decision making is influenced by a multitude of diverse factors. Black takes the view that in relation to the increase in testing in recent years the ease of access and the use of autoanalysers may be the most important factors in influencing practice.⁹

The division into positive and negative defensive practices warrants further explanation. For example, in relation to "increased diagnostic testing" one doctor's defensive medicine may be another doctor's good practice. Diagnostic testing may reach a defensive level in different doctors at differing levels and thus, in this study, inquiring about specific tests was avoided.

Avoiding certain procedures in practice was used to indicate negative defensive practice. However, though this accords with definitions used elsewhere, Black has suggested that if risk avoidance leads to a concentration of services in the hands of fewer specialised doctors it could enhance rather than lower the quality of care.⁹

The response rate in the survey was 60%. This compares favourably with response rates in similar medicolegal surveys and accords with a recent review of general practice based research published in the *British Journal of General Practice*.¹⁰ Some biases may have arisen both from the choice of the sampling frame and from response bias. For several reasons the Medical Defence Union might be more successful at recruiting from certain medical schools. Response bias was examined to some extent by comparing the general practitioners responding to the survey with known demographic variables among British general practitioners. The results indicate the generally representative nature of this study.¹¹

Some defensive practices such as increased patient explanations or more detailed note taking are clearly beneficial. However, the existence of negative defensive medical practice is perhaps best viewed as a symptom of the fundamental problems inherent within the present judicial and quasijudicial regulatory systems. The reforms proposed by the Wilson committee will encourage complaints, and my results indicate that in the current climate there could be a

Key messages

- Implementing the findings of the Wilson committee will encourage complaints in general practice
- Some defensive practices may be beneficial but others will have adverse effects on both patient care and resource allocation
- Some 98% of general practitioners claim to be making practice changes in response to the possibility of a patient complaining
- Defensive medical practices correlate with concerns about risks but not with a lack of understanding of the concept of negligence or the general practitioner's terms of service; such an association is particularly strong in the case of negative defensive practices

significant rise in such negative defensive medical practices with adverse consequences for patient care.

I acknowledge the help of Dr P Hoyte and the Medical Defence Union for help in distributing the questionnaire.

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(Accepted 17 November 1994)

Antibiotics carried in general practitioners' emergency bags: four years on

See Editorial

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BMJ 1995;310:29-30

In 1988 we found in a survey of 115 general practitioners that fewer than half of them carried parenteral penicillin in their emergency bags.¹ Since then there has been much publicity and education among doctors about the role of treating patients early with antibiotics to reduce mortality from bacterial meningitis.²⁻⁴ We therefore carried out a similar survey in north west England, where the original survey was conducted, and in the north east to assess whether measures suggested since our first study had affected the range of antibiotics that general practitioners carry in their emergency bags.

Methods and results

During November and December 1992 we sent all registered general practitioners in north east and north west England (n=3724) a one page questionnaire containing lists of common antibiotics. They were

asked to tick those antibiotics that they kept in their bags (questionnaire is available from ELCO). The survey was anonymous, and a stamped addressed envelope was enclosed. No reference was made to the use of early parenteral benzylpenicillin in meningococcal infection.

In all, 70.8% of the questionnaires were returned (69.1% from the north west and 73.0% from the north east). A total of 85.3% of general practitioners carried parenteral benzylpenicillin in their emergency bags (80.1% in the north west and 91.4% in the north east). The mean number of antibiotics carried by general practitioners was six (range 0-12) in the north east and five (0-10) in the north west. The most common antibiotic carried in the north west was oral erythromycin (86.4%) and in the north east was parenteral benzylpenicillin (91.4%). The two most commonly carried oral antibiotics in the north east were amoxycillin (89.3%) and erythromycin (86.7%). Overall, erythromycin was the commonest antibiotic (86.6%) carried, with amoxycillin (86.2%) the second commonest. The table shows the full results of the survey.

Comment

We are encouraged by the appreciable increase in the number of general practitioners who carried parenteral benzylpenicillin in their emergency bags compared

Numbers (percentages) of respondents in north east and north west England who carried various antibiotics in their emergency bags

Antibiotic	North west (n=1424)	North east (n=1214)	Overall (n=2638)
<i>Penicillins</i>			
Benzylpenicillin	1140 (80.1)	1109 (91.4)	2249 (85.3)
Ampicillin	229 (16.1)	194 (16.0)	423 (16.0)
Amoxycillin	1190 (83.6)	1084 (89.3)	2274 (86.2)
Flucloxacillin	243 (17.1)	359 (29.6)	602 (22.8)
Phenoxymethylpenicillin	299 (21.0)	366 (30.1)	665 (25.2)
Pivampicillin	12 (0.8)	19 (1.6)	31 (1.2)
Co-amoxiclav	232 (16.3)	202 (16.6)	434 (16.5)
Co-fluampicil	16 (1.1)	0	16 (0.6)
<i>Aminoglycosides</i>			
Gentamicin*	31 (2.2)	22 (1.8)	53 (2.0)
Neomycin*	17 (1.2)	16 (1.3)	33 (1.3)
<i>4-Quinolones</i>			
Nalidixic acid	32 (2.2)	29 (2.4)	61 (2.3)
Ciprofloxacin	437 (30.7)	257 (21.2)	694 (26.3)
Ofloxacin	153 (10.7)	106 (8.7)	259 (9.8)
Norfloxacin	4 (0.3)	0	4 (0.2)
<i>Cephalosporins</i>			
Cephadrine	191 (13.4)	123 (10.1)	314 (11.9)
Cefradroxil	103 (7.2)	31 (2.6)	134 (5.1)
Cefaclor	579 (40.7)	280 (23.1)	859 (32.6)
Cephalexin	70 (4.9)	43 (3.5)	113 (4.3)
Cefixime	3 (0.2)	10 (0.8)	13 (0.5)
Cefuroxime	97 (6.8)	96 (7.9)	193 (7.3)
Cefotaxime	6 (0.4)	2 (0.2)	8 (0.3)
<i>Macrolides</i>			
Erythromycin	1231 (86.4)	1053 (86.7)	2284 (86.6)
Azithromycin	42 (2.9)	31 (2.6)	73 (2.8)
Clarithromycin	1 (0.1)	14 (1.2)	15 (0.6)
<i>Others</i>			
Co-trimoxazole	726 (51.0)	603 (49.7)	1329 (50.4)
Trimethoprim	521 (36.6)	503 (41.4)	1024 (38.8)
Tetracycline	159 (11.2)	184 (15.2)	343 (13.0)
Doxycycline	10 (0.7)	8 (0.7)	18 (0.7)
Chloramphenicol*	169 (11.9)	135 (11.1)	304 (11.5)
Metronidazole	228 (16.0)	181 (14.9)	409 (15.5)
Nitrofurantoin	15 (1.1)	50 (4.1)	65 (2.5)
Fusidic acid*	24 (1.7)	38 (3.1)	62 (2.4)
Mupirocin*	6 (0.4)	0	6 (0.2)

*Topical preparation.

with the number in our study in 1988. This rise probably reflects increasing awareness by general practitioners of meningococcal disease and of the importance of giving parenteral benzylpenicillin, particularly in the presence of haemorrhagic rash. A

publicity campaign conducted among general practitioners in the north east in October 1991 may explain the high percentage of general practitioners in that region carrying benzylpenicillin compared with general practitioners in the north west. The number of general practitioners carrying amoxycillin instead of ampicillin had increased notably since 1988, probably because of the former's better bioavailability and eight hourly dosing regimen, which should increase compliance. Cefaclor was the most popular cephalosporin, and the number of general practitioners carrying ciprofloxacin had increased. Half of the general practitioners still carried co-trimoxazole.

Although the antibiotics carried in the emergency bags do not necessarily reflect general practitioners' prescribing choices, each general practitioner must decide which drugs are the most appropriate for dealing unaided with his or her practice's emergencies. Considerations such as the location and size of the area served by the practice, the distance to the nearest hospital, the availability of casualty services and pharmacists, and likely ambulance response times all help general practitioners to determine what drugs and equipment are needed for the practice and how usefully they can be distributed between the emergency bag, the boot of the car, and the surgery. A parenteral penicillin in our view is essential as evidence increasingly suggests that early treatment with penicillin and prompt referral to hospital results in reduced mortality from meningococcal disease, particularly in septicæmic patients, and we will continue to urge our colleagues in general practice to give parenteral penicillin to all patients with suspected meningococcal disease.

We thank the National Meningitis Trust and Mr Graham Wood, Glaxo Laboratories, for their help and all the general practitioners who participated in the study.

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(Accepted 30 June 1994)

ANY QUESTIONS

Are there any objective measurements of the potency of diuretics? If so, how much does adding 5 mg amiloride to 40 mg frusemide increase the potency?

Potency of diuretics is determined in several ways. Formal assessment requires studies in which the dose or concentration of the diuretic is related to response. From the studies you can construct a curve from which the dose or concentration causing half the maximal response can be derived. Relative potency among diuretics then compares the difference in this value. As an example, 1 mg bumetanide has essentially the same potency as 40 mg frusemide. It is important to emphasise that potency determined in this fashion differs from efficacy. Efficacy is essentially the maximal response that can be elicited. Again using bumetanide and frusemide as an example, maximal response is the same for both of these loop diuretics, though the milligram amount needed to cause this response differs by a factor of 40—that is, potency. Analyses have been performed only with loop diuretics and to a lesser extent thiazides.

The most pertinent question concerning a combination of amiloride and frusemide is not really potency but rather efficacy. How much is the response to frusemide increased

if amiloride is added? There is no easy answer because it partly depends on the patient. Some patients have a poor response to a loop diuretic because of increased proximal tubular reabsorption of sodium. Activity at more distal nephron sites, where amiloride has its effect, is irrelevant. Amiloride would add nothing to the effects of frusemide in terms of sodium excretion. Conversely, if a patient is receiving a loop diuretic and considerable reabsorption of sodium is occurring at more distal sites then addition of amiloride could cause a substantial increase in sodium excretion and at the same time have potassium sparing properties. Thus the expectation of the effect of amiloride on response to frusemide will be greatly influenced by the individual patient. Incremental natriuresis would be expected if active distal reabsorption of solute was occurring. One could predict this in an individual patient by assessing urinary sodium and potassium excretion; low urinary sodium and high urinary potassium would suggest that addition of amiloride would result in an incremental increase in sodium excretion. On the other hand, low sodium and low potassium in the urine would suggest little, if any, effect of adding amiloride.—

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