 in the community: Attendance

- Outpatient department (OPD) attendance
  - Increase could suggest an increase in the number of cases due to COVID-19 or other illnesses
  - A decrease could mean a shift towards self-care at home because:
    - Safety concerns
    - government policy (stay at-home orders)
    - lack of health care workers in facilities
    - disruptions to public transportation systems, etc.
Indicators of potential COVID-19 in the community: Febrile Illness

- Patients with fever may be due to malaria, COVID-19, or other febrile illnesses
  - Shifts in age patterns to older individuals could suggest a non-malaria cause(s) such as COVID-19
  - An increasing fever rate in the absence of increasing confirmed malaria might suggest that fevers are occurring due to COVID-19
  - When fever not reported, number tested for malaria may be a surrogate
Indicators of potential COVID-19 in the community: Hospitalizations

- Could be proxy indicators of severe illness due to malaria or COVID-19 (or other causes) that warrants further investigation
Keys for interpreting routine surveillance data
RBM* Example: Interpreting Temporal Trends in Outpatient Attendance

“...in 2020 all outpatient visit attendance dropped (orange) in March and April in relation to the four previous years (blue and grey) ...”

Further investigation should be conducted to determine the reasons behind this decrease (e.g. shift towards self-care at home, stay at home orders, lack of health care workers in facilities…”

What about reporting???

Example 1: Interpreting Trends in Reported Outpatient Attendance

Lower than usual in April and May; sharp decline in June 2020
Example 1: Interpreting Trends in Reported Outpatient Attendance

- Lower than usual in April and May;
- Sharp decline in June 2020

Evidence of service disruption?
Example 1: Interpreting Trends in Reported Outpatient Attendance
Number of Reports, 2018-2020

Reporting incomplete for April, May, and especially June
Example 1: Interpreting Trends in Reported Outpatient Attendance

Number of Reports

Lower numbers of facilities reporting

Attendance

Leads to lower reported attendance
Example 1: Interpreting Trends in Reported Outpatient Attendance Number of Reports, 2018-2020

Lower number of facilities reporting

Are reporting systems disrupted?
Example 1: Interpreting Trends in Reported Outpatient Attendance Number of Reports, 2018-2020

Lower number of facilities reporting

Are reporting systems disrupted?

Probably not: Reporting typically lags by several months
Example 1: Interpreting Trends in Reported Outpatient Attendance

Number of Reports, 2018-2020

Typically, there is a subset of facilities that report on time (e.g. 3 weeks after end of month)

Probably not: Reporting typically lags by several months
Example 1: Interpreting Trends in Reported Outpatient Attendance

Number of Reports, 2018-2020

Reports from remaining facilities trickle in over several months

Probably not: Reporting typically lags by several months
Example 1: Interpreting Trends in Reported Outpatient Attendance
Number of Reports On Time, 2018-2020

May be earliest indication of reporting disruption
Example 1: Interpreting Trends in Reported Outpatient Attendance
Number of Reports On Time, 2018-2020

May: no change, suggesting no disruption
Example 1: Interpreting Trends in Reported Outpatient Attendance
Number of Reports On Time, 2018-2020

June: Lower than expected—but this data viewed before “reporting on time” deadline
Example 2: A country with declining reporting, evidence of system-wide problem
Example 2: A country with declining reporting, evidence of system-wide problem

October 2019 – June 2020
Example 2: A country with declining reporting, evidence of system-wide problem
Summary

- Routine health facility data may provide indirect evidence of COVID-19 transmission

- Must account for reporting when interpreting routine data
  - When looking at recent health facility data, remember that reporting is frequently delayed by several months
  - Changing “Reporting on Time” may be indicator of systemic change that has less lag-time than overall reporting rate
COVID-19 and Polio/AFP Active Surveillance – Uganda Experience

Wilbrod Mwanje
African Field Epidemiology Network (AFENET)
Integrating AFP and COVID-19 active surveillance in high-risk districts of Uganda

July 6, 2020
Wilbrod Mwanje MD, MPH
COVID-19 surveillance in Uganda

• Uganda experienced the unprecedented COVID-19 outbreak when its first case was confirmed on March 21, 2020.

• Border districts with high-volume Points of Entry (PoEs) remain hotspots for the epidemic.

• Cargo truck drivers – a key population for COVID-19 infection.
Approaches to COVID-19 surveillance in Uganda are risk-based

Uganda last country in region to register a case of COVID-19, amid high incidence rates in neighboring countries.
Epidemic curve of 2,303 confirmed COVID-19 cases in Uganda

- 1st Case: Mar 21
- Ban on public transport & trading of non food items: Mar 25
- 14-day nationwide lockdown except cargo planes/trucks: Mar 30
- Lockdown extended for 21 days: April 14
- Lifted ban on public transport except in border districts: May 14
- Suspended all public gathering & travel ban on returnees from high-risk countries: Mar 18

953 Ugandan cases - Surge of cases mostly among cross-border cargo trucker drivers

Data as of July 5, 2020
Project goal and objectives

• **Overall**
  – To integrate active surveillance for COVID-19 and acute flaccid paralysis (AFP) in high risk districts.

• **Specifically**
  – To strengthen district capacity for detection and response to COVID-19.
  – To strengthen district capacity for detection of AFP.
  – To establish and implement a schedule of active surveillance visits to priority health facilities and communities located close to Points of Entry (PoEs).
Methods I

- Trained Field Epidemiology Training Program (FETP) and National Stop Transmission of Polio (NSTOP) field teams in COVID-19 and AFP surveillance – May 29, 2020

- Deployed teams (Epi, lab, central supervisor) to 7 districts for 10 days starting June 1
Methods II

- **Training/Sensitization:**
  - We sensitized health workers at health facilities and village health team members (VHTs) on COVID-19 & AFP surveillance.

- **Visits to health facilities:**
  - Documented active search visits to the facility in 3 months prior to our visit.

- **Review of AFP/COVID-19 surveillance practices**
  - Reviewed AFP & suspect COVID-19 cases in registers against those reported in the monthly report form for the 3 months prior to our visit.
  - Line-listed missed COVID-19 suspect cases (SARI, pneumonia/severe pneumonia) and AFP cases within 3 months to our visit.
  - Suspect COVID 19 specimens were only collected from suspects who presented to the health facility within a 14 days prior to our visit.
  - PCR testing for SARS-CoV2 was performed on all suspect COVID 19 specimens.
# Sensitization of COVID-19 / AFP surveillance

<table>
<thead>
<tr>
<th>District</th>
<th>Health workers</th>
<th>Village Health Team members (VHTs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amuru</td>
<td>92</td>
<td>53</td>
</tr>
<tr>
<td>Busia</td>
<td>61</td>
<td>40</td>
</tr>
<tr>
<td>Kampala</td>
<td>68</td>
<td>45</td>
</tr>
<tr>
<td>Kyotera</td>
<td>120</td>
<td>48</td>
</tr>
<tr>
<td>Masindi</td>
<td>51</td>
<td>38</td>
</tr>
<tr>
<td>Tororo</td>
<td>124</td>
<td>30</td>
</tr>
<tr>
<td>Wakiso</td>
<td><strong>40</strong></td>
<td><strong>30</strong></td>
</tr>
<tr>
<td>Totals</td>
<td><strong>556</strong></td>
<td><strong>284</strong></td>
</tr>
</tbody>
</table>

*Health workers sensitization session*

*VHT sensitization session*
### Health facility (HF) visits by district

<table>
<thead>
<tr>
<th>District</th>
<th>AMURU</th>
<th>BUSIA</th>
<th>KAMPALA</th>
<th>KYOTERA</th>
<th>MASINDI</th>
<th>TORORO</th>
<th>WAKISO</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number planned</td>
<td>34</td>
<td>32</td>
<td>42</td>
<td>40</td>
<td>45</td>
<td>40</td>
<td>29</td>
<td>262</td>
</tr>
<tr>
<td>Number visited</td>
<td>19</td>
<td>18</td>
<td>31</td>
<td>40</td>
<td>23</td>
<td>18</td>
<td>21</td>
<td>170</td>
</tr>
<tr>
<td>% Visited</td>
<td>56%</td>
<td>56%</td>
<td>74%</td>
<td>100%</td>
<td>51%</td>
<td>45%</td>
<td>72%</td>
<td>65%</td>
</tr>
</tbody>
</table>

Delay while filling the electronic data collection forms, Distant facilities were reasons for not reaching all HF's
## AFP & COVID-19 surveillance practices in health facilities

<table>
<thead>
<tr>
<th>Month in 2020</th>
<th>AFP surveillance</th>
<th>COVID-19 surveillance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>AFP cases identified in OPD register</td>
<td>SARI or Pneumonia cases identified in OPD register</td>
</tr>
<tr>
<td></td>
<td>AFP cases reported in monthly HMIS 105</td>
<td>SARI or Pneumonia cases reported in monthly HMIS 105</td>
</tr>
<tr>
<td></td>
<td>AFP cases investigated by health facilities for Polio</td>
<td>SARI or Pneumonia cases NOT reported</td>
</tr>
<tr>
<td></td>
<td>AFP cases NOT reported</td>
<td>SARI or Pneumonia cases investigated for COVID19</td>
</tr>
<tr>
<td>March</td>
<td>3</td>
<td>3281</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2625</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>656</td>
</tr>
<tr>
<td></td>
<td>17%</td>
<td>0</td>
</tr>
<tr>
<td>April</td>
<td>2</td>
<td>2088</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>1956</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>132</td>
</tr>
<tr>
<td></td>
<td>17%</td>
<td>0</td>
</tr>
<tr>
<td>May</td>
<td>1</td>
<td>1871</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>1613</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>258</td>
</tr>
<tr>
<td></td>
<td>20%</td>
<td>0</td>
</tr>
<tr>
<td>Totals</td>
<td>6</td>
<td>7240</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>6194</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>1046</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

*DSFP = District Surveillance Focal Person
## Test Results

<table>
<thead>
<tr>
<th>Disease</th>
<th>Suspect Cases</th>
<th>Specimens collected</th>
<th>Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>COVID-19</td>
<td>363</td>
<td>363</td>
<td>0</td>
</tr>
<tr>
<td>AFP</td>
<td>2</td>
<td>0</td>
<td>NA</td>
</tr>
</tbody>
</table>

*Loss to follow up of 2 AFP cases No Specimens picked*
Risk factors among 312 suspect COVID-19 cases

<table>
<thead>
<tr>
<th>Risk factor</th>
<th>Number and percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspect case travelled anywhere in with ongoing transmission in last 14 days</td>
<td>52 (17%)</td>
</tr>
<tr>
<td>Suspect case was a close contact</td>
<td>69 (22%)</td>
</tr>
<tr>
<td>Suspect case visited health facility with symptoms</td>
<td>85 (27%)</td>
</tr>
<tr>
<td>Health worker</td>
<td>74 (24%)</td>
</tr>
</tbody>
</table>
Reasons for non-investigation of suspect cases

- **Acute flaccid paralysis (AFP)**
  - AFP cases were not investigated due to transport difficulties following the lockdown.

- **COVID-19**
  - Health workers not knowledgeable of the suspect COVID19 case definition
  - Health workers not trained in COVID-19 surveillance.
  - Health workers have limited access to testing supplies.
  - Active search for COVID-19 not fully rolled out in Uganda as a strategy.
Suspect COVID-19 and AFP cases by district

Legend:
- Project district
- Rest of Uganda
- AFP Case

AFENET
African and Edward Network
A Healthier Africa
Good IPC practices observed

- Review of records outdoors
- Outdoor sensitization meetings & social distancing
- Sample Collection: PPE used, done in spacious room
- Hand washing facilities observed at health facilities entrance
Learned lessons & limitations

• **Lessons learned:**
  - Active search for COVID-19 can be implemented using similar strategies as traditionally used for AFP active surveillance. It is feasible to simultaneously implement active search for the two diseases.

**Limitations:**

  - We did not sample all the health facilities, thus collected suboptimal data to allow for generalization of findings.

  - We did not assess time from exposure to testing for suspect cases that tested negative.
Acknowledgements

Ministry of Health Uganda
CDC/GID/PEB
District Health teams – Project districts
Questions?

CDC COVID-19 International Task Force:
eocevent223@cdc.gov

For more information, contact CDC
1-800-CDC-INFO (232-4636)

The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the Centers for Disease Control and Prevention.