



THE PATH OF LEAST RESISTANCE

SYNOPSIS

**Standing Medical Advisory Committee
Sub-Group on Antimicrobial Resistance**

In July 1997, the Chief Medical Officer asked the Standing Medical Advisory Committee (SMAC) to examine the issue of antimicrobial resistance in relation to medical prescribing. SMAC responded by setting up an interdisciplinary Sub-Group with the following Terms of Reference:

BOX 1. TERMS OF REFERENCE

In the light of the increasing clinical importance of resistance to antimicrobial drugs, to:

- identify the major and emerging problems of antimicrobial resistance in clinical practice
- identify clinical practices that may predispose to the development of resistance
- identify practices in antimicrobial use that might help to limit the development and spread of resistance
- identify priorities for changing practice in the use of antimicrobial agents
- advise on how such changes might most effectively be achieved for both professionals and the public

Membership of the Sub-Group included cross-representation from the Standing Advisory Committees for Dentistry, Pharmacy, Nursing and Midwifery and consumer, veterinary medicine and pharmaceutical industry representation.

The main report, of which this is the synopsis, reviews the problem at several levels:

Case-studies explore day-to-day antimicrobial prescribing problems faced by doctors.

The basis and impact of resistance are reviewed. Aspects of antimicrobial use and misuse that exacerbate resistance are identified, together with strategies to conserve the usefulness of antimicrobial agents.

Recommendations are made. These recognise that the decisions concerning antimicrobial prescribing are often complex, and are as much about minimising harm as about maximising benefit.

Methods for implementation of the recommendations are reviewed. The Report does not claim to address all the issues, or to make recommendations that will solve all the problems associated with antimicrobial use. Nevertheless, key areas are identified where innovative approaches may lessen a problem that affects us all.

This Synopsis presents the key points from the main Report. It follows the same section numbering as the main Report to ease cross-referral. The main Report also contains a full set of references and a glossary of terms.

In introducing the Report, it may be helpful to draw attention to specific features that distinguish antimicrobial therapy from all other forms of medicinal treatment.

FIRST

The majority of the population will take antimicrobial agents at some time or other in their lives. Apart from simple analgesics, no other drugs are in such widespread use.

SECOND

The efficacy of an antimicrobial in any individual patient is affected by its previous use in other individuals, which may have selected for resistance to the drug. This does not apply to any other kind of medicine: taking a drug to lower blood pressure in the wrong dose, or unnecessarily, may be deleterious for that individual, but it will not affect the efficacy of the medication for others.

THIRD

There is probably no other area of prescribing in which patients' expectations, and doctors' perceptions of those expectations, play such a role in determining whether or not to prescribe. Any strategy to reduce unnecessary prescribing cannot be targeted only at professionals. It must also address the needs of the consumer for clear information about the risks and benefits of antimicrobial agents and about the circumstances in which it is appropriate for the doctor *not* to prescribe.

FOURTH

Resistance is a natural evolutionary result of exposing microbes to antimicrobials. A realistic expectation would be that reducing inappropriate prescribing would prevent the situation deteriorating further. While certain clinical prescribing practices exacerbate the development of resistance, it is much less clear that changing those practices

will achieve a decline in the prevalence of resistance. Unrealistic expectations should not be generated by the recommendations in this Report.

FIFTH

The part played by veterinary prescribing in the development of antimicrobial resistance in human pathogens is important with some (although not all) pathogens. This is the subject of review by the Government's Advisory Committee on the Microbiological Safety of Food. Debate over the relative contributions of medical and veterinary prescribing to the development of antimicrobial resistance in human pathogens must not be allowed to delay the implementation of initiatives to improve clinical prescribing practices.

SIXTH

The use of antimicrobials as animal growth promoters is distinct from veterinary prescribing and is not performed under veterinary supervision. Its role in the selection of resistance is a major concern, especially its potential to generate resistance to antibiotics which are under development for use in humans.

SEVENTH

It is important to recognise that our best efforts, in this country, to minimise resistance may be frustrated by a lack of comparable initiatives abroad. Some early and demonstrable successes in modifying clinical prescribing practice in the UK may provide a helpful model for others.

FINALLY

Good antimicrobial prescribing will have other beneficial effects – in particular, a reduction in the incidence of adverse effects. Adverse effects are always unwelcome, but an adverse event arising from an unnecessary prescription is doubly so.

The recommendations in this Report are directed towards ensuring that best practice in antimicrobial prescribing becomes routine practice. This will require a willingness, on the part of health care professionals and the public alike, to treat antimicrobials as a valuable and non-renewable resource, to be treasured and conserved in everyone's interest.

There is a huge literature on antimicrobial resistance in relation to clinical prescribing. Not all of it is soundly evidence-based and many fundamental questions have not been addressed. Hence, the Sub-Group has not attempted to produce an exhaustive set of recommendations for minimising the development of antimicrobial resistance in every clinical situation.

Rather, since the aim of this Report is to make a genuine difference, we have taken the pragmatic approach of concentrating on recommendations where the 'pay-back' in terms of potential benefit seems to us, on the evidence currently available, likely to be greatest. Thus, we have concentrated on recommendations related to prescribing for the most commonly encountered conditions and on proposals for developing support systems that help prescribers make evidence-based decisions and which involve patients and carers in the decision-making process.

In the light of research on behavioural change, the Report proposes a co-ordinated approach with various incentives ranging from educational programmes, through organisational changes, to financial inducements to industry. The recommendations are presented in a framework which is addressed to policy and decision makers – including industry – and to prescribers and the public. Within that framework, there are recommendations aimed at helping general medical practitioners (who undertake 80% of all antimicrobial prescribing) make a real difference to the development of resistance, by optimising their own prescribing practices.

PRESCRIBING IN THE COMMUNITY

Patients with minor infections mostly present to general practitioners (GPs); consequently, 80% of UK human antimicrobial prescribing is in the community. This Report, therefore, concentrates on community prescribing of antimicrobials. **We recommend** that there should be a national Campaign on Antibiotic Treatment (CAT) in primary care on the theme of '**Four things you can do to make a difference**'.

BOX 2. FOUR THINGS YOU CAN DO:

- no prescribing of antibiotics for simple coughs and colds
- no prescribing of antibiotics for viral sore throats
- limit prescribing for uncomplicated cystitis to three days in otherwise fit women
- limit prescribing of antibiotics over the telephone to exceptional cases

In making recommendations aimed at influencing doctors' prescribing habits, we acknowledge the importance and influence of patients' expectations and demands on the decision-making process. We see these as two sides of the same coin; modifying patients' expectations, through a process of public education, will make it easier for GPs to adhere to the recommendations. Hence, **we recommend** that the CAT must be matched by a National Advice to the Public (NAP) campaign aimed at supporting the initiative in primary care. A key feature of the NAP campaign should be to highlight the benefits of 'cherishing and preserving your normal bacterial flora'.

We recommend that further support for appropriate prescribing in primary care be provided by developing and promulgating evidence-based national guidelines for the management of certain infections, under the aegis of the National Institute for Clinical Excellence. Guidelines would aim to minimise unnecessary antimicrobial use, and to ensure that, when needed, the most appropriate antimicrobial and regimen is prescribed, so as to ensure the best possible clinical outcome and reduce the risk of resistance developing. **We recommend** that such national guidelines be adapted for local use during the development of Health Improvement Plans. Health Authorities will need to co-ordinate ideas on guideline development and use with Primary Care Groups/Local Health Groups and with local microbiological and epidemiological advice.

The best of guidelines are of no value if they are not used. To make the incorporation of the guidelines into everyday practice as effort-free as possible, **we recommend** that they should be integrated within computerised decision-making support systems. A number of these are under development and some are currently being piloted in general practice. The guidelines should also be promulgated widely through the medical literature.

PRESCRIBING IN HOSPITALS

Hospital prescribing accounts for only about 20% of all human prescribing of antimicrobials in the UK. Nevertheless, resistance problems are greatest in hospitals, reflecting the facts that (i) the prescribing is concentrated in a small locale, intensifying selection pressure for resistance, (ii) many hospitalised patients have severe underlying diseases that render them susceptible to infection by otherwise harmless ‘opportunistic pathogens’ that have been adept at acquiring resistance and (iii) the high concentration of susceptible patients facilitates the spread of infection. Thus, prescribing in hospitals poses some different issues from those in primary care. However, hospital clinicians would benefit as much as GPs from the availability of computer-aided decision-support systems, into which suitably adapted national prescribing guidelines could be integrated. IT for clinical use tends not to be as well developed in hospitals as in primary care, although systems are being developed. Therefore, **we recommend** that studies be undertaken in selected hospitals to develop and test one or more prototype decision-support systems. To be fully effective, these computer-based advisory systems should include information from local antimicrobial sensitivity profiles. These, in turn, should feed into regional and national surveillance databases.

PRESCRIBING GUIDELINES

We recommend that local prescribing information should, wherever possible, be harmonised with that in the British National Formulary (BNF) and other formularies. Guidelines and formularies should also take account of the proposed national evidence-based guidelines to be produced under the aegis of the National Institute for Clinical Excellence. All local prescribing guidelines should take their cue from these national guidelines to avoid re-invention of the wheel. **We recommend** that all such local guidelines should include, as a minimum, certain standard items of information on drug, regimen and duration.

EDUCATION

The development of guidelines and their widescale introduction into clinical practice will have important and beneficial spin-offs for the education of health care professionals involved in antimicrobial prescribing. **We recommend** that greater emphasis than hitherto should be placed on teaching about antimicrobial prescribing in medical and dental schools, as well as in the undergraduate curricula for pharmacists and nurses. **We recommend also** that teaching about antimicrobials should be better integrated with teaching about the infections for which they are used. This enhanced emphasis on education in antimicrobial use should be carried over into continuing medical, dental and professional education and development. Similar concepts apply in the field of veterinary medicine.

The whole population, not just those destined to become health care professionals, would benefit from enhanced education about the benefits and disadvantages of antimicrobials. **We recommend** that, in addition to health education material aimed at adults, teaching about antibiotics should be included as part of the health education in the National Curriculum.

SURVEILLANCE OF RESISTANCE

Effective surveillance is critical to understanding and controlling the spread of resistance. Not only does surveillance monitor the existing situation, it allows the effects of interventions to be tested. **We recommend** that a strategic system for surveillance of antimicrobial resistance should be developed as swiftly as possible, and that this should cover the whole of the UK. Discussions to develop such a system are taking place between the Public Health Laboratory Service (PHLS), the British Society for Antimicrobial Chemotherapy and various parties in Scotland and Ireland. It is vital that the system being developed is adequately funded, also that PHLS and NHS microbiology laboratories, whose routine data will be collected, are adequately staffed and resourced to provide high-quality information and **we so recommend**.

RESEARCH

National and local surveillance will give invaluable guidance to the many Health Service and University projects needed to investigate the drivers of

resistance and the effects of interventions. Aside from these studies, more basic research is needed on the mechanisms of antimicrobial resistance and their spread. **We recommend** that research into antimicrobial resistance should become a high priority for all funding bodies concerned with health care and biomedical research. We note, with grave concern, the downgrading of medical microbiology as an academic speciality in many teaching hospitals, including several with distinguished records of work on antimicrobial resistance.

HYGIENE, INFECTION CONTROL AND CROSS-INFECTION

Not all problems merit the ubiquitous ‘more research needed’ recommendation. In some cases the solutions are well known; it is implementation that is faulty or deficient. This is true for certain aspects of infection control. In hospitals, guidance is available to be followed. At its heart is the issue of attention to cleanliness and hygiene in all their manifestations. These extend from the thoroughness of the work done by cleaning staff to simple handwashing by health care professionals in contact with patients. The issue of infection control, although intimately bound up with problems of antimicrobial resistance, particularly in hospitals and other health care environments, was outside the Terms of Reference of our Sub-Group. Nevertheless, we believe that it is so fundamental to preventing the spread of resistant organisms, not only in hospitals but also in the community, that **we recommend** consideration be given to producing guidance on infection control in the community, especially in nursing and residential homes. This may need to await clarification of the roles and responsibilities of Health and Local Authorities in the control of infection.

VETERINARY AND AGRICULTURAL USE

Antimicrobials are used under veterinary supervision for the treatment and prophylaxis of infection in animals. Some agents are also used, *without this supervision*, as growth promoters. These aspects were, strictly, outside our remit although our Sub-Group had cross-representation from the Advisory Committee on the Microbiological Safety of Food, whose Working Group on Microbial Antibiotic Resistance in Relation to Food Safety is expected to report later this year. Nevertheless, we recognise that the use of antimicrobials in

animals has a profound influence on the development of antimicrobial resistance in human pathogens and **our general recommendation** would be that the use of antibiotics in veterinary practice should be guided by the same principles as those for prescribing in humans – namely, they should be used only for clinical conditions where their use is likely to provide a genuine health benefit. **We recommend** that alternative means of animal husbandry be developed so that the use of antimicrobials as growth promoters can be discontinued.

IMPLICATIONS FOR INDUSTRY

If our recommendations are followed, they should have the effect, *inter alia*, of reducing antibiotic usage. There may be financial implications for the pharmaceutical industry, upon whose profitability the development of new antibiotics depends. Therefore, **we recommend** that consideration be given by the appropriate bodies to finding ways – through pricing and other mechanisms – of ensuring that investment in the development of new antibiotics remains commercially viable for the industry.

In addition, **we recommend** that industry should be encouraged to undertake studies of optimum prescribing regimens for new antimicrobials, for each of their indications and in adults and children as appropriate. This evidence-based information should be included in the Summary of Product Characteristics (SPC) for each product as set out in the product licence and the product data sheet. **We recommend** that the licensing authorities should have due regard to an antimicrobial's potential to select for resistance as well as to its efficacy and safety.

INTERNATIONAL CO-OPERATION

In the field of antibiotic prescribing, this country cannot consider itself an island. International prescribing practices have a major influence on the development and spread of antimicrobial-resistant organisms and their genes. Resistant organisms in Europe enjoy as much freedom of movement – only in larger numbers – as their human hosts. Hence, **we recommend** that every effort is made by the Government to raise the profile of antimicrobial resistance as a major public health issue meriting priority action from all Member States of the European Union.

EXPECTATIONS

We wish to emphasise that our Report should not generate unrealistic expectations. Even stopping altogether the prescribing of certain antimicrobials may not lead to an appreciable reduction in the levels of resistance to those drugs, even over a period of several years. However, we hope to achieve a slowing of the rate at which resistance develops. This may buy a few more years of therapeutic usefulness for certain antimicrobials, until such time, hopefully, as they may be replaced by new and novel compounds. Different considerations may then apply, so as to build in, from the outset, safeguards to minimise the development of resistance.

NATIONAL STRATEGY

Our aim has been to produce recommendations that can constitute the first phase of a national strategy for minimising the development of antimicrobial resistance. **We recommend**, as part of this phase, the establishment of a small National Steering Group (NSG) charged with ensuring that these recommendations are implemented and their effects, on prescribing practice and on the development of resistance, are monitored. The NSG, which might need to establish a small number of expert groups to take forward specific aspects of the recommendations, should report to the Chief Medical Officer within a year on progress with – and lessons learned from – implementing Phase 1 of the strategy. Thereafter, the CMO may wish to consider asking SMAC to reconvene this Sub-Group, in order to provide a suitable interdisciplinary forum for the development of the next phase of the strategy, building on the results of various pilot and other studies to evaluate the effectiveness of the recommendations in this Report.

Figure 1 Recommendations for the professions and the public: CATNAP

