

# Recommendations for Antibiotic Stewardship in Irish Hospitals

December 2003

## ***Introduction***

This document outlines the recommendations of the Strategy for the control of Antimicrobial Resistance in Ireland (SARI) Hospital Antibiotic Stewardship Working Group. The recommendations include a number of options for promoting rational antibiotic prescribing in Irish hospitals. These range from relevant structures and personnel that should be in place in all Irish hospitals to specific interventions that should be considered once essential structures are in place. The recommendations are summarised in a flow chart at the end of the document.

## ***General Principles***

Antibiotic stewardship, which implies quality prescribing, is distinguished from antibiotic control, which implies limiting use.

The primary rationale for antibiotic stewardship is, clearly, the prevention or reduction of antibiotic resistance. There is evidence from the literature that intensive hospital stewardship programmes do have an impact on resistance levels. In addition such programmes have been shown to result in major reductions in antimicrobial acquisition and administration costs and reductions in adverse drug reactions. Stewardship programmes also act as a quality assurance tool with improved assessments of the appropriateness of drug choice.

Stewardship programmes should be based on consensus and it is important that prescribers feel that they have ownership of policies. It is also important that hospital management accept a role in the prevention of antibiotic resistance.

Although the focus in this summary is on stewardship initiatives it should be remembered that stewardship programmes need to be combined with effective infection control and surveillance programmes.

Implementation of the recommendations outlined in this document will require adequate numbers of relevant professionals in Irish hospitals, particularly clinical microbiologists/infectious disease physicians and clinical pharmacists.

The following summarises the main features of hospital antibiotic stewardship programmes, as recommended in the literature.

### ***1: Structure***

#### **a) Key individual(s) responsible in each hospital**

Each healthcare institution should have a designated person or persons with responsibility for appropriate antibiotic use. In most institutions the key individuals will also have responsibility for other aspects of therapeutic drug use or control of antimicrobial resistance. A consultant clinical microbiologist or infectious disease physician should manage hospital antibiotic stewardship programmes. Effective implementation of antibiotic stewardship programmes therefore requires

sufficient consultant staffing. The SARI report (2001) recommended that the minimum number of consultant clinical microbiologist posts required in Ireland is 41. This recommendation was produced by the RCPI Faculty of Pathology and was based on Royal College of Pathologists' guidelines, which took account of workload and population. The recommended minimum full-time equivalent posts for each Health Board region are as follows:

- North Western Health Board 2
- North Eastern Health Board 2
- Eastern Regional Health Authority 21.5
- Midland Health Board 2
- Mid Western Health Board 2
- Western Health Board 4
- South Eastern Health Board 2
- Southern Health Board 5.5

The microbiology, infectious disease and pharmacy departments should have adequate facilities and funding for educational programmes, prescribing audit and other stewardship initiatives. Numerous studies have shown that clinical pharmacists have an important role to play in antibiotic stewardship and that the appointment of a full-time antibiotic liaison/infectious disease pharmacist is highly cost-effective. The role of such pharmacists may include, but are not limited to:

- The preparation of prescribing guidelines for antimicrobials
- Monitoring of antibiotic use and expenditure
- Teaching and training
- Attending ward rounds and acting as a point of contact between pharmacy and microbiology/ID/infection control teams

Clinical pharmacists can advise on rational antibiotic therapy, develop and monitor stewardship initiatives and identify emerging problems with antimicrobial use and resistance. In addition to enhancing antimicrobial efficacy and reducing antibiotic pressure antibiotic liaison pharmacists can help to reduce drug interactions, adverse drug reactions and costs.

Each hospital should have at least one designated antibiotic liaison/infectious disease pharmacist, or at least one pharmacist who has responsibility for antibiotic stewardship. One or more full-time positions will be required for tertiary referral centres and regional hospitals. Smaller hospitals should have at least one pharmacist with part time responsibility for antibiotic stewardship. Antibiotic liaison pharmacists should have appropriate training in infectious disease pharmacy.

#### **b) Drugs and Therapeutics Committee**

All healthcare institutions should have a drugs and therapeutics (D&T) committee to oversee all drug use in the institution. A single D&T committee may serve a number of institutions within a given region. The D&T committee should advise on all matters relating to the efficacy, safety and economy in the use of medicinal products. Decisions made by the D&T Committee should be based on scientific data from peer-reviewed journals, rather than personal testimonials, marketing brochures etc.

The functions of a D&T committee are:

- To promote safe, effective and efficient use of medicines.
- To develop co-ordinate policies for the use of medicines.
- To produce a hospital or regional formulary which is reviewed regularly.
- To monitor the use and cost of medicines.
- To provide information on new medicines and monitor their introduction.
- To advise management and staff on relevant issues.
- To set-up specialist groups as required to develop treatment guidelines.

- To encourage research and audit into drug use.

The D&T committee should be multi-disciplinary and include consultant representatives from all of the main clinical directorates in a hospital or group of hospitals, pharmacists, senior nursing representatives and hospital administration. Consideration should be given to including representation from other groups, such as doctors in training and general practitioners.

### **c) Antibiotic Advisory Committee**

Healthcare institutions should consider the need for an antibiotic advisory committee. The need for a specific antibiotic advisory committee in an individual hospital will depend on the size and complexity of the hospital and available human resources. Larger hospitals may require their own in-house committee, while regional committees may be set up to service smaller institutions or develop regional guidelines. The committee should include, where possible, a clinical microbiologist, infectious disease physician, pharmacy director, antibiotic liaison pharmacist, infection control nurse, consultant surgeon, consultant physician, non-consultant hospital doctor, casualty consultant, ward nurse and hospital administrator. Larger hospitals should also have representatives from other specialist areas, such as intensive care, transplant units etc. A clinical microbiologist or infectious disease physician should chair the committee.

The committee should consider timely introduction of new antibiotics within the hospital/region. Quality of care should take precedence over drug costs. Consideration should also be given to the potential for resistance arising from the use of specific agents.

The committee should also oversee antibiotic stewardship initiatives. The committee should start with a small number of key initiatives that are considered most appropriate for their institution or region.

### **d) Structures at national and regional levels**

Structures for producing national and regional guidelines should be in place. Quality prescribing of antibiotics should be a strategic goal of the Department of Health and Children (DoHC), Health Boards and other relevant and regional bodies. Academic and professional representative bodies should also see quality antibiotic prescribing as a strategic goal and play an active role in education of health professionals.

Consideration should be given to setting up a national antibiotic advisory body, which would produce guidelines on specific areas of antibiotic use and develop template antibiotic formularies

### **e) Role of hospital administration**

Control of antibiotic resistance, including rational antibiotic use, should be a strategic goal of hospital administration and should be a key component in clinical governance. Control of resistance should also be a component in hospital accreditation, with antibiotic stewardship, surveillance and infection control programmes seen as key quality indicators. Hospital administration should set minimum standards for prescribing, along with managerial goals and accountability. Some responsibility for control of resistance, including rational antibiotic use, should be borne by the institution and not just by individual prescribers.

## **2: Prevent Infection**

### **a) Infection control (see recommendations of Infection Control working group)**

It is important to remember that prevention of the spread of resistant organisms is just as important as antibiotic stewardship initiatives in the control of antimicrobial resistance in hospitals. The SARI

infection control working group will be making recommendations and producing specific guidelines on hospital infection control.

**b) Hospitalisation is an opportunity to vaccinate**

Hospitals should have systems in place to identify patients for whom influenza or pneumococcal vaccination is indicated. CDC recommends pre-discharge pneumococcal and influenza vaccination in patients for whom they are indicated. Hospitals should have a system for identifying patients who are likely to benefit from such vaccination.

Annual influenza vaccination should be readily available for all hospital staff, including students and temporary staff. A programme of active promotion of annual vaccine uptake among hospital staff should also be in place in all hospitals.

**c) Removal of unnecessary catheters and devices**

Hospitals should have written guidelines on catheter insertion and care. These guidelines should stress that catheters, both urinary and vascular, should only be used when essential and removed as soon as they are no longer essential. Clinicians should be encouraged to include assessment of the continued need for such catheters as part of the routine daily clinical evaluation of their patients. The hospital's infection control team should regularly audit catheter insertion and care.

Consideration should be given to the use of antimicrobial-impregnated urinary and/or vascular catheters in settings of high catheter-associated infections and in line with international, evidence-based guidelines. The use of such devices must be supported by ongoing local surveillance of catheter-related infection rates.

### **3: Surveillance**

Surveillance is essential to identify resistance problems, guide interventions and monitor the impact of interventions. It is important that any surveillance activity is not simply a data gathering exercise: surveillance means information for action. Prescribers, pharmacy departments, infection control teams, hospital administration and other relevant persons should receive regular, timely feedback of surveillance data. Feedback of data to prescribers is particularly important to cultivate trust in, and ownership of, stewardship initiatives. Data feedback should be tailored to the needs of each data recipient.

A detailed list of surveillance options for monitoring the impact of antibiotic stewardship initiatives is given in Goldman et al (JAMA 1996, 275: p236).

**a) Surveillance of antibiotic resistance (see recommendations of AMR Surveillance working group)**

The SARI AMR surveillance working group will produce recommendations on regional and national surveillance of antibiotic resistance. Laboratories should carry out routine surveillance of local susceptibility patterns and disseminate this data to local prescribers. This data should be stratified by patient location/service and patient type. Distinction should be drawn between community and hospital-acquired isolates. Local resistance profiles should be regularly updated and should follow accepted guidelines on preparation, reporting and interpreting of resistance profiles, such as those produced by NCCLS. Clinicians should be quickly notified of any significant changes in local resistance patterns.

**b) Surveillance of antibiotic consumption (see recommendations of Antimicrobial Consumption Surveillance working group)**

Hospitals should be able to produce monthly antibiotic consumption figures, expressed as defined

daily dose (DDD) per 100 bed days. These should be broken down by hospital area or prescribing service. The antibiotic liaison pharmacist should have responsibility for antibiotic consumption surveillance. Hospitals should ensure that electronic data collection systems are in place in pharmacy departments to facilitate surveillance of antibiotic consumption.

#### **c) Surveillance of clinical outcomes**

Where possible surveillance of antibiotic resistance and antibiotic consumption should be linked to clinical outcomes, to ensure that stewardship programmes result in a clinical benefit and that they do not lead to under-treatment of infection. Likewise optimisation of surgical prophylaxis should be linked to surveillance of surgical site infection (SSI).

#### **d) Audit of antibiotic prescribing practices**

In addition to surveillance of overall antibiotic use hospitals need to carry out periodic audits of prescribing to ensure that policies are being adhered to and to identify specific targets for stewardship initiatives. Such audits should include data on dose, duration, indication and route of administration of antibiotic therapy. Prescribing audits should include outpatient, day-care and casualty department prescribing.

### **4: Optimise Treatment**

#### **a) Improve the clinical diagnosis of infection**

Antibiotic policies should stress the importance of establishing a firm diagnosis and treatment decisions should be linked to the likelihood of infection being present, based on sound evidence-based principles. Hospitals should use clinical algorithms for the diagnosis of infection. These may be developed in-house, or adapted from international guidelines. The use of standardised documentation of treatment decisions, such as infection stamps or stickers in charts, may act as an aid to establishing a firm diagnosis.

#### **b) Encourage microbiological documentation of infection by increasing access to laboratories and improving laboratory proficiency and turn about times**

Laboratories should ensure that clinically relevant data are transmitted back to prescribers in a timely fashion. Consideration should be given to rapid methodologies, such as antigen detection and PCR, which have been shown to result in more rational antibiotic therapy. There should be prompt clinical liaison for critical laboratory results. Laboratories should have written protocols for results that require immediate contact with the responsible clinician.

Laboratory proficiency should be maintained through participation in internal and external quality assurance programmes.

Laboratory turnaround times should be critically monitored and any causes of delay, such as specimen transport or issuing of printed reports, remedied. Clinical laboratories should have electronic laboratory information systems, to facilitate surveillance, audit and electronic reporting.

#### **c) Standardise susceptibility testing ensuring proficiency**

Irish clinical laboratories should adopt NCCLS standardised susceptibility testing methodology, as recommended by the the Academy of Medical Laboratory Scientists and the Irish Society of Clinical Microbiologists.

#### **d) Streamline treatment based on pathogen detection**

Antibiotic therapy should be narrowed towards the causative organism(s), as soon as possible. Rapid laboratory turnaround times and clinical liaison should be optimised to facilitate this.

**e) Optimise empiric therapy (see 5)**

Empiric antibiotic therapy should be based on the most likely pathogen(s) and local susceptibility data. Pharmacokinetic principals should be used in selecting the most appropriate drug, dose and route of administration. Ensure appropriate dose, route, timing, duration, pharmacodynamics and adverse event avoidance of treatment choice. The optimal dose should be used for the minimum duration necessary. Empiric agents should not be chosen on the basis of dosing convenience.

**f) Optimise surgical prophylaxis**

Hospitals should have local evidence-based policies on surgical prophylaxis. Guidelines should comply with international evidence-based guidelines, such as those produced by the Scottish Intercollegiate Guidelines Network ([www.sign.ac.uk](http://www.sign.ac.uk)). Prophylaxis should only be used for procedures where it has been shown to be beneficial. Single dose prophylaxis should be the norm for most surgical procedures.

**g) Multidisciplinary care delivery involving pharmacy, microbiology etc.**

Care of patients with severe or complex infections should be multidisciplinary and coordination between relevant medical, surgical and allied specialties should be encouraged.

## ***5: Role of Formulary, Policy and Guidelines***

**a) Hospital formulary**

All hospitals should have a written formulary. This should be subject to regular revision, by the drugs and therapeutics committee or antibiotic advisory committee. Regional formularies should be considered to service smaller hospitals. Selection of agents to include on formularies should be primarily based on clinical efficacy, and this should take precedence over financial considerations.

**b) Consider national regional and local guidelines**

Guidelines should cover diagnosis, treatment and prophylaxis of infection. Guidelines should be developed or adapted in cooperation with local clinicians. Guidelines should be regularly updated and consideration should be given to including an “expiry date” on each new edition of the policy. Consideration should be given to producing separate guidelines for surgical prophylaxis, with particular attention to the timing and duration of prophylactic antibiotics.

**c) Consider "reserved" or "restricted" antibiotics; antibiotics cycling; combination therapy and drug removal**

Designation of certain agents as “reserved” or “restricted” has been shown to reduce resistance to these agents. It is important, however, that controlling the use of one agent does not lead to excessive use of another agent with resulting increased resistance. There is increasing evidence that certain agents are more strongly associated with the development of resistance than others, and that restrictions should target agents with a high resistance potential.

The literature on antibiotic cycling is inconclusive and this process is not recommended as a routine stewardship intervention in current guidelines.

Combination therapy may reduce the selection of resistance in certain infections, such as some invasive pseudomonas infections, and may be considered in clinical guidelines.

## ***6: Interventions at Point of Prescribing***

**a) Access to expert advice**

This is probably the most important factor in promoting good antibiotic practice. Prescribers should

have ready access to clinical microbiology or infectious disease expertise on a 24-hour basis. Such contact should be encouraged for all serious or complicated infections. Provision of sufficient expertise at regional level should be considered so that access to expert advice is available for all healthcare institutions and not just larger hospitals.

Early surgical advice should also be sought for cases where surgical intervention may be required.

**b) Passive prescriber education**

This is the least effective educational intervention, but may be useful if part of a wider stewardship programme.

**c) Antimicrobial order forms**

Dedicated order forms for antibiotics, which may include automatic stop dates, have been shown to be a useful component in antibiotic stewardship programmes.

**d) Computer prescribing with microbiological intervention either indirectly or IT integrated**

Where possible computerised prescribing should be developed to facilitate surveillance and decision support for prescribing.

**e) Standard duration of antibiotic prophylaxis/therapy**

There should be agreed standard durations of antibiotic prophylaxis and therapy. A system should be in place to encourage review of the ongoing need for antibiotic prophylaxis/therapy that exceeds the standard duration. This may include an automatic microbiology/infectious disease consultation for patients who are on antibiotics for an extended duration. This intervention may be limited to certain antibiotic classes, patient types etc.

**f) Formulary restriction**

Antibiotic use in hospitals should be restricted, where possible, to agents on the formulary. Hospitals should have a written protocol for allowing breaches to this rule and this should be agreed by all clinical disciplines within the hospital. Where possible the use of non-formulary agents should be on a named patient basis and should be approved by the antibiotic advisory committee.

**g) Approval to start, continue certain agents**

Certain agents on the formulary, particularly broad-spectrum agents with a high resistance potential, may be restricted for use in certain hospital units or by designated clinicians. Some agents may require individual approval by a clinical microbiologist or infectious disease physician before they can be used. This has been a successful component of antibiotic stewardship in many institutions, mainly in North America. The use of such approval mechanisms on their own is likely to alienate prescribers and should probably only be used in conjunction with other antibiotic stewardship initiatives.

**h) Formulary substitution and oral switch**

Although substituting oral agents for parenteral agents may be seen as primarily a cost-cutting exercise, though the cost savings may help to pay for other elements of a stewardship programme. Oral switch also reduces the incidence of adverse reactions related to parenteral agents, particularly those related to drug administration. Removal of intravenous catheters also prevents catheter-associated infection, reducing the need for further antibiotic therapy.

**i) Interactive prescriber education**

Interactive educational interventions have generally been shown to be more effective than passive

reminders or large teaching sessions. Ward-based interaction with microbiologists, infectious disease physicians, clinical pharmacists and infection control nurses are likely to result in the greatest compliance with antibiotic policy.

Consideration should be given to educating patients and the wider public about rational antibiotic stewardship in hospitals.

## **7: Antibiotic Avoidance**

### **a) Device removal**

Catheter removal alone may be sufficient to treat some cases of central venous catheter-related infections. Early removal of catheters, drains and other indwelling devices should be encouraged to reduce the incidence of hospital-acquired infections and to remove potential colonisation sites for resistant organisms.

### **b) Surgical drainage**

Many purulent infections can be treated with surgical drainage alone. In other cases surgical drainage can reduce the duration of antibiotic therapy required. Early surgical advice should be sought for cases where surgical intervention may be required.

## **8: Ensure Treatment of Patient and Not Laboratory Report**

### **a) Ensure treatment of infection (not colonisation or contamination)**

Prescribers should be made aware of the risks of basing the need for antibiotic therapy on colonisation or contaminated cultures. Likewise in patients who do require therapy the choice of agent should not be based purely on the presence of resistant colonising organisms. It is important that prescribers are educated regarding interpretation of laboratory reports.

### **b) Ensure carefully collected appropriate cultures are sent**

Prescribers need to be educated about appropriate specimen collection and use of diagnostic tests. Particular attention should be paid to blood culture protocols. Hospitals should aim for a blood culture contamination rate of <2%.

### **c) Report interpretively**

Clinically relevant interpretative comments should be included on microbiology reports, including relevant negative reports. Comments should encourage clinicians to seek expert advice where needed.

### **d) Report antibiotic susceptibilities restrictively**

Susceptibilities should only be reported where clinically indicated and these should be restricted to agents included in the antibiotic formulary. Clinical laboratories should minimise susceptibility reporting. Clinical liaison to discuss appropriate treatment should be encouraged, particularly where the clinical relevance of results is not clear.

### **e) Report susceptibility algorithmically or in a cascade fashion**

Where susceptibility results are reported these should be restricted to the narrowest spectrum agents to which the organism is susceptible. Susceptibility results for broad spectrum agents should be restricted, but may be made available to clinicians following appropriate clinical liaison.

## **9: Restrictive Use of Certain Agents**

The use of agents that are particularly associated with the emergence of resistance should be restricted. The US Hospital Infection Control Practices Advisory Committee (HICPAC) guidelines on rational vancomycin use should be applied to all glycopeptide use in Ireland (MMWR September 22, 1995 / Vol. 44 / No. RR-12).

The key HICPAC recommendations include situations in which the use of a glycopeptide is appropriate or acceptable, such as treatment of serious infections caused by beta-lactam-resistant gram-positive bacteria or serious gram-positive bacterial infections in patients with a major allergy to beta-lactam antibiotics. The recommendations also list situations in which glycopeptides should not be used, such as empiric therapy where beta-lactam-resistant gram-positive bacterial infection is unlikely and use of glycopeptides because of dosing convenience. These guidelines should be used as a template for producing similar guidelines for restricting the use of other agents, particularly those that are strongly associated with selection of resistant bacteria.

## **10: Antibiotic Discontinuation**

Protocols should be in place in each institution to ensure that antibiotics are stopped if infection appears unlikely or when the patient has had an adequate response to therapy. Prescribers should be educated on the risks associated with excessive duration of antibiotic therapy. Monitoring of antibiotic use by ward pharmacists will be required, combined with interventions where an excessive duration of therapy is suspected. Such interventions may range from reminder notes from the pharmacist in the prescribing chart/"cardex" to direct contacting of the relevant clinician by a pharmacist, clinical microbiologist or infectious disease physician.

## **11: Pharmaceutical promotion**

Ethical promotion of antibiotics should be encouraged, in line with the code of practice produced by the Irish Pharmaceutical Healthcare Association (IPHA). All promotional activities should be approved by the drugs and therapeutics committee and should comply with local antibiotic policies.

## **12: Education**

### **a) Undergraduate**

Education on evidence-based diagnosis of infection, antibiotic resistance and rational antibiotic use should be included in undergraduate training for all healthcare professionals. Where possible such education should be an integral part of clinical training and linked to clinical scenarios.

### **b) Post graduate**

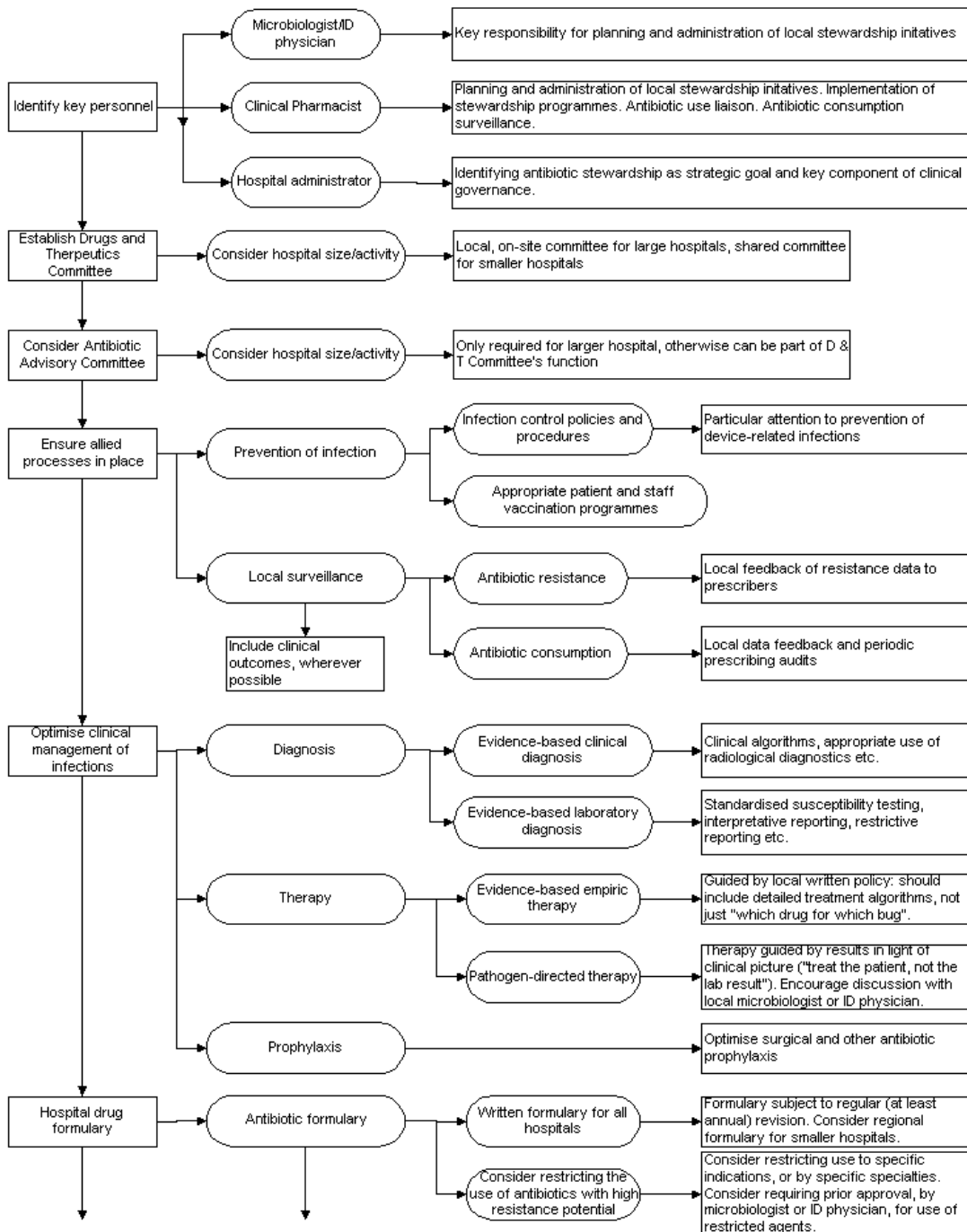
Prevention of antibiotic resistance, including rational antibiotic use, should be an integral part of postgraduate education and continuing professional development for all health professionals, including healthcare administrators and managers. Principles of rational antibiotic use should be included in postgraduate examinations.

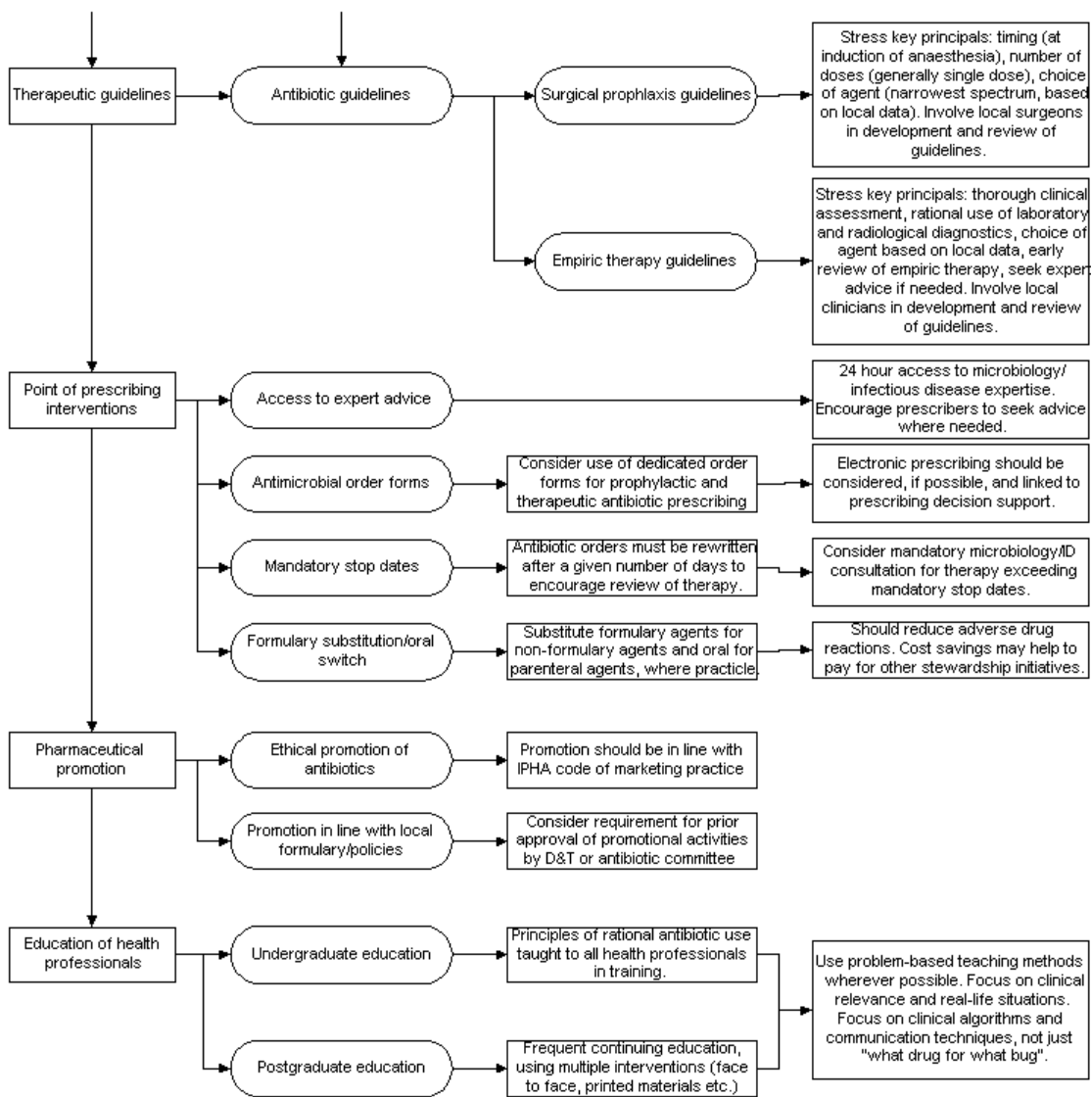
## **13: Communication**

Successful stewardship programmes rely on good communication between all of the health professionals involved in developing, implementing and monitoring the programmes. Relevant surveillance and audit data should be widely disseminated. Awareness of stewardship programmes among all health professionals should be maintained. Successful programmes should be publicised,

not just to health professionals but also to health planners, patients and the wider public.

# Summary of options for hospital antibiotic stewardship





**Appendix: Membership of the SARI Hospital Antibiotic Stewardship Working Group**

<b>Name</b>	<b>Position</b>	<b>Nominated by:</b>
Dr. Edmond Smyth (chair)	Consultant Clinical Microbiologist, Beaumont Hospital	Irish Society of Clinical Microbiologists
Dr. Robert Cunney	Clinical Microbiologist, NDSC	National Disease Surveillance Centre
Dr. Colm Bergin	Consultant Infectious Disease Physician, St. James' Hospital	Royal College of Physicians in Ireland
Dr. Bernard Silke	General Physician, St. James' Hospital	Royal College of Physicians in Ireland
Prof. Cathal Kelly	General Surgeon, Beaumont Hospital	Royal College of Surgeons in Ireland
Dr. Geraldine Nolan	Consultant Paediatrician, Portlaoise General Hospital	Royal College of Physicians in Ireland, Faculty of Paediatrics
Olivia Flynn	Infectious Disease Pharmacist, St. James' Hospital	Hospital Pharmacists Association
Emer Fitzgerald	Chief 2 Pharmacist, Waterford Regional Hospital	Hospital Pharmacists Association
Dr. John Stinson	Medical Director, Leo Laboratories Ltd.	Irish Pharmaceutical Healthcare Association