Burden of Influenza Disease

Global Influenza Programme (GIP)
Julia Fitzner

May 2017
Why do we try to measure disease mortality and morbidity?

- **Support development of public health policy for influenza prevention and control**
  - Support decisions on influenza vaccine introduction
  - Support decision on vaccine expansion
  - Inform treatment guidelines (e.g. antibiotic use, antiviral use)
  - Evaluate existing influenza prevention and control strategies
  - Inform allocation of resources

- **Communicate disease severity**
  - Compare global/regional and national estimates and other disease estimates
  - Compare a pandemic burden to seasonal burden

- **Research / expand knowledge**
  - e.g. strain specific
  - define risk group
WHO Main Strategy for influenza disease burden estimate

- Provide guidance on how to measure influenza disease burden and economic burden
- Use estimates derived from the “WHO”-methods as standard and triangulate with estimates derived from other methods
- Mapping of existing knowledge
  - Literature reviews
  - Using networks to find unpublished data
  - Hold consultations to find and understand gaps
- Use international expertise to join results
Development of a methodology to estimate the global influenza burden

Produce credible global burden estimates of influenza mortality, and hospitalization, including information on high risk groups

Ongoing work in 5 areas

• Literature review for mortality and incidence
• Literature review on risk factors
• Under 5 years burden estimate with comparison to RSV
• Global mortality estimate for seasonal influenza
• Global morbidity estimate for seasonal influenza
The one used: Annual attack rate estimated at 5%–10% in adults and 20%–30% in children. Worldwide, annual epidemics estimated to result in 3 to 5 million cases of severe illness, and 250 000 to 500 000 deaths.¹

Global respiratory mortality studies

- GBD 2015 Lower respiratory infections death due to influenza
  83 100 (55 700-122 100) ²

- Estimates of respiratory death per year (As of March 2016)
  CDC Global 269 731 – 617 897 or 3.8 – 8.7/100 000
  GLAMORII 226 000 – 426 000 or 3.1 – 5.8/100 000

Influenza is associated with 10% of respiratory hospitalizations in children³

CDC and GLAMOR method

- Stage one national mortality estimates
  - The two groups are sharing their first stage estimates if collaborating countries agree

- Stage two extrapolate to the world
  - CDC by using analytic zones based on WHO respiratory death estimates in different age categories
  - GLAMOR II using imputation based on 10 indicators
    (WHO region, Age group all-cause mortality rates, Physician density, Obesity, Population density, Major Infectious Diseases prevalence, GNI per capita, Rural population, Population age structure, Latitude)
CDC Study Contributing Country Map

From Danielle Iuliano
## CDC Global Estimates of Influenza-associated Respiratory Mortality

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Death Estimate (95% CI)</th>
<th>Mortality Rate per 100,000 (95% CI)</th>
<th>Proportion of Total Estimated Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;65 Years</td>
<td>50,546 – 291,671</td>
<td>0.8 – 4.5</td>
<td>29%</td>
</tr>
<tr>
<td>65-74 Years</td>
<td>38,587 – 152,826</td>
<td>11.6 – 45.8</td>
<td>23%</td>
</tr>
<tr>
<td>≥75 Years</td>
<td>116,852 – 310,618</td>
<td>52.6 – 139.9</td>
<td>46%</td>
</tr>
<tr>
<td>Total</td>
<td>269,731 – 617,897</td>
<td>3.8 – 8.7</td>
<td>--</td>
</tr>
</tbody>
</table>
GLAMOR II Global Seasonal Estimates
(based on 7 seasons, 2002-2008)

<table>
<thead>
<tr>
<th>Age group</th>
<th>Rate per 100,000 persons (range)</th>
<th>Estimate (range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-64</td>
<td>1.5-2.1</td>
<td>85,000-128,000</td>
</tr>
<tr>
<td>65+</td>
<td>31.8-61.6</td>
<td>141,000-299,000</td>
</tr>
<tr>
<td>Total</td>
<td>3.1-5.8</td>
<td>226,000-427,000</td>
</tr>
</tbody>
</table>

- December 2016 estimates
- Highest burden (rates) in 65+
- Lower than the CDC estimate (314,000-530,000)
### Global Estimates of Influenza-associated Respiratory Mortality (IHME)

<table>
<thead>
<tr>
<th>Age</th>
<th>Deaths</th>
<th>YLDs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number</td>
<td>PAF</td>
</tr>
<tr>
<td><strong>Under 5</strong></td>
<td>10,150.6 (5,731.1-16,789.6)</td>
<td>1.4 (0.8-2.4)</td>
</tr>
<tr>
<td><strong>All Ages</strong></td>
<td>83,116.8 (55,658.5-122,066.7)</td>
<td>3.0 (2.0-4.4)</td>
</tr>
</tbody>
</table>

Form Bobby Reiner
Influenza associated respiratory mortality estimates/per year

<table>
<thead>
<tr>
<th>IHME</th>
<th>CDC</th>
<th>GLAMOR II</th>
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<tbody>
<tr>
<td>83 100 (55 700-122 100)</td>
<td>269 731 – 617 897</td>
<td>226 000 – 426 000</td>
</tr>
</tbody>
</table>

- Estimates are only influenza associated respiratory death
- Respiratory to all cause mortality is likely to be at least x2
- Influenza associated mortality is likely to be in the range of 500 000 – 1 000 000 death per year
- WHO has engaged an expert panel to review estimates to be able to understand differences and interpret results
  - IHME analysis with subgroup July 2017
Collaboration on the global burden estimate

- Similar to the mortality approach countries are asked to collaborate in a global burden estimate

- Countries that have done influenza disease estimates using the WHO-manual method or estimating influenza disease burden using the ICD codes and influenza positivity will be considered as first stage estimates

- From these different models will be used to extrapolate

- This work will be done in collaboration with CDC Atlanta
Global influenza-associated respiratory hospitalization burden – (CDC/WHO project)

- Reaching out to countries with influenza associated hospitalization estimates- seeking agreement to participate

- Using expert panel to advise on extrapolation model

<table>
<thead>
<tr>
<th>Region</th>
<th># Countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>AFRO</td>
<td>16</td>
</tr>
<tr>
<td>AMRO</td>
<td>20</td>
</tr>
<tr>
<td>EMRO</td>
<td>12</td>
</tr>
<tr>
<td>EURO</td>
<td>24</td>
</tr>
<tr>
<td>SEARO</td>
<td>8</td>
</tr>
<tr>
<td>WPRO</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>91</td>
</tr>
</tbody>
</table>
Needs from collaborating countries

- The annual rates of influenza-associated hospitalization
- Information about influenza surveillance platforms,
- Methods used to calculate influenza-associated hospitalization rates

This will be used to feed the global model, interpretation will be done as a collaboration with data providers.

We hope that all of you will collaborate- let us know if you have issues
Influenza-Associated Hospitalization Rate Data for Global Estimation

- Data gathered from systematic review to identify influenza-associated hospitalization rates
- Most rates from developed or high-income countries

Results

Influenza-associated hospitalization rates

- 8-54/100,000 for all ages,
- 23-297/100,000 for children <5 years
- 12-189/100,000 for adults ≥65 years.

from Katherine Roguski
Summary of the influenza BoD aim

- Lay out a strategy to further close the gap in burden estimate
  - Update the 250-500 000* death/year estimate and give global morbidity estimates

- Help countries make decision if they should introduce vaccination or other control measures and for who based on evidence

- Prepare countries to estimate the burden of seasonal epidemics and future pandemics and build a baseline to measure impact of interventions

* FAQ – WHO influenza
  Estimate was a crude extrapolation from US estimates to global population with minor adjustment for age distribution.
Acknowledgement

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- Anand Krishnan
- Cheryl Cohen
- Jorge Jara
- Vernon Lee

And ....all the collaborators in countries providing data
Thanks Gracias