

Influenza Severity Assessment

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Based on slides from Kaat Vandemaele

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IHR Review Committee

WHO should develop and apply measures that can be used to assess severity of every influenza pandemic.

http://apps.who.int/gb/ebwha/pdf_files/WHA64/A64_10-en.pdf.

- By applying, evaluating and refining tools to measure severity **every year**, WHO and MS will be better prepared to assess severity in next pandemic
- An early assessment followed by ongoing **re-assessment** as the pandemic evolves and new information becomes available, bearing in mind that severity will likely vary by place and over time;
- **Quantitative** values to define descriptive terms (e.g. mild, moderate and severe) to facilitate consistency;
- Use of a “**basket of indicators**” (e.g. hospitalization rates, mortality data, identification of vulnerable populations and an assessment of the impact on health systems) derived from a pre-agreed minimum data set;
- The expression of **confidence and uncertainty** around any estimates.



Severity indicators

- Transmission
- Seriousness of disease
- Impact (on society and health care systems)



Transmission

- Reflects the ease of movement of the influenza virus between individuals, communities, and countries. A virus that has a high human-to-human transmission will spread rapidly from one person to another.
- Combination of
 - the ability to invade and establish infection in humans
 - the dynamics of the spread (interaction patterns, nature of contact)
 - the susceptibility of the exposed population.
 - Climatic factors
- During seasonal influenza: main parameter is intensity as a proxy for transmission
- Special studies for
 - The dynamics of the spread
 - The susceptibility of the exposed population.



Seriousness of disease

- An influenza virus that has a high level of clinical severity can result in a disproportionate number of persons with serious or grave illness and deaths.
- The severity or virulence of an influenza virus will also depend on the presence of underlying medical conditions that predispose individuals to severe illness, as well as age.



Impact

- represents the impact on society (f.e. excess mortality) and the health-care sector (hospitalization and ICU admissions)
- impact on the health sector will also be influenced by public concern and health-care policies put in place in response to the event. As such, assessing impact will aid in understanding how these issues interact with inherent characteristics of the virus and the way it behaves.
- The public health event may also result in societal and economic consequences, such as absenteeism from workplaces and schools, loss of critical infrastructure, and decreases in trade and tourism.



How to measure the indicators?

- WHO technical working group on PISA
 - List of parameters considered to be most useful to inform the 3 indicators (transmission, seriousness of disease, impact) **routinely collected in seasonal** influenza and collected during special studies.
 - **Quantitative** information



Parameters (routinely collected)

- TRANSMISSION:

- Weekly ILI or MAARI (medically attended acute respiratory illness) cases as a proportion of total visits, or incidence rates.
- Weekly percentage of respiratory pathogen samples testing positive for influenza.
- Combination of weekly ILI or MAARI *weekly percentage positivity rates for influenza.



Parameters

- **SERIOUSNESS of DISEASE :**
 - Individual Case Severity
 - Cumulative death: hospitalization ratio (ideally for confirmed influenza)
 - Cumulative ICU: hospitalization ratio (ideally for confirmed influenza)
 - SARI/ARI or ILI ratio



Parameters

- **IMPACT: Impact on society and the burden on the healthcare system**
 - weekly or monthly number or proportion of SARI cases with percentage flu-positive among SARI cases
 - weekly excess Pneumonia & Influenza (P&I) or all-cause mortality stratified by age.
 - weekly number of confirmed influenza cases admitted to ICU; weekly number of confirmed influenza cases admitted to hospital ■
- **Other possible parameters reflecting more the impact on the society are:**
 - School closures
 - Hospital beds occupied
 - Work absenteeism
 - School absenteeism



Categorize values for the parameter

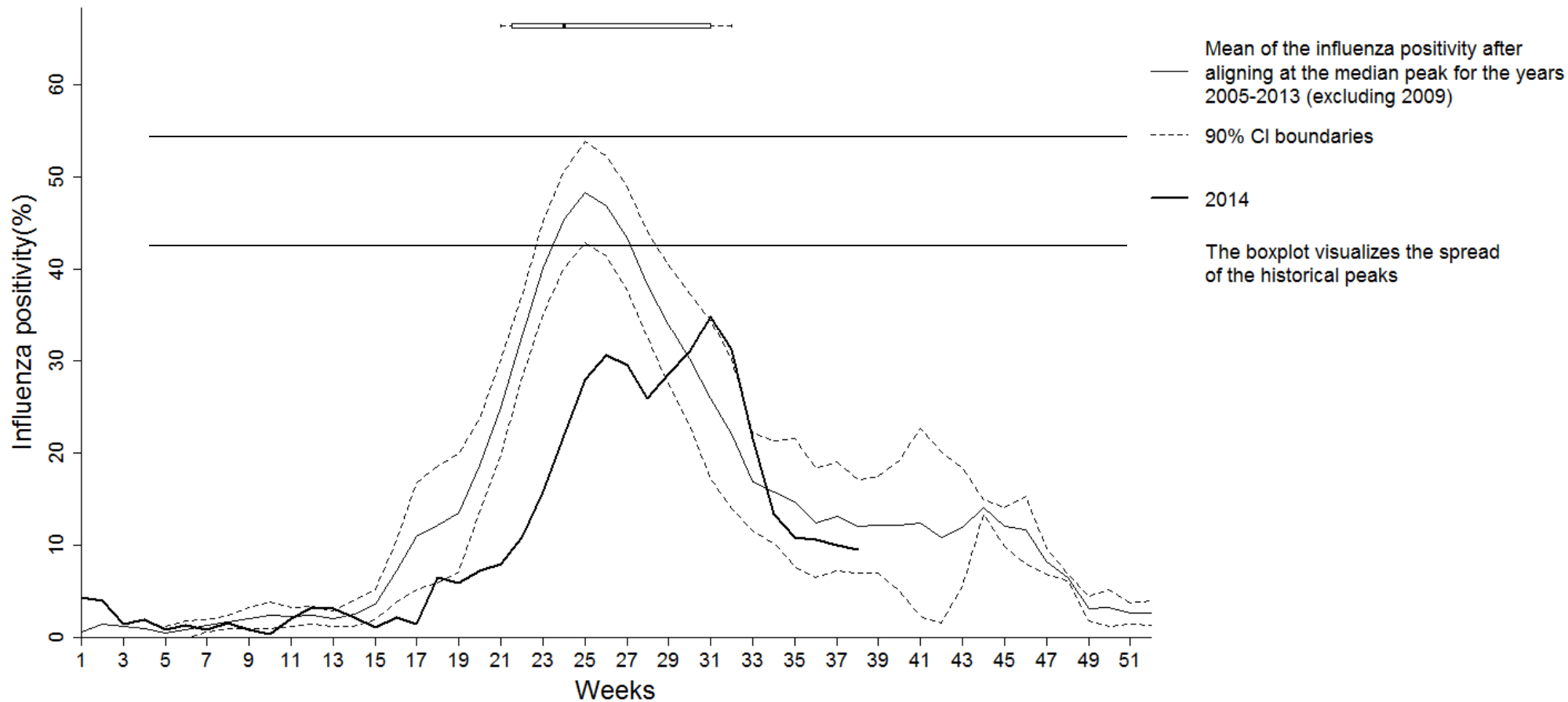
- Absolute values are not comparable between countries
- Need for common denominator
- When put into context with historical data, it is possible to assign them a category and compare parameters between countries

Seasonal activity range				
Below seasonal threshold	Low	Moderate	High	Extra-ordinary



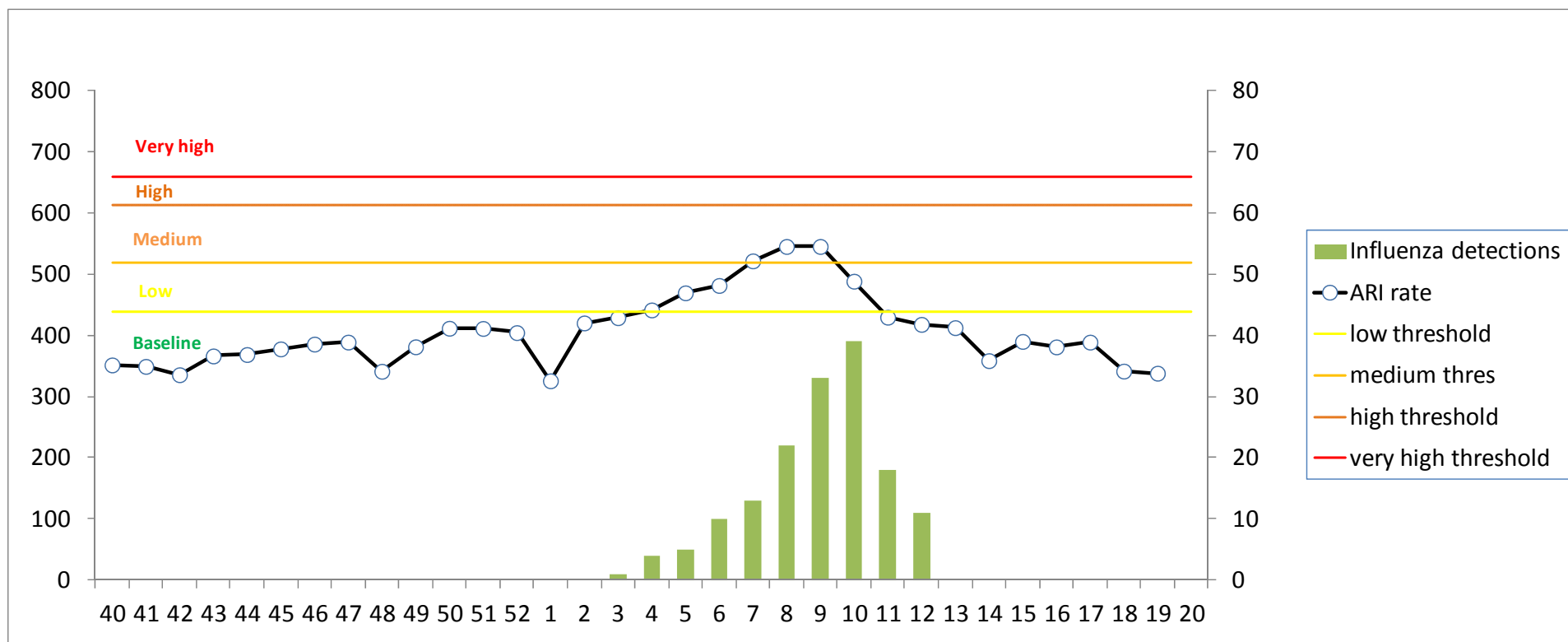
Comparison with previous seasons

WHO method



Comparison with previous seasons

The MEM-intensity levels based on the 40%, 90% and 97.5% of the upper CI of the geometric mean of the rates during the epidemic period



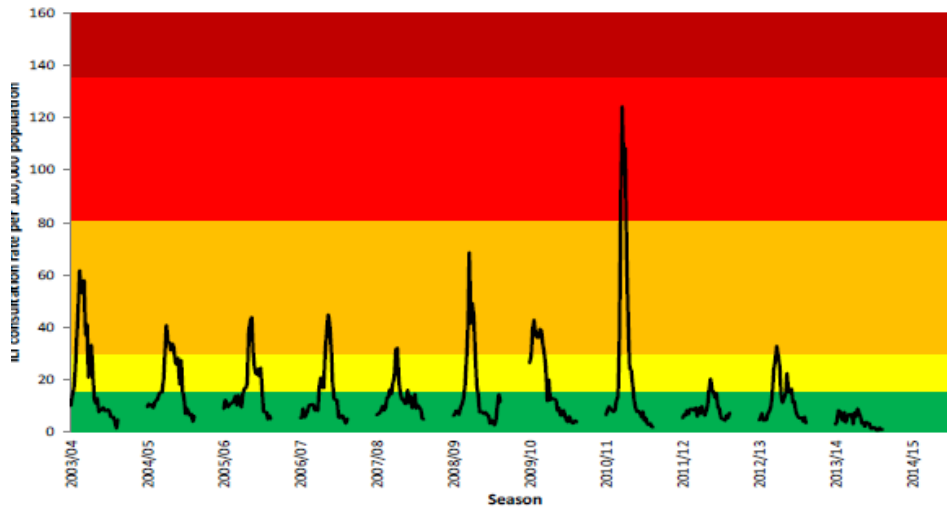
T. Meerhoff¹, P. Jorgensen², T. Vega Alonso³, J.E. Lozano Alonso³, C.S. Brown², *EuroFlu member

Example UK



Public Health
England

Parameters and thresholds: *transmissibility*



Parameter: - --
RCGP GP weekly
ILI consultation
rate
Confidence - high

Threshold:
MEM method

Age	Nil ¹	Low ²	Moderate ³	High ⁴	Extraordinary ⁵
All	<15.6	15.6 to <30.0	30.0 to <81.0	81.0 to <135.7	135.7+
<15yrs	<13.9	13.9 to <18.3	18.3 to <85.0	85.0 to <167.7	167.7+
15-64yrs	<11.7	11.7 to <15.9	15.9 to <52.5	52.5 to <89.0	89.0+
65+yrs	<12.1	<11.4	11.4 to <45.2	45.2 to <83.0	83.0+

ECDC cut-points

¹Below pre-epidemic threshold
²Pre-epidemic threshold breach to <
 40th percentile
³40th to <90th percentile
⁴90th to <97.5th percentile



Threshold setting

	MEM	WHO	Example of country-specific approach: percentiles*
No or below seasonal threshold	Below the seasonal threshold as set by the MEM method	Below the seasonal threshold as set by the WHO method ² (annual median value)	Below the seasonal threshold as set by the country-specific surveillance definition
low	Between seasonal threshold and upper limit of the 40% one sided confidence interval of the geometric mean.	Between the seasonal threshold and upper 40% confidence interval of the mean peak value of the average curve.	Between the seasonal threshold (0%-percentile) and 33%-percentile of the values in previous seasons.
Moderate	Between upper limit of the 40% and 90% one sided confidence intervals of the geometric mean	Between the upper limit of the 40% and 90% of the confidence interval of the mean peak value of the average curve	Between the 33%-percentile and 67%-percentile of the values in previous seasons.
High	Between upper limit of the 90% and 97.5% one sided confidence intervals of the geometric mean	Between the upper limit of the 90% and 97.5% CI of the mean peak value of the average curve	Between the 67%-percentile and 100%-percentile of the values in previous seasons.
Extra ordinary	Above the upper limit of the 97.5% one sided confidence intervals of the geometric mean.	Above the upper limit of the 97.5 % CI of the mean peak value of the average curve	Above the 100%-percentile of the values in previous seasons.

Parameters (quantitative information) feed into indicators

- Parameter 1

- Parameter 2

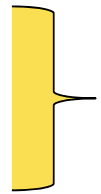
- Parameter 3

- Parameter 4

- Parameter 5

- Parameter 6

- Parameter 7



Transmission indicator



Seriousness of disease indicator



Impact indicator



Indicators and their categories

Transmission

No activity or below seasonal threshold				
	Low	moderate	high	Extra-ordinary

Level of confidence

Low	Medium	high

Seriousness of disease

No activity or below seasonal threshold				
	Low	Moderate	high	Extra-ordinary

Level of confidence

Low	Medium	high

Impact

No activity or below seasonal threshold				
	Low	moderate	high	Extra-ordinary

Level of confidence

Low	Medium	high

Pilot testing

- Countries participating: Australia, Bangladesh, Canada, Chile, Egypt, Germany, France, India, Japan, Madagascar, New Zealand, Norway, Portugal, Spain, Singapore, South Africa, Thailand, UK (England and Scotland), USA
- Steps:
 - Define at national level the parameters for each indicator
 - Which ones do you trust most
 - Timeliness, representative, reliable, stable over time
 - Historical data
 - Categorize values for the parameters
 - This can be done by threshold setting
 - Reality check by using values from previous years and assigning them into the boxes
 - Combine the parameters, and give an qualitative assessment of the indicator into the categories
 - Give a confidence level to the score/assessment



Next steps

- Testing of different threshold setting methods on same data set.
- Find solutions for parameters with little variability
- Review of available special studies and how they can feed in.
- Formation of a modelling group to answer questions on role of modelling in the rapid assessment.
- Improving outputs of PISA at global level.



Acknowledgment

- The WHO technical working group for PISA
- Global influenza Programme colleagues



THANKS