

## Research

# Evaluation of the antibiotic prescribing of nurse practitioners trained to prescribe in primary care

Sophie E. Nuttall<sup>1</sup>, Craig C. Dobson<sup>2</sup> and Rhiannon Mills<sup>3</sup>

<sup>1</sup>North East Lincolnshire Primary Care Trust, Grimsby, North East Lincolnshire, UK

<sup>2</sup>Hull York Medical School, Clee Medical Centre, Cleethorpes, UK

<sup>3</sup>Hull York Medical School, Hull, UK

**Aim:** To evaluate the antibiotic prescribing of prescriber-trained nurse practitioners in a primary care setting. **Background:** As of 1st May 2006, legislation was introduced extending the prescriptive powers of appropriately trained nurses and nurse practitioners to nearly equal that of fully registered doctors. Following this increase, we believe that it is important to ensure that these new powers are being used judiciously. In this paper, we focus on a particular aspect of prescribing: that of antibiotics in a primary care setting. We examine how the prescriber-trained nurse practitioners' prescribing of antibiotics compares with the practice guidelines on prescribing. **Methods:** An audit of all consultations for six months following 1st May 2006 by the three nurse practitioners trained to prescribe was conducted. Where an antibiotic was prescribed, the anonymous clinical detail was compared with the appropriate practice guideline. The antibiotic-prescribing habits of doctors were identified from a literature search using Medline, by using UK-wide data provided by the Prescriptions Pricing Authority and from the practice Primary Medical Services review. **Findings:** The nurse practitioners were found to prescribe antibiotics in a total of 1296 out of 3211 consultations at an average monthly rate of 41 per 100 consultations. The most common antibiotics prescribed in descending order of frequency were as follows: amoxicillin; flucloxacillin; erythromycin; penicillin V; cefalexin and trimethoprim. Of the antibiotics prescribed during this period, 1065 were found to adhere to practice guidelines and 200 did not. A further 31 were deferred prescriptions. Off-guideline prescribing was accompanied by clear clinical indication as to the reason for the prescription identified in the medical record. Overall prescribing rates in this study of 80 per 100 consultations (including items other than antibiotics) are comparable with those published in the literature.

**Key words:** antibiotic; nurse practitioners; prescriptions; primary care

*Received: 5 September 2007; accepted: 12 March 2008*

## Introduction

The Department of Health (DOH) policy of improving patient access to medicines has driven

a series of changes in the way medicines can be accessed from the NHS culminating in the 2006 legislation (DOH, 2006). Prescribing by nurses was first introduced across the UK in 1998 following a pilot scheme set up in 1994, which allowed certain district nurses or health visitors to prescribe from a limited Nurse Prescriber's Formulary (Morris, 1994). Prescribing rights were

---

Correspondence to: Dr Craig Dobson, Hull York Medical School, Clee Medical Centre, 323 Grimsby Road, Cleethorpes DN35 7XE, UK. Email: craig@dobsonweb.me.uk

© 2008 Cambridge University Press

gradually increased in the UK through a series of stages including supplementary prescribing introduced in 2003. This allowed appropriately trained nurses to prescribe most UK-licensed medicines provided that a doctor had made the diagnosis and a clinical management plan had been made for the patient (Berry *et al.*, 2006). From 1st May 2006 legislation was introduced ([www.doh.gov.uk](http://www.doh.gov.uk)) extending the prescriptive abilities of appropriately trained nurses to be similar to that of fully registered doctors. They are able to prescribe from the entire British National Formulary, within their scope of practice, except for unlicensed drugs and most controlled drugs. Prior to 1st May 2006, nurse prescribers were permitted to prescribe only a limited number of antibiotics for specific conditions. Nurse practitioners, like other nurses, who have undergone a designated prescribing course, are now able to prescribe any antibiotic they feel is appropriate for treatment of a diagnosed condition and it is in their area of competence. This has generated extensive informal debate with clear advantages and disadvantages to nurse prescribing being expounded (Freeman, 2006). At the same time, it is becoming increasingly apparent that it is necessary to restrict the use of antibiotics as much as possible to help avoid the problems of widespread antibacterial resistance (Del Mar, 2007).

In a primary care setting many nurse practitioners are often consulted by patients with minor illness, such as upper respiratory tract infections, urinary tract infections and otitis media. Many of these conditions require no prescription. Some nurse practitioners have other training that allows them to be involved in the management of chronic conditions such as diabetes and asthma through the running of specialist clinics. There have been several studies examining the new role of the nurse practitioner (Myers *et al.*, 1997; Kinnersley, 2000) but as yet there have been no investigations into their antibiotic prescribing in a primary care setting. The aim of this study is to evaluate the antibiotic prescribing of nurse practitioners, who have been trained to prescribe, over a six-month period starting in May 2006. To examine the quality of their prescribing, we decided to compare each case against agreed practice guidelines for the use of antibiotics in minor illness.

*Primary Health Care Research & Development* 2008; 9: 199–204

We intended to compare the nurse practitioners prescribing with other prescribers. However, within the practice other prescribers such as general practitioners (GPs) now rarely deal with minor illness. We therefore turned to the literature and performed a Medline literature search. Much of the literature focuses on the use of antibiotics in specific conditions. This brings into consideration the problems of diagnosis and the likely small numbers in each category. We also requested UK-wide information on antibiotic prescribing from the Prescriptions Pricing Authority (PPA). We used this information along with information from our Primary Medical Services review to provide comparison for the overall prescribing of the nurse practitioners.

## Method

An audit of all nurse practitioner consultations at the practice for six months following 1st May 2006 was undertaken as described below. A search of the practice computer database revealed that there had been 3211 patient consultations between the three nurse practitioners over the period from 1st May 2006 to 31st October 2006. An anonymous list was generated of the patients seen at each consultation. Following this, their medical records were manually searched by research assistants. The following data were noted from each consultation: whether or not a prescription had been issued, the drug prescribed, whether or not a patient had been advised to delay the prescription, the patient's reason for attending the surgery. A recording of a 'delayed' prescription included situations where the patient was advised not to begin taking the medication for a few days for any reason, where the prescription was dated in advance, or where the prescription was issued in case a patient's symptoms worsened and they would be unable to re-attend (for example, in the case of a forthcoming holiday).

If an antibiotic was issued, the notes from the consultation documenting the reason for a prescription were compared with the appropriate practice antibiotic prescribing guidelines. The guidelines specify symptoms, signs and/or diagnoses that indicate the prescription of antibiotics. The presence or absence of the appropriate

combination of symptoms, signs and/or diagnoses in the notes was ascertained by research assistants. If there was any doubt, then the consultation was scrutinised by a GP. The information contained in the practice guidelines comes from a variety of sources including the following: central NHS data ([www.nhs.uk](http://www.nhs.uk)); Scottish Intercollegiate Guidelines ([www.sign.ac.uk](http://www.sign.ac.uk)); the latest British National Formulary ([www.bnf.org](http://www.bnf.org)); and existing guidelines from the Primary Care Trust. These practice guidelines are updated every two years according to new information and are agreed upon by all independently prescribing medical professionals within the practice. The resulting consultation data were then manually totalled by the researchers into the number of antibiotic prescriptions and the number of non-antibiotic prescriptions. Antibiotic prescriptions were then split into three groups: those that were strictly according to guidelines, those that were not and those that were 'deferred' in any way.

## Results

The nurse practitioners were found to prescribe antibiotics in a total of 1296 consultations out of 3211 during this period, an average monthly rate of 41 per 100 consultations. The most common antibiotic prescribed by prescriber-trained nurse practitioners was amoxicillin (as also shown by UK-wide PPA data), followed by flucloxacillin, erythromycin, penicillin V, cefalexin and trimethoprim (Table 1). Eight other antibiotics were also prescribed during

the six-month period, but relatively rarely, ranging from once (for example, nitrofurantoin for a urinary tract infection) to 16 times for co-amoxiclav (Table 2). Examination of the clinical records revealed that of the antibiotics prescribed during this period, 1065 were found to adhere to practice guidelines compared to 200 that did not (Table 2). The prescribing adhered strictly to recommended practice guidelines in 72–99% of cases depending on the particular antibiotic (Figure 1). The highest figure for 'off' guideline prescribing was 28% for erythromycin (Table 2).

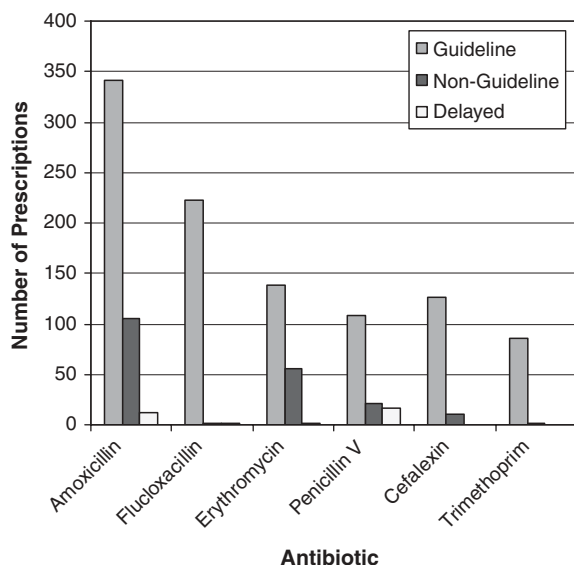
The records of the 200 (16%) prescriptions that did not adhere to practice guidelines were examined to identify the reason for the prescription being issued. In all cases, attempts were made by the prescribing clinician to justify this off-protocol prescribing generally on apparent clinical severity. The remaining 31 antibiotic prescriptions were found to have been delayed in some way either by the patient following advice or directly (i.e. dated in advance) by the nurse practitioner.

**Table 1** Data for antibiotics prescribed over the six months by Nurse Practitioners

Antibiotic	Total prescribed six months	Average per month
Amoxicillin	460	77
Flucloxacillin	226	38
Erythromycin	197	33
Penicillin V	145	24
Cefalexin	137	23
Trimethoprim	87	15

**Table 2** Data for antibiotics prescribed according to guidelines

Antibiotic prescribed	According to guidelines	Not according to guidelines	Prescription 'delayed'
Amoxicillin	342	106	12
Flucloxacillin	223	2	1
Erythromycin	139	56	2
Penicillin V	108	21	16
Cefalexin	126	11	0
Trimethoprim	86	1	0
Co-amoxiclav	16	0	0
Ciprofloxacin	11	2	0
Clarithromycin	7	0	0
Oxytetracycline	2	0	0
Metronidazole	2	0	0
Doxycycline	1	1	0
Co-fluampicil	1	0	0
Nitrofurantoin	1	0	0



**Figure 1** 'Off' and 'On' Guideline Prescribing

## Discussion

The majority (84%) of antibiotic scripts issued by prescriber-trained nurse practitioners followed practice guidelines in this study. Antibiotics were prescribed at a rate of approximately 41 items per 100 consultations. They accounted for approximately half of the total prescriptions issued by the nurse practitioners during the six-month study period. In complicated cases that were seen or where a less commonly used antibiotic was thought to be required, nurse practitioners tended to seek advice from a colleague, usually a GP but occasionally another nurse practitioner with more experience in that particular area. GPs were consulted for particular cases 141 times out of a total of 3211 consultations over the six-month period, at an average of 24 times every month. The Nursing and Midwifery Council states that independent nurse prescribers are fully accountable for their own prescribing decisions ([www.nmc-uk.org](http://www.nmc-uk.org)). Therefore, they are not legally required to seek such assistance or advice, nor are they required to prescribe according to specific guidelines. The fact that our nurse practitioners seek advice from time to time is possibly due to their professionalism. It reflects their unwillingness to prescribe outside their own field of

competence, which is in line with good practice and a requirement for them to prescribe.

The compliance of the nurse practitioners with the advised practice guidelines for antibiotic prescribing depended upon the particular antibiotic. The numbers of prescriptions issued strictly in accordance with the guidelines were very high, around 99%, for flucloxacillin (mainly for the treatment of skin infections) and trimethoprim (used predominantly to treat urinary tract infections). This decreased to 72% for erythromycin (used as second line in a variety of conditions). Examination of all the records of consultations with patients, which led to an off-guideline prescription event, contained the precise nature of the patient's symptoms and also a clear, reasoned case for the use of a particular antibiotic. This is, at the very least, a confirmation of the good clinical record-keeping by the nurse practitioners. More positively, it suggests that these prescribers are prepared to deviate from a guideline when they judge it clinically necessary.

The 31 prescriptions that were recorded as delayed were explained in the clinical records made by the nurse practitioners. There has been some disagreement as to the value of deferred prescribing but the PPA describes it as an effective method in terms of both managing the patients' expectations and reducing the unnecessary use of antibiotics ([www.ppa.org.uk](http://www.ppa.org.uk)).

The study may have been improved by the addition of data on antibiotic dosage and the further categorisation of the reasons for the issue of the prescription but it was intended to be a 'first glimpse' into independent nurse prescribing following the change in legislation. This study is confined to one practice and might not reflect general prescribing by nurse practitioners who have been trained to prescribe. The main reason for this is that currently, each practice has its own prescribing guidelines. Many of the guidelines share common features but are not identical and hence the use of the single practice with a common target.

This is the first study into the antibiotic prescribing rates and guideline adherence of prescriber-trained nurse practitioners and so we have been unable to identify any directly comparable studies. Some studies from early in the history of nurse practitioners in the UK documented a large difference in the general prescriptive rates per

**Table 3** Summary of comparative rates of prescribing

Date	Nurse practitioners	General practitioners
2003 (Britten <i>et al.</i> )		0.65
2004 (Weiss <i>et al.</i> )	0.66	0.74
2006 (Hollinghurst <i>et al.</i> )	1.00	0.88
2007 (Data from this study)	0.8	

*Note:* These are general rates of prescribing accounting for all drugs and medical items such as dressings and appliances.

consultation. One study found that GPs were significantly more likely to prescribe following consultation than nurse practitioners, 79% compared to 64% (Myers *et al.*, 1997). Several years later as restrictions were further relaxed and nursing roles more clearly defined, GPs were prescribing at a rate of 74% compared to 66% (Weiss *et al.*, 2004). The most recent study places the level of nurse practitioner prescribing at 1.00 per consultation compared to 0.88 by GPs (Hollinghurst *et al.*, 2006). This study records nurse practitioner issued prescriptions for all items at a comparable rate of 0.8 (Table 3). The discrepancy between the two figures may be accounted for by the fact that the 2006 study investigated rates for the whole of the UK, rather than for a single practice. The data from GP studies include a 2003 study where GPs issue prescriptions for approximately 65% of their consultations (Britten *et al.*, 2003). Much GP data that are available mainly focuses on one or more specific illness such as a sore throat (Smith *et al.*, 2006), which raises issues around diagnosis as well as treatment. Work on concordance in nurses' prescribing suggests that they incorporate this into their consultations at least to some degree (Latter *et al.*, 2005). A 2003 study investigated the appropriateness of prescribing in general practice attempting to measure it by combining pharmacology, and patients' and GPs' views (Britten *et al.*, 2003). They found that a uniform measure was difficult to quantify and that GPs themselves thought on average one in five prescriptions was not strictly indicated (Britten *et al.*, 2003).

Analysis of PPA data has shown that over the period May 2006 to February 2007 the total number of antibacterial drugs (as per BNF category) prescribed by all nurses in the UK has doubled. Particularly large rises in prescriptions

were noted between September and October, and between December and January, which can possibly be attributed to seasonal outbreaks of illness. It is yet too early in the history of extended nurse practitioner prescribing to hypothesise whether this overall rate of antibiotic prescribing will continue to increase or merely attain a constant level. This is an area for future research. At the PCT level, during the study, the practice was in the middle of the third quartile for prescribing antibiotics. It adopted virtually the same point for generic prescribing. It is in the middle of the second quartile for statin prescribing. It is difficult to be sure what these data mean but it does suggest that its prescribing habits are broadly in line with the rest of the PCT.

The findings from this study have relevance to primary care staff across the UK. As the role of the nurse continues to expand along the lines laid down by DOH policy (DOH, 2002), it is important that the consequences of the changes for patient care are addressed. This study adds credence to the notion that nurse practitioners can prescribe antibiotics according to pre-set guidelines and not outside their scope of ability. It may also help to alleviate some of the concerns currently being raised about how the quality of prescribing might vary between GPs and nurse practitioners. This is supported by several studies that have concluded that appropriately trained nurses can provide as high a standard of care as GPs (Laurant *et al.*, 2005). Questions have also been raised as to the views of patients, however, many studies are showing that patients are responding well to the extended role of nurse practitioners within the practice and are mostly happy to consult a nurse practitioner even if they originally requested an appointment with a doctor (Kinnersley *et al.*, 2000; Banning, 2004). Further studies should go beyond practice and geographical boundaries as well as include other prescribers.

### Funding body

This work was supported by North East Lincolnshire PCT and Hull York Medical School. Funding for medical research posts was provided but the funding sources had no direct involvement in the study.

## Ethics committee

Ethical approval was not required for this study.

## Acknowledgements

The authors would like to thank the three nurse practitioners for their support of this project, North East Lincolnshire PCT and staff at the PPA for providing us with prescribing data.

## References

- Banning, M.** 2004: Nurse prescribing, nurse education and related research in the United Kingdom: a review of the literature. *Nurse Education Today* 24, 420–27.
- Berry, D., Courtenay, M. and Bersellini, E.** 2006: Attitudes towards, and information needs in relation to, supplementary nurse prescribing in the UK: an empirical study. *Issues in Clinical Nursing* 15, 22–28.
- Britten, N., Jenkins, L., Barber, N. et al.** 2003: Developing a measure for the appropriateness of prescribing in general practice. *Quality and Safety in Health Care* 12, 246–50.
- Del Mar, C.** 2007: Prescribing Antibiotics in Primary Care. *BMJ* 335, 407–408.
- Department of Health.** 2002: *Liberating the talents: Helping primary care trusts and nurses to deliver the NHS Plan.* Retrieved 7 January 2008 from [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4007473](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4007473)
- Department of Health.** 2006: *Improving patients' access to medicines: A guide to implementing nurse and pharmacist independent prescribing within the NHS in England.* Retrieved 5 January 2008 from [http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH\\_4133743](http://www.dh.gov.uk/en/Publicationsandstatistics/Publications/PublicationsPolicyAndGuidance/DH_4133743)
- Freeman, G.** 2006: Nurse prescribing: the pros and cons. *Diabetes Care*; Summer 2006.
- Hollinghurst, S., Horrocks, S., Anderson, E. and Salisbury, C.** 2006: Comparing the cost of nurse practitioners and GPs in primary care: modelling economic data from randomised trials. *BMJ* 332, 530–35.
- Kinnersley, P., Anderson, E., Parry, K. et al.** 2000: Randomised controlled trial of nurse practitioner versus general practitioner care for patients requesting “same day” consultations in primary care. *BMJ* 320, 1043–48.
- Latter, S., Maben, J., Myall, M. and Young, A.** 2005: Perceptions and practice of concordance in nurses' prescribing consultations: findings from a national questionnaire survey and case studies of practice in England. *International Journal of Nursing Studies* 44, 9–18.
- Laurant, M., Reeves, D. and Hermens, R.** 2005: Substitution of doctors by nurses in primary care. *Cochrane Database of Systematic Reviews* Issue 5. CD001271.
- Morris, J.** 1994: Demonstration sites for nurse prescribing. *Nursing Times* 90, 31–32.
- Myers, P.C., Lenci, B. and Sheldon, M.G.** 1997: A nurse practitioner as the first point of contact for urgent medical problems in a general practice setting. *Family Practice* 14, 492–97.
- Smith, S., Smith, G.E., Heatlie, H. et al.** 2006: Reducing variation in antibacterial prescribing rates for 'cough/cold' and sore throat between 1993 and 2001: regional analyses using the general practice database. *Public Health* 120, 752–59.
- Weiss, M.C., Deave, T., Peters, T.J. and Salisbury, C.** 2004: Perceptions of patient expectation for an antibiotic: a comparison of walk-in centre nurses and GPs. *Family Practice* 21, 492–99.