Cumulative Antibiograms Analysis
National Standard Hospital-Level
Cumulative Antibiogram Expert
Roundtable

11 December 2012

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The Problem of AMR

1. Increasing Antibiotic Resistance
2. Increasing Antibiotic Use
3. Vanishing Antibiotic Pipeline
Antibiotics caused US deaths to decline by ~220 per 100,000 in 15 years.

Sulfa
Penicillin

All other medical technologies reduced deaths by ~20 per 100,000 over the next 45 years.

Inevitability of antibiotic resistance
The antibiotic pipeline

Figure 1: 14 classes of antibiotics were introduced for human use between 1935 and 1968; since then, 5 have been introduced.

- Polypeptides
- Rifamycins
- Macrolides
- Lincosamides
- Cycloserine
- Glycopeptides
- Tetracyclines
- Aminoglycosides
- Nitromidazoles
- Quinolones
- Sulfonamides
- Chloramphenicol
- Trimethoprim
- Mupirocin (topical)
- Streptogramins
- Oxazolidinones
- Lipopeptides
- Pleuromutilins (topical)

* Beta-lactams include three groups sometimes identified as separate classes: penicillins, cephalosporins, and carbapenems.
NDM-1 producing E. coli and K. pneumoniae isolates

Poirel, L. et al. (2011) AAC 55:5403
The Latest Superbugs
Resistant to all but the last toxic antibiotic

Carbapenemase-producing Enterobacteriaceae in the UK
(n = 1003)

Multiple enzymes; most increasing, and plasmid-encoded

ARMRL, Unpublished data
Resistant “VRE”

VRE Notifications – Clinical isolates

ACT  NSW
NT  QLD
SA  TAS
VIC  WA

Incomplete
Resistant “Golden Staph”

Community-onset MRSA

Hospital-associated

Community-associated

% of S. aureus

2000
2002
2004
2006
2008
2010

ACT
NSW
NT
Qld
SA
Tas
Vic
WA
Aust

2010
Percent MRSA of all isolates of *S. aureus* from blood in the EU 2008

Australia 24%
- Community 18%
- Hospital 34%

Data from the European Antimicrobial Surveillance System, EARSS
Evolution of Resistance is not linear
What are the consequences of antibiotic resistance?

• Some infections may become difficult or impossible to treat: this is happening now

• Many of modern medicine’s achievements are only possible with effective antimicrobials
  - Routine and complex surgery
  - Intensive care medicine
  - Neonatal care
  - Modern obstetrics
  - Organ transplantation
  - Cancer treatment

• When will the risks become too great?
Strategies to address the rising problem of resistance

- Prevent Infections
  - Infection control
  - Immunisation

- Prolong effectiveness of existing antibiotics
  - early and accurate diagnosis
  - antimicrobial stewardship

- Develop New Therapies
  - Minimise antimicrobial use in agriculture and veterinary medicine
WHO Global Strategy for Containment of Antimicrobial Resistance

FIFTY-EIGHTH WORLD HEALTH ASSEMBLY
Agenda item 13.10

Improving the containment of antimicrobial resistance

The Fifty-eighth World Health Assembly,

Having considered the report on national use of antibiotics by group

Acknowledging that the containment of antimicrobial resistance is essential to the internationally agreed health-related goals contained in its Declaration,

Recalling the recommendations of the Second International Con

Respecting also the findings of relevant WHO reports, including "Reducing the risk of antimicrobial resistance from the use of antimicrobial agents" (Copenhagen, 1998),

Aware of the spread of antimicrobial resistance represent a global problem that requires urgent action at national, regional and international levels in view of the increasing development of new antimicrobial agents,

Recalling previous resolutions WHA 50.27 and WHA 57.11 in which the Assembly, in resolutions WHA 50.27 and WHA 57.11 on antimicrobial resistance, and WHA 54.14 on global health

Recognizing the efforts of WHO in collaboration with governments and intergovernmental organizations to contain antimicrobial needs of the World Health Organization,

Noting that, despite some progress, the strategy for containment is not yet widely implemented,

Wishing to encourage efforts to contain antimicrobial resistance and antimicrobial agents by providing and consumers in order to improve the


The evolving threat of antimicrobial resistance
Options for action
What is happening in Australia to combat AMR?
Antimicrobial Stewardship in Australian Hospitals

2011

Editors: Margaret Duggan and Marilyn Graham

Therapeutic Guidelines products

Electronic products

For information about the content and features of these products, click on the following icons.

Print products

For details of topics covered in the various titles, click on the following icons.

Therapeutic Guidelines

- Antimicrobials
- Antibiotics
- Antimicrobial Resistance
- Drug Utilisation

NATIONAL ANTIMICROBIAL UTILISATION SURVEILLANCE PROGRAM (NAUSP)

ANNUAL REPORT 2007-2008
Despite some national efforts.

A patchwork with many of the elements, but essentially incomplete.
Major gaps in addressing AMR identified by Colloquia 2011

1. **Surveillance of hospital and community isolates**
   - Limited targeted surveillance (DoHA Health Surveillance Funding)
   - No national passive surveillance (collation of laboratory information databases)
   - No national alert system
   - Limited disease burden surveillance.
   - Limited disease outcome surveillance.
   - No systematic approach to collection of data on disease outcomes (mortality, disability, additional health-care costs)
   - Limited antimicrobial usage surveillance.

Hospitals: NAUSP, CHRISP
Community: DUSC, BEACH
2. Regulation of drugs.

- Drug registration – human. Resistance risk assessment has not been mandated for new products or indications. Therapeutic Goods Administration (TGA) remit only covers agents with an express therapeutic claim and does not address the issue of antimicrobial agents which can select for resistance of human importance in consumer products or the environment (e.g. triclosan).

- Access to new drugs – human. No obvious registration path for orphan antibiotics which are now valuable again, e.g. fosfomycin (although are available on an individual named patient basis via SAS approval scheme).
3. Usage and regulation in animal and agriculture

- No structured surveillance program for local and imported foods
- No structured surveillance program for companion animals
- Usage surveillance APVMA collect data as part of their requirement for annual returns but data are treated as commercial-in-confidence
- Regulation of drugs. Focussed on resistance risk assessment in relation to food animals, less so on companion animals
Australian Health Protection Principal Committee Governance structure

SCH  Standing Council on Health
AMAC  Australian Health Ministers’ Advisory Council
AMRSC  Antimicrobial Resistance Standing Committee
BBVSS  Blood Borne Virus and Sexually Transmissible Infections Standing Committee
CDNA  Communicable Disease Network Australia
enHealth  Environmental Health Standing Committee
NHEMS  National Health Emergency Management Standing Committee
PHLN  Public Health Laboratory Network
Antimicrobial Resistance Standing Committee (AMRSC)

Role of the AMRSC is to:

- Advise the Australian Health Protection Principal Committee on matters relating to antimicrobial resistance
- Provide expert advice and assistance on issues relating to antimicrobial resistance
- Recommend national priorities relating to antimicrobial resistance for action

Membership
- Australian Commission on Safety and Quality in Health Care
- Australian Pesticides and Veterinary Medicines Authority
- Australasian Society for Infectious Diseases
- Australian Society for Antimicrobials
- Australasian College for Infection Prevention and Control
- Communicable Disease Network Australia Public Health Laboratory Network
- Department of Agriculture, Fisheries and Forestry
- National Health and Medical Research Council
- National Prescribing Service
- Therapeutic Goods Administration
- Pharmaceutical Benefits Advisory Committee
- Department of Health and Ageing
Interim Report 1
Goal: National Coordination of Surveillance and Reporting of Antimicrobial Resistance and Antibiotic Usage (AMRAU) in Australia

With respect to bacteria in the context of human health:

• What activities for the surveillance and reporting of antimicrobial resistance and antibiotic usage currently occur globally?

• What options or models for a nationally coordinated approach for the surveillance and reporting of antimicrobial resistance and antibiotic usage are most applicable to the Australian context?

• What are the enablers of, and barriers to, the establishment of the preferred model/s for a nationally coordinated approach to surveillance and reporting of antimicrobial resistance and antibiotic usage in Australia?
Two-phase study

Phase 1: Integrative Literature Review + Document/Policy Analysis
- Review of the global programs and related literature
- National activity analysis (Document and Policy)

Phase 2: Key Stakeholder Engagement Analysis
- Telephone interview and/or survey engagement with key stakeholders in antimicrobial resistance and antimicrobial usage and across Australia.
- Thematic analysis described by Silverman (2006)
Timeline

- **Milestone 1:** Project Approval - 20 July 2012
- **Milestone 2:** Interim Report 0 - 1 October 2012
- **Milestone 3:** Interim Report 1 - 31 Oct 2012
- **Milestone 4:** Interim Report 2 - 30 Nov 2012
- **Milestone 5:** Final Report - 28 January 2013

- **Deliverable 1:** Preliminary Report - 31 Oct 2012
- **Deliverable 2:** Evaluation Report Draft - 30 Nov 2012
- **Deliverable 3:** Evaluation Report Final - 31 Dec 2012
- **Deliverable 4:** Final Report - 28 January 2013
Broader Considerations for an Antimicrobial Resistance Surveillance System

- Clinical data
- Demographic data
- Institutional data
- Outcome data
- Denominator data
- Laboratory data
- Human AMR surveillance system
- Antimicrobial consumption data
- Comprehensive national system
- Animal AMR data
- Food AMR data
• **Coordinated national surveillance to:**

  - **Know what is happening and where, so action can be targeted**
  - **Determine trends in antimicrobial resistance and the need for particular interventions**
  - **Detect the emergence of new strains of antimicrobial resistance bacteria**
  - **Provide a basis for policy recommendations**
1) Assess the feasibility of implementing electronic requesting and reporting for the four HAI referenced in the core information components for structured microbiology requests and reports for Healthcare Associated Infections:
   - Healthcare associated *Staphylococcus aureus* bacteraemia (SAB);
   - Central line associated bloodstream infections (CLABSI);
   - Healthcare acquired *Clostridium difficile* infection (CDI); and
   - Surgical site infections (SSI).

2) Identify any elements of the core information components which require revision

3) Trial electronic surveillance of HAI in hospitals using the core information components
   - Both sites concentrated on generating reports for surveillance as electronic ordering was not feasible due to time and budget constraints.
   - Both sites did a gap analysis of current orders and results against the core information components, highlighting the lack of essential data such as admission date/time.
   - The pilots also demonstrated where clinical review is required to determine HAI cases and where lab results are sufficient to determine HAI cases. As a result of the pilot, there will be some modifications to the core information components.
   - The pilot has informed the development of standards for electronic surveillance of SAB, CDI, CLABSI and SSI.
Multi Resistant Gram Negative Taskforce

- The aim of the Taskforce is to provide advice and recommendations on prevention and control measures on multi-resistant Gram negative bacteria.

- Information will also be developed to assist health staff to care for patients, and information for patients considering overseas medical treatment.

- Taskforce membership covers all states and the Northern Territory.
Antimicrobial Stewardship Network

- The role of the Network is to:
- Provide a means for two way communication between the Commission and jurisdictions, private and paediatric sectors in regard to AMS activities
- Provide a means to implementing AMS activities nationally,
- Provide opportunity for Jurisdictions, Private and Paediatric sectors and the Commission to share materials and lessons learned nationally
- Assist to identify resources suitable for national development.
- Provide a forum for jurisdictions to be able to provide advice to the Commission via the Antimicrobial Stewardship Advisory Committee on proposed activities for national action.
The NSQHS Standards

1. Governance for Safety and Quality in Health Service Organisations
2. Partnering with Consumers
3. Healthcare Associated Infections
4. Medication Safety
5. Patient Identification and Procedure Matching
6. Clinical Handover
7. Blood and Blood Products
8. Preventing and Managing Pressure Injuries
9. Recognising and Responding to Clinical Deterioration in Acute Health Care
10. Preventing Falls and Harm from Falls
Criterion 3.14 Antimicrobial stewardship

- An AMS program is in place
- Access to antibiotic guidelines
- Monitoring of use and resistance
- Action taken to improve
Safety and Quality Improvement Guides
Accreditation Workbooks

Day Procedure Services Accreditation Workbook
September 2012

Hospital Accreditation Workbook
September 2012
Australian Safety and Quality Goals for Health Care

1. Safety of care: That people receive healthcare without experiencing preventable harm. Initial priorities are in the areas of:
   1.1 Medication safety
   1.2 Healthcare associated infection
      - Hand hygiene
      - Antimicrobial stewardship
      - Surveillance
   1.3 Recognising and responding to clinical deterioration

2. Appropriateness of care:
   2.1 Acute coronary syndrome
   2.2 Transient ischemic attack and stroke

3. Partnering with consumers
ACSQHC Work Plan 2013-16

1. National safety and clinical standards

2. Formulation and implementation of national accreditation schemes

3. Reduction in unwarranted variation in practice and outcomes for individuals and populations

4. Nationally coordinated action to address healthcare associated infections and antimicrobial resistance

5. National data set development

6. Publishing and reporting

7. Knowledge and leadership for safety and quality.
Conclusion

- AMR is a global problem impacting on the Australian community today – and will get a lot worse

- National coordinated surveillance underpins all efforts to manage resistance problem

- National strategic approach to coordinate prevention, stewardship, education, regulation and research
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December 2012

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