Acute respiratory infections among refugees

Hubert P Endtz
Fondation Mérieux, Lyon
Erasmus Medical Centre, Rotterdam
Main focus: on developing countries & vulnerable populations

Objective 1: Strengthening laboratory capacity and quality of clinical laboratory platforms in developing countries integrated within national healthcare systems

Objective 2: Enhance local research capabilities and competencies by training young researchers, develop collaborative research and training programs
Displaced persons (millions)
1997 - 2016
Forcibly displaced individuals worldwide

68.5 million (40 million internally displaced) approximate equivalent to the entire population of France.

2/3 of refugees come from just five countries: Syria, South Sudan, Somalia, Afghanistan, Myanmar
Forcibly displaced individuals worldwide

- The Syrian refugees constitute the largest refugee crisis in the world
  (5 million refugees, 12 million internally displaced)

- The Rohingyas refugee crisis is the fastest growing refugee crisis in the world
  (one new refugee every 2 seconds)
Rodolphe Mérieux Laboratories
Global footprint

2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018

Mali (2005)
Haiti (2009)
Madagascar (2010)
Bangladesh (2015)
Tunisia (2019)

Cambodia (2005)
Laos (2009)
Lebanon (2011)
Brazil (2016)
Bekaa valley, Lebanon 2015; Informal tented settlements (n=4000)
Syrian refugees in the Middle East
(millions)

- Turkey: 3.6
- Lebanon: 1.0
- Jordan: 0.7
- Irak: 0.2
- Egypt: 0.1

UNHCR
Health care access among refugees

Turkey

In 2014 refugees were granted secure legal status and access to national health care insurance system covered under the general health insurance system and paid for by the government.
Estimates of number of refugees in Lebanon

- 1.0 million Vulnerable Lebanese
- 1.5 million Displaced Syrians
- 310,000 Palestinian refugees

- 10% of Lebanese live on < 2.5 US $ per day
- > 50% are Women and Children
- 52% of displaced Syrians live on < 2.5 US $ per day
- including 31,500 Palestinians from Syria
ALRI among in DC and refugees

• The cause nearly 4 million deaths per year
• 60 deaths per 100,000 population
• In DC among <5y 10-25% deaths are due to pneumonia
• UNHCR: ALRI main cause of mortality and morbidity among refugees
• Among refugees in Kenia:
  – in <5y ARI responsible for 30-40% of death and 45% of morbidity
  – RSV associated with high rates of illness
Main risk factors for adverse events in ALRI among refugees

• Malnutrition
• Low vaccination status
• Poor shelter conditions
• Extreme weather conditions
• Crowding
• Co-morbidity
• Poor access of adequate health care
Main morbidities among Syrian refugees Jan-June 2015, Bekaa Valley

Data MSF
Reports from Lebanon

• High morbidity and mortality due to respiratory tract infections among 1.5 M Syrian refugees
• Low access to laboratory and other diagnostics
Pneumonia etiology study among Syrian refugees & vulnerable Lebanese

• **Design:** case-control study
• **Sample size:** 1200 (600 cases 600 controls)
• **Study Population:** Syrian refugees & Lebanese
• **Study sites:** Bekaa valley and Akkar
• **Audits and training:** start September 2016
• **First inclusion:** Nov 2016
• **Last inclusion:** March 2018
Concentration of Syrian refugees registered in Lebanon as of Sept. 30, 2015

- Tripoli
- Al Bashaer
- Baalbek El Ain
- Machgara Kamed el Loz
- Damascus

Number of refugees per district:
- 3,000 - 8,000
- 8,000 - 16,000
- 16,000 - 30,000
- 30,000 - 90,000
- 90,000 - 171,649

Source: UNHCR
• Université St Joseph + LRM, Beyrouth
• Université Libanaise, Tripoli
• El Bashaer (NGO) Tripoli
• AMEL (NGO), Bekaa
• Chtaura Hospital, Zahlé
• Fondation Mérieux, Lyon et Beyrouth
• Bioteck, Beyrouth
• External consultants:
  – Philippe Vanhems (Lyon 1)
  – Ranna Hajjeh (EMRO)
  – Abdullah Brooks (Hopkins)
Objectives

• **Primary Objective**: to estimate the proportion of Community Acquired Pneumonia attributable to specific viral and bacterial pathogens.

• **Secondary Objective**: to assess the feasibility and performance of rapid, film array Point-of-Care diagnostic tests in a humanitarian crisis.
Case definition & selection criteria pneumonia

- Patients > 2 year
- Onset of symptoms less than 14 days
- Written informed consent

- Cough OR dyspnea
  - AND
- Lower chest wall indrawing (≤3 years old only)
  - OR
  - Tachypnea (breathing rate > 40 breaths/min)
  - AND
  - Absence of wheezing
Lebanon 2015; Mothers and children
Population Attributable Fraction (%)
### Population Attributal fraction (%) per age group

<table>
<thead>
<tr>
<th>Rank</th>
<th>All</th>
<th>Children under 5</th>
<th>Children above 5</th>
<th>Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Influenza</td>
<td>29.6</td>
<td>30.4</td>
<td>25.6</td>
</tr>
<tr>
<td></td>
<td>RSV</td>
<td></td>
<td></td>
<td>20.8</td>
</tr>
<tr>
<td>2</td>
<td>Rhinovirus</td>
<td>16.1</td>
<td>23.0</td>
<td>15.0</td>
</tr>
<tr>
<td></td>
<td>S. aureus</td>
<td></td>
<td></td>
<td>14.8</td>
</tr>
<tr>
<td>3</td>
<td>Rhinovirus</td>
<td>11.9</td>
<td>18.6</td>
<td>13.3</td>
</tr>
<tr>
<td></td>
<td>RSV</td>
<td></td>
<td></td>
<td>12.6</td>
</tr>
<tr>
<td>4</td>
<td>Parainfluenza</td>
<td>9.2</td>
<td>10.6</td>
<td>11.2</td>
</tr>
<tr>
<td></td>
<td>Atypical bacteria</td>
<td>8.8</td>
<td></td>
<td>7.3</td>
</tr>
<tr>
<td>5</td>
<td>Atypical bacteria</td>
<td>7.7</td>
<td>4.6</td>
<td>6.0</td>
</tr>
<tr>
<td></td>
<td>hMPV</td>
<td></td>
<td></td>
<td>5.0</td>
</tr>
<tr>
<td>6</td>
<td>Coronavirus</td>
<td>5.0</td>
<td>4.3</td>
<td>3.6</td>
</tr>
<tr>
<td></td>
<td>S. pneumoniae</td>
<td>4.7</td>
<td></td>
<td>3.4</td>
</tr>
<tr>
<td>7</td>
<td>S. pneumoniae</td>
<td>4.7</td>
<td></td>
<td>2.0</td>
</tr>
<tr>
<td></td>
<td>hMPV</td>
<td></td>
<td></td>
<td>3.0</td>
</tr>
<tr>
<td>8</td>
<td>hMPV</td>
<td>4.0</td>
<td>-2.2</td>
<td>-1.0</td>
</tr>
<tr>
<td></td>
<td>Coronavirus</td>
<td>-1.0</td>
<td></td>
<td>0.8</td>
</tr>
<tr>
<td>9</td>
<td>Adenovirus</td>
<td>3.0</td>
<td>-20.4</td>
<td>-1.6</td>
</tr>
<tr>
<td></td>
<td>S. aureus</td>
<td></td>
<td></td>
<td>0.0</td>
</tr>
<tr>
<td>10</td>
<td>Adenovirus</td>
<td>-5.0</td>
<td>S. pneumoniae</td>
<td>-2.3</td>
</tr>
<tr>
<td></td>
<td>S. aureus</td>
<td></td>
<td></td>
<td>-20.7</td>
</tr>
</tbody>
</table>
Virus isolation by age group in SARI among refugees in Kenya 2010

Ahmed et al. 2012 BMJ Infectious Diseases

*Respiratory syncytial virus,
**Human metapneumovirus
***Parainfluenza viruses
Viral detection by age group
pneumonia among refugees Thai-Myanmar border

- <1y
- 1-4y
- 5y and older

% of all viruses detected: RSV, Influenza A & B, Adenovirus, hMPV

Paul Turner et al. BMC Infect Dis 2013
mRNA profiles of human leukocytes in children hospitalized with pneumonia

Wallihan, Suarez et al (in preparation)
We never return
Without our citizenship
and our rights.
Food and waterborne and other diseases in crises settings

- Cholera & acute watery diarrhea
- Bloody diarrhea
- Typhoid fever
- Hepatitis A and E (HEV outbreak Chittagong)
- Measles
- Malaria
- Dengue, Chikungunya
- Acute respiratory diseases
  - Main cause of death in children <5
Diphtheria outbreak
Rohingyas 2017-2018

as per September: 5208 suspected, 2700 probable cases
277 confirmed and 44 deaths

Figure 1: Epidemic curve of diphtheria case-patients 2017-2018 in Cox’s Bazar, Bangladesh
Projets Rohingyas
Infections respiratoires aiguës
étiologie et impact diagnostic rapide

- Conception: Études cas-témoins + contrôlée randomisée
- Échantillon: 1200 (600 cases 600 controls)
- Population: Réfugiés Rohingyas
- Géographie: Ukhiya, Cox’s Bazar, Bangladesh
- Sites d’étude: GoB, PHC centres
- Consortium: GoB, IdeSHi, BITID, FMX (PI)
- Audits and training: 1 avril 2018
- Premier inclusion: 1 juillet 2018
- Dernier inclusion: 30 juin 2019
Better health in humanitarian crises: future needs

- managing and addressing health risks
- reducing vulnerability
- better characterize epidemiology and etiology of ARI
- rationalize disease priorities
- improved diagnostics
- optimize treatment algorithms
- make the best use new vaccines against Hib, pneumococcus, measles and pertussis.
- measure effectiveness of interventions

Lancet editorial 2015. Sergio Viera de Mello
Our Global Footprint