Workstream 2: AMR surveillance
Anonymised individual-level data submission

• Aggregation of AMR data at national levels poses a major challenge:
  − accurate data analysis
  − interpretation of results
• A number of countries are already submitting individual level data
  − CAESAR, EARS-Net, and ReLAVRA
  − Even more countries collect individual AMR data at the national level.
• For the next stage of implementation: **OPTION individual, line-listed anonymized AMR data**
  − monitor the occurrence of multidrug resistance,
  − explore additional data analyses and stratifications,
  − analyse drivers and risk factors linked to resistance,
  − add genetic information, and
  − improve interpretation of results
Q: ... would your country be capable of starting anonymised individual data submission in the next stage of the GLASS implementation?
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<table>
<thead>
<tr>
<th>Yes</th>
<th>19 countries provided comments</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Several responding countries are already submitting individual level data to international networks and more countries collect individual AMR data at the national level</td>
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<td></td>
<td>• Several countries noted that this will require additional efforts, improving national coordination, developing approaches for evaluation of surveillance sites, adjusting IT tools</td>
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<table>
<thead>
<tr>
<th>No</th>
<th>12 countries provided comments</th>
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<tbody>
<tr>
<td></td>
<td>• Responding countries explained their answer by limitations of the laboratory-centred systems, lack of human and IT resources.</td>
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<td></td>
<td>• Several countries were not convinced by the provided rationale</td>
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<thead>
<tr>
<th>Don’t know</th>
<th>11 countries provided comments</th>
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<tbody>
<tr>
<td></td>
<td>• The majority of responding countries explained that further discussions/consultations with national authorities/stakeholders are required</td>
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2
INCLUSION OF MOLECULAR MARKERS
Molecular indicators

For the next stage of implementation, GLASS-AMR offers the option for submission of data generated by molecular AMR diagnostics to complement phenotypic AMR diagnostics data and improve understanding of the underlying mechanisms responsible for resistance.

<table>
<thead>
<tr>
<th>GLASS target pathogens</th>
<th>Mechanisms of resistance</th>
<th>Molecular targets</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acinetobacter spp.</strong></td>
<td>Carbapenem resistance</td>
<td>NDM, OXA, VIM, IMP, GES, KPC</td>
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<tr>
<td><em>P. aeruginosa</em></td>
<td>Colistin resistance</td>
<td>mcr 1-10</td>
</tr>
<tr>
<td><strong>E. coli</strong></td>
<td>Extended spectrum beta-lactamases</td>
<td>CTX-M, TEM, SHV</td>
</tr>
<tr>
<td><strong>K. pneumoniae</strong></td>
<td>Carbapenem resistance</td>
<td>NDM, OXA, VIM, IMP, GES, KPC</td>
</tr>
<tr>
<td><strong>Salmonella spp.</strong></td>
<td>Colistin resistance</td>
<td>mcr 1-10</td>
</tr>
<tr>
<td><strong>Shigella spp.</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S. aureus</strong></td>
<td>Methicillin resistance</td>
<td>meca/mecC</td>
</tr>
<tr>
<td></td>
<td>Linezolid resistance</td>
<td>cfr</td>
</tr>
</tbody>
</table>
Q: Is the AMR national surveillance system in your country applying any type of molecular methods targeting specific resistance genes in support to phenotypic methods?

Results by WHO Region

- WPR (N=4): Yes - 0%, No - 100%, Don’t know - 0%
- SEAR (N=3): Yes - 0%, No - 0%, Don’t know - 0%
- EUR (N=11): Yes - 0%, No - 0%, Don’t know - 0%
- EMR (N=21): Yes - 0%, No - 0%, Don’t know - 0%
- AMR/PAHO (N=15): Yes - 0%, No - 0%, Don’t know - 0%
- AFR (N=3): Yes - 0%, No - 0%, Don’t know - 0%

Results by income level

- GLASS countries (N=43): Yes - 65%, No - 32%, Don’t know - 3%
- Non-GLASS countries (N=14): Yes - 0%, No - 100%, Don’t know - 0%

Results by GLASS status

- All responding countries (N=63): Yes - 65%, No - 32%, Don’t know - 3%
Q: Is the AMR national surveillance system in your country applying any type of molecular methods targeting specific resistance genes in support to phenotypic methods?

• Techniques used in countries that currently apply molecular methods targeting specific resistance genes are very diverse, including conventional and RT PCR, commercial PCR-based systems, gene sequencing, WGS, PFGE, immunocromatography, MLST, RFLP and SNP Allelic Discrimination
3

IMPROVING DATA QUALITY AND REPRESENTATIVENESS

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report
Global Antimicrobial Resistance and Use Surveillance System (GLASS)

GLASS approach to improving the quality of surveillance data

• AMR surveillance approach relying on diagnostic microbiological results routinely generated for clinical purposes:
  - Difficulties in obtaining a representative sample of the population seeking care, even when minimum sampling criteria are set
  - Lack or limited access to health care and microbiological tests
  - Selection bias when:
    ✓ patients with suspected infection do not have a sample taken according to best clinical practices
    ✓ microbiological tests are not performed routinely (many patients may be tested only after antimicrobial treatment failures or when severely ill)
  - Inaccurate microbiological testing distorting the estimation of frequency of AMR
GLASS approach to improving the quality of surveillance data

• GLASS protocol for enhancing precision and representativeness of routine AMR surveillance

• Additional surveillance approaches including syndrome-based (case-based, patient-based) surveillance, and population-based surveillance using Lot Quality Assurance Sampling (LQAS)

• Addition of data collected by population-based studies (e.g., repeated surveys), designed specifically to fill in the gaps left by the routine surveillance