



Scottish
Medicines
Consortium

Scottish Antimicrobial Prescribing Group

Annual Report 2008-2009



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Contents

1 Chairman's introduction	5
2 Executive summary	7
3 Work stream updates	11
Organisation work stream	11
Information work stream	13
Education work stream	16
Infection management work stream	18
Community acquired pneumonia work stream	23
4 Conclusion	25
5 References	26
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Appendices	27
Appendix 1 – SAPG membership	29
Appendix 2 – Work stream action plans, Oct 2008–Oct 2009	31
Organisation work stream	31
Information work stream	32
Education work stream	33
Infection management work stream	35
Community acquired pneumonia work stream	37
Appendix 3 – Antimicrobial management team national network events	39
Appendix 4 – Presentations and publications	40
Appendix 5 – Glossary of abbreviations	41

1 Chairman's introduction

In March 2008, the Scottish Government launched the Scottish Management of Antimicrobial Resistance Action Plan¹ (ScotMARAP). One of the key actions was initiation of the Scottish Antimicrobial Prescribing Group² (SAPG), hosted by the Scottish Medicines Consortium (SMC), to take forward national implementation of the key recommendations of ScotMARAP. SAPG held its first meeting in June 2008 and membership was fully established by October 2008. SAPG is a national clinical multidisciplinary forum with representation from stakeholders in the national and regional NHS. The primary objective of SAPG is to co-ordinate a national framework for antimicrobial stewardship to enhance the quality of antimicrobial prescribing and infection treatment in Scotland. This complements the immense efforts already being undertaken in infection prevention and environmental decontamination as part of the national strategy to combat healthcare associated infections (HAI).

At the heart of ensuring ownership and engagement from the antimicrobial prescribing community in Scotland, SAPG has successfully developed and embedded clinical antimicrobial management teams (AMTs) within NHS boards. These specialist teams are the key support for clinicians in primary and secondary care to encourage prudent prescribing. The formation of a clinical network of AMTs has been instrumental in providing SAPG with 'real world' feedback relating to antimicrobial issues. This regular two-way dialogue is helpful in informing national policy and guidance. The structure of SAPG is similar to that of its host organisation the SMC, in that SMC represents a consortium of active Area Drug and Therapeutics Committees (ADTCs) and SAPG represents an active consortium of AMTs. AMTs engage with a broad body of prescribing clinicians and key local stakeholders such as risk management, infection prevention teams, the Scottish Patient Safety Programme (SPSP), clinical governance and others.

At the inception of SAPG, Scotland, in keeping with the UK and many parts of the world, was faced with not only the considerable threat of antibiotic resistance, but also the significant burden of *Clostridium difficile* infection (CDI). This is primarily as a consequence of the unique ecological impact of often unnecessary and inappropriate antibiotic prescribing. For many years we have enjoyed the unequivocal clinical benefits of modern powerful antibiotic therapy. There is now, however, a realisation that clinicians, organisations and the public have to learn to use this valuable resource more prudently, otherwise the effectiveness of these drugs and their longevity will be depleted and we will continue to incur the undoubted risks described. Our stewardship interventions are based on a sound evidence base from published literature and relevant experience from the UK and internationally. While key outcomes such as clinical improvement, reduction in CDI and resistance and fiscal benefits have been described, it is important to reassure clinicians that any change in prescribing will not lead to unintended harm such as worsening mortality or drug-related toxicity. These concerns have informed the strategy of our work programmes which, where appropriate, have been underpinned by quality improvement methodology and NHS board level national scrutiny targets.

After a period of consultation we have identified five work streams to tackle the range of challenges: Organisation, Information, Education, Infection Management and Community Acquired Pneumonia. Some of our early key achievements from these work streams are summarised in this report.

Our aim is to engage and support local clinicians and NHS boards to regularly collect and share information relating to the quantity and quality of prescribing and infection treatment areas to support improvement in prescribing. Additionally, SAPG will enhance national collation of antimicrobial resistance surveillance data, thereby supporting local data and informing the important link between prescribing and resistance. These data will provide SAPG and others with national trends in resistance to inform policy. The implementation of good practice guidance will be supported by educational programmes and improvement methodology where appropriate. For example, we aim to closely work with the SPSP³ to improve surgical antibiotic prophylaxis.

We recognise that the work streams will deliver a range of outcomes over a short to medium time frame. However, it is critical SAPG is responsive to any unforeseen immediate challenge whilst also importantly providing a longer term vision for stewardship in Scotland. For example, the need to engage local and international expertise in developing robust pragmatic methodology to measure and communicate the value of our interventions is critical. Furthermore, we recognise the clear need for public engagement and for close collaboration with UK and international stewardship organisations. This will ensure that we provide Scotland with a high quality and fit for purpose national stewardship programme for at least the next decade and beyond.

It is my pleasure to ask you to consider this report outlining our aims, objectives, current progress and ambition for SAPG. I am extremely grateful to all the members of SAPG, its key stakeholders and above all the AMTs for their dedication and enthusiasm in helping us take forward this project. It is my hope, once you have read this report, you will agree that since the inception of SAPG in March 2008, we have come a long way but our journey has just begun.



Dilip Nathwani
Chair Scottish Antimicrobial Prescribing Group



2 Executive summary

SAPG was initiated in March 2008 as a national clinical forum which would lead the first national initiative to actively address antimicrobial stewardship.

By October 2008, SAPG membership was established and key appointments recruited (Appendix 1). During 2008–2009, Professor Ken Paterson, Chair of SMC and Professor Dilip Nathwani, Chair of SAPG, visited the majority of NHS boards to meet ADTC and AMT members to raise awareness of SAPG and the national antimicrobial agenda and to learn about local antimicrobial issues. SAPG now meets every 2 months and a Project Board has been set up to provide clinical and financial governance. SAPG has developed five work streams to take forward various aspects of Scottish Management of Antimicrobial Resistance Action Plan (ScotMARAP) and each has a work plan and defined timescales (Appendix 2). Some of our early key achievements from these work streams are summarised below.

Organisation: Antimicrobial management has been raised as a high priority for NHS boards and local AMTs have been established in all NHS boards to lead antimicrobial management programmes.

Information: Prescribing indicators for primary care have been developed to provide NHS boards with an overview of quantity and quality of antimicrobial prescribing. This includes an indicator to support the *Clostridium difficile* associated disease Health Efficiency and Access to Treatment (CDAD HEAT) target⁴ - seasonal variation in quinolones. 36 hospitals across Scotland participated in a European point prevalence study of antimicrobial prescribing which has provided AMTs with anonymised patient level information on how antimicrobials are being used. Antimicrobial susceptibility testing (AST) of blood cultures has been standardised by the implementation of VITEK 2 systems (an automated identification and antimicrobial susceptibility testing system) in laboratories across Scotland.

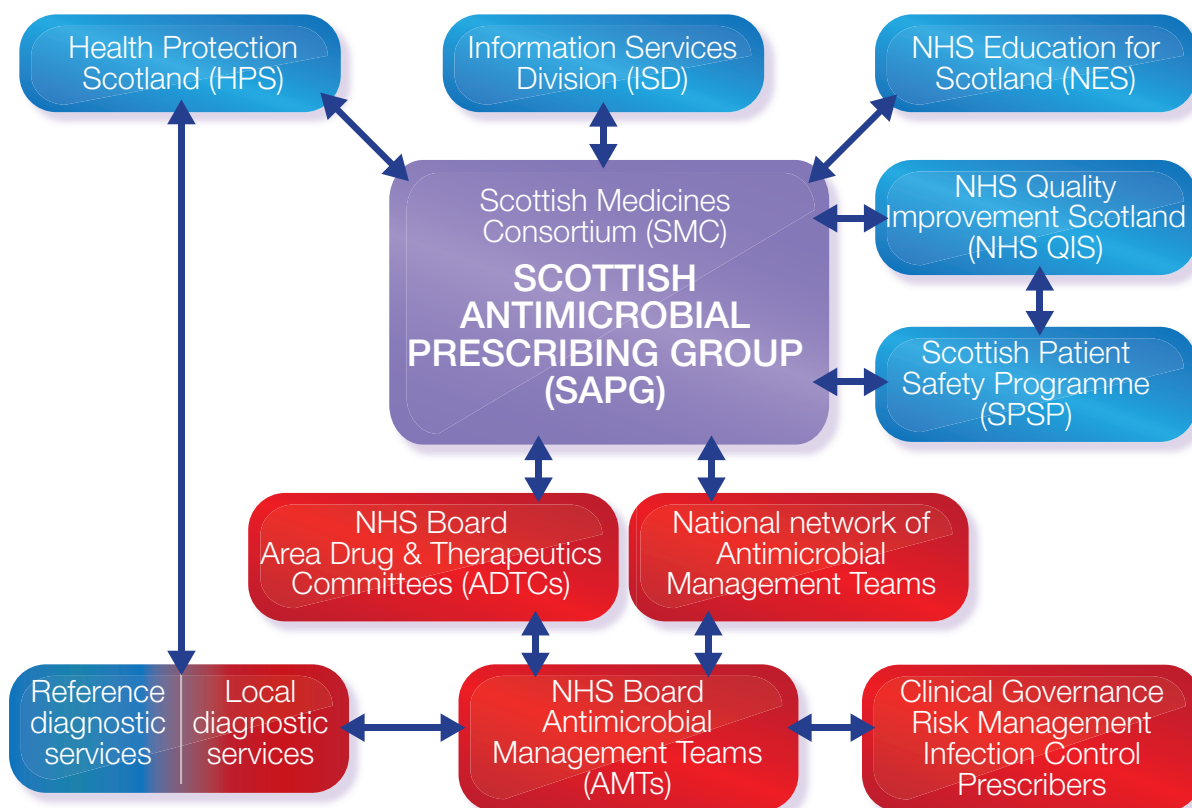
Infection management: Antibiotic policies have been revised in all NHS boards to restrict antibiotics with a high risk of *Clostridium difficile* infection and to standardise how gentamicin and vancomycin are used. A national antimicrobial policy has been adopted within primary care healthcare settings.

Education: The Doctors Online Training System (DOTS) for all foundation training doctors in Scotland has been revised to highlight current issues. An evaluation of this programme in 2007 by NHS Education for Scotland (NES) revealed a high level of participation and satisfaction among Scottish foundation doctors. Antimicrobial prescribing is also being integrated into the medical undergraduate curriculum of Scottish medical schools. National training for pharmacists has been developed and delivered and e-learning packages for healthcare staff on *Clostridium difficile* and bacterial resistance have been launched.

Community acquired pneumonia: the Scottish National Audit Project-Community Acquired Pneumonia (SNAP-CAP) has been taken over by SAPG as an exemplar quality improvement model for infection management to embed this methodology within NHS boards. It is promoted in all NHS boards as best practice in managing pneumonia through the implementation of a care bundle. The data management system used for SNAP-CAP has been developed and expanded to also analyse and report CDAD HEAT target prescribing indicator data.

Collaboration with key stakeholders at national and NHS board level has been essential to develop national consensus on key issues within antimicrobial stewardship.

The diagram below shows the key national and local stakeholders that SAPG collaborate with. National stakeholders are shown in blue and local stakeholders in red.



SAPG hosts regular national AMT network events to provide peer support opportunities for AMT members throughout Scotland (Appendix 3).

Events are informative and educational and highlight the work of SAPG and best practice within NHS boards. Events are also a very good networking opportunity for NHS board AMT members and other health professionals to meet face-to-face and discuss current issues. Feedback from all events has been positive and has been used to inform the content of future meetings. Each event has been accredited for four continuing professional development points via the Royal College of Physicians and all presentations from events are available on the SAPG website².

Communication of our work at national and international meetings is important to demonstrate that our national model for improvement is effective. SAPG has submitted several poster presentations to conferences, the Chair and other members have presented on SAPG at international conferences and a group from SAPG has an article for publication in press (Appendix 4).

Below are some views from a selection of NHS boards about the impact SAPG has had in their area.

“SAPG and the national AMT networking events have allowed NHS Highland AMT to become part of, and influence, the development of antimicrobial prescribing policy recommendations in Scotland. A greater understanding of the background and evidence base from which the recommendations are derived improves ownership and facilitates implementation throughout the NHS board. Specific issues relating to the remote and rural nature of NHS Highland can be fed back through two of our primary care representatives on the local AMT who are also members of SAPG. These useful links help further engage the local AMT with the SAPG. The national AMT networking events encourage and enhance best practice sharing and in particular develop links with other AMTs facing similar problems.”

Alison MacDonald, Area Antimicrobial Pharmacist and Professional Secretary to NHS Highland
Antimicrobial Management Team

“The Dumfries & Galloway AMT was well established prior to the introduction of SAPG. In 2009, membership was widened to include GP and pharmacy representation from primary care and nursing members. In the last year, major developments have included the provision of a well-received antibiotic awareness week and recruitment of an antibiotic nurse and pharmacy technician. Further progress has been made to improve antibiotic prescribing through the implementation and feedback of weekly antibiotic prescribing indicator measurement in admission wards, participation in the European Surveillance of Antimicrobial Consumption (ESAC) point prevalence study, implementation of surgical prophylaxis guidelines in line with SAPG recommendations and participation in the SNAP-CAP project. The link with infection control has strengthened including the development of a Hospital Acquired Infection Executive meeting attended by the chair of the AMT and antibiotic pharmacist. SAPG has provided national direction and accelerated the progress of the AMT towards optimal antibiotic stewardship.”

Susan Roberts, Pharmacist Team Manager Prescribing Development
Martin Connor, Consultant Microbiologist
NHS Dumfries & Galloway Antimicrobial Management Team

“The formation of SAPG has had a positive impact in NHS Grampian in terms of progressing with recommendations: Empirical prescribing data are now being collected on the Acute Medical Admissions Unit and Infection Unit by foundation year doctors and SNAP-CAP data is being collected on respiratory wards by a medical registrar. SAPG guidance on surgical practice is a useful adjunct to the SIGN surgical prophylaxis guideline in terms of offering antibiotic choices for specialties and guidance on gentamicin and vancomycin dosing will be used to update our own guidance. Within primary care, SAPG endorsement of Health Protection Agency (HPA) guidance as a basis for Primary Care Empirical Guidance for Common Conditions will strengthen the value of the document and encourage buy-in from GPs in terms of evidence base. The SAPG summary of evidence on treatment of respiratory infections in primary care offers additional support for GPs to discourage patients from requesting antibiotics for certain conditions. The availability of the Primary Care Prescribing Indicators, along with the quarterly CDI reports by NHS boards, have given strong motivation for GPs to accept that change in practice is required.”

Antimicrobial Management Team
NHS Grampian

SAPG aims to collaborate at both national and international level with other organisations working on infection management and quality improvement.

The SPSP has been running for 2 years now in all NHS boards. SAPG has started to work with SPSP to integrate quality improvement initiatives to optimise antibiotic use and management of common infections in hospitals with SPSP work.

The model for the structure of SAPG and AMTs detailed within ScotMARAP was based on the Swedish system, Strama⁵ (Swedish strategic programme against antibiotic resistance) which was initiated in 1995. In October 2009, a delegation from SAPG visited the central office of Strama in Stockholm and a regional Strama centre in Växjö, Kronoberg County, to discuss current activities, successes and challenges. The key findings from this visit were that while the Swedish system has comprehensive antimicrobial and surveillance data, SAPG appears to have more advanced communication between the centre and AMTs than Strama.

The Welsh Antimicrobial Resistance Programme⁶, established in 2005, has similar aims to SAPG. A delegation from Health Protection Scotland (HPS) and Information Services Division (ISD) visited the Welsh Surveillance Unit in Cardiff to learn how prescribing and surveillance data are collected and evaluated. In February 2009, Dr Robin Howe and Dr Maggie Heginbotham attended an SAPG network event to present and discuss their data.

Next steps: Quality improvement in surgical prophylaxis and management of pneumonia will be integrated with parallel SPSP work to avoid duplication of data collection and utilise the quality improvement experience of clinical staff working in these areas.

A study carried out in Ninewells Hospital, Dundee, in collaboration with Hopitaux Universitaires de Genève has shown that variation in the use of broad spectrum penicillins, cephalosporins and fluoroquinolones explained up to 60% of variation in the incidence of CDI⁷. Further work is planned to develop a national study to analyse the effects of changes in antibiotic policy at national level using data on antibiotic prescribing, CDI rates and mortality from HPS and ISD. This will be the first national study of its type and will allow staff in NHSScotland to gain sustainable expertise in an innovative statistical approach.

Ongoing collaboration with colleagues throughout Europe will share experience in data collection, analysis and antimicrobial stewardship approaches. This will be via reciprocal visits, participation in exchange meetings and presentations at international conferences.

3 Work stream updates

Organisation work stream

This work, led by the HAI team, NHS Quality Improvement Scotland (NHS QIS), involves working with NHS boards to ensure that essential organisational and accountability infrastructures relevant to antimicrobial stewardship are in place.

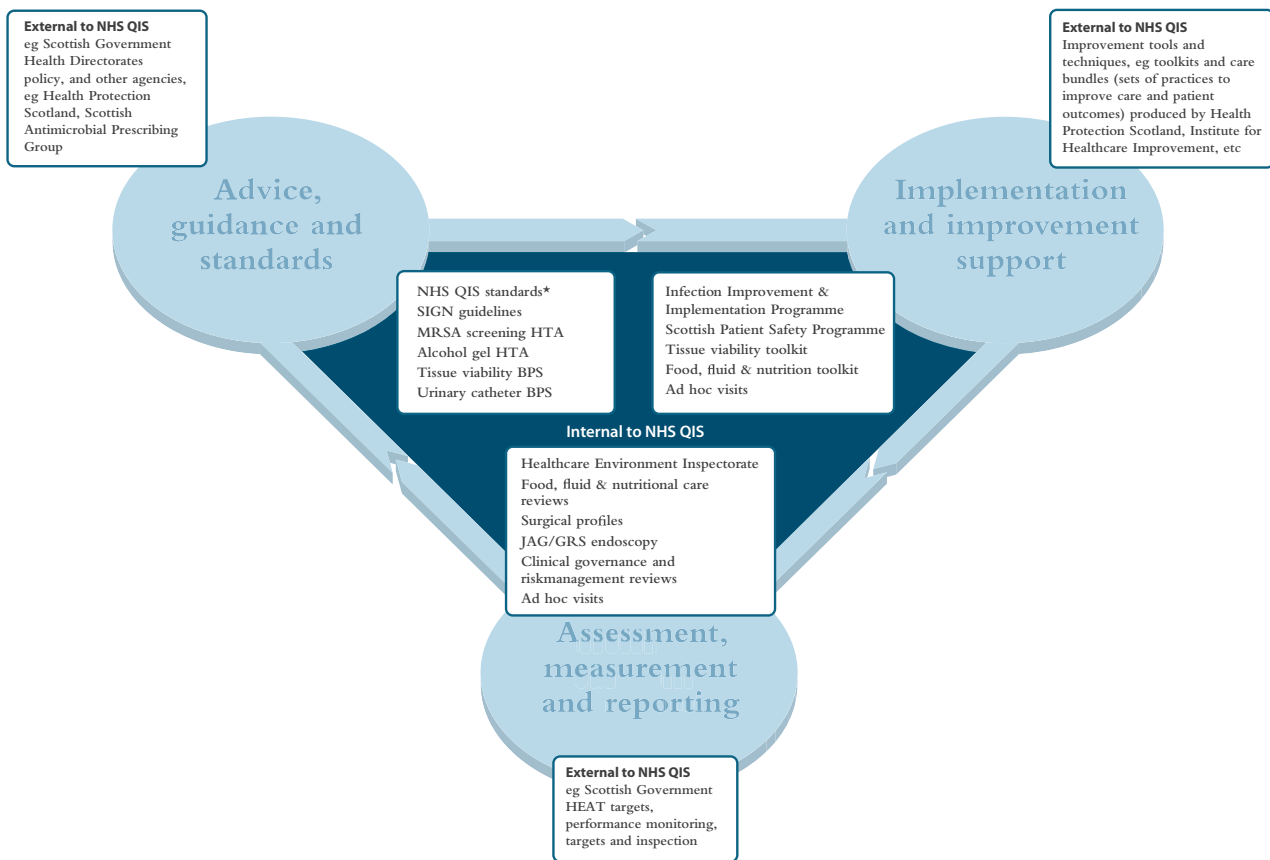
A self-assessment questionnaire was developed and completed by all NHS boards in December 2008 to establish a baseline position for antimicrobial stewardship within each NHS board. This survey concluded that all NHS boards now have an established AMT (of varying composition and activity) and all have an antimicrobial pharmacist or specialist pharmacist input. All AMTs report to the NHS board medical director and the ADTC but links vary with other key groups such as the infection control committee and clinical governance and risk management.

Next steps: The next major and ongoing piece of work is to integrate antimicrobial stewardship into the new Healthcare Environment Inspectorate (HEI)⁸ process. SAPG has input to the Inspectorate's initial online self-assessment, based on the Infection Control Standards, which was completed by NHS boards in June 2009. Further work to develop inspection tools and train staff in their use is being supported by SAPG via provision of expert advice on antimicrobial management. In tandem with the Inspectorate process, a new programme for Infection Implementation and Improvement (iiiP) is being developed within the NHS QIS HAI Improvement and Implementation Support Team. The aim of the programme is to develop the capacity and capability of infection and control teams in improvement methodologies to support frontline staff with optimal sustained and reliable implementation of core HAI policies and guidance. Antimicrobial prescribing has been identified as one of four key areas for improvement work within this programme.

Peter Christie, Consultant in Public Health Medicine - HAI, NHS QIS

Jackie Ley, Nurse Consultant - HAI, NHS QIS

The following diagram shows how iiiP integrates within NHS QIS and with other organisations.



Key to abbreviations:

- SGHD IST Scottish Government Health Department Improvement and Support Team
- SIGN Scottish Intercollegiate Guidelines Network
- HAI Healthcare Associated Infection
- HTA Health Technology Assessment
- NES NHS Education for Scotland
- BPS Best Practice Statement
- HFS Health Facilities Scotland
- JAG/GRS Joint Advisory Group/Global Rating Scale

Information work stream

This work, led by NHS National Services Scotland (NHS NSS⁹) – HPS and ISD – involves the development of systems for the collection, analysis and reporting of information relating to antimicrobial prescribing and resistance in all healthcare settings.

A key objective is to align the surveillance of antimicrobial prescribing and resistance activity at local and national level to support AMTs and frontline staff by allowing access to standardised information that is relevant to their own practice, ward or clinical area across NHS boards in Scotland. The initial focus has been to establish what information is available at national and local level and to determine the information needs of AMTs.

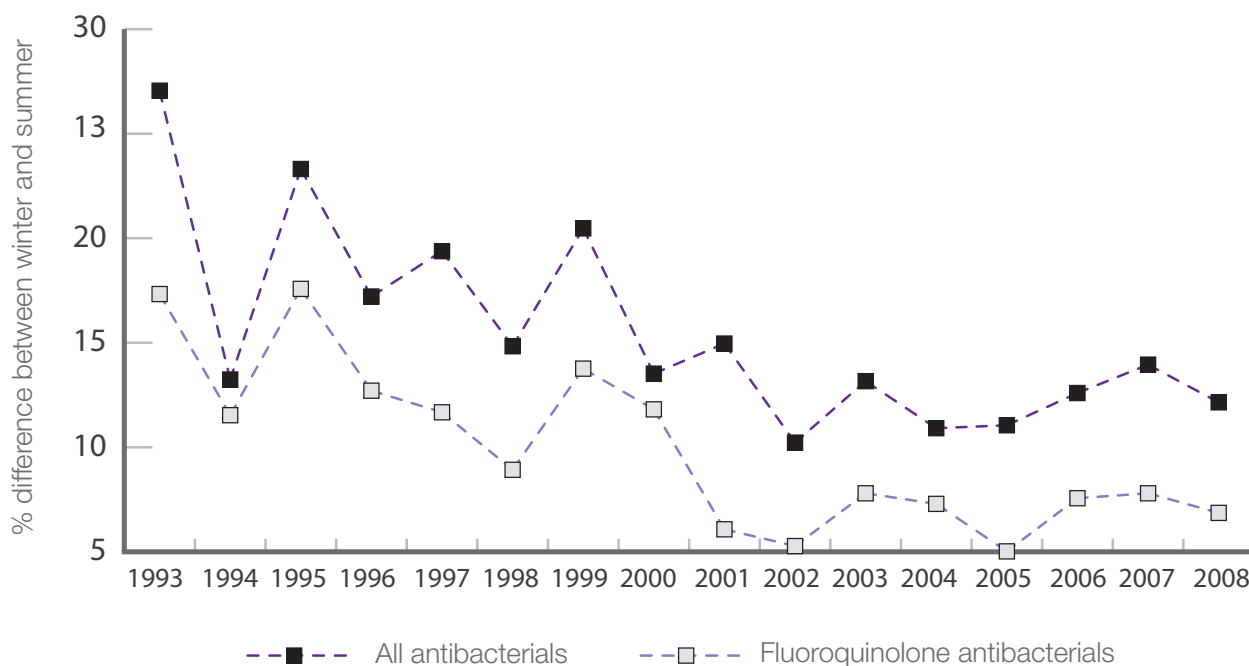
Information on antimicrobial prescribing

A major achievement in 2008–2009 was the development of a set of 41 nationally agreed prescribing indicators on primary care use of antibacterials as standard reports within the web-based Prescribing Information System for Scotland (PRISMS). Prescribing indicators are objective measurements that are used to monitor use of antibacterials over time, between geographical areas and against national averages. These indicators are intended to support AMTs and frontline healthcare professionals by providing a complete picture of the pattern of use of antibacterials and identify areas for discussion with local prescribers to support improvement in prescribing practice. There has been a focus in these national prescribing indicators to provide information on the use of antibacterials such as fluoroquinolones, cephalosporins, clindamycin and co-amoxiclav that are known to increase the risk of CDI. The first national report on these indicators was issued to AMTs in September 2009.

A priority area for Scottish Government and SAPG is reducing CDI. A letter issued to NHS board chief executives – CEL 11 (2009)⁹ – in April 2009, announced a CDAD HEAT target defined as a reduction in the rate of CDI among people aged 65 years and above by at least 30% by 31 March 2011. The Scottish Government and SAPG have agreed three supporting antimicrobial prescribing indicators to underpin this HEAT target. The primary care indicator is ‘seasonal variation in use of fluoroquinolones which should be no more than 5% greater in the winter quarters compared to the preceding summer quarters’. Fluoroquinolones are antibiotics which have been associated with an increased risk of CDI and are not recommended for use within primary care, except for a few specific infections. Excess usage during the winter months suggests inappropriate use for respiratory infections. This indicator will be measured using prescribing data up to 31 March 2011 and is one of the national prescribing indicators previously mentioned.

The following chart shows annual seasonal increase in overall use of all antibacterials and use of fluoroquinolones expressed as defined daily dose (DDD) in the winter quarters relative to the preceding summer quarters.

Chart 1: NHSScotland use of antibacterials in primary care, % seasonal variation 1993-2008



This chart illustrates that from 2004 to 2008 the seasonal variation for fluoroquinolones has been between 5% and 8%, with a steady reduction since 1993. This may indicate that there is less use of fluoroquinolones for respiratory tract infections in the winter months, but the level of variation in 2008 remains above the Scottish Government target of 5%, to be reached by 2011.

Another major achievement has been national participation in a European study to examine the use of antibacterials in hospitals. This study organised by the ESAC¹⁰ group saw 36 Scottish hospitals engage by collecting a snapshot of information about the way antimicrobials are used. This is the first such study undertaken at a national level in Scotland. The results will provide important information for AMT on anonymised patient level information on the indication and way in which antimicrobials are being used. This will allow SAPG to compare use of antimicrobials across NHSScotland and throughout Europe and aims to support improvements in antimicrobial stewardship.

Next steps: In looking forward, significant work is ongoing within ISD to deliver a national database of hospital use of medicines, Hospital Medicines Utilisation Database (HMUD). HMUD will collect information from individual hospital pharmacy systems and present standardised information of the use of medicines at hospital and national level for NHS boards in Scotland. HMUD is a new national development and the first main clinical area to benefit from this greatly enhanced information will be the surveillance of use of antibacterials in a hospital setting. This will complement the information on use in primary care allowing for a better understanding of the use of antibacterials across all healthcare sectors in Scotland and will support the work of SAPG and work across the NHS to improve the way in which antibacterials are used.

Marion Bennie, Chief Pharmaceutical Adviser, NHS NSS
William Malcolm, Pharmaceutical Adviser, HPS
Tracey Cromwell, Information Analyst, ISD

Information on antimicrobial resistance

In 2009, a national surveillance programme for monitoring antimicrobial resistance in clinically important pathogens was developed. The surveillance programme is aimed at preserving the effectiveness of the currently available antimicrobial medicines by supporting NHS boards in their long-term strategic planning of antimicrobial prescribing and infection control policy development and to identify new emerging patterns of resistance.

The Scottish surveillance programme is modelled on the European Antimicrobial Resistance Surveillance System (EARSS) and is initially focusing on monitoring antimicrobial resistance in invasive isolates from hospital patients with bloodstream infections (caused by *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Streptococcus pneumoniae* and *Enterococcus faecium* and *faecalis*). The first joint annual report on antimicrobial use and resistance is due for publication in January 2010.

A major achievement in 2009 was the standardisation of antimicrobial susceptibility testing (AST) of blood cultures. This was achieved, in collaboration with diagnostic microbiology laboratories in Scotland, by the implementation of VITEK 2 systems (an automated identification and antimicrobial susceptibility testing system) in laboratories across Scotland. This VITEK 2 system provides high quality and comprehensive comparable antimicrobial resistance information for all NHS boards in Scotland that will allow detailed analysis of resistance trends and emerging new resistances at national level.

Establishment of a solid IT infrastructure for reporting surveillance data from the laboratories to HPS is currently under development. When completed, this will enable fully automated reporting of high quality resistance data to HPS.

Next steps: This will include expansion of the surveillance programme to include more clinical important pathogens (such as *Acinetobacter baumannii*) and other types of clinical isolates such as urinary tract and respiratory isolates including isolates originating from patients in the community. Antimicrobial resistance in those other types of isolates is often a precursor of evolving resistance in blood isolates.

An electronic alert system, which can detect rare pathogen-resistance combinations, is under development and will be introduced in 2010. An alert system will help identify rare resistant pathogens that can cause severe clinical problems if initially treated with the wrong antimicrobial drug. National alerts on rare resistant pathogens will help raise awareness among prescribers and other clinical staff.

Anne Eastaway, Consultant Microbiologist, HPS

Camilla Wiuff, Epidemiologist & Antimicrobial Resistance Programme Manager, HPS

Education work stream

This work, led by NES, involves scoping and development of training materials on antimicrobial stewardship for both undergraduate and postgraduate healthcare professionals.

A multidisciplinary Education Advisory Sub-group has been established to take forward this work including professionals from primary and secondary care.

A framework of learning outcomes for antimicrobial stewardship which align with 'The Scottish Doctor' has been developed after broad consultation and SAPG has recommended its adoption into the curricula of the five Scottish Medical Schools.

The Prudent Antibiotic Prescribing for Foundation Year Doctors Programme within DOTS has been revised to align with current practice and provides additional training on use of gentamicin and vancomycin. The August 2009 cohort of doctors was the first to undertake the revised programme.



The screenshot displays a web application interface for 'Antibiotic Prescribing'. The main content area is titled 'AP Vignette 1 - Case description'. It features a 'Table of Contents' sidebar on the left with a tree view of vignettes. The main text describes a 65-year-old man with community-acquired pneumonia (CAP) who has been unwell for 5 days after returning from a holiday in Benidorm, Spain. The case includes a physical examination section with the following findings:

- 1. Temperature: Pyrexia, 39°C
- 2. Slight confusion: MSQ 7/10, but oriented in person (normally very organised)
- 3. Pulse rate: 96/min
- 4. Respiratory rate: 26/min
- 5. Blood pressure (BP): 160/80mmHg
- 6. Mild dehydration

The interface also includes a top navigation bar with various icons and a bottom taskbar with open applications like Microsoft Word and Yahoo! Browser.

Example of DOTS case study on community acquired pneumonia

A major piece of work has been the development and delivery of comprehensive training on antimicrobials for pharmacists. Three bespoke sessions for antimicrobial pharmacists were held during the first part of 2009 and a multi-professional conference held in October 2009 was attended by over 100 delegates including pharmacists, non-medical prescribers and infection control nurses. A continuing professional development pack on 'Pharmaceutical Care of Patients with Infections' has been developed in collaboration with the Association of Scottish Antimicrobial Pharmacists and this is being delivered nationally at local events to over 800 community and hospital pharmacists during November 2009 to March 2010.

Two online learning packages were launched on the NES HAI portal¹¹ in 2009 providing background information and case scenarios on *Clostridium difficile* and bacterial resistance.

Next steps: The learning outcomes framework developed for medical students will be adapted and integrated into pharmacy undergraduate and nursing postgraduate curricula. Extension of DOTS to include primary care case scenarios on infection and increased access to DOTS to allow other healthcare professionals to use the training materials is planned.

An online learning package on colonisation is in development and will be launched in 2010. A training pack on 'Use of Antimicrobials in Clinical Practice' will be launched in early 2010. This will provide AMTs with materials for training practitioners in safe and effective use of antimicrobials in hospital and primary care, and will address the continuing professional development needs of recently qualified doctors, nurses and pharmacists.

Liz Gillies, Education Lead for ScotMARAP, NES
Arlene Brailey, Assistant Director of Pharmacy, NES
On behalf of the Education Advisory Sub-group

Infection management work stream

This work, led by SAPG clinicians, focuses on development of a national approach to antimicrobial prescribing policies, quality indicators for prescribing in all healthcare settings and clinical audit of infection management.

This work stream is supported by a variety of healthcare professionals from around Scotland and several sub-groups have been established to lead on topics including Primary Care, Surgical Prophylaxis, Care Homes, and Public Campaigns.

Hospital antibiotic policies

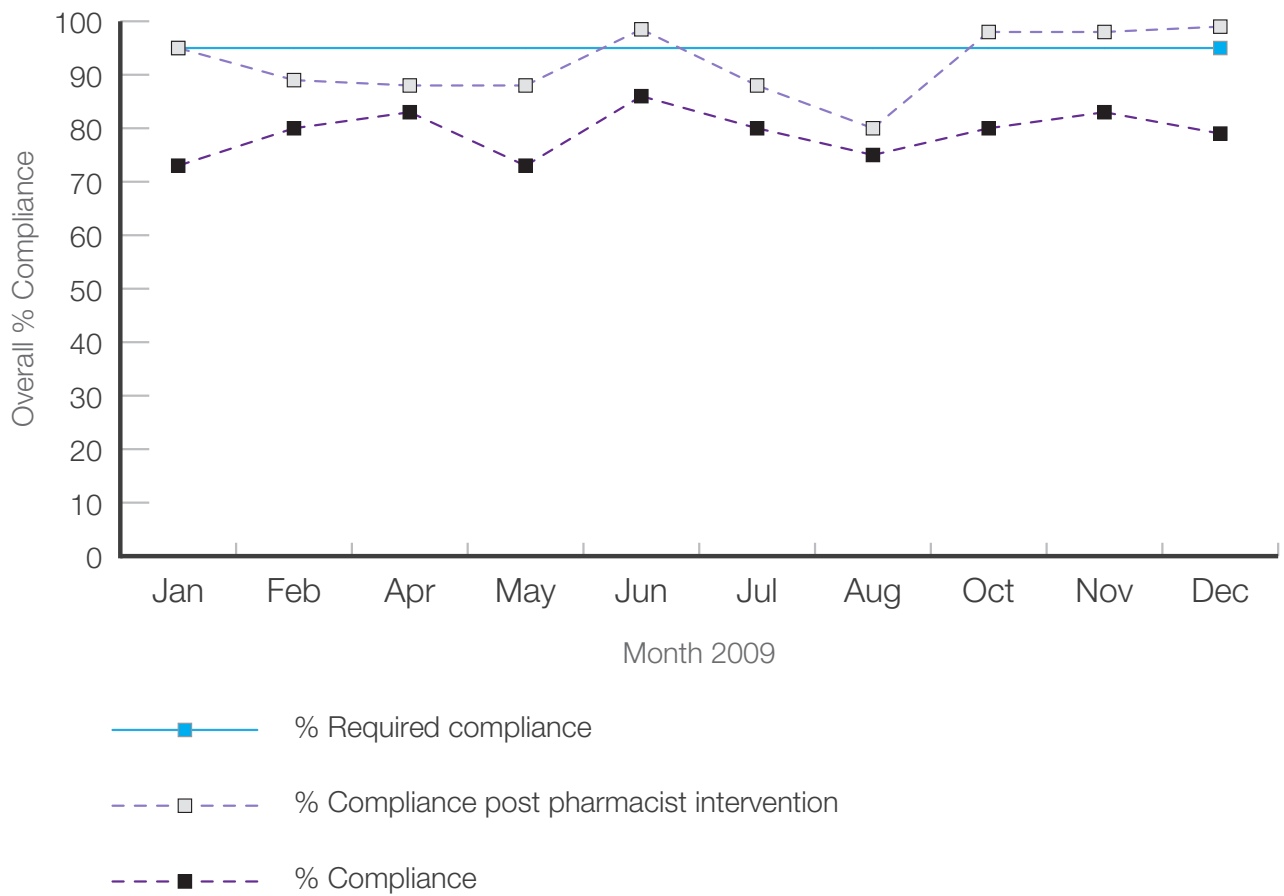
National reduction of the use of antibiotics associated with a high risk of CDI was an initial priority for SAPG. Our first guidance document was issued in July 2008 and this was followed up with 'Hospital Antibiotic Management: Minimum Requirements for Antimicrobial Prescribing Policies'¹² in December 2008 and 'Antibiotic Prophylaxis in Surgery'¹³ in July 2009. All NHS boards have now reviewed their hospital antibiotic policies to ensure that the use of 'C. diffogenic' agents such as cephalosporins, co-amoxiclav, clindamycin and ciprofloxacin are restricted both for treatment of infections and in surgical prophylaxis. Implementation of these antimicrobial stewardship measures to reduce the burden of CDI has been staggered with some NHS boards acting as early adopters and implementers of our guidance. While we are in the process of measuring the impact of these measures nationally, some of the case studies below aim to illustrate early areas of good practice.

NHS Tayside

“Most patients with infections are admitted via acute medical, surgical and care of elderly wards. Antibiotic use in these wards represents a significant proportion of overall antibiotic prescribing and thereby also the highest potential for inappropriate use. We have targeted prescribing in these areas by developing a local antibiotic policy in consultation with prescribers and supported by ongoing educational support. To evaluate compliance with our policy each week, a sample of 5–10 prescriptions for antibiotics are audited for choice of antibiotic and recording of the reason for the prescription in the medical notes. Ward-based pharmacists have been instrumental in providing prescribing support and co-ordinating the collection of compliance data by the attending teams. Compliance data are regularly presented as a run chart (see Chart 2) to the prescribers on the ward and at departmental meetings. There is clear evidence of support and engagement from many attending clinicians and sub-optimal prescribing is discussed through root cause analysis, and where necessary, face-to-face meetings. Antibiotic prescribing also forms part of the HAI balanced score card for scrutiny by clinical groups.”

Kirsteen Hill, Lead Antimicrobial Pharmacist
Dilip Nathwani, Consultant in Infectious Diseases

Chart 2: Compliance with antibiotic policy in acute medical admissions unit - Ninewells Hospital



NHS Greater Glasgow and Clyde

“As a consequence of recognition of increased rates of CDI and relative high rates of prescribing of co-amoxiclav and cephalosporins, the AMT, in conjunction with key stakeholders, developed and implemented restrictive prescribing guidance across all acute adult hospitals between July and August 2008. Reductions in both co-amoxiclav and cephalosporins were noted and a temporal improvement was noted in CDI (see Charts 3 and 4). Work is ongoing to reinforce good prescribing practice in both secondary and primary care and to ensure safe use of other antimicrobials promoted within the new guidance.”

Ysobel Gourlay, Lead Antimicrobial Pharmacist
Andrew Seaton, Consultant in Infectious Diseases

Chart 3: Antibiotic use by quarter 2007-2009 in NHS Greater Glasgow and Clyde and highlighting introduction of new antibiotic policy

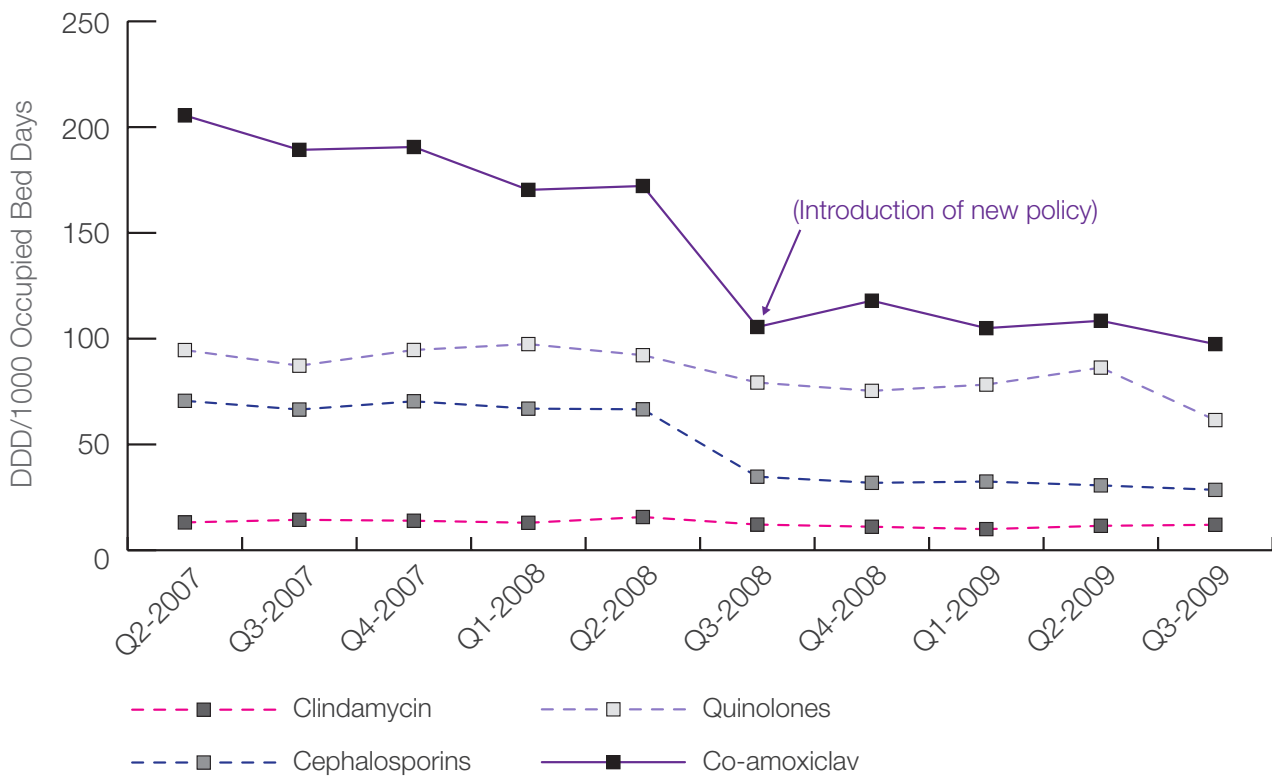
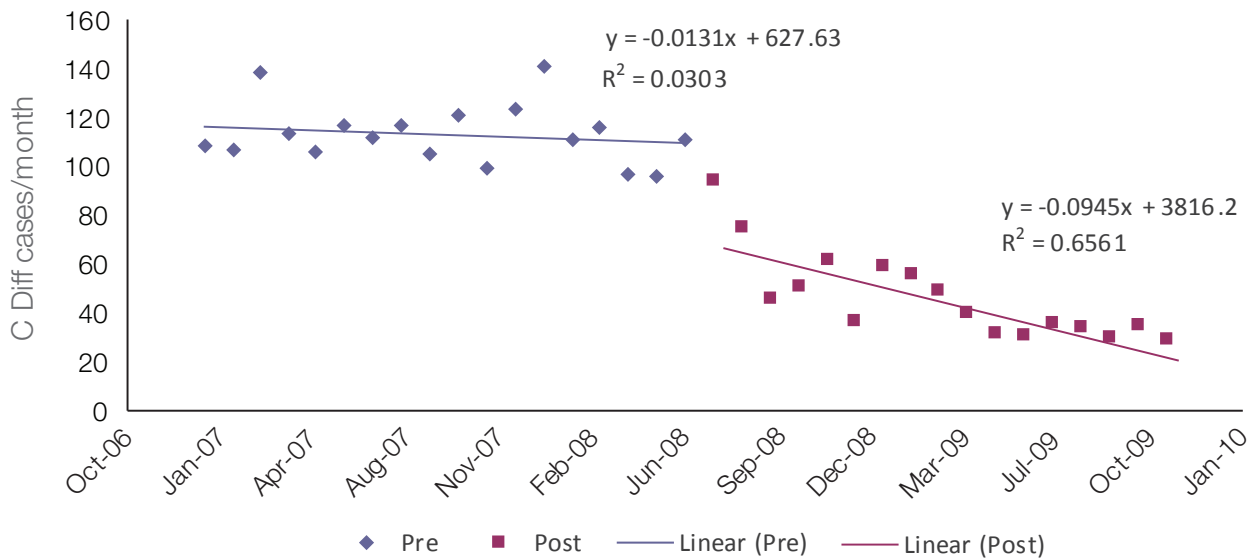


Chart 4: CDI cases October 2006 to October 2009 in NHS Greater Glasgow and Clyde before and after new antibiotic policy



Next steps: The effects of the introduction of restricted antibiotic policies will be evaluated in all NHS boards to assess the effects on CDI, resistance rates and unintended consequences.

Gentamicin and vancomycin

There has been an increase in the use of gentamicin, and to a lesser extent vancomycin due to recent changes in hospital antimicrobial prescribing, driven by SAPG guidance on restriction of antibiotics associated with CDI. Increased use of gentamicin and vancomycin is in itself a concern due to the potential for errors in gentamicin dose calculation and monitoring and also the potential adverse consequences of renal and oto toxicity. To address these concerns, SAPG has undertaken broad consultation to develop a national consensus on optimum use of both gentamicin and vancomycin. The conclusion of this work, 'Guidance on Use of Gentamicin and Vancomycin in Adults'¹⁴, was communicated to AMTs in September 2009 and local policies will, during the next few months, be rationalised to a single national vancomycin policy and one of two recommended policies for gentamicin.

Next steps: Further collaborative research with the University of Strathclyde is planned to look at how the new gentamicin and vancomycin policies have been implemented, their impact on improving safety and efficacy, and evidence of unintended consequences.

HEAT target prescribing indicators

In 2008, the Scottish Government announced a HEAT target of 30% reduction in CDI by March 2011. SAPG was asked to develop national prescribing indicators for antimicrobial use in hospital and primary care that would underpin this HEAT target and contribute to reduction of CDI. Following wide consultation and debate, three indicators were agreed with the Scottish Government Health Department HAI Team and these were announced in a Chief Executive letter in April 2009⁹. These indicators are based on compliance with local antibiotic policies which indirectly provides assurance that antibiotics associated with CDI are not used inappropriately.

Details of the indicators are shown below.

- 1 Empirical prescribing in hospital:** Indication for treatment with an antibiotic is recorded in patient medical record and antibiotic choice is compliant with the local Antimicrobial Prescribing Policy – target $\geq 95\%$
- 2 Surgical prophylaxis:** Duration of surgical antibiotic prophylaxis is < 24 hours and compliant with local Antimicrobial Prescribing Policy– target $\geq 95\%$
- 3 Primary care prescribing:** Seasonal variation in fluoroquinolone use calculated using the equation: $(\text{Oct-Mar total DDDs} \div \text{Apr-Sep total DDDs} - 1) \times 100\%$. Consumption of fluoroquinolones in winter months is $\leq 5\%$ greater than consumption in summer months.

The primary care indicator is one of a series of indicators developed within PRISMS (see Information work stream section for further details). Methods for data collection in hospital admission units (Indicator 1) and surgical wards/theatres (Indicator 2) have been agreed and a web-based system has been developed for data analysis and reporting. The Institute for Healthcare Improvement (IHI)¹⁵ is an American not-for-profit organisation which hosts a web-based Extranet which can be used to record, analyse and report quality improvement data. The system is used by the SPSP and was already in use for the SNAP-CAP work stream of SAPG. Development of the SNAP-CAP site to become the SAPG site has been carried out to allow data management for the CDAD HEAT target Prescribing Indicators.

Next steps: A process for national reporting of the CDAD HEAT target prescribing indicators will be developed to provide information for stakeholders on local and national performance.

Primary care antibiotic policies

Local primary care antibiotic policies have been reviewed by the Primary Care Practice Sub-group. A survey of current policies showed that most NHS board policies were broadly similar and were based on the HPA template¹⁶. The benefits of using this template are that the supporting evidence is reviewed and updated every 6 months. National consensus was reached on formally adopting this template as the basis for a Scottish primary care policy. The HPA has welcomed this and agreed to engage with SAPG within their review process.

Next steps: Future work in primary care will focus on improving antibiotic use within long-term care facilities and care homes by ensuring implementation of the primary care antibiotic policy and providing education on antibiotic use for healthcare staff.

Another key area for future work is educating patients and the public about prudent use of antibiotics to reduce patient expectation for antibiotics in self-limiting viral infections. A sub-group of healthcare professionals and patient representatives has been established to develop a national approach to provision of patient information and this will inform future public health campaigns.

Andrew Seaton, Consultant in Infectious Diseases, NHS Greater Glasgow and Clyde
On behalf of SAPG clinicians

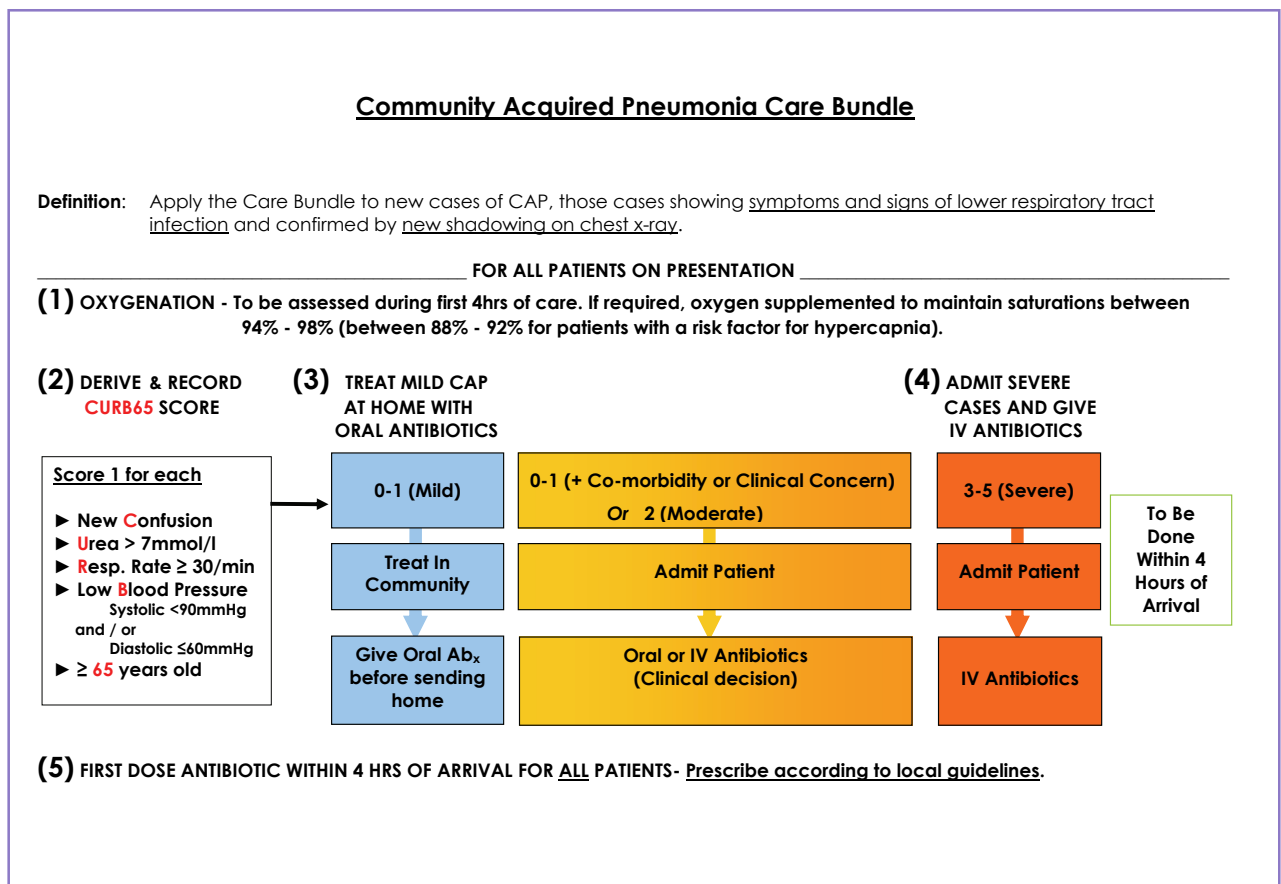
Community acquired pneumonia work stream

This work, led by the SNAP-CAP steering group, involves improving the management of CAP which is a common and potentially serious respiratory infection.

SNAP-CAP originated in 2006 as a quality improvement initiative hosted by the Scottish Royal Colleges of Physicians and funded by the Health Foundation. Funding from the Health Foundation ended in June 2009 and SAPG agreed to take over the project with funding secured from the Scottish Government Health Department HAI Taskforce.

Patients with severe CAP require urgent hospital admission and treatment with intravenous antibiotics while patients with mild CAP can be treated at home with oral antibiotics. SNAP-CAP involved development and implementation of an evidence-based care bundle to optimise the management of patients presenting to hospital with CAP. Care bundles are used to ensure that patients receive the best quality of care by identifying several key actions and treatments.

The care bundle for CAP is shown below.



SNAP-CAP involves collection of data by clinical teams in accident and emergency departments and acute medical admissions units from patients presenting with CAP. The project uses quality improvement methodology to address non-compliance with bundle elements and data management is via the SAPG Extranet described in the Infection management section.

Another feature of this improvement approach is that clinical teams participate in a monthly teleconference to discuss their results and share good practice. Currently 11 of the 14 NHS boards have at least one hospital engaged with SNAP-CAP although not all sites are posting data on the Extranet every month. Combination of data collection with the empirical prescribing HEAT indicator has been proposed to spread uptake to all acute hospitals in all NHS boards.

SNAP-CAP has its own website¹⁷ which hosts evidence to support the care bundle, data collection forms and details of learning events and publications.

Next steps: Proposed future work includes extension of the care bundle approach to CAP in primary care and other common infections. This work will be developed in collaboration with the SPSP, which uses similar methodology.

The evidence for the care bundle will be reviewed to include any recent publications on management of pneumonia.

A key outcome measure for SNAP-CAP is evaluating whether implementing the care bundle results in reduced mortality due to CAP. Initial data analysis suggests that data available from ISD can be used to monitor death within 30 days of admission in patients with a diagnosis of CAP and this can be combined with bundle compliance to conduct an outcome analysis. Development of this methodology is ongoing.

Peter Davey, Lead Clinician for Clinical Quality Improvement, NHS Tayside
Andrea Patton, Information Analyst, SAPG
On behalf of the SNAP-CAP Steering Group

4 Conclusion

SAPG is now established and has successfully engaged with national stakeholders and AMTs throughout Scotland and has developed a national consensus approach to the use of antimicrobials.

The completion of data management systems for prescribing, surveillance and clinical audit will provide essential information to support and direct future work.

In the coming year, priorities will be to embed education on antimicrobial prescribing in undergraduate teaching, develop antimicrobial stewardship in non-acute hospitals and care homes, to engage with patients and the public at national and local level to increase awareness of the prudent prescribing agenda and to evaluate the outcomes of our interventions.

5 References

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- 2 Scottish Antimicrobial Prescribing Group www.scottishmedicines.org.uk/smc/6616.html
- 3 Scottish Patient Safety Programme www.nhshealthquality.org/nhsqis/6466.html
- 4 Chief Executive letter 11 (2009): A revised framework for national surveillance of healthcare associated infection and the introduction of new health efficiency and access to treatment (HEAT) target for *Clostridium difficile* associated disease (CDAD) for NHS Scotland www.sehd.scot.nhs.uk/mels/CEL2009_11.pdf
- 5 Swedish strategic programme against antimicrobial resistance <http://en.strama.se/dyn/,84,,.html>
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- 7 Temporal effects of antibiotic use and *Clostridium difficile* infections
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- 9 NHS National Services Scotland www.nhsnss.org/
- 10 European Surveillance of Antimicrobial Consumption <http://app.esac.ua.ac.be/public/>
- 11 NHS Education Scotland Healthcare Associated Infection www.nes.scot.nhs.uk/hai/default.asp
- 12 Hospital antibiotic management: Minimum requirements for antimicrobial prescribing policies, December 2008, www.scottishmedicines.org.uk/smc/files/Microsoft%20Word%20-%20Minimum%20requirements%20for%20Antimicrobial%20PrescribingPolicies.pdf
- 13 Antibiotic prophylaxis in surgery, June 2009 www.scottishmedicines.org.uk/smc/files/Microsoft%20Word%20-%20SAPG%20Guidance%20on%20surgical%20prophylaxis.pdf
- 14 Guidance on use of vancomycin and gentamicin, September 2009
http://www.scottishmedicines.org.uk/smc/files/SAPG_Guidance_on_gentamicin_and_vancomycin_policies_revised.pdf
- 15 Institute for Healthcare Improvement www.ihl.org/ihl
- 16 Health Protection Agency, Management of Infection Guidance for Primary Care, www.hpa.org.uk/HPA/Topics/InfectiousDiseases/InfectionsAZ/1197637041219/
- 17 Scottish National Audit Project – Community Acquired Pneumonia, www.snap-cap.org.uk

Appendices

Appendix 1 – SAPG membership	29
Appendix 2 – Work stream action plans, Oct 2008–Oct 2009	31
Organisation work stream	31
Information work stream	32
Education work stream	33
Infection management work stream	35
Community acquired pneumonia work stream	37
Appendix 3 – Antimicrobial management team national network events	39
Appendix 4 – Presentations and publications	40
Appendix 5 – Glossary of abbreviations	41

Appendix 1 – SAPG membership

SAPG representation	Name	Job title/Specialty
Chair	Professor Dilip Nathwani	Consultant in Infectious Diseases NHS Tayside
Professional Project Lead	Dr Jacqueline Sneddon	Principle Pharmacist Scottish Medicines Consortium
Project Officer	Ms Susan Paton	Project Officer Scottish Medicines Consortium
Representative from Medical Directors Group and Vice Chair	Dr Bob Masterton	Medical Director & Consultant Microbiologist, NHS Ayrshire & Arran
Representative from Directors of Pharmacy Group and Vice Chair	Mrs Gail Caldwell	Director of Pharmacy NHS Forth Valley
Representatives from Scottish Medicines Consortium Executive Team	Mrs Angela Timoney	Vice Chair SMC and Director of Pharmacy NHS Tayside
	Mrs Laura McIver/Mrs Anne Lee	Chief Pharmaceutical Adviser/Acting Chief Pharmaceutical Adviser Scottish Medicines Consortium
Lead for Information Work Stream (Prescribing)	Professor Marion Bennie	Chief Pharmaceutical Adviser NHS National Services Scotland
Lead for Information Work Stream (Surveillance)	Dr Anne Eastaway	Consultant Microbiologist Health Protection Scotland
Pharmaceutical adviser for Information Work Stream	Mr William Malcolm	Pharmaceutical Adviser, Health Protection Scotland
Lead for Antimicrobial Resistance Programme	Dr Camilla Wiuff	Epidemiologist and Programme Manager Health Protection Scotland
Lead for Education Work Stream	Mrs Liz Gillies	Education Lead for ScotMARAP NHS Education for Scotland
Pharmacy Representative on Education Work Stream	Mrs Arlene Brailey	Assistant Director of Pharmacy NHS Education for Scotland
Lead for Organisation Work Stream	Dr Peter Christie/Mrs Jackie Ley	Consultant in Public Health Medicine/Nurse Consultant - HAI Team NHS Quality Improvement Scotland
Lead for Infection Management Work Stream	Dr Andrew Seaton	Infectious Diseases Consultant NHS Greater Glasgow and Clyde
Lead for SNAP-CAP Work Stream and representative for International Liaison	Professor Peter Davey	Lead Clinician for Clinical Quality Improvement NHS Tayside
SNAP-CAP Project Co-ordinator and SAPG Information Analyst	Ms Andrea Patton	Advanced Information Analyst Scottish Medicines Consortium
Representative from Scottish Government Healthcare Associated Infection Team	Mrs Lorna Willocks/Mrs Carol Fraser	Senior Medical Advisor/Nurse Adviser HAI Scottish Government Health Directorates
Representative from the Scottish Patient Safety Programme	Dr Malcolm Daniel	Consultant in Anaesthesia & Intensive Care NHS Greater Glasgow and Clyde
Professional Secretary for ScotMARAP	Ms Ysobel Gourlay	Lead Antimicrobial Pharmacist NHS Greater Glasgow and Clyde
Representative from Association of Scottish Antimicrobial Pharmacists	Dr Nicholas Reid	Lead Antimicrobial Pharmacist NHS Ayrshire & Arran
Antimicrobial Management Team Representatives	Dr Martin Connor	Consultant Microbiologist and Infection Control Doctor NHS Dumfries & Galloway
	Mrs Alison Cockburn/Dr Karen MacSween	Antimicrobial Pharmacist/Consultant Microbiologist NHS Lothian

Appendix 1 – SAPG membership continued . . .

SAPG representation	Name	Job title/Specialty
Representative from Scottish Microbiology Forum	Dr Ian Gould	Consultant Microbiologist NHS Grampian
Representative from Infectious Diseases Consultants Group	Dr Nick Kennedy/Dr Stephanie Dundas	Consultant in Infectious Diseases NHS Lanarkshire
Representative from Chief Executives Group	Mr Mike Grieve	Director of Delivery NHS Lothian
Representative from Infection Control Managers Group	Dr Robert Gray	Infection Control Manager Golden Jubilee National Hospital
Public Health representative	Mr Ishtiaq Mohammed	Clinical Effectiveness Pharmacist NHS Fife
General Practitioner	Dr Simon Hurding/Dr Gail Haddock	General Practitioners NHS Highland
Dental representative	Dr Alexander Crichton	Consultant in Oral Medicine Glasgow School of Dentistry
Veterinary representative	Mr Jesus Gallego/Mrs Sheila Voas	Veterinary Adviser (Meat Hygiene)/ Veterinary Adviser (Public Health) Scottish Government Health Directorates
Representative for Undergraduate Medical Education	Professor Hamish McKenzie	Head of Division of Medical and Dental Education University of Aberdeen
Representative from Infection Prevention Society	Ms Sybil Solomon	Nurse Consultant in Infection Control NHS Forth Valley
Representative from Scottish Infection Research Network	Dr Alistair Leonard	Director of Scottish Infection Research Network University of Glasgow
Patient representative	Mrs Sheila Tunstall-James	Public Partner SMC Patient and Public Involvement
Association of the British Pharmaceutical Industry representative	Dr John Northfield	Medical Advisor (Anti-Infectives) Astellas UK Ltd
Representative from Care Commission	Mr David Marshall	Pharmacy Adviser Care Commission

Appendix 2 – Work stream action plans, Oct 2008–Oct 2009

Organisation work stream

Action	Method	Output
Report on the structures in place within each NHS board for antimicrobial management.	Self-assessment questionnaire developed and completed in December 2008 to establish a baseline position for antimicrobial stewardship within each NHS board.	Final report included structures in place within each NHS board for antimicrobial management (AMT, ADTC, antimicrobial pharmacists, links with clinical governance structures and appropriate communication mechanisms). The survey concluded that all boards now have an established AMT (of varying composition and activity) and all but Western Isles have an antimicrobial pharmacist. Report issued to NHS boards with request to develop local action plan to address deficiencies where appropriate.
Integration of antimicrobial prescribing into Healthcare Environment Inspectorate (HEI) process.	The final self-assessment report on NHS boards' management of antimicrobial stewardship was sent to all NHS boards in March 2009 (with an action letter).	Further discussion and development of a reporting process between the HEI and SAPG to integrate and provide feedback on progress with antimicrobial stewardship and compliance by NHS boards via the HEI process is under way.
Development of system for supporting implementation and improvement.	NHS QIS will deliver the HAI iiiiP and it is anticipated that all NHS boards will agree to participate. Antimicrobial prescribing and stewardship has been identified as one of the key areas of focus for action within iiiiP.	The purpose of the programme is to build capacity and capability in improvement methodologies among leaders for improvement across infection prevention and control and clinical teams in Scotland. Output from the programme will be demonstrated via NHS QIS documentation.

Information work stream

Action	Method	Output
Establish information needs of AMTs in regard to prescribing and surveillance data for primary and secondary care.	A sample of AMTs visited and needs discussed. All information team members aware of local data sources.	Current status of local data established and document produced on national approach to surveillance of antimicrobial resistance and consumption – and advice on local surveillance.
National point prevalence study of antimicrobial prescribing in hospitals.	Total of 36 hospitals in 14 NHS boards took part in ESAC study during June 2009.	Working with boards to obtain permission for data sharing to allow production of a national report for completion by end December 2009.
Development of core set of national prescribing indicators for antimicrobials used in primary care setting.	Partnership working between SAPG, AMT and other stakeholders to develop a range of prescribing indicators that allow quantitative and qualitative analysis of primary care prescribing. Focus on SAPG recommended agents and agents associated with high risk of CDI.	All indicators available as standard reports in web-based PRISMS allowing monitoring of use at NHS board, community health partnership and GP practice level. SAPG report on indicators published August 2009. Report discussed with AMTs and AMT network event in September 2009.
Pilot report on resistance among Gram-negative blood isolates tested in VITEK system.	Pilot datasets on antimicrobial resistance in Gram-negative bacteraemia generated on VITEK 2 AST testing systems were received from 3 hospitals. Data were analysed with a view to producing national data on antimicrobial resistance.	Preliminary data analysis of the pilot data were presented in a short report to SAPG for review. This work formed a basis for the development of future annual reports on AMR data.
Examine options for interim AMR data transfer and current NHS board laboratory practice.	The HPS team explored various options for interim transfer of detailed AMR data (ie MIC-data) from the diagnostic laboratories to HPS (ECOSS).	By November 2009, nine diagnostic laboratories had implemented IT solutions which feed detailed AMR-data and associated patient information into ECOSS.
Establish working group to explore development of integrated web based database containing antimicrobial consumption and resistance data.	Group established and system outline specification agreed.	Completed preliminary user requirements specification for NSS evaluation.

Education work stream

Action	Method	Output
Complete and launch online tutorials on <i>Clostridium difficile</i> and antimicrobial resistance.	Initially commissioned by the HAI Taskforce. Both these programmes were developed in partnership with University of Dundee Medical School.	A <i>Clostridium difficile</i> clinical scenario and bacterial resistance tutorial are available to all relevant NHS staff at http://www.nes.scot.nhs.uk/hai/osc/ Both programmes are also available to undergraduate providers. An evaluation is scheduled for 2010–2011.
Link with institutions providing undergraduate education to develop framework for the preparation of antimicrobial prescribers.	A draft framework of learning outcomes which align with 'The Scottish Doctor' was developed. Consultation with all five medical undergraduate providers was undertaken to reach a consensus.	Anticipating confirmation that a consensus has been reached on a framework for undergraduate medical training in antimicrobial stewardship. Follow-up work will be undertaken to see how it has been implemented by medical schools.
Review DOTS vignettes to update in line with current practice.	Specialist advisory panel reviewed and updated content. Additional training on gentamicin and vancomycin included.	Revised Prudent Antibiotic Prescribing for Foundation Year Doctors programme released for autumn 2009 cohort of F1/F2 doctors.
Organise training events for antimicrobial pharmacists, non-medical prescribers and infection control teams.	Ascertained learning needs of these groups of healthcare practitioners in relation to antimicrobial prescribing. Designed educational events to meet these specific learning needs.	<ol style="list-style-type: none"> 1. Bespoke training day for antimicrobial pharmacists across Scotland (February 2009) 2. Two training days (Glasgow, Aberdeen) on pharmacokinetics of gentamicin and vancomycin for antimicrobial pharmacists (April, June 2009) 3. Multiprofessional conference on prudent prescribing of antimicrobials attended by over 100 practitioners from primary and secondary care (October 2009).

more . . .

Action	Method	Output
Develop national continuing professional development course on antimicrobials for pharmacists.	NES Pharmacy commissioned five members of Association of Scottish Antimicrobial Pharmacists to produce quality assured course materials for 5 hours of learning on prudent antimicrobial prescribing. Also commissioned professional graphic design and print of these materials to produce high quality resources.	A core educational pack for distribution to up to 1000 pharmacists in Scotland who will attend a NES course locally during November 2009-March 2010, or use for personal study. Pack contains: a) pre-recorded presentations on 'Bugs and Drugs' and 'Pharmaceutical care of patients with infections' b) selection of case studies based on urinary tract, skin/soft tissue and respiratory infections c) multiple choice questions for self-check. Materials will also be made available on NES website. Over 900 pharmacists from throughout Scotland have signed up for this course.
Commission a Master of Science for infection control professionals and others to address training needs on infection management and antimicrobial stewardship.	Based on a training needs analysis of infection control teams, Higher Education Institutions were invited to tender for the provision of a series of masters level modules.	A consortia of University of Dundee, Glasgow Caledonian University and University of Highlands and Islands Millennium Institute is currently progressing this development. The antimicrobial stewardship module is being developed to mirror the work streams of SAPG. The first intake is scheduled for February 2010.

Infection management work stream

Action	Method	Output
Develop guidance for AMTs on optimising antimicrobial use and reducing CDAD.	Review of available evidence and current guidance in Scottish health boards and other UK experience. Consensus developed through SAPG, HPS and AMT consultation. Feedback through workshops in first national AMT network event November 2008.	CEL regarding health board roles and responsibilities relating to antimicrobial prescribing and development of local antimicrobial management teams (June 2008). Guidance paper issued to boards and AMT for local implementation: 'Guidance to Optimise Antimicrobial Use and Reduce <i>Clostridium difficile</i> in Scottish Hospitals' (July 2008).
Develop national standards for hospital antimicrobial prescribing policies.	Developed from 'Antimicrobial Prescribing Policy and Practice in Scotland' (2005). Consensus agreed through SAPG and AMT consultation.	'Hospital Antibiotic Management: Minimum Requirements for Antimicrobial Prescribing Policies' communicated to Medical directors and AMTs (December 2008).
Develop prescribing indicators for hospital and primary care to support the CDAD HEAT target.	Minimum requirements to support antimicrobial management identified through review of PRISMS data (primary care) and through collective antimicrobial audit experience of SAPG and AMT. Discussed and refined through multidisciplinary workshops in AMT networking event. Consensus agreed with Scottish Government HAI Team.	CEL 11 (2009) outlining prescribing indicators and associated compliance targets (April 2009). Development of Institute for Healthcare Improvement Extranet site to facilitate audit of quality improvement in hospital indicators (August 2009). Development of primary care indicator as standard report within PRISMS (August 2009) – see Information work stream for details.
Establish national consensus on dosage and administration of gentamicin and vancomycin.	Survey of practice across NHS boards. Collation and presentation at AMT network event. Consensus agreed by SAPG and AMT.	'Guidance on Use of Gentamicin and Vancomycin in Adults' issued to AMTs (September 2009).

more . . .

Action	Method	Output
Develop guidance for AMTs on the use of antimicrobials in surgical prophylaxis.	SIGN 104 Antibiotic Prophylaxis in Surgery used to develop guidance on 'general principles' and specific specialty-based guidance. SAPG, AMT and Scottish Microbiology Forum consensus developed in conjunction with Chief Medical Officer surgical specialty advisers.	SAPG guidance document 'Antibiotic Prophylaxis in Surgery' issued to AMTs (July 2009).
Incorporate measures relating to antimicrobial use into National Surgical Site Infection Audit.	Collaboration with HPS to refine national audit tool to capture key data on over use (duration of prophylaxis) and non-compliance (with local policy).	Refinement of audit tool complete and integrated into routine data collection for specific surgical procedures (June 2009).
Develop a national approach to antimicrobial prescribing policies for primary care.	Primary Care Prescribing Sub-group established. Survey of practice in NHS boards was undertaken and good practice identified. Health Protection Agency (HPA) Guidance for Management of Infection in Primary Care reviewed and adopted with local adaptation for NHS boards.	National adoption of HPA template launched at AMT network event (September 2009). Commitment by Sub-group to ongoing review of updates to HPA template and collaboration with HPA in their review process.

Community acquired pneumonia work stream

Action	Method	Output
Transfer SNAP-CAP work programme, staff and website from RCPE to SAPG.	Funding secured from Scottish Government HAI Team. Job description for Information Analyst developed and evaluated for Agenda for Change banding. Position recruited via Human Resources, NHS QIS.	SNAP-CAP project co-ordinator transferred to SAPG as Information Analyst on 1 July 2009 and SNAP-CAP became fifth work stream in SAPG programme. SNAP-CAP website transferred to NHS QIS website with new domain name www.snap-cap.org.uk in September 2009.
Facilitate uptake of SNAP-CAP by a minimum of one hospital in each mainland NHS board.	SAPG project lead and information analyst visited each NHS board, including the island boards, to disseminate SNAP-CAP information.	All NHS boards visited by end of September 2009. Sites keen to participate although progress has been slow.
Develop guidance on how AMTs and NHS board management should engage with SNAP-CAP.	Starter packs created and sent to AMT leads and also available on SAPG Extranet. Starter pack available for SNAP-CAP only and further starter pack available for integration of SNAP-CAP with empirical prescribing collection.	SNAP-CAP data can be collected in acute medical admission units and/or accident and emergency departments. AMTs that collect empirical prescribing indicators in acute medical admission units can combine data collection with SNAP-CAP. Combining data collection will prevent duplication. SNAP-CAP data can continue to be collected separately if already established in the hospital. Starter pack includes a data collection form, data aggregation form, measurement plan that contains operation definitions for compliance with measures, inclusion criteria and exclusion criteria. Details about data security and an Extranet user guide also included in starter pack. Extranet demonstrated at October antimicrobial pharmacists meeting and SAPG.
Develop primary care pneumonia bundle.	Primary care bundle created and circulated to SAPG members and Royal College of General Practitioners for comment.	The primary care bundle was intended as an educational tool for use in primary care. However, unlike the secondary care bundle, there is a lack of evidence linking bundle measures to outcomes. Agreed to postpone introduction of primary care bundle until secondary care consistently recording data.

more . . .

Action	Method	Output
Develop Good Governance Guide as tool to update board management on quality improvement initiatives.	Good Governance Guide (GGG) Template developed by Good Governance Institute to facilitate communication between SNAP-CAP teams and NHS board members.	Feedback on the GGG indicated that NHS boards would not review single issue projects such as SNAP-CAP. Suggested routes included Patient Safety Leads or Clinical Governance Leads. The guide should be tailored to each NHS board with number of cases quantified for local population. Introduction of GGG has been postponed until secondary care consistently recording data.
Care bundle evidence review.	CAP care bundle evidence finalised in early 2007. British Thoracic Society (BTS) issued update to their pneumonia guideline in October 2009 and this will be used in review process.	The care bundle evidence will be reviewed to include BTS and any new publications and guidelines. The Scottish Intercollegiate Guideline Network (SIGN) has agreed to facilitate the literature review.
Develop data management system to integrate SNAP-CAP data with prescribing indicator data.	Extranet to be used to record empirical prescribing and surgical prophylaxis data.	Funding was allocated from Scottish Government for set-up of new Extranet to record prescribing indicators. The SNAP-CAP Extranet was modified to include recording for prescribing indicators. SNAP-CAP Extranet renamed as SAPG Extranet. Access is password protected although no patient identifiable data are added.

Appendix 3 – Antimicrobial management team national network events

18 November 2008, Stirling Highland Hotel

Inaugural event, to mark the first European Antibiotic Awareness Day, was an introduction to SAPG. The event concentrated on the role of SAPG, communication of current measures being used to tackle *Clostridium difficile* and introduced the SNAP-CAP. The event was attended by 48 delegates and feedback from the event included suggestions for future events.

3 March 2009, Royal Pharmaceutical Society of Great Britain, Edinburgh

This event communicated details of the Information work stream of SAPG using presentations, discussions and workshops on the use of national and local antimicrobial prescribing and surveillance data. Guest speakers from the Welsh Antimicrobial Resistance Programme Surveillance Unit presented details of their programme. The event was attended by 50 delegates.

2 June 2009, Royal College of Physicians of Edinburgh

This event concentrated on the Infection Management work stream. Topics included discussion on the 2009 update of the British Thoracic Society guidelines for community acquired pneumonia, local surveillance data, local plans for data collection for hospital CDAD HEAT targets, development of national policies for surgical prophylaxis and use of gentamicin and vancomycin. The event was attended by 55 delegates.

29 September 2009, Royal College of Physicians of Edinburgh

This event concentrated on primary care and the Education work stream. Topics included the adoption of a national antimicrobial policy in primary care, prescribing indicators developed in PRISMS and methods to influence prescribers on using antimicrobial prescribing data. Progress with the Education work stream was highlighted and online learning packages were demonstrated. The event was attended by 50 delegates.

Three events are planned for 2010, one large event on 9 February to communicate the achievements of SAPG which will be open to a wider audience including NHS board senior management and two AMT network events on 8 June and 24 November.

Appendix 4 – Presentations and publications

The Scottish Antimicrobial Prescribing Group

I. Gould, Presentation to the Australian Health Commission, Sydney, Australia, September 2008.

I. Gould, Presentation to the Ontario Hospitals Association, Ontario, Canada, June 2009.

National Collaboration on Antimicrobial Stewardship: Scottish Antimicrobial Prescribing Group

P. Christie, C. Wiuff, Poster presentation at European Antibiotic Awareness Day 18 November 2008, Science Museum, London.

J. Sneddon, S. Paton, Poster presentation at NHS Scotland Event, 16–17 June 2009, Scottish Exhibition & Conference Centre.

Antimicrobial Stewardship: The Scottish National Approach.

D. Nathwani, Plenary presentation to the 2nd Annual Scientific Meeting of the Infectious Diseases Society of Ireland (IDSI). Dublin, Republic of Ireland, 11 June 2009.

Which clinical improvement model do I use?

A. Patton, Poster presentation at International Society for Quality in Healthcare (ISQua) meeting 13 October 2009, Dublin, Republic of Ireland.

A National Approach to Antimicrobial Stewardship in Primary Care

S. Hurding, Poster presentation at Royal College of General Practitioners Conference, 5–7 November 2009, Royal College of Physicians Edinburgh.

The Development of National Prescribing Indicators for Antimicrobials

A National Approach to Antimicrobial Stewardship in Primary Care

J. Sneddon, Poster presentations at Infection 2009 Conference, 11–13 November 2009, Birmingham International Conference Centre.

The Development of National Prescribing Indicators for Antimicrobials

J. Sneddon. Abstract accepted for poster presentation at the International Forum on Quality and Safety in Healthcare, 20–23 April 2010, Nice, France.

What improvement in reliability of care is required to make a difference to clinical outcome?

A. Patton. Abstract accepted for poster presentation at the International Forum on Quality and Safety in Healthcare, 20–23 April 2010, Nice, France.

Overview of strategies for overcoming the challenge of antimicrobial resistance

P. Davey, D. Nathwani, J Sneddon, A Patton, in press, for publication in Expert Review of Clinical Pharmacology 2010.

Appendix 5 – Glossary of abbreviations

ADTC	Area Drug and Therapeutics Committee
AMR	Antimicrobial Resistance
AMT	Antimicrobial Management Team
BTS	British Thoracic Society
CDAD	<i>Clostridium difficile</i> associated disease
CDI	<i>Clostridium difficile</i> infection
CEL	Chief Executive Letter
DDD	defined daily dose
DOTS	Doctors Online Training System
EARSS	European Antimicrobial Resistance Surveillance System
ESAC	European Surveillance of Antimicrobial Consumption
HAI	Healthcare Associated Infection
HEAT	Health improvement, Efficiency, Access and Treatment
HMUD	Hospital Medicines Utilisation Database
HPA	Health Protection Agency
HPS	Health Protection Scotland, NHS NSS
iiiP	Infection Implementation and Improvement Programme
ISD	Information Services Division, NHS NSS
NES	NHS Education for Scotland
NHS NSS	NHS National Services Scotland
NHS QIS	NHS Quality Improvement Scotland
PRISMS	Prescribing Information System for Scotland
RCPE	Royal College of Physicians Edinburgh
SAPG	Scottish Antimicrobial Prescribing Group
ScotMARAP	Scottish Management of Antimicrobial Resistance Action Plan
SIGN	Scottish Intercollegiate Guidelines Network
SMC	Scottish Medicines Consortium
SNAP-CAP	Scottish National Audit Project - Community Acquired Pneumonia
SPSP	Scottish Patient Safety Programme

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