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Background to the Resistance Map

This is a collaborative project between:
- the National Department of Health (NDoH),
- public sector and
- private sector laboratories
- and the Center for Disease Dynamics, Economics & Policy (CDDEP),

to build an antimicrobial resistance map for South Africa.
Produces independent, multidisciplinary research to advance the health and wellbeing of human populations in the United States and around the world.

Dr Ramanan Laxminarayan

Research Areas:
- AMR
- Disease control priorities
- Environmental Health
- Malaria
- Alcohol and Tobacco
- Health and Development

www.cddep.org/
It’s a visual representation of the patterns of antibiotic use and antibiotic resistance in South Africa, displayed with as much detail as the data allows.

Ideally, it would be by “bug-drug combinations,” that is, separate maps showing each important bacterial pathogen and each important antibiotic used to treat it.
Carbapenem-resistant *K. pneumoniae*, % RESISTANT

- Pacific
- East South
- Central
- Mid-Atlantic
- Mountain
- New England
- East North
- Central
- South Atlantic
- West North
- Central
- West South
- Central

<table>
<thead>
<tr>
<th>Year</th>
<th>1999</th>
<th>2001</th>
<th>2003</th>
<th>2005</th>
<th>2007</th>
<th>2009</th>
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</thead>
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<td>Value</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
<td>3.00</td>
</tr>
</tbody>
</table>
Figure 3.1. *Escherichia coli*. Percentage (%) of invasive isolates with resistance to third-generation cephalosporins by country, EU/EEA countries, 2012

- < 1%
- 1% to < 5%
- 5% to < 10%
- 10% to < 25%
- 25% to < 50%
- ≥ 50%
- No data reported or less than 10 isolates
- Not included
What are the most dispensed antibiotic classes and where is consumption most intensive?
The Drug Resistance Index (DRI) is a composite measure that combines the ability of antibiotics to treat infections with the extent of their use in clinical practice. - See more at: http://www.cddep.org/projects/resistance_map/
Why do we want to map AMR?

- To create a consolidated view of antimicrobial resistance for South Africa. It should:
  - Show public and private data sets for antimicrobial resistance
  - Map antimicrobial use where the data exist
  - Develop our own Drug Resistance Index
- To determine trends in antimicrobial resistance over time
Why do we want to map AMR?

- To help guide empiric treatment, particularly to inform:
  - National Standard Treatment Guidelines development and policy decisions on Essential Medicines List (EML) (NEDLAC);
  - individual hospital-level formularies and maybe even district-level formularies in the future;
  - future General Practitioners (GP’s) prescribing and Primary Health Care (PHC) standard treatment guidelines
Why do we want to map AMR?

- Gather data to support research into antimicrobial resistance and other strategic initiatives, policy and planning decisions within public health realm in South Africa.
CDDEP’s MOU with labs

Data sharing agreement:

- Laboratory submitting the data will continue to own the data and have rights to claim the data and extracts when needed.
- If CDDEP gets a request for data to be sent for research to another party they will first get permission from the data owners.
- The data will sit on their server with its own security settings and then be published on their website.
- Lab may at any time remove their data by withdrawing CDDEP’s right to use the data.
- CDDEP will use the data to create graphs, maps and publications – Labs will be acknowledged.
- Labs may continue to publish the data themselves.
How do we create the maps?

Phase 1 – aggregate data
- Existing published data from SASCM
- As far back as possible
- Both public and private data

Phase 2 – line item data
- Blood specimen data to start with and potentially also urine specimens in the future
How do we create the maps?

Phase 1 – aggregate data

1. For data before 2014:
   - as already submitted to SASCM for publication on its website
   - Sent to CDDEP in excel format (no extra work)
   - Needs an MOU between each Lab and CDDEP (confidentiality protection)

2. For data from 2014 onwards:
   - Simple standardised spreadsheet template to allow the individual labs information to be collected and aggregated with minimal additional intervention

SASCM spreadsheet template

<table>
<thead>
<tr>
<th>E.coli: BLOODCULTURE</th>
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</thead>
<tbody>
<tr>
<td># Susceptible</td>
</tr>
<tr>
<td>SITE 1    SITE 2</td>
</tr>
<tr>
<td>n = Total of isolates</td>
</tr>
<tr>
<td>Ampicillin</td>
</tr>
<tr>
<td>Cefuroxime</td>
</tr>
<tr>
<td>Ceftriaxone/cefotaxime</td>
</tr>
<tr>
<td>Cefepime</td>
</tr>
<tr>
<td>Amox / clavulanate</td>
</tr>
<tr>
<td>Piperacillin/tazobactam</td>
</tr>
<tr>
<td>gentamicin</td>
</tr>
<tr>
<td>amikacin</td>
</tr>
<tr>
<td>Ertapenem</td>
</tr>
<tr>
<td>Imipenem/meropenem</td>
</tr>
<tr>
<td>Ciprofloxacin</td>
</tr>
<tr>
<td>Tigecycline</td>
</tr>
<tr>
<td>% ESBL</td>
</tr>
</tbody>
</table>
How do we create the maps?

Phase 2 – disaggregate or line item data

- Geographic location
  - Area code
  - Province, District, Ward
  - Facility name
- Laboratory code or name
- Patient ID – unique identifier, (Age, Gender)
- Date of specimen collection
- Date of patient admission (day, month, year)
- Patient location (Inpatient, Outpatient, Nursing home etc), Location in facility
- Source (Blood, urine, respiratory, wound, skin)
- Results (Sensitive, Intermediate, Resistant)
- Bugs and drugs need to be decided by advisory committee
- Quantitative results (MIC and disk zone diameters) *
- Testing method (if Automated like Vitek or Microscan etc.) *

Patient identifier information that is needed only to deduplicate
POPI act personal information
* Not critical
How do we create the maps?

Need to think bigger picture here in terms of “SURVEILLANCE” in general

Phase 2 – disaggregate or line item data

Central warehousing of data

Line item data by lab

Separate private and Public data warehousing

NHLS CDW

Extracts off data sent to CDDEP whilst retaining details in SA

Other 3rd party data warehouse

Extracts off data sent to CDDEP whilst retaining details in SA

Private send data extracts to CDDEP biannually x4

Public sends data extracts to CDDEP biannually
The importance of confidentiality of patient information cannot be overemphasized. This includes:

- All patient identifiers to be removed and only needed information retained such as unique code, sex and age
- Laboratory holds all the patient confidential information and only submits deduplicated, anonymised data
- Ethics approval for surveillance will be sought for the country
Ethics – initial thoughts

Professor Sabiha Essack Opinion

- Data collection in context of the routine role & continuous quality improvement for service delivery by the NDoH, then ethical clearance is not necessary.
- If private and public data is covered by GERMS – no ethic clearance, assuming that the ethical clearance is routinely reviewed & renewed by the ethics committee in question.
- The complexity comes in if the data is used for publication/research especially as all journals have an ethics requirement.
Ethics – initial thoughts

Professor Sabiha Essack Opinion

- Phase 2 does require ethical clearance:
  - Class clearance across all public & private laboratories and hospitals as well as other entities that will generate such surveillance data
  - National Health Research Ethics Council.
  - Gatekeeper permission from the Heads of the labs, hospital groups, PDoH, NDoH, Council of Medical Schemes etc. confirming anonymity & confidentiality.
- Endorsement from the Office of Heath Standards Compliance
- Participating institutions should include this as part of the patient waiver/indemnity.
Discussion points? Questions to answer?

- Does the Resistance Map add value to the surveillance process?
- Phase 1 – can we collect 2014 data soon
- Phase 1 – can we submit 2014 and prior data to CDDEP
- Phase 1 – can the labs sign the MOU?
- Phase 2 – how do we create the process for the line item data to be collected?
Dr Kim Faure
PURE HEALTH CONSULTING
082 565 1388
kim.faure@mweb.co.za