Scottish Management of Antimicrobial resistance Action Plan 2014 – 18 (ScotMARAP 2)

Scottish Medicines Consortium

Scottish Antimicrobial Prescribing Group

**Scottish Management of Antimicrobial resistance Action Plan 2014 – 18
(ScotMARAP 2)**

Background

The scale of the threat of antimicrobial resistance (AMR) and the case for action was set out in the Annual Report of the Chief Medical Officer 2011 published in March 2013 and the UK Five Year Antimicrobial Resistance Strategy 2013-18 sets out actions to address the key challenges to AMR. The overarching goal of the Strategy is to slow the development and spread of AMR and focuses on activities around 3 strategic aims:

- improve the knowledge and understanding of AMR,
- conserve and steward the effectiveness of existing treatments,
- stimulate the development of new antibiotics, diagnostics and novel therapies.

The UK AMR Strategy identifies 7 key areas for action to support the 3 strategic aims:

1 Improving infection prevention and control practices in human and animal health.
2 Optimising prescribing practice through implementation of antimicrobial stewardship programmes.
3 Improving professional education, training and public engagement to improve clinical practice and promote wider understanding of the need for more sustainable use of antibiotics.
4 Developing new drugs, treatments and diagnostics through better collaboration between research councils, academia, industry and others.
5 Better access to and use of surveillance data in human and animal sectors.
6 Better identification and prioritisation of AMR research needs to focus activity and inform our understanding of AMR.
7 Strengthened international collaboration working with and through a wide range of governmental and non-governmental organisations, international regulatory bodies and others.

In Scotland, the Scottish Management of Antimicrobial Resistance Action Plan 2008, made recommendations for improving the use of antimicrobials across all healthcare settings as part of the broader Healthcare Associated Infection (HAI) Task Force Delivery Plan. ScotMARAP has largely been delivered by establishment of the Scottish Antimicrobial Prescribing Group (SAPG) and collaborative working between national stakeholders and NHS boards.

ScotMARAP has been refreshed to address key areas 2, 3 and 5 (human sector) of the UK AMR Strategy and ScotMARAP 2 provides an update to the original ScotMARAP document including revised roles and deliverables for SAPG and other stakeholders.

The remaining areas of the UK AMR strategy will be implemented in Scotland via an overarching Controlling Antimicrobial Resistance in Scotland (CARS) group and actions from ScotMARAP 2 will feed into this group.

ScotMARAP 2 will inform the operational delivery plans of SAPG for 2014 – 18 as well as the annual work plans of national and local stakeholders, and will be integrated into the current HAI Task Force Delivery Plan. ScotMARAP 2 will build upon the successes of ScotMARAP 2008 to maintain and further develop the current national stewardship programme using a quality improvement approach informed by the evolving national informatics capability.

A summary of the key aims of ScotMARAP 2 are shown in the following Antimicrobial stewardship driver diagram:

AIM	PRIMARY DRIVERS	SECONDARY DRIVERS

AIM

Timely and appropriate antimicrobial use in all health and care settings

- Improved clinical outcomes for patients with infections

- Decreased incidence of antimicrobial-related adverse drug events (ADEs)

- Decreased prevalence of antimicrobial resistant healthcare-associated pathogens

- Decreased incidence of healthcare-associated *Clostridium difficile* infection (CDI)

- Improved cost-effective use of antimicrobials

PRIMARY DRIVERS

Timely and appropriate initiation of antimicrobial treatment

Appropriate administration and de-escalation

Stewardship infrastructure, data monitoring and staff education

Availability of expertise at the point of care

SECONDARY DRIVERS

- Identify and reassure patients who do not require antibiotics
- Promptly identify patients who require antibiotics and in patients with sepsis syndrome start treatment within one hour
- Obtain cultures (where appropriate) prior to starting antibiotics
- Do not give antibiotics with overlapping activity or combinations not supported by evidence or guidelines
- Determine and verify antibiotic allergies and tailor therapy accordingly
- Consider local antibiotic susceptibility patterns in selecting therapy
- Start treatment promptly following local guidelines
- Specify expected duration of therapy based on evidence and national and local guidelines

- Clearly identify currently prescribed antibiotics, indication for treatment, start dates and intended duration or review date for each patient at the point of care.
- Give antibiotics at the right dose and interval
- Stop or de-escalate therapy promptly based on culture and sensitivity results; consider role of biomarkers
- Ensure therapeutic drug monitoring and dosage adjustment is carried out reliably
- Reconcile and adjust antibiotics at all transitions and changes in patient's condition
- Consider need for use of IV route throughout the patient's episode of treatment; consider IVOST
- Monitor for toxicity reliably and adjust agent and/or dose promptly when required

- Establish stewardship as an organisational priority, ensure resources are made available and identify accountability
- Ensure local structures for antimicrobial stewardship and links to management, infection prevention and control and patient safety are in place
- Monitor, feedback, and make visible data regarding antibiotic utilisation, antibiotic resistance, ADEs, CDI, cost, and adherence to the organisation's recommended microbiology and prescribing practices
- Ensure national and local education programmes on antimicrobial stewardship meet the training needs of health and care staff and promote patient and public awareness about use of antimicrobials

- Develop and make available multi-professional expertise in antimicrobial use
- Ensure expertise is available at the point of care across all health and care settings

Based on the CDC/IHI Antimicrobial stewardship Driver Diagram http://www.cdc.gov/getsmart/healthcare/pdfs/Antibiotic_Stewardship_Driver_Diagram_10_30_12.pdf

Action plan: Scottish Government Health and Social Care Directorates (SGHSCD)

The primary role for SGHSCD is to ensure pace and delivery of the UK AMR Strategy Action Plan and that prescribing, Public Health and educational aspects of the strategy are aligned. This involves facilitating the detection and reporting of local and national trends in antimicrobial resistance and antimicrobial utilisation by allocating tasks and ensuring consistency and coherence with related health policy developments, ensuring that key reporting mechanisms are in place and ensuring that education and understanding of AMR is both supported and encouraged.

The principal task in the context of ScotMARAP 2 is to ensure alignment with the wider objectives of the UK AMR Strategy Action Plan and reporting of progress within NHS Scotland through engagement with the Department of Health High Level Steering Group (HLSG).

The key deliverables for SGHSCD are:

- Develop policy that will support and enable the delivery of the UK AMR strategy.

- Oversight of the overall program ensuring delivery of key objectives as identified in the delivery plan.

- Co-ordination of effort within Scotland with the UK AMR strategy via the HLSG.

- Reporting progress to the Policy Group.

- Supporting, identifying and co-ordinating interdisciplinary workstreams led by key stakeholders.

- Explore contractual agreements to support reduction of unnecessary antimicrobial use in primary care.

Action plan: Healthcare Improvement Scotland

Healthcare Improvement Scotland is a statutory body that works with Healthcare providers to drive improvement in the quality of healthcare, and empower patients and the public through a combination of evidence-based standards and guidelines, a scrutiny and assurance regime and quality improvement implementation support. The Scottish Medicines Consortium (SMC), Healthcare Environment Inspectorate (HEI), Scottish Health Council (SHC) and the Scottish Intercollegiate Guidelines Network (SIGN) are all part of Healthcare Improvement Scotland which also leads on the Scottish Patient Safety Programme.

In the context of ScotMARAP 2, SMC through its Scottish Antimicrobial Prescribing Group (SAPG) plays a lead role in delivering antimicrobial stewardship and Healthcare Improvement Scotland has a key role in delivering the actions detailed below.

Scottish Antimicrobial Prescribing Group (SAPG) as part of Scottish Medicines Consortium

The primary role for SAPG is to deliver the national stewardship programme through collaborative working with national stakeholders, NHS boards and the clinical community.

The key deliverables for SAPG as part of SMC are:

- Leadership of the national stewardship programme and clinical engagement through AMTs and clinical specialist groups. (Area 2)

- Development, implementation and delivery, on time and within budget, of an annual work programme aligned with the HAI Delivery Plan, Healthcare Quality Strategy and UK AMR Strategy. (Area 2)

- Meetings and network events to inform national strategy facilitate discussion and establish consensus on current issues. (Areas 2 & 3)

- Maintenance of communication of stewardship agenda to national stakeholders and NHS boards. (Area 2)

- Support SMC in providing expert advice in the assessment of new antimicrobials in clinical practice. (Area 2)

- Report on progress with AMR activities in NHS Scotland to national/UK groups as appropriate. (Areas 2, 3 and 5)

- Development of stewardship interventions including measurement to evaluate the intended and unintended consequences of their impact on outcomes. (Area 2& 5)

- Coordinating the antimicrobial prescribing aspects of national point prevalence studies. (Areas 2 & 5)

- Supporting the assessment of the potential benefits of rapid diagnostics and point of care tests in the delivery of antimicrobial stewardship across Scotland. (Area 2)

- Support and inform the development and implementation of the infection intelligence platform which aims to improve patient outcomes and reduce harm from infection through an innovative, integrated database, to support clinicians within the NHS in Scotland. (Area 5)

- Communication with National Procurement to facilitate cost-effective procurement and availability of antimicrobials. (Area 2)

- Work with SIGN and other groups to support development of evidence based and consensus guidance to address the needs of AMTs and clinicians. (Areas 2 & 3)

- Collaborative working with other national and local stakeholders on patient safety and quality improvement interventions to address priority areas across health and social care settings. (Area 2 & 3)

- Support, maintain and monitor progress with healthcare staff educational activity in relation to antimicrobial stewardship. (Area 3)

- Lead development and delivery of national activities for European Antibiotic Awareness Day. (Area 3)

- Improving public engagement with the antimicrobial stewardship agenda through working with Public Partners to communicate key messages. (Area 3)

- Support clinical research and improvement research into prudent antimicrobial prescribing by work with SIRN and other research groups. (Area 2)

Healthcare Environment Inspectorate (HEI)

The key role of the HEI is to deliver a programme of Healthcare Environment Inspections.
The key deliverables for HEI are:
- Provide public assurance that standards of antimicrobial stewardship across hospitals in Scotland are met and publicly report on our findings. (Area 2)
- Ensure that where standards of antimicrobial stewardship are not met NHS boards take the necessary steps to drive improvement. (Area 2)

Evidence and Standards

The key role of evidence and standards is to develop evidence-based advice, guidance and standards.
The key deliverable for evidence and standards is:
- Collaborative working with SAPG and other stakeholders to develop and maintain evidence-based advice, guidance and standards on infection and antimicrobial related issues. (Areas 2 & 3)

Scottish Health Council

The key role of the Scottish Health Council is to promote Patient Focus and Public Involvement in the NHS in Scotland to ensure the NHS works in partnership with patients, carers and the public, and to ensure effective support for person centredness, patient and public engagement in the work of Healthcare Improvement Scotland as a whole.

The key deliverable for SHC is:

- Collaborative working with SAPG and Healthcare Improvement Scotland Public Partners to support public engagement and promote public awareness through the work they do, about responsible use of antibiotics. (Area 3)

Implementation and improvement support

The key role of implementation and improvement support is to reliably spread and support implementation of best practice.

The key deliverables for implementation and improvement support are:

- Through the **Scottish Patient Safety Programme** collaborate with SAPG and other stakeholders on infection and antimicrobial related improvement initiatives. (Area 2 and 3)

Action Plan: NHS National Services Scotland (NSS) - Public Health and Intelligence (PHI), National Procurement (PCF) and Information Technology Strategic Business Units (IT SBUs)

The key role of NSS Public health Intelligence (previously NSS ISD and NSS HPS) relates to the broader public health aspects of antimicrobial resistance with a focus on containing antimicrobial resistance through collection and interpretation of health information and support clinicians to improve the quality of antimicrobial prescribing, healthcare and patient safety. PHI will continue to support the nationwide implementation of antimicrobial stewardship in all healthcare settings through the provision and interpretation of quality assured information on antimicrobial use and resistance and its interpretation, guidance and expert advice. This involves working closely with clinicians in all healthcare settings to support the implementation of effective interventions aimed at improving the quality of prescribing and minimising the further development antimicrobial resistance. PHI also provides the essential external links to sister organisations in the UK and Europe and participates in coordinated data collection on antimicrobial use and resistance and distribute alerts on new emerging threats to public health.

The key deliverables for PHI are:

- Modernisation, integration and interpretation of health information currently collected in all healthcare settings that will empower clinicians and infection specialists to develop, implement and measure the effectiveness of interventions to prevent and treat infections. (Area 5)

- Lead the development of the NHS Scotland 'Infection Intelligence Platform (IIP)' which will support clinical staff to improve patient outcome, reduce harm from infection and benefit public health. This will be achieved through accurate monitoring of antimicrobial treatment, patient outcome, and development of antimicrobial resistance and unintended consequences (i.e. adverse events); and centralised analysis and Interpretation of the integrated health information will support the development of effective interventions aimed at reducing the risk to individual patients and the population as a whole, while preserving effective antimicrobials for anti-infective therapy and prophylaxis for future generations. (Area 5)

- Lead role in development of IT-systems (in partnership with the NSS IT SBU) that will make the national datasets immediately available to clinicians at the frontline will be developed as part of this (Area 5).

- Lead the health protection coordination function for Scotland within the UK and in relation to Europe, and will be the national point of contact for the ECDC with regards to surveillance and epidemic intelligence collection around infection, antimicrobial use and resistance.(all action areas)

The role of National Procurement is delivering best value supply chain services that support Scotland's health. In the context of ScotMARAP 2 this relates to ensure the cost-effective and timely supply of antimicrobials to NHS boards to support safe and effective management of infections.

The key deliverables for National Procurement are:

- Engagement with SAPG and ASAP to support the procurement and contracting process for antimicrobials. (Areas 2 and 5)

- Communication with SAPG and ASAP regarding supply issues for antimicrobials and liaison with manufacturers to resolve supply problems. (Area 2)

Footnote: In the wider context of UK AMR action plan, PHI plays central role in coordinating national initiatives on infection prevention and control, creating public awareness through national campaigns, central partner in translational research projects on antimicrobial use and resistance, healthcare associated infections and infection prevention and control. PHI is coordinating collaboration with the veterinary sector to collect joint information on antimicrobial use and resistance in humans and animals.

Action Plan: NHS Education for Scotland (NES)

The primary role for NES is to continue to develop, deliver, maintain and evaluate multidisciplinary education initiatives which promote prudent antimicrobial use and awareness of prevention and control of infection.

The key deliverables for NES (all Area 3) are:

- Maintain the provision and support of educational resources to support all aspects of antimicrobial stewardship for the administration, monitoring and prescribing of antimicrobial drugs.

- Implement, embed, sustain and evaluate current educational resources to support improved outcomes and behaviours through a well developed workforce. New resources will only be developed due to emergent need.

- Maintain links with undergraduate programmes in Medicine, Nursing, Pharmacy, Allied Health Professions (AHP) and Dentistry to ensure evidence based antimicrobial prescribing and stewardship.

- Promote evidence based antimicrobial prescribing and stewardship in post graduate education and induction programmes.

- Work in partnership with key stakeholders and promote further strategic engagement with NHS Boards to support staff to translate the wider socio-political environment within their own work context by ensuring educational programmes align to and provide links to other relevant programmes of work and policy directives.

- Review current resources on antimicrobial prescribing to ensure 'fit for purpose' following the NES process of editorial governance - gathering user feedback, assessment results and course statistics to identify relevant changes and improvements.

- Explore options and support implementation of varied approaches, delivery modes, scenarios and sharing of practice across professions and NHS Scotland.

- Consider the implications of the Integration of Health and Social Care to adapt resources for non-NHS settings to build capacity, capability and sustainability.

Action Plan: NHS boards and their Area Drug and Therapeutics Committees (ADTCs)

The primary role of NHS boards is to support and maintain an active and effective Antimicrobial Management Teams (AMT) as a sub group of their Area Drug and Therapeutics Committee (ADTC).

NHS boards must also ensure local organisational structures for clinical governance and risk management are in place to support antimicrobial stewardship and the broader HAI agenda.

 The key deliverables for ADTCs are:

- Maintain reporting structures within NHS boards to ensure that antimicrobial stewardship remains a high priority. (Area 2)

- Ensure board-level accountability for antimicrobial stewardship through the ADTC Chair and/or direct reporting to the NHS board Medical director. (Area 2)

- Maintain a local joint formulary for primary and secondary care aligned with national guidance on antimicrobial use. (Area 2)

- Continue to disseminate and ensure implementation of guidance and advice from SAPG regarding antimicrobial resistance and antimicrobial utilisation at NHS board level across hospital and community settings. (Areas 2 & 3)

Action Plan: Antimicrobial Management Teams (AMTs)

The role of the Antimicrobial Management Team in improving standards of antimicrobial use includes supporting staff education and clinical governance, promoting application of hospital antimicrobial policies, and enabling audit and feed back of these policies, analysis of trends in local antimicrobial use and resistance data and interventions to improve prescribing in primary care.

The key deliverables for AMTs are:

- **Demonstration of ongoing collaboration with Infection Prevention and Control teams.** (Area 2)
  - Strategic: committee representation and joint working on specific projects relating to AMR and antimicrobial prescribing.
  - Reactive: AMT involvement in outbreak control/ clinical incidents/surgical site infections where antimicrobial prescribing may be implicated (e.g. CDI, SAB, MDRGNB).

- **Demonstration of ongoing collaboration with ADTCs to report on AMT activities and provide expert advice on new antimicrobials.** (Area 2)

- **Optimising prescribing practice through implementation of antimicrobial stewardship (AS) programmes.** (Area 2)
  - Demonstrate engagement with work of SAPG through participation in learning events and amplification of local good practice to and from SAPG
  - Demonstrate a continuing programme of work to support SAPG guidance
  - Report to the Board Medical Director to promote implementation of AS programme
  - Demonstrate engagement/ communication with key stakeholders (prescribers, pharmacy nursing, clinical groups and management) in local health board with regards to AS and AMR
  - Contribute to the development/ testing of national prescribing indicators/ other AS interventions
  - Demonstrate use of quality improvement methodology to support the AS programme
  - Demonstrate compliance with nationally agreed prescribing indicators Surveillance of local quantitative prescribing data and consideration in the context of national prescribing trends
  - Review of local and national AMR (and other microbiological) data in context of guideline development and AS strategies
  - Engagement with clinical teams to demonstrate feedback, learning and action in response to local and national AMR and quality improvement data. (Areas 2 and 3)
  - Demonstrate a continuing programme of work to anticipate, review and minimise unwanted unintended consequences of antimicrobial prescribing

- **Improving professional education, training and public engagement to improve clinical practice and promote wider understanding of the need for more sustainable use of antibiotics.** (Area 3)
  - Support inclusion of AS in local under graduate medical, nursing, AHP and pharmacy curricula
  - Ensure AS is included in different tiers of local post graduate education including new doctor induction programs and non-medical prescriber education programmes.
  - Support eLearning related to antimicrobials in both primary and secondary care
  - Support and develop engagement with European Antibiotic Awareness Day (EAAD)
  - Support the development of GP/ Consultant annual appraisal tool relating to aspects of antimicrobial prescribing/AMR

- **Better access to and use of surveillance data in humans.**
  - Ensure the timely communication of important antimicrobial surveillance data including their implications for clinical practice and proposed local actions.(Area 5)
  - Ensure participation in assessment of quality of prescribing data (e.g. point prevalence survey, antimicrobial audit, surveillance of antimicrobial use), regular feedback of these data to prescribers and development of quality improvement action plans. (Areas 2, 3 and 5)
  - Engagement with dental and non-medical prescribers to communicate surveillance data. (Area 5)

- **Better identification and prioritisation of AMR research needs to focus activity and inform our understanding of AMR.** (Area 2)
  - Share locally generated research ideas with SAPG.
  - Engage with and inform the work of the Infection Intelligence platform.

Action Plan: Association of Scottish Antimicrobial Pharmacists (ASAP)

The role of ASAP is to provide a professional leadership and a national network for antimicrobial pharmacy and in the context of ScotMARAP 2 to lead delivery of the local antimicrobial stewardship programme.

The key deliverables for ASAP are:

- Support and develop a highly specialised antimicrobial pharmacist workforce including workforce planning and career progression for post holders. Boards should encourage development of staff for practice at accredited advanced level to enable post holders to function as antimicrobial stewardship leaders. (Areas 2 and 3)

- Support the implementation of 'Prescription for Excellence' and lead on the delivery of safe, effective, person-centred pharmaceutical care for patients with infections in all care settings. (Area 2)

- Provide expert advice to develop guidance for good practice in areas of antimicrobial use where risk has been identified but evidence is lacking or contradictory. (Area 2)

- Utilise advanced technology to monitor trends in antibiotic prescribing in all care sectors. Influence the development of national technology systems to improve information capture and analysis for feed back to prescribers. (Area 5)

- Contribute to national development of educational resources for all professional groups including novel delivery methods.(Area 3)

- Work with public engagement groups locally and nationally to influence public knowledge around best antibiotic use, highlighting the threat of rising resistance and need to target antibiotics use appropriately. (Area 3)

Specific deliverables for NHS board Antimicrobial Pharmacists are:

- Support the AMT lead in championing optimal use of antibiotics aiming to reduce resistance and deliver the best possible outcome for patients with infections and the wider population. Link with local board delivery plans for public health, infection prevention and control and pharmacy to ensure the appropriate use of antibiotics and reduction in resistance is included. (Area 2)

- Work with the AMT lead to continually strive to advance excellent antimicrobial prescribing practice across all prescribers, using quality improvement methodology, rapid process improvement techniques and audit and feedback. (Area 2)

- Oversee the development and delivery of education and training on optimal prescribing practice to all relevant staff groups within own board. (Area 3)

- Act as a role model for antimicrobial prescribing by participating in multi-disciplinary team antimicrobial/infection ward rounds in priority clinical areas. (Area 3)

- Continued use of existing information technology systems (PRISMS, PIS, HMUD, AMIDS, local Pharmacy systems) to monitor antibiotic utilisation across primary and secondary care. (Area 5)

Action Plan: Scottish Microbiology and Virology Network (SMVN)

The role of SMVN is to provide professional leadership and a national network for medical microbiology and in the context of ScotMARAP 2 support rapid clinical diagnosis to optimise antimicrobial prescribing.

All diagnostic disciplines are moving into an era of rapid / molecular technology and are most rapidly evolving within Clinical Microbiology and Virology due to the emergence of novel pathogens (e.g. respiratory viruses) and antimicrobial resistance (AMR) mechanisms and the requirement for expeditious treatment and implementation of infection prevention and control measures. This dovetails with the Public Health Microbiology strategy in Scotland to implement new, molecular technology in order to support national and international objectives on surveillance of infectious diseases and epidemic preparedness. This development work will be progressed via the overarching CARS group.

The key deliverables for SMVN are:

- Continue to support stewardship programmes through daily case management, membership of AMTs and implementation of SAPG initiatives. (Area 2)

- Assess new diagnostics in identifying pathogens, antimicrobial resistance testing and molecular technologies to optimise diagnosis and antimicrobial treatment of infections. (Area 2)

- Develop and endorse National laboratory protocols for standardised methodologies to facilitate diagnosis and antimicrobial treatment of infections. (Area 2)

- Contribute to surveillance systems using national reporting structures. (Area 5)

- Agree in partnership with National reference laboratories criteria for submission of organisms for further identification. (Area 2)

Action Plan: Infection Prevention and Control Teams (IPCTs)

The role of IPCTs is to develop, implement and monitor procedures to reduce the risk of healthcare associated infection to patients, staff and visitors. In the context of ScotMARAP 2 the role of IPCTs is to work collaboratively with local AMTs and patient safety teams to ensure an integrated approach to infection prevention and control and antimicrobial management planned programmes.

The key deliverables for IPCTs are:

- AMT and related committee representation. (Area 2)

- Joint working on specific projects relating to AMR and antimicrobial prescribing. (Area 2)

- Ensuring appropriate AMT involvement in outbreak control/ clinical incidents/surgical site infections where antimicrobial prescribing may be implicated e.g. CDI, SAB, MDRGNB. (Area 2)

- Ensuring alignment of local infection prevention and control management education programmes with local antimicrobial management education programmes. (Area 3)

- Ensuring local surveillance of key alert organisms, including multi-drug resistant organisms is shared with AMTs and along with AMT surveillance data is used to determine local priorities for joint action. (Area 5)

Action Plan: Prescribers' Individual Responsibilities

Patient safety and quality of care is the personal responsibility of each prescriber. In the context of ScotMARAP 2 all prescribers must ensure they have adequate knowledge of management of infection and appropriate antimicrobial use.

Key objectives for prescribers are:

- Ensure that all use of antimicrobials is rational and appropriate. (Area 2)

- Document in the medical notes the indication for prescribing an antimicrobial, supporting rationale for the decision to prescribe and the intended duration of antimicrobial therapy. (Area 2)

- Follow local antimicrobial guideline to ensure appropriate choice, route, dose and duration. (Area 2)

- Use narrowest spectrum agent possible. (Area 2)

- Comply with local policies to restrict the use of antimicrobials with a high risk of CDI and 'Alert' antimicrobials. (Area 2)

- Seek specialist advice from Microbiology, Infectious Diseases or Pharmacy (as appropriate) if required and document the advice received in the medical notes. (Area 2)

- Ensure empirical antimicrobial prescriptions are reviewed within 48-72 hours and therapy is de-escalated where appropriate. (Area 2)

- Ensure appropriate therapeutic drug monitoring of antimicrobials following local policy. (Area 2)

- Identify and report adverse event or harm from antibiotics through local risk management system and participate in significant adverse events analysis where appropriate.

- Participate and show evidence of engagement with opportunities for education and training on antimicrobials and management of infection. (Area 3)

- Engage with data collection and feedback activities for national and local prescribing indicators. (Areas 2 & 3)

- Contribute to individual and organisational actions necessary to improve antimicrobial use as highlighted by national and local surveillance and prescribing indicator data. (Area 2)

Action Plan: Pharmacists' responsibilities

Safe, rational and effective use of medicines is the responsibility of all registered pharmacists across hospital and community settings. In the context of ScotMARAP 2 all pharmacists must ensure they have adequate knowledge of management of infection and appropriate antimicrobial use.

The key objectives for pharmacists are:

- Ensure that all use of antimicrobials is safe, rational, appropriate and follows local policy. (Area 2)

- Monitor antimicrobial therapy to optimise efficacy to incorporate timely IV to oral switch, de-escalation from broad to narrow spectrum in line with culture and sensitivity results and dose optimisation of therapy for drugs with a narrow therapeutic range. (Area 2)

- Monitor patients receiving antimicrobial therapy for adverse drug events. (Area 2)

- Engage with opportunities for education and training on antimicrobials and management of infection. (Area 3)

- Support patients and carer's understanding of antibiotic use to reduce unnecessary use. (Area 3)

Action Plan: Registered nurses' responsibilities

Patient safety and quality of care is the personal responsibility of each registered nurse. In the context of ScotMARAP 2 all registered nurses must ensure they have adequate knowledge of management of infection and appropriate antimicrobial use.

Key objectives for registered nurses are:

- Support the multi-professional team to ensure that all use of antimicrobials is rational, appropriate and follows local policy. (Area 2)

- Understand and support appropriate taking of microbiological samples for patients with infection. (Area 2)

- Ensure timely administration of antimicrobials by supporting the sepsis programme and bundle and follow up of missed doses. (Area 2)

- Monitor duration and route of antimicrobial treatment including instigating prompt de-escalation from intravenous to oral therapy as part of care bundles for venous access devices. (Area 2)

- Monitor for drug allergies and side effects. (Area 2)

- Support appropriate therapeutic drug monitoring of antimicrobials following local policy. (Area 2)

- Engage with opportunities for education and training on antimicrobials and management of infection. (Area 3)

- Support patients and carer's understanding of antibiotic use. (Area 3)

Appendix: Membership of the ScotMARAP 2 Short Life Working Group

Chair: Alistair Leanord, HAI Medical Advisor, Scottish Government

Professional secretary: Jacqueline Sneddon, Project lead for SAPG

Representatives from the following stakeholders:

Scottish Antimicrobial Prescribing Group: Dilip Nathwani, Chair of SAPG, NHS Tayside

Public Health and Intelligence Unit, NHS National Services Scotland:
Jacqui Reilly, Lead Consultant HAI, Health Protection Scotland
Camilla Wiuff, Strategic Lead for AMR, Health Protection Scotland
William Malcolm, Pharmaceutical Adviser, Health Protection Scotland

NHS Education for Scotland: Gill Walker, Programme Director for HAI

Healthcare Improvement Scotland: June Wylie, Head of Implementation and Improvement

Antimicrobial Management Teams: Andrew Seaton, NHS GGC

Association of Scottish Antimicrobial Pharmacists: Alison MacDonald, NHS Highland

Scottish Microbiology and Virology Network: Ian Gould, NHS Grampian

Infection Control Managers Group: Bob Wilson, NHS Ayrshire & Arran

Primary Care: Simon Hurding, GP adviser, Scottish Government

GLOSSARY OF ABBREVIATIONS

ADTC	Area Drug and Therapeutics Committee
AMIDS	Antimicrobial integrated resistance and usage database for Scotland
AMR	Antimicrobial resistance
AMT	Antimicrobial Management Team
ASAP	Association of Scottish Antimicrobial Pharmacists
CDI	*Clostridium difficile* infection
DDD	Defined daily dose
ECDC	European Centre for Disease Control
HAI	Healthcare Associated infection
HEAT	Health improvement, Efficiency, Access and Treatment
HEI	Healthcare Environment Inspectorate
HIS	Healthcare Improvement Scotland
HMUD	Hospital Medicines Utilisation Database
HPS	Health Protection Scotland
IIP	Infection Intelligence Platform
IPCT	Infection Prevention and Control Team
ISD	Information Services Division
MDRGNB	Multi drug resistant Gram negative bacteria
NES	NHS Education for Scotland
NSS	National Services Scotland
PHI	Public Health and Intelligence
PIS	Prescribing Information System
PRISMS	Prescribing Information System for Scotland
SAB	*Staphylococcus aureus* bacteraemia
SAPG	Scottish Antimicrobial Prescribing Group
ScotMARAP	Scottish Management of Antimicrobial Resistance Action Plan
SHC	Scottish Health Council
SIGN	Scottish Intercollegiate Guidelines Network
SMC	Scottish Medicines Consortium
SMVN	Scottish Microbiology and Virology Network
SPSP	Scottish Patient Safety Programme
SSI	Surgical site infection