Early Warning System in the Eastern Mediterranean Region of WHO

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Outline of presentation

• Background
• Objectives of EWARS
• System design and how it functions
• Critical review: Findings from recent evaluation
• Uses of EWARS and outstanding questions
• Challenges
• Way forward

Countries of EMR either in humanitarian crisis and/or complex emergencies

Palestine

Countries in Crisis
Approximately 76 million people in EMR live in countries with humanitarian crisis or complex emergencies (CE).

Over 10 million of these people living in countries with CEs are internally displaced.

The six most challenging countries in the world with either humanitarian crisis or complex emergency are in the EMR (Afghanistan, Iraq, OpT, Somalia, Sudan and Pakistan).

Objectives of Early Warning System for Disease Outbreaks

• Early detection of outbreaks
• Timely outbreak response and control
• Monitoring communicable disease trends
How the System is designed to work

All suspected alerts/outbreaks are reported directly to the state.

- Attended by clinic staff
- Case definitions used to record an event
- Weekly EWARS form compiled

Health events under surveillance

- 23 health events in total (varies by countries)
  - Acute Watery Diarrhea
  - Acute Flaccid Paralysis
  - Acute Respiratory Infection
  - Acute Jaundice Syndrome
  - Avian Influenza/ Pandemic (H1N1) 2009 (Afghanistan)
  - Bloody Diarrhea
  - CCHF (Afghanistan)
  - Chicken Pox (Afghanistan)
  - Guinea worm (south Sudan)
  - Injuries (northern Sudan)
  - Malaria
  - Mumps (Somalia)
  - Measles
  - Meningitis
  - Neonatal Tetanus
  - Others (northern Sudan)
  - Scabies (Pakistan)
  - Schistosomiasis (Somalia)
  - Severe acute malnutrition
  - Typhoid Fever (Gaza Strip, Palestine and Afghanistan)
  - Unexplained Fever
  - Viral haemorrhagic fever (south Sudan)
  - Whooping cough (Afghanistan and Somalia)
  - Yellow Fever (south Sudan)
### Variables reported for each reporting period

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morbidity and Mortality</td>
<td>Cases and deaths for events under surveillance</td>
</tr>
<tr>
<td>Zero reporting</td>
<td>Not in data collection form, but in the report</td>
</tr>
<tr>
<td>Demographic data</td>
<td>Estimated catchment area</td>
</tr>
<tr>
<td>Reporting frequency</td>
<td>Weekly</td>
</tr>
</tbody>
</table>

### Data analysis and indicators produced

- Consultation numbers
- Population under surveillance
- Health facility utilization rate
- Absolute morbidity and mortality
- Proportional morbidity and mortality
- Trends
- Case Fatality Rate (IPD)
- Attack rate (For outbreaks whenever possible)
How the EWARS Functions?

- **Surveillance strategy**
  - Health facility based (sentinel sites);
  - Basically passive;
  - Active case findings during an outbreak
  - Date relayed through phone, fax, e-mail and also by hand
  - Mortality data generated from health facilities

- **Choice of health events**
  - Epidemic and non-epidemic prone diseases;
  - Choice depend on the epidemic proneness, burden or specific events encountered
  - “Others” in order to calculate total number of consultations

- **Case definitions**
  - Clinical diagnosis – mostly syndromic
  - Laboratory confirmation facilities not always available
How the EWARS Functions?

• **Data analysis**
  - Weekly
  - Data analysis using customized software (Epi data and Epi-Info version 6.0)
  - Comparison with historical values to detect “unusual” increase

• **System performance**
  - Good reporting completeness
  - Good timeliness (average 3 days)

• **Outbreak detection**
  - Mostly passive
  - Aggregated data analysis
  - Early detection of outbreaks through direct alert from health facilities (e.g., hepatitis E)

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How the EWARS detects an outbreak: using threshold values for epidemic prone disease

<table>
<thead>
<tr>
<th>Epidemic prone disease</th>
<th>Threshold</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute watery diarrhoea</td>
<td>Unusual Increase</td>
<td>Cholera: 1 death in 5 years + age group in non endemic area</td>
</tr>
<tr>
<td>Acute bloody diarrhoea</td>
<td>Unusual Increase</td>
<td>Doubling of cases in two consecutive weeks</td>
</tr>
<tr>
<td>Acute jaundice syndrome</td>
<td>Unusual Increase</td>
<td></td>
</tr>
<tr>
<td>Malaria</td>
<td>Unusual Increase</td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td>Yes</td>
<td>Camp situation: 1 case</td>
</tr>
<tr>
<td>Neonatal Tetanus</td>
<td>Yes</td>
<td>1 case</td>
</tr>
<tr>
<td>Meningococcal Meningitis</td>
<td>Yes</td>
<td>Two laboratory-confirmed case in a week</td>
</tr>
</tbody>
</table>

No possibility to compare with previous year in displaced population context
## EWARS: Training for Surveillance and Response

![EWARS Training Images]

## EWARS in the EMR: A snapshot

<table>
<thead>
<tr>
<th>Country</th>
<th>Reporting units</th>
<th>Population under surveillance</th>
<th>No of health events monitored</th>
<th>Average no of consultations reported on a weekly basis</th>
<th>Reporting timeliness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>182</td>
<td>-</td>
<td>13</td>
<td>190,000 -230,000</td>
<td>&gt; 96%</td>
</tr>
<tr>
<td>Pakistan</td>
<td>332</td>
<td>3.7 million</td>
<td>13</td>
<td>100,000 -150,000</td>
<td>&gt; 85%</td>
</tr>
<tr>
<td>Palestine (Gaza Strip)</td>
<td>17</td>
<td>0.8 million</td>
<td>9</td>
<td>280,000-300,000</td>
<td>&gt; 85%</td>
</tr>
<tr>
<td>Somalia</td>
<td>35</td>
<td>0.8-1 million</td>
<td>12</td>
<td>35,000-50,000</td>
<td>&gt; 90%</td>
</tr>
<tr>
<td>Sudan (North)</td>
<td>155</td>
<td>1.7 million</td>
<td>13</td>
<td>100,000 -120,000</td>
<td>&gt; 80%</td>
</tr>
<tr>
<td>Sudan (South)</td>
<td>30-40</td>
<td>Not known</td>
<td>14</td>
<td>&lt; 10,000</td>
<td>&lt; 45%</td>
</tr>
</tbody>
</table>
EWARS Sites: Considerable variation in coverage and type

Monitoring Reporting Timeliness of EWARS: Example from Darfur
Monitoring Health Facility Utilization Rate

Age-specific proportionate morbidity and mortality as an indicator of monitoring trend: example from Pakistan

Figure 2: Weekly distribution of population under surveillance and consultations, Greater Darfur, Sudan, 1 Jan 2006 – 2 February 2007.

Figure 2: Proportion of primary causes for all reported cases, Lower Shabelle region, Somalia, 29 November 2009 – 2 January 2009.
Monitoring evolution of outbreaks: example from Darfur

**Weekly Reported Acute Jaundice Syndrome**

<table>
<thead>
<tr>
<th>Week Number</th>
<th>Number of AJS Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yr 2009</td>
</tr>
<tr>
<td></td>
<td>Yr 2008</td>
</tr>
</tbody>
</table>

Hepatitis E Outbreak in Al Salam Camp
Monitoring effectiveness of programme interventions: examples from Darfur

Monitoring effect of a crisis (war) on the changes in disease trend: example from Gaza Strip
Critical review of the system: Findings from EWARS Evaluation of Darfur and southern Sudan

- Rapid turn over of staff
- Inadequate training for staff
- Some EWARS case definitions not clear (ARI, Unexplained Fever)
- No clear threshold values for some diseases
- Most alerts originate at clinic level
- Delay/Non-receipt of laboratory specimens result
- Limited in-depth analysis of data to monitor the disease trend
- Proportional morbidity used more than incidence trend
- No clear population denominator
Critical review of the system: Findings from EWARS evaluation of Darfur and southern Sudan

- **Sensitivity**
  - Unable to determine

- **PPV: Low - more alerts than true outbreaks**
  - West Darfur: 11 alerts PVP=45%-64%
    - Confirmed 5, Negative 5, Pending 2
  - North Darfur: 9 alerts PVP=11%-22%
    - Confirmed 1, Negative 7, Pending 1
  - South Darfur: 9 alerts PVP=33%-44%
    - Confirmed 3, Negative 5, Pending 1

- **Reporting timeliness**: > 80%

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Outbreak Detection: PVP and Timeliness of Response: Findings from southern Sudan

- **Central level PPV estimated at 40%**
  - 25/62 positive

- **WES PPV estimated at 3.8%**
  - 1/26 positive

- **Timeliness of outbreak response (Central)**
  - Onset to alert (n= 17): 5.2 days (0-16)
  - Alert to response (n=12): 4.4 days (0-17)
    - % responded in 48 hours: 42
Data Quality : Findings from evaluation

- Multiple versions of forms, registers
  - Insufficient supply of tools
  - Different # of reportable diseases

- Inconsistent use of case definitions
  - Miscategorization of diseases (cholera, AWD, malaria)
  - New vs revisit, transfer patients

- Only deaths occurring at HF reported

Strengths of EWARS: Findings from evaluation

- High acceptability among health facility staff
- High usefulness among users
- Easy to use (simple)
- Good collaboration among NGOs, MOH, and WHO
- Weekly analysis of the data
- Weekly Coordination Meeting to discuss weekly trend of epidemic prone disease using data from the EWARS
- Wide distribution of Weekly epidemiological bulletin
- Monitoring effectiveness of programme interventions
Outstanding Questions

• All the EWARS system in the EMR was implemented in response to a humanitarian crisis – Is the system still appropriate?
• What would be the trade-off – Ability to detect all potential health events or a higher PPV or both?
• For diseases such as malaria and diarrhoea, should EWARS have a “sentinel” lab component?
• In choosing the appropriate database what is the trade-off, between a flexible system familiar to users and a “locked” system which allows less error?

Challenges

• Sustaining the system in its current form
• Integration with the routine disease surveillance system for infections diseases
• Improving PPV of the system to detect true outbreaks
• Changing the system attributes to be able to monitor trends, detect other emerging diseases not covered by the existing system
Way Forward

- Compatibility check between the EWARS and the existing communicable disease surveillance system in the host country;
- Comprehensive data analysis from the EWARS in IDP settings (modeling and time-series analysis to set benchmarks for some diseases ?)
- Agreement on data access and ownership before implementing EWARS;
- Cost-effectiveness of the EWARS;
- Improvement of the software - Free and open access
- Better documentation of evidence that EWARS worked (as well as identify things that did not work)

An uphill task ahead!
Thank you