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ANTIMICROBIAL STEWARDSHIP IN SCOTLAND

Key achievements of the Scottish Antimicrobial Prescribing Group

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Project Lead
Scottish Antimicrobial Prescribing Group
Overview of talk

- ScotMARAP & SAPG
- Results from workstreams
- Future work
Scott MARAP


- Made recommendations for NHS Boards to ensure prudent use of antimicrobials.

- Scottish Antimicrobial Prescribing Group (SAPG) formed to ensure national delivery of ScotMARAP – funded by Scottish Government via the HAI Taskforce.
What is SAPG?

• Multidisciplinary national clinical forum based on SMC collaborative structure
• Chaired by Professor Dilip Nathwani, Consultant in Infectious Diseases, NHS Tayside
• Staffed by Project Lead (pharmacist), Project Officer & Information Analyst
• Includes representatives from key national stakeholders - SMC, QIS, ISD, HPS, NES and SGHD and all mainland NHS boards.
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A consortium of Antimicrobial Management Teams
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Antimicrobial Management Team (AMT)

• Sub-group of NHS Board Area Drug & Therapeutics Committee

• Key role in progressing ScotMARAP at local level

• Lead doctor, Consultant Microbiologist, Antimicrobial Pharmacist, Infection Control Manager, Primary Care representative
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Medical Director

Area Drugs & Therapeutics Committee

ANTIMICROBIAL MANAGEMENT TEAM (AMT)

Antimicrobial Pharmacist

Ward Based Clinical Pharmacists

Chief Executive

Infection Control Manager

Risk Management Committee

Clinical Governance Committee

Infection Control Committee

Microbiologist / Infectious Diseases Physician

PRESCRIBER

Dissemination & feedback

Prescribing support / feedback

NHS SCOTLAND
Antimicrobial Pharmacists

- Key members of AMT tasked with local delivery of stewardship

- SGHD provided money (2008-2011) employ antimicrobial pharmacists in each NHS board

- Association of Scottish Antimicrobial Pharmacists established in 2004

- Currently 0.63- 2.35 Work Time Equivalents of antimicrobial pharmacists per 1000 acute beds
IMMEDIATE CHALLENGES

- Raise profile of antibiotic prescribing in Scottish healthcare facilities.
- Organisations structures, accountability and leadership.
- Provide evidence based guidance where appropriate.
- Introduce measures for judgement & scrutiny.
- Harness local expertise, engagement and ownership - AMT network.
- Reliable, robust, uniform systems for measuring and communicating antibiotic resistance rates and consumption locally and nationally.
Organisation & accountability workstream – actions by NHS Quality Improvement Scotland

- Report on the structures in place within each NHS Board for antimicrobial management.

- Integration of quality measures for antimicrobial prescribing into Healthcare Environment Inspectorate (HEI) process.

- Development of the infection implementation and improvement programme (iiiP).
Current issues at NHS board level

- Engagement of clinicians in antimicrobial stewardship
- Links with Infection Control
- Capability to use data for quality improvement
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**Education workstream**
– actions by NHS Education for Scotland

- Antibiotic prescribing for Foundation Year doctors in Scotland (Dundee University/NES). Launched 2006 and revised June 2009, wider access to other prescribers and primary care section in 2010.

- Bacterial Resistance & *Clostridium difficile* –online tutorials.

- Training on the use of antimicrobials in clinical practice (PowerPoint presentation with associated teaching notes).

- Framework of learning outcomes for antimicrobial stewardship developed for inclusion in undergraduate medical curriculum.
AP Vignette 1 - Case description

A man who is 65 years old has been unwell for 5 days after returning from holiday in Benidorm in Spain. He developed a high fever and productive cough with small amounts of sputum. His GP prescribed oral amoxicillin (250mg, three times daily) 2 days ago as he was becoming mildly confused and short of breath. His condition has not improved and his wife has become increasingly concerned. His GP thinks that he may have community-acquired pneumonia (CAP) and has requested urgent assessment and inpatient care if appropriate.

PMH: Hypertension.
Drug history: Amoxicillin (250mg, three times daily) x 2 days; bendrofluamide 2.5mg, daily.
SH: Smoker 20 cigarettes/day, occasional beer 8 units/week.
PH: Nil of note.

On examination

1. Temperature: Pyrexia, 39°C
2. Slight confusion: MSQ 7/10, but oriented in person (normally very organised)
3. Pulse rate: 90/min
4. Respiratory rate: 26/min
5. Blood pressure (BP): 160/80mmHg
6. Mild dehydration
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NHS Education for Scotland

Learning outcomes
To be achieved by the end of the training, participants will be able to:

Section One – Policy context: National and local strategic approaches

The participant will be able to:
- discuss the role of antimicrobial stewardship and its importance in promoting appropriate use of antibiotics
- identify key national and local policies and strategies related to antimicrobial stewardship
- describe how these policies and strategies influence clinical practice

Section Two – Diagnosis of infection and clinical decision making

The participant will be able to:
- distinguish between community and hospital-acquired infections
- explain the role of microbiology in the diagnosis of infections
- discuss the importance of antibiotic sensitivity testing in clinical decision making

Section Three – Prudent antimicrobial prescribing

The participant will be able to:
- discuss the principles of antimicrobial stewardship in acute and chronic care settings
- describe how antimicrobial stewardship strategies reduce the risk of antibiotic resistance
- explain the importance of monitoring and evaluating antimicrobial use

Section Four – Antimicrobial use in hospital

The participant will be able to:
- describe the key principles of infection control in hospital settings
- discuss the role of clinical governance in antimicrobial stewardship
- explain how multidisciplinary teams can improve antimicrobial prescribing

Section Five – Antimicrobial use in primary care

The participant will be able to:
- describe the role of general practitioners in antimicrobial stewardship
- discuss the importance of patient education and self-management
- explain how effective antimicrobial use can be achieved through collaboration between primary and secondary care providers

Introduction

Training on use of antimicrobials in clinical practice
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Pharmacist education and training

- **Specialist training**
  Antimicrobial pharmacist intensive training
  Pharmacokinetics of gentamicin & vancomycin training

- **Multiprofessional conference**
  Pharmacists (clinical, prescribing advisers, primary care)
  Non-medical prescribers, infection control staff, others

- **CPD Resource pack**
  954 hospital and community pharmacists
  Learning session delivered in every NHS board area
Information workstream
– actions by National Services Scotland

• Antimicrobial use
  Publication of ‘national prescribing indicators’ for primary care use of antimicrobials
  National participation in ESAC-3
  Development of Hospital Medicine Utilisation Database (HMUD)

• Antimicrobial resistance
  Procurement and installation of VITEK 2 sensitivity testing systems completed
  Electronic link to transfer resistance (VITEK 2) data between diagnostic laboratories and HPS piloted
  ALERT system being developed and piloted
  HPS AMR expert group established
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First joint national report on antimicrobial resistance and use

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Report on Antimicrobial Resistance and Use in Humans in 2008
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#### Resistance data

**Percentage resistance to key antibiotics for Gram-negative pathogens from blood culture isolates 2008 data**

<table>
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<tr>
<th>Pathogen</th>
<th>Amx</th>
<th>Amc</th>
<th>Cro</th>
<th>Caz</th>
<th>Gen</th>
<th>Cip</th>
<th>Mem</th>
<th>Ptz</th>
<th>Tmp</th>
<th>C/O</th>
<th>C/G</th>
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<tr>
<td><strong>E. coli</strong></td>
<td>61</td>
<td>27</td>
<td>12</td>
<td>10</td>
<td>7</td>
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<td>0</td>
<td>3</td>
<td>36</td>
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<td>5</td>
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<tr>
<td><strong>K. pneumoniae</strong></td>
<td>99</td>
<td>14</td>
<td>16</td>
<td>13</td>
<td>8</td>
<td>11</td>
<td>0</td>
<td>7</td>
<td>18</td>
<td>9</td>
<td>10</td>
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<td>12</td>
<td>5</td>
<td>8</td>
<td>95</td>
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Emerging resistances

<table>
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<tr>
<th></th>
<th>ESBL producers</th>
<th>Carbapenemase producers</th>
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<tr>
<td><strong>E. coli</strong></td>
<td>7.2%</td>
<td>0</td>
</tr>
<tr>
<td><strong>K. pneumoniae</strong></td>
<td>8.4%</td>
<td>0*</td>
</tr>
</tbody>
</table>

* One report received from the UK reference lab (ARMRL) in 2009
Overall use antimicrobials in Scotland in primary care
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Primary Care - recommended antimicrobials

[Graph showing the use of antimicrobials per 1000 patient days from 2004/05 to 2008/09 for different health boards in Scotland.]
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Primary care – antibiotics with high risk of CDI
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HMUD: Hospital Medicines Utilisation Database

Data available from HMUD datamart
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BNF Chapters, cost per occupied bed day, April 2007
National Point Prevalence Study 2009 (ESAC-3) - summary

- 31 hospitals (8732 patients)
- 27.8% patients on antimicrobials
- 50.5% given intravenously
- 76.1% reason recorded in case notes
- 57.9% compliant with local guidelines
- 30.3% surgical prophylaxis more than one day

some room for improvement
Scotland and Europe comparison of proportion of total antimicrobials prescribed, ESAC PPS 2009

- Amoxicillin
- Doxycycline
- Metronidazole
- Trimethoprim
- Flucloxacillin
- Ciprofloxacin
- Clindamycin
- Cephalosporins

Proportion of total antimicrobials prescribed (%)
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Infection Management workstream – actions on prescribing practice

• Revision of antimicrobial prescribing policies to restrict agents associated with CDI – hospital policies and surgical prophylaxis.

• National policies for gentamicin and vancomycin.

• National adoption of HPA template for infections in primary care.
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**C. difficile Infection trends**

**FIGURE 6.** Overall quarterly CDI rates for Scotland (per 1000 total OCBDs) for thirteen quarters of mandatory surveillance covering the period October 2006-December 2009.
Health, Efficiency & Access to Treatment (HEAT) Targets – CDI HEAT Target

• 30% reduction in CDI rate by March 2011.

• SAPG asked to develop prescribing indicators to support target.

• **Empirical prescribing**: compliant with the local antimicrobial policy and indication recorded in case note in ≥ 95% of sampled cases

• **Surgical antibiotic prophylaxis**: compliant with local antimicrobial prescribing policy and duration is <24 hours in ≥ 95% of sampled cases

• **Primary Care empirical prescribing**: seasonal variation in quinolone use (winter months vs. summer months) is ≤ 5%
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Compliance with Antibiotic Policy in Acute Medical Admissions Unit - Ninewells Hospital

D Nathwani, SAPG annual report 2009
Empiric prescribing – national compliance

Results range from 63-74% with median compliance of 72%
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% Seasonal variation in all antibacterials and fluoroquinolones in primary care

![Graph showing seasonal variation in antibacterials and fluoroquinolones](image)
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Seasonal variation in quinolones by NHS board
Winter 2008-9 c.f. Summer 2008

HEAT target ≤5% seasonal variation for use of fluoroquinolones
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Interim update on quinolone use

Quinolone DDDs per 1000 Patients

- NHS Tayside
- Scotland
- Linear (Scotland)
- Linear (NHS Tayside)
Scottish National Audit Project - Community Acquired Pneumonia (SNAP-CAP)

- Started as project by Royal Colleges (Edinburgh & Glasgow) and funded by Health Foundation.
- Care bundle developed for CAP and established as ‘best practice’.
- Use quality improvement methodology c.f. Scottish Patient Safety Programme.
- Measure mortality as primary outcome.
Community Acquired Pneumonia Care Bundle

Definition: Apply the Care Bundle to new cases of CAP, those cases showing symptoms and signs of lower respiratory tract infection and confirmed by new shadowing on chest x-ray.

FOR ALL PATIENTS ON PRESENTATION

(1) OXYGENATION - To be assessed during first 4hrs of care. If required, oxygen supplemented to maintain saturations between 94% - 98% (between 88% - 92% for patients with a risk factor for hypercapnia).

(2) DERIVE & RECORD CURB65 SCORE

Score 1 for each
- New Confusion
- Urea > 7mmol/l
- Resp. Rate ≥ 30/min
- Low Blood Pressure Systolic <90mmHg and/or Diastolic ≤60mmHg
- ≥ 65 years old

(3) TREAT MILD CAP AT HOME WITH ORAL ANTIBIOTICS

0-1 (Mild)
- Treat In Community
- Give Oral Abx before sending home

0-1 (+ Co-morbidity or Clinical Concern)
- Or 2 (Moderate)
- Admit Patient
- Oral or IV Antibiotics (Clinical decision)

(4) ADMIT SEVERE CASES AND GIVE IV ANTIBIOTICS

3-5 (Severe)
- Admit Patient
- IV Antibiotics
- To Be Done Within 4 Hours of Arrival

(5) FIRST DOSE ANTIBIOTIC WITHIN 4 HRS OF ARRIVAL FOR ALL PATIENTS - Prescribe according to local guidelines.
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Participation in SNAP-CAP

• Current uptake
  8/11 mainland NHS boards

• Aim
  Introduce into all acute hospitals focusing on Acute Medical Admission Units
  Achieve sustained, >95% reliability for compliance with CAP bundle
Future work: 3 key elements

• DATA
• COLLABORATION
• QUALITY IMPROVEMENT
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Data - surveillance

- Framework to collect qualitative information on primary care prescribing
- System for identifying multiresistant strains among key organisms
- Studies to address specific clinical issues
- Systems to identify unintended consequences of changes in antimicrobial use
- IT-systems to access combined antimicrobial use and resistance data
Data – impact of interventions

• How effectively has SAPG guidance been implemented at local level? Survey of AMTs, DDD data, PPS

• Time series analysis of antibiotic use, CDI rates and mortality.

• Evaluation of implementation, clinical effectiveness and safety of gentamicin and vancomycin guidance.
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Potential unintended consequences of changes in antimicrobial policy

Local and national programmes in development to detect:

- Toxicity – renal, otovestibular
- Treatment failure - ICU admission, mortality
- Resistance – trends in bacteraemias
Collaboration

- **NHS board level** – Infection Control Teams, Risk Management/Governance

- **Scottish groups** – Scottish Patient Safety Programme, Healthcare Environment Inspectorate, Society for Acute Medicine

- **UK groups** – Welsh Antimicrobial Resistance Programme, ARHAI, BSAC

- **European groups** – ECDC, STRAMA (SAPG based on their model).
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SPSP Peri-operative work stream

Asks the questions:

- “Was the antibiotic given within 60 mins knife to skin?”

- “Was the antibiotic compliant with local policy?”

We want to add:

- “Was the antibiotic stopped within 24 hours?”
Comparison of relative strengths of STRAMA & SAPG

**STRAMA**
- Comprehensive data on antibiotics and resistance.
- Good relationship with media and public.
- Local infrastructure variable and no mandatory activities.
- No national education programme.
- High scientific profile, nationally and internationally.

**SAPG**
- Data systems in development.
- No media interaction
- AMT structure and local activities mandated.
- Good communication between SAPG and AMTs and AMT network.
- National education programme.
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Quality improvement

• Audit and feedback only achieves up to 80% compliance with policy/standards.

• Improvement methodology from Institute for Healthcare Improvement can achieve >95%.

• Used nationally in Scotland by SPSP and iiiP.

• Aim to integrate our work with these other programmes to give reliable, sustainable improvement in management of infections.
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Model for Improvement

What are we trying to accomplish?

How do we know that a change is an improvement?

What changes can we make that will result in the improvements we seek?

Act

Plan

Study

Do

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‘We have come a long way but our journey has just begun’

Dilip Nathwani