A One-Health approach to antibiotic stewardship in Africa

Prevention, monitoring and control of Antimicrobial Resistance in the context of a One Health approach involving veterinary and human health fields

Prof Moritz van Vuuren
The need for antimicrobial stewardship across a One Health platform
Targeted metagenomic analyses of rigorously authenticated ancient DNA from 30,000-year-old Beringian permafrost sediments identified a highly diverse collection of genes encoding resistance to β-lactam, tetracycline and glycopeptide antibiotics.
One health approach
The hammer blow will fall on LMICs

The review on antimicrobial resistance, chaired by Jim O'Neil, 2014
n=76 countries over a period of 16 years

Between 2000 and 2015, antibiotic consumption, expressed in defined daily doses (DDD), increased 65% (21.1–34.8 billion DDDs), and the antibiotic consumption rate increased 39% (11.3–15.7 DDDs per 1,000 inhabitants per day).

The increase was driven by low- and middle-income countries (LMICs), where rising consumption was correlated with gross domestic product per capita (GDPPC) growth \( (P = 0.004) \)
Authors present the first global map of antibiotic consumption in livestock

They project that antimicrobial consumption will rise by 67% by 2030, and nearly double in Brazil, Russia, India, China, and South Africa

This rise is likely to be driven by the growth in consumer demand for livestock products in middle-income countries and a shift to large-scale farms where antimicrobials are used routinely
One Health approach to stewardship and AMS deliverables in South Africa

Commitments and objectives of the AMR National Strategy Framework launched at the end of 2014
Commitments and Objectives

- To collaborate as inter-sectoral, interdisciplinary organisations and departments to strengthen, coordinate and institutionalise efforts to address AMR

- To establish a national surveillance system to track and report resistant organisms and antimicrobial use in agriculture and human health

- To promote the appropriate use of antimicrobials in human and animal health through antimicrobial stewardship in facilities and suitable enabling legislation and regulations

- To build the expertise and strengthen the competency of health and veterinary professionals and improve the staffing levels of the workforce in AMR and IPC
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| AB consumption humans 2018 |
| AB consumption animals 2015-2017 |
| AMR maps for human and animal health |

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AMR maps for RSA

Escherichia coli resistance to carbapenems

Surveillance for Antimicrobial Resistance and Consumption of Antibiotics in South Africa
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SAASP annual workshops
SAASP Antibiotic guideline
Practical guide to AMS – One Health
Technical guide for veterinarians
A POCKET GUIDE TO ANTIBIOTIC PRESCRIBING FOR ADULTS IN SOUTH AFRICA, 2015

SEAN WASSERMAN
TOM BOYLES
MARC MENDELSON

ON BEHALF OF THE SOUTH AFRICAN ANTIBIOTIC STEWARDSHIP PROGRAMME (SAASP)

<table>
<thead>
<tr>
<th>Infection Episode 1</th>
<th>Diagnosis</th>
<th>Pneumonia</th>
<th>UTI</th>
<th>Meningitis</th>
<th>Line infection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cellulitis</td>
<td>Intra-abdominal infection</td>
<td>Other</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Source**
- Community acquired
- Hospital acquired

**Indication**
- P = Prophylactic
- E = Empirical
- D = Definitive

**SEND APPROPRIATE CULTURES BEFORE PRESCRIBING ANTIBIOTICS**

<table>
<thead>
<tr>
<th>Cultures</th>
<th>Sent before antibiotics</th>
<th>Sent after antibiotics</th>
<th>Not Sent</th>
</tr>
</thead>
</table>

*CA = Community acquired: within 48h of admission
HA = Hospital acquired: >48h after admission or within 30 days of discharge

<table>
<thead>
<tr>
<th>Indication</th>
<th>Medicine Approved Name or GE</th>
<th>Dose</th>
<th>Route</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td></td>
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<tr>
<td>E</td>
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<tr>
<td>D</td>
<td>DRS Signature &amp; Name</td>
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</tbody>
</table>

**Antibiotic Day**

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Start Date</th>
<th>Duration</th>
<th>Frequency</th>
</tr>
</thead>
</table>

**Antibiotic Prescription Chart**

**Patient Label**

**Weight**

**eGFR**

**Allergies**
A Practical Guide to Antimicrobial Stewardship in South Africa

July 2016
A Practical Guide to Antimicrobial Stewardship in South Africa: One Health Approach and Governance 2016

One Health approach and governance - MAC, Provincial AMS committees and district committees including veterinary, environmental aspects

AMS guidelines for Hospitals
- Leadership, accountability and structures for AMS;
- Determining baselines and defining priorities
- Improvement initiatives and activities
- Tracking and measuring improvement
- Education and training

AMS guidelines for Animal Health Hospitals
AMS guidelines for Clinics and Primary health/community level
TECHNICAL
GUIDELINES
FOR THE
RESPONSIBLE
AND PRUDENT
USE OF
ANTIMICROBIALS
IN VETERINARY
MEDICINE IN
SOUTH AFRICA

Developed by the Medicines Committee
of the South African Veterinary Association
together with the Department of
Paraclinical Sciences,
Faculty of Veterinary Science,
University of Pretoria.
PART 2
AMS in hospital care
An antibiotic prescription chart and weekly antibiotic stewardship ward round was introduced into two medical wards of an academic teaching hospital in South Africa between January-December 2012.

19.6% decrease in volume with a cost reduction of 35% of the pharmacy’s antibiotic budget

Concomitant increase in laboratory tests driven by requests for biomarkers
116 662 patients receiving antibiotics at 47 hospitals during 104 weeks of standardised measurement and feedback, were reviewed for 5 targeted measures, e.g.

- prolonged duration of therapy
- the use of multiple antibiotics
- redundant antibiotic coverage

Pharmacists intervened in 7 934 prescriptions (1/15), 40% of which related to an excessive duration of therapy

18% reduction in consumption was achieved
Guidelines for the Prevention and Containment of Antimicrobial Resistance in South African Hospitals

Supporting the Antimicrobial Resistance Strategy Framework and the Guidelines on Implementation of the Antimicrobial Strategy in South Africa: One Health Approach and Governance, 2018
AMS in primary care
The majority (80%) of antibiotic use occurs in the community, with acute respiratory tract infections (ARTIs) the most common indication.
The role of appropriate diagnostic testing in acute respiratory tract infections: An antibiotic stewardship strategy to minimise diagnostic uncertainty in primary care

A J Brink,1 MB ChB, MMed (Micro); J van Wyk,2 MB ChB, MMed (Clin Path); V M Moodley,2 MB ChB, DTM&H, FCPath (Micro) SA, MMed (Micro); C Corcoran,3 MB ChB, FCPath (Virol), DTM&H, MMed (Virol); P Ekermans,4 MB ChB, DTMH, MMed (Clin Path); L Nutt,5 MB ChB, MMed (Clin Path); T Boyles,6 MA, BM BCh, MRCP, MD, DTM&H, Cert ID SA; O Perovic,7,8 FC Path (SA) (Micro), MMed (Micro), DTM&H, MD; C Feldman,9 MB BCh, DSc, PhD, FRCP, FCP (SA); G A Richards,10 MB BCh, PhD, FCP (SA), FRCP; M Mendelson,6 BSc, PhD, MBBS, FRCP, DTM&H
Knowledge, attitude and perceptions of patients & primary care prescribers in SA

SAASP 2017
South African Antibiotic Stewardship Programme Annual Workshop – 24 & 25 February 2017

BEHAVIOUR CHANGE (BC) IN ADDRESSING ANTIBIOTIC RESISTANCE

<table>
<thead>
<tr>
<th>FRIDAY 24 FEBRUARY</th>
<th>HILTON HOTEL, SANDTON</th>
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<tbody>
<tr>
<td>VENUE</td>
<td>HILTON BALLROOM FOYER</td>
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<tr>
<td>09h00 – 10h45</td>
<td>Registration</td>
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<tr>
<td>VENUE</td>
<td>HILTON BALLROOM 1 &amp; 2</td>
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<tr>
<td>10H45 – 11H00</td>
<td>WELCOME</td>
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</table>

Marc Mendelson & Adrian Brink
Antibiotic use and resistance: Knowledge, attitudes and perceptions among primary care prescribers in South Africa

E Farley, MPH; A Stewart, MPH; M-A Davies, PhD, MPH, MB ChB; M Govind, MB ChB; D van den Bergh, EngD, MSc (Med), BPharm; T H Boyles, MA, BM, BCh, MCRP, MD, DTM&H, Cert ID (SA)

Patients (n=403); Prescribers (n = 264)

95.8% believed that ABR is a significant problem in SA
66.5% felt pressure from patients to prescribe antibiotics
Nearly 30% of 264 primary care providers reported that on about half of the occasions in which antibiotics were “not absolutely necessary,” they nonetheless prescribed the medicines
Veterinarians predominantly use antibiotics empirically before resorting to laboratory testing (91.16% of respondents).

Antimicrobial compounding and off-label use of human registered medication was common practice (86.19% of respondents).

A large number of clients attempted antibiotic treatment of their pets prior to seeking veterinary assistance.
South African medical students’ perceptions and knowledge about antibiotic resistance and appropriate prescribing: Are we providing adequate training to future prescribers?

S Wasserman, MB ChB, MMed; S Potgieter, MB ChB; E Shoul, MB ChB; D Constant, PhD, MPH; A Stewart, MPH; M Mendelson, MD, PhD; T H Boyles, MD

289 students at 3 medical schools. There are low levels of confidence with regard to antibiotic prescribing among final-year medical students in SA, and most students would like more education in this area.
260 fourth year (final year) pharmacy students from 8 universities

90.0% indicated that they would like more training on antimicrobial stewardship at undergraduate level.
South Africa’s National Training Centres for Antibiotic Stewardship
Antibiotic stewardship rounds at Onderstepoort Veterinary Hospital

Photos courtesy of Prof. Debra Goff
Need for a standardized curriculum

Standardised learning outcomes of a core consensus SA stewardship curriculum is required as a matter of urgency for all cadres of health workers.
AMS initiatives in African countries
WHO AFRO
NATIONAL FOCAL POINT WORKSHOP

21-23 March 2016
Harare, Zimbabwe

Agenda

<table>
<thead>
<tr>
<th>Date &amp; Time</th>
<th>Activity</th>
<th>Topic/s</th>
<th>Presenter/Facilitator</th>
<th>Exercise</th>
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<tbody>
<tr>
<td>DAY 1</td>
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<tr>
<td>Monday 21 March</td>
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<tr>
<td>08H30-09H00</td>
<td></td>
<td>Arrival and Registration</td>
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<tr>
<td>09H00-10H00</td>
<td>Opening Ceremony (Programme Director: Dr JB Ndihokubwayo)</td>
<td>Welcome to participants</td>
<td>Dr Okello, WR/IST Coord</td>
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<tr>
<td></td>
<td></td>
<td>Opening Address</td>
<td>Harare, Zimbabwe MoH Official</td>
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<tr>
<td>10H00-10H30</td>
<td>Welcome &amp; Introductions</td>
<td>Introduction to the regional AMR workshop</td>
<td>Dr JB Ndihokubwayo</td>
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<td>Participant introductions and expectations.</td>
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<td>Administrative, security &amp; housekeeping announcements</td>
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<tr>
<td>10H30-11H00</td>
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<td>Break</td>
<td></td>
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<tr>
<td>11H00-12H30</td>
<td>Overview of AMR &amp; Action Plans</td>
<td>Antimicrobial Resistance: global overview, the response</td>
<td>Dr C Pessoa da Silva &amp;</td>
<td></td>
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<tr>
<td></td>
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<td>and the Global Action Plan on AMR</td>
<td>Dr A Aidara</td>
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<td></td>
<td></td>
<td>The Global Action Plan and OIEs activities on AMR</td>
<td>Dr J Marot &amp; Dr A Baku</td>
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Global Database for Antimicrobial Resistance Country Self-Assessment

Information captured in this database is a result of the annual country self-assessment questionnaire disseminated to countries by WHO, FAO and OIE since 2016.
## Multi-sector and One Health collaboration/coordination

### Table 2
Multisectoral coordination mechanisms based on the “One Health” approach (2018/19)

<table>
<thead>
<tr>
<th>2019 World Bank income category (total countries that responded in each category)</th>
<th>Countries with functional multisectoral working groups</th>
<th>Number</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>High-income (52)</td>
<td>36</td>
<td>69</td>
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</tr>
<tr>
<td>Upper-middle-income (48)</td>
<td>21</td>
<td>44</td>
<td></td>
</tr>
<tr>
<td>Lower-middle-income (33)</td>
<td>10</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Low-income (25)</td>
<td>7</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td><strong>Total (158)</strong></td>
<td><strong>74</strong></td>
<td><strong>47</strong></td>
<td></td>
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Country progress with development of a NAP on AMR (116/194)
### NAPs approved by national authorities

*(accessed from WHO AFRO office 23/01/2019)*

<table>
<thead>
<tr>
<th>Burkina Faso</th>
<th>Sierra Leone</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Republic of Tanzania</td>
<td>Zambia</td>
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<tr>
<td>Zimbabwe</td>
<td><strong>Malawi</strong></td>
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<td>Mauritius</td>
<td>Liberia</td>
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<td>Mozambique</td>
<td>Kenya</td>
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<tr>
<td>Nigeria</td>
<td>Ghana</td>
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<tr>
<td>South Africa</td>
<td>Gabon</td>
</tr>
<tr>
<td>Cameroon</td>
<td>Ethiopia</td>
</tr>
</tbody>
</table>
WHO library of existing, publicly available national action plans
(accessed 04 May 2019)

Ethiopia
Sierra Leone

Kenya

Mauritius

South Africa

United Republic of Tanzania
Derives its institutional authority from the African Union

Africa CDC will establish the Anti-Microbial Resistance Surveillance Network (AMRSNET)

AMRSNET seeks to serve as the primary coordinator for AMR surveillance and control on the African continent

Africa CDC will also need to advocate for diagnostic stewardship among animals that are reared for food

Disseminate Africa-specific antimicrobial treatment and stewardship guidelines for facilities and clinicians.