Global Amtimicrobial Resistance and Use Surveillance System

NATIONAL ACADEMY OF SCIENCES
COMMITTEE ON THE LONG-TERM MEDICAL AND ECONOMIC EFFECTS OF AMTIMICROBIAL RESISTANCE, NOVEMBER 2020

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Outline

- GLASS development
- Summary results
- GLASS in 2020
- Challenges
- Conclusions
Global Antimicrobial Resistance and Use Surveillance System

- The first global system to incorporate official national data from surveillance of AMR
  - standardized approach to the collection, analysis, and sharing of AMR, AMC and AMU data
  - One Health model for AMR surveillance
  - generate data to inform AMR burden estimates

**Initial focus:**
Bacterial infections in humans
Steps towards the global system

2014
Summarise status of AMR surveillance globally

2015
Develop global standards for surveillance

2016
Establish a global surveillance system

2017-18
GLASS data call and reporting

2019
Incorporation of AMC and focused surveillance activities, studies and surveys

2020
GLASS revision

Stockholm, April 2021:
- 3rd High Level Technical Consultation and Meeting on Surveillance of Antimicrobial Resistance and Use for Concerted Actions
- Supported by Republic of Korea and Sweden

Online technical discussions
GLASS environment 2020

**ROUTINE DATA SURVEILLANCE**
- Antimicrobial Resistance surveillance (GLASS-AMR)
- Antimicrobial Consumption surveillance (GLASS-AMC)

**FOCUSSED SURVEILLANCE**
- Emerging Antimicrobial Resistance Reporting (GLASS-EAR)
- Enhanced Gonorrhoeae surveillance (GLASS-EGASP)
- Candida spp. AMR surveillance (GLASS-Fungi)

**SURVEYS AND STUDIES**
- One Health AMR surveillance (GLASS-One Health)
- Point Prevalence Survey methodology for antibiotic use in hospital
- GLASS methodology for estimating of AMR burden
Countries and territories enrolled in GLASS, as of 22 October 2020

N = 99

The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data source: World Health Organization
Map production: Information Evidence and Research (IER)
World Health Organization
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GLASS impact: progress in surveillance in African Countries

2014 WHO report on AMR surveillance

2020 Countries enrolled in GLASS
What data does GLASS-AMR collects?

Status of national AMR surveillance system

• Indicators collected: overall coordination, surveillance system structure, and quality control

AMR data

• for eight priority human bacterial pathogens isolated from clinical specimens
  ✓ blood, urine, stool, and cervical and urethral specimens

• population data:
  ✓ overall number of patients tested per specific specimen
  ✓ age, gender, and infection origin (hospital versus community)
GLASS-AMR submission

By the end of data call, 31st July 2019

- **82** countries/territories/areas enrolled
- **78** countries/territories/areas submitted data
  - **12** countries provided only the information on the status of their national AMR surveillance systems.
  - **One** country provided AMR rates only
  - **65** countries provided the information on the status of their national AMR surveillance systems and 2018 AMR rates
Reporting by Economic Status

Economic status (World Bank 2019)

- LIC
- LMC
- UMC
- HIC

Number of countries

Information on surveillance system
AMR rates
Summary status of national surveillance systems reported by 77 countries, territories and areas

- Almost all NRLs participate in an External Quality Assessment (EQA) scheme
- AST according to internationally recognised standards

EQA provided to NRLs by region and year

Types of AST standards used by region and year

AFR, African Region n=47
AMR/PAHO, Region of the Americas/ Pan American Health Organization n=35
EMR, Eastern Mediterranean Region n=22
EUR, European Region n= 54
SEAR, South-East Asia Region n=11
WPR, Western Pacific Region n=27
AMR data: Progress in reporting

<table>
<thead>
<tr>
<th>Reported to GLASS - AMR</th>
<th>2017 (22 countries)</th>
<th>2018 (48 countries)</th>
<th>2019 (66 countries)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of sites</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hospitals</td>
<td>466</td>
<td>3,097</td>
<td>5,521</td>
</tr>
<tr>
<td>Outpatients clinics</td>
<td>139</td>
<td>2,358</td>
<td>56,818</td>
</tr>
<tr>
<td>In-out patients</td>
<td>N.A.</td>
<td>N.A.</td>
<td>1,998</td>
</tr>
<tr>
<td>Other institutions</td>
<td>124</td>
<td>560</td>
<td>424</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>729</td>
<td>6,015</td>
<td>64,761</td>
</tr>
<tr>
<td><strong>Number of patients with suspected infection</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Blood stream</td>
<td>81,920</td>
<td>262,265</td>
<td>441,794</td>
</tr>
<tr>
<td>Urinary tract</td>
<td>415,679</td>
<td>1,424,011</td>
<td>1,888,545</td>
</tr>
<tr>
<td>Gastro-intestinal</td>
<td>7,477</td>
<td>10,735</td>
<td>17,061</td>
</tr>
<tr>
<td>Sexually transmitted</td>
<td>2,847</td>
<td>9,567</td>
<td>18,572</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>507,923</td>
<td>1,706,578</td>
<td>2,365,972</td>
</tr>
</tbody>
</table>

Most countries reporting for the third year in a row showed an increase in the number of surveillance sites reporting...
# GLASS Report 2020: infections by pathogen & site

<table>
<thead>
<tr>
<th>Infection site</th>
<th>Total number of infected patients</th>
<th>Pathogen</th>
<th>Number of infected patients (by pathogen)</th>
<th>Number of patients with AST results (by pathogen)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Community</td>
<td>Hospital</td>
<td>Unknown</td>
</tr>
<tr>
<td>Bloodstream</td>
<td>441 794</td>
<td>Acinetobacter spp.</td>
<td>1 780</td>
<td>2 736</td>
</tr>
<tr>
<td></td>
<td></td>
<td>E. coli</td>
<td>48 939</td>
<td>35 974</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K. pneumoniae</td>
<td>15 306</td>
<td>15 455</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Salmonella spp.</td>
<td>2 947</td>
<td>334</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S. aureus</td>
<td>12 030</td>
<td>1 740</td>
</tr>
<tr>
<td></td>
<td></td>
<td>S. pneumoniae</td>
<td>3 627</td>
<td>1 274</td>
</tr>
<tr>
<td>Urinary tract</td>
<td>1 888 545</td>
<td>E. coli</td>
<td>405 942</td>
<td>164 385</td>
</tr>
<tr>
<td></td>
<td></td>
<td>K. pneumoniae</td>
<td>64 571</td>
<td>42 206</td>
</tr>
<tr>
<td>Gastroenteric</td>
<td>17 061</td>
<td>Salmonella spp.</td>
<td>2 630</td>
<td>257</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shigella spp.</td>
<td>375</td>
<td>42</td>
</tr>
<tr>
<td>Genital</td>
<td>18 572</td>
<td>N. gonorrhoeae</td>
<td>16 336</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>2 365 972</td>
<td></td>
<td>574 483</td>
<td>280 072</td>
</tr>
</tbody>
</table>

*Note: All numbers are approximate and subject to rounding errors.*
Sustainable Development Goal AMR Indicator

Goal 3: Ensure healthy lives and promote well-being for all at all ages

TARGET 3.d: Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks

Proportion of bloodstream infections among patients due to

- methicillin-resistant *Staphylococcus aureus* (MRSA)
- *Escherichia coli* resistant to 3rd generation cephalosporin
SDG indicators for AMR: LMICs report higher AMR BSI rates

LMICs need urgent support and analysis of underlying causes (e.g. selection biases?)

3rd gen cephalosporin resistant *E. coli*

- HIC (n=27) vs LMIC (n=11)
- 15.3% vs 45.5%*
- p<0.0001

Methicillin resistant *S. aureus*

- HIC (n=25) vs LMIC (n=11)
- 12.4% vs 52.2%*
- p=0.0007

*median proportion; countries that reported < 100 isolates with antibiotic susceptibility testing results were excluded from the analysis.

Source: 3rd GLASS Report, May 2020
Global summaries of AMR rates
Bloodstream infections

* Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen–pathogen combination.
Global summaries of AMR rates

Bloodstream infections

Blood - *Acinetobacterspp.*

Antibiotic / Number of reporting countries, territories and areas*

Aminoglycosides

- Proportion of non-susceptible patients

Carbapenems

- Proportion of non-susceptible patients

*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen–pathogen combination.
Highlights of reported resistance

While the data still need to improve national representativeness, some alarming rates have been reported.

• Median frequency of resistance in pathogens isolated from patients with bloodstream infections
  - methicillin-resistant *S. aureus* (MRSA): 12.11% (IQR 6.4–26.4)
  - *E. coli* resistant to third-generation cephalosporins: 36.0% (IQR 15.2–63.0)
  - *K. pneumoniae* resistant to third-generation cephalosporins 57.6% (IQR 33.4–77.8)
  - *Acinetobacter* spp.: aminoglycosides 41.2% (IQR 5.20–83.31); carbapenems 63.2% (IQR 19.78 -81.63)

• Median resistance to ciprofloxacin in urinary tract infections
  - 43.29% (IQR 23.8 – 46.4)) for *E. coli* in 33 reporting countries, territories and areas
  - 38.1% (IQR 8.41 – 63.53) for *K. pneumoniae* in 34 reporting countries, territories and areas
Limitations and challenges

GLASS Results

- Data completeness & representativeness
- Need for laboratory strengthening
- Need for Universal Health Coverage

Diagnostic stewardship

- Population at risk
- Access to health care
- Infection suspected
- Patient specimen collected
- Quality microbiological test performed
- Data recorded & analysed

Global Antimicrobial Resistance and Use Surveillance System (GLASS)
Conclusion

• GLASS relies on continued data sharing as well as global collaboration, harmonization, and coordination between all partners involved in the implementation of AMR surveillance.

• Some countries still face huge challenges to building their national surveillance systems and partners play a key role in assisting WHO support countries.

• Data limitations should not impede the surveillance, but rather be used to improve it!

• Country full ownership of data is paramount

➢ We are at the initial steps of the global system!
For more information on GLASS

- More information on GLASS and synergies, enrolment procedures, links to the GLASS manuals, the yearly report, and data visualization can be found on the GLASS website http://www.who.int/glass/en/

- Other WHO AMR surveillance initiatives

Thank you!