Global Research on Antimicrobial Resistance (GRAM) project

Determining the global burden of antimicrobial resistance

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GRAM project objectives

1. Comprehensive and up-to-date global data synthesis of AMR of (selected) bacterial pathogens
2. Geospatial mapping of the distribution of resistance of selected bug-drug combinations
3. Incorporation of the mortality and morbidity caused by these AMR bacterial pathogens into the Global Burden of Disease Study estimates

<table>
<thead>
<tr>
<th>Bacteria</th>
<th>Antibacterial drug(s)</th>
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</thead>
<tbody>
<tr>
<td><strong>Escherichia coli</strong></td>
<td>Third-generation cephalosporins, fluoroquinolones</td>
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<td><strong>Shigella</strong></td>
<td>Fluoroquinolones</td>
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<tr>
<td><strong>Klebsiella pneumoniae</strong></td>
<td>Third-generation cephalosporins, carbapenems</td>
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<td><strong>Streptococcus pneumoniae</strong></td>
<td>Penicillin</td>
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<td><strong>Staphylococcus aureus</strong></td>
<td>Methicillin</td>
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<tr>
<td><strong>Salmonella Typhi and Paratyphi</strong></td>
<td>Fluoroquinolones, chloramphenicol</td>
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<tr>
<td><strong>Non-typhoidal Salmonellae</strong></td>
<td>Fluoroquinolones</td>
</tr>
<tr>
<td><strong>Neisseria gonorrhoeae</strong></td>
<td>Third-generation cephalosporins</td>
</tr>
<tr>
<td><strong>Mycobacterium tuberculosis</strong></td>
<td>First-line – isoniazid, rifampicin, second-line – fluoroquinolones, amikacin, capreomycin, kanamycin</td>
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</table>
To estimate the global burden of AMR, we are seeking:

- **Microbiology laboratory**
- **Hospital clinical database**
- **Microbiology Surveillance**
- **Mortality data**
Preliminary results – *Salmonella enterica* serovar Typhi

<table>
<thead>
<tr>
<th>Proportion of MDR Typhi</th>
<th>Proportion of FQNS Typhi</th>
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<tr>
<td><strong>1990</strong></td>
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Maps showing the distribution of MDR and FQNS Typhi in 1990 across different regions of the world.
Conclusions

• GRAM aims to produce an estimate that is as accurate as possible
• The data and the modelling assumptions are central
• We are learning where data is available and where the gaps exist
• In collaboration with researchers we are able to understand their
data and their needs
• Global surveillance systems need to be built up in more countries
• Identification of knowledge and skills gaps will be a key output
• We seek to provide a framework for collaboration and drive support
for strategies to fight AMR
Thank you

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The GBD-AMR team
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