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Drug treatment is the major part of the management of many illnesses and has a key role in preventative medicine. How many young children are taking drugs to reduce their fits or asthma attacks? How many young women are taking an oral contraceptive? How many middle-aged men are taking low dose aspirin, a statin and/or an antihypertensive drug? The benefits are well documented, well known and not disputed. But there are costs.

The nation spends about 11 billion pounds per year on drugs and as pharmaceutical companies develop more effective, better researched and sometimes potentially more toxic ones the bill is likely to rise substantially.[1] General practitioners (GPs) know the approximate cost of the drugs they prescribe over the course of a year. Most hospital doctors have no idea. We also do not know how much the NHS pays to cover the cost of drugs prescribed by doctors in their first year after qualification. But one does wonder how many are well prepared for this considerable responsibility.[2,3]

The other major costs arise from treating the wrong disease or giving the wrong, or at least suboptimal, therapy.[4–6] Also there is the major burden caused by adverse drug reactions (ADRs).[7–9] These all have major consequences for the patients and for the health service. Quantifying the total impact of all these serious problems is not possible. However some issues have been addressed such as the number of admissions to hospital caused by ADRs to drugs taken in the community and the additional time spent in hospital by patients suffering the ADRs occurring in hospital.[7,10] Based on the Liverpool study it is estimated that 6.5% of hospital admissions are for ADRs and that patients admitted with ADRs occupy the equivalent of seven 800-bedded hospitals and cost the NHS about £466 million at 2004 prices.[7]

This introduction is not intended as a brief summary of key aspects of therapeutics. Rather it is intended to make the point that knowing how to prescribe the right dose of the right drug for the right patient for the right length of time and by the right route is rather important. Since there are so many diseases, drugs and doses, the prescriber needs a little help.

Hitherto in this context the word ‘prescriber’ would have meant doctor. Now the number of non-medical prescribers is increasing rapidly month by month. They include nurses, pharmacists, dentists, optometrists and podiatrists. The potential for polypharmacy and drug interactions must be greater if several prescribers are prescribing for one patient but this issue has not been investigated in the current UK setting. However, the desirability of all prescribers following the same guidelines and using the same drugs and dosing regimens is self evident.

Having agreed that all prescribers need help, how the help is provided should be considered. Since 1981 the British National Formulary (BNF) has been published twice a year in paperback form, as a book which was originally designed to fit in a white coat pocket. Today, increasingly help, guidance and information are often sought from computers and/or hand-held devices. The information in the book has to be available through those devices. Furthermore information technology opens up a whole range of different ways of using the BNF’s database to address clinical questions of the prescriber. These exciting opportunities need to be explored and if they can help they should be exploited.

The British National Formulary

Most readers will be familiar with and will have used the BNF in book form. Few would be able to describe the extent of the information or know how the BNF is produced. A brief description of the latter is needed.

A team of editors, based at the Royal Pharmaceutical Society, London, are continually working on their sections and chapters. They read the relevant literature and all new guidelines, they note the comments and criticisms of users and they meet with colleagues at the National Institute for Health and Clinical Excellence (NICE), the Medicines and Healthcare products Regulatory Agency (MHRA), the National Patient Safety Authority (NPSA) and other expert groups. They then propose changes to improve the current text. These proposals and specific questions are put to our panel of about 60 national experts who reply with advice, explanatory information and relevant documents. These are then converted to succinct amendments to the text, which are then reviewed by the Joint Formulary Committee (JFC) and, if agreed, they appear in the next edition.

The BNF covers a very large number of drugs, a huge number of doses and a lot of advice. Although it is self evident that all drugs and all the proprietary preparations have to be spelled correctly, the doses have to be right and the advice in different parts of the BNF has to be consistent. Achieving this twice a year is a major undertaking.

The JFC has a chairman, three medical members, three pharmacists, three government representatives of the Department of Health (DH) in London and the devolved administrations. In addition there is a representative from the MHRA. The chairman has to lead the team and is a senior medical person in

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the BNF organisation. In 2000 I was invited to become the chairman of the JFC.

Children

For many years the BNF has provided guidance on the doses of most drugs used in the treatment of children. However, at the time I took over as chairman of the JFC, the editorial staff at the BNF, the national advisers and the professional members of the JFC all had a background in adult medicine. Furthermore, it was becoming increasingly recognised that the drug treatment of children required special attention. There are many reasons for this. For the BNF the particular challenges relate to the urgency when treating a rapidly deteriorating child, the importance of getting the dose right and the lack of good clinical trial data. Those who prescribe for children, particularly for neonates, babies and small children, need guidance and help. This guidance can come in part from trials but this could be supplemented with advice from those who have experience in the management of children with particular problems.

Did we need an editor with paediatric experience, a paediatric JFC member or did we need a BNF for children? The latter could provide guidance based on the best available information supplemented by the advice and expertise of those who spend their time managing paediatric problems. To me a BNF for children (BNFC) seemed the best solution. However, as often happens, when you have decided on the best solution to a problem, others make encouraging noises then end with a serious 'but…'. They said, for example, you cannot have two BNFs so put it all in one book, you cannot put in unlicensed drugs in the BNF, the DH will not buy it, or that GPs will get confused.

Fortunately the President of the Royal College of Paediatrics and Child Health at the time, Sir Alan Craft, and some of his senior colleagues were very encouraging and politically helpful. The DH agreed to purchase the product. A Paediatric Formulary Committee was formed, chaired by Dr George Rylance, new editors were employed and a new type of BNF was born. Princess Anne helped launch the first BNFC which appeared in September 2005.

The BNFC is now published annually. It combines the data collecting, editing and publishing skills of the BNF team and the expertise of a selected group of British paediatricians. The junior doctor, the GP, the trained nurse and the pharmacist can now have 'a paediatrician in their pocket or their computer'. If the prescriber gets good advice, the child should get good treatment – a win-win situation.

Nurses

In 2005 the government approached the Committee on Safety of Medicines to consider whether appropriately trained nurses could become independent prescribers. This would allow them to prescribe any drug in the BNF while working within their area of expertise and experience and taking responsibility for their actions. This was agreed to and then implemented in 2006.

The training programmes at many different centres around the country are now producing increasing numbers of nurse prescribers. They are all qualified nurses with clinical experience in general practice or specialist hospital units who return to their clinical units where they tend to prescribe a small range of drugs.

Some doctors noticed this development with considerable concern. Is their training appropriate, do they have the basic sciences, will they know the diagnosis? My concerns about the growth of non-medical prescribers were the risks of polypharmacy and drug interactions and who will stop drugs and who will take responsibility for interactions between drugs prescribed by different prescribers? A good start would be to make sure all prescribers are well informed and all sing from the same hymn sheet. I saw here another job for the BNF and the BNFC.

For many years the BNF team have produced a Nurse Prescribers Formulary which provided information on a limited number of drugs and the dressings used by community practitioners. In the new era of increasing numbers of independent nurse prescribers it seemed to me we needed to ensure that the BNF met the needs of nurses, that nurses being trained to prescribe used the BNF as they learned about prescribing and that when trained they used the BNF as their guide. To achieve these aims we needed a BNF Nurse Prescribers Advisory Group (NPAG). To be effective this group needed to have a membership which was well informed about what is happening at the coal face. Asking for representatives of various national bodies could have produced a team of eminent people with little practical experience of prescribing themselves and perhaps little interest in therapeutics. On the other hand we did need the support of the Chief Nurse, the Royal College of Nursing and the Nursing and Midwifery Council. So I found some clinically active nurses working in different clinical areas and added some academics and teachers. Then I persuaded the key nurse leaders to select some effective representatives.

I am pleased to report that NPAG is up and running and is very effective. Nurses in training, nurse prescribing teachers and trained nurse prescribers are using the BNF. In addition the BNF is listening to their concerns and becoming more useful to nurses. We have not solved the concerns about polypharmacy, but drug interactions have not emerged as a major problem and doctors and nurses are now in tune.

Challenges for the future include addressing the following questions. Can we:

- Improve the training of nurse prescribers?
- Improve the guidance given to nurses in the therapeutic areas in which they play a major role?
- Monitor, audit and stimulate research into nurse prescribing and its impact on patient care?
- Expect GPs to maintain overall control of the drugs which patients are taking? If they do not – then who will?

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Dentists

Three concerns related to dentists and drugs merit some attention in relation to the work of the BNF. Firstly to what extent do dentists prescribe? Are they trained in therapeutics, do they take an interest in the drugs their patients are taking, do they use the BNF? Secondly should the BNF seek the advice of appropriate dentists on the role of drugs in the management of dental, oral and maxillo facial disorders (herein after the word 'dental' covers all these)? Thirdly do dentists need advice about how to manage patients with medical disorders and particularly those who have some kind of medical emergency while under the care of a dentist?

Dealing with the first concern, legally dentists can prescribe any drug privately ie the patient has to pay for the drug. This rarely happens except when a particular specialist, in for example a facial pain, might want to prescribe something for neuropathic pain. On the NHS, dentists have to prescribe from a limited list which contains drugs which a dental formulary subcommittee has advised the DH are effective and safe to use for specific indications. This list is about to be reviewed in its entirety probably for the first time. Unfortunately most dentists prescribe rarely and tend to use few drugs. If they do want a drug to be prescribed they may write to the patient's GP. In theory if the practice nurse has done their training they could prescribe the drug for the dentist. They probably should not because it would be 'out of their area of expertise' but that would also be true of the GP.

At the risk of upsetting the dental profession, I would venture to suggest that most dentists know relatively little therapeutics and do not see prescribing as a major part of what they do. But is this missing an opportunity to improve patient care? Would patients be better served if the dentist could prescribe a potent non-steroidal drug for a few days and cover the ulcer risk with a proton pump inhibitor? Do they use antibiotics optimally? Should they be more actively involved in smoking cessation work? Most of these needs could probably be met by reviewing and modestly increasing the limited list. Their training should prepare them to use a limited number of drugs well and they should have a good grounding in therapeutics. In addition to prescribing well for their patients they need to know about the possible effects of the drugs which their patients are taking.

Finally, do they use the BNF? Many dentists do not use the BNF regularly. Further since, perhaps up to 50% of high street dentists work outside the NHS, they will not be sent a BNF and probably they will not buy one. A clinical governance issue?

Perhaps surprisingly I am trying to address some of the problems outlined above. With help and with the support of the British Dental Association we have managed to replace the Dental Formulary Subcommittee whose function was principally to approve the limited list of drugs for dental use with a BNF Dental Advisory Group (DAG). This group will:

- improve the way the BNF helps dentists and the way dentists help the BNF
- improve dental therapeutics by discussing the training of dental students and improving dentists access to the BNF
- address the second and third of my concerns to be discussed next.

All prescribers may have to deal with dental problems. The DAG is working to ensure that the BNF gets the best advice from the DAG and from the experts it recommends. That is happening now – both for adults and for children.

Finally in relation to dentists – can the BNF help the dentists cope with medical problems? Already the BNF has a short section on medical emergencies in dental practice and covers such problems as asthma, anaphylaxis, cardiac emergencies, epilepsy, hypoglycaemia and syncope. If continuing professional development for dentists does anything it should ensure that dentists have read the relevant two or three pages in the BNF. The short section has to be a compromise between what is medically desirable and what is possible in a dental surgery. The DAG with its dental experts and the BNF team is ideally placed to address this issue – and does.

Digital developments

The BNF has had to move into the digital era. Providing information and guidance for prescribers, dispensers and those who administer drugs now has to be possible through various means. These include the computer-based systems currently widely used in general practice, and systems for use in hospitals which in terms of prescribing are still limited in their availability and usefulness, though there is an effective system working in the University Hospital Birmingham Foundation Trust.

Connecting for Health (CfH) is the DH's organisation which has been working for some years to produce a nationwide electronic clinical record on all patients. This should make it possible to obtain key information about any patient, anywhere in the country if you are cleared to gain access to the system. It should also make possible electronic prescribing supported by appropriate information and guidance. In addition prescribers want to have drug information and guidance available on their computer or on their handheld device.

It is obvious that paper-based and electronic guidance should be the same. If different databases were used to provide information on drugs and doses confusion would be inevitable and patient care would suffer. Given the universal distribution of the print version of the BNF, every effort is being made to ensure that the BNF's database is also the one used nationwide and by all computer systems. Discussions with the CfH and the many organisations currently involved with the specification and supply of computerised drug information are being actively pursued.

Converting the information available in the BNF and BNFC into a format that can be used in computer-based systems has also not been easy. Every element of the BNF data has to be coded so that links can be made to the specific sections of the text. Each small section has to be self sufficient ie not requiring

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reference to other parts of the BNF. And the information has to meet the specifications of both CfH and the various system developers with whom the BNF works in partnership. All this has to be achieved while ensuring that the information provided is clear, consistent and correct. Tackling this problem has been given a high priority in recent years. A lot of work has been done with the result that BNF data are now being extensively used in computer-based systems and handheld devices.

The potential advantages of having electronic BNFs are many. They include:

- the potential to update continuously
- the lack of constraints on space (or book size)
- the ability to link directly to information from the MHRA and to guidelines from NICE
- the possibility of interrogating the database in new ways: for example which drugs reduce potassium, increase cholesterol or cause purpura.

The digital development has achieved some successes but it will always be work in progress. The challenges are great, the evolving opportunities are exciting. The BNF is committed to remaining at the forefront of these developments. Its goal is to become as effective and ubiquitous in computer-based systems as it already is in print.

Students

The main aim of the BNF is to help the prescriber. However it also has great potential as a training manual for students of medicine, dentistry, nursing, pharmacy, podiatry and optometry who will be the prescribers of tomorrow. Newly qualified doctors, for example, start prescribing on day one of their medical career. They will also take histories from patients who will be on drugs. They will almost certainly need help from the BNF on day one. It would seem sensible to ensure that they can find their way around it and obtain the information which will allow them to understand a patient's current treatment and plan their immediate management. It is difficult to argue against the assertion that a student who is not familiar with the BNF will become an inadequately trained doctor. The need to address the problem has become even more critical since many medical schools have dismantled their courses in clinical pharmacology.[1] When new doctors start, usually in August, the period of their uncertainty about therapeutics, and hence of increased risk for their patients, will be reduced if the doctors have become familiar with the BNF as students.

Before 2007 the DH purchased and distributed BNFs to medical schools so that each clinical student would receive one copy at some point during their training. They then decided to change the system and simply transfer the funding to primary care trusts who may or may not use the money to provide medical students with a BNF. The result is that most medical schools do not now get BNFs and their students, in relation to therapeutics and prescribing, start their careers ill prepared.[3]

Conclusion

The BNF has become a national institution in the medical world. Over the last 28 years 57 editions have been published and over 11 million copies have been distributed to NHS staff. Most of the credit for its success must go to the BNF editorial team and my two predecessors Professors Owen Wade and Sir Charles George. My job was to maintain standards and keep up with a rapidly changing part of medical practice. I am pleased to have been able to play a key role in making the BNFC a reality and am convinced that this is making a major impact on the care of children. I have taken steps to meet the needs of dentists and the new professional groups who have become prescribers in the last four years. My impact on the digital development has been modest but I have done what I can to push forward this critically important development. Finally my work on the educational front is at an early stage. I have no doubt that the BNF should have a key role in the training of the prescribers of tomorrow and, through continued professional development programmes, in keeping today's prescribers competent and up to date.

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