prevalence of resistance of *Streptococcus pneumoniae* to common antimicrobial agents in two consecutive periods in east London.

In our first study we determined the antimicrobial susceptibilities of sequential clinical isolates of pneumococci obtained during January to September 1994. Seven (12%) of 60 isolates had reduced susceptibility to penicillin (either intermediate resistance (minimum inhibitory concentration 0.1-1 mg/l) or high resistance (minimum inhibitory concentration ≥ 2 mg/l)). In view of this high prevalence we then collected all isolates from October 1994 until April 1995 and established the minimum inhibitory concentrations for a range of antimicrobial agents and the serological type.² Seventy five isolates were obtained during this period, of which nine (12%) had reduced susceptibility to penicillin. We believe that this is the highest reported prevalence of pneumococci with reduced susceptibility to penicillin in Britain. All strains were typable and are represented in the vaccine that is currently used.

During the overall study period 16 pneumococcal strains of reduced susceptibility (12% of the 135 isolates) were collected from 16 patients. Two isolates had minimum inhibitory concentrations of penicillin of >1 mg/l but were sensitive to erythromycin. Four isolates were also resistant to at least two of the three agents commonly tested in vitro—namely, tetracycline, erythromycin, and chloramphenicol. Nine (7%) of the 135 isolates were resistant to erythromycin. The sources of the samples were predominantly sputum or respiratory samples (65 isolates), blood cultures (38), and eye (15) and ear swabs (9). Two patients yielded multiple isolates.

Our results confirm that the prevalence of resistant strains of pneumococci varies considerably in Britain and that continued monitoring of antimicrobial resistance at a local level is essential for the continuing optimal management of infections due to this organism. Many pneumococcal infections, even when caused by an organism with reduced susceptibility to penicillin, will respond to penicillin as long as adequate doses are used.³ This does not, however, apply to pneumococcal meningitis, as adequate concentrations of penicillin in the cerebrospinal fluid may not be achieved. The increasing prevalence of resistance to penicillin means that this drug will no longer be useful for empirical treatment of this condition, and it is vital that the individual susceptibilities of the causative organism are determined for each patient.

PETER WILSON
Consultant microbiologist
D LEWIS
Registrar in microbiology

Newham District Microbiology Laboratories,
St Andrew's Hospital,
London E3 3NT

PETER JENKS
Lecturer in microbiology
S HOQUE
Lecturer in microbiology

Microbiology Laboratories,
Roya's Hospital Trust,
London E1 1BB

- 1 Johnson AP, Speller DCE, George RC, Warner M, Domingue G, Efstratiou A. Prevalence of antibiotic resistance and serotypes in pneumococci in England and Wales: results of observational surveys in 1990 and 1995. *BMJ* 1996;312:1454-6. (8 June.)
- 2 Sørensen UBS. Typing of pneumococci by using 12 pooled antisera. *J Clin Microbiol* 1993;31:2097-100.
- 3 Friedland IR, McCracken H. Management of infections caused by antibiotic resistant *Streptococcus pneumoniae*. *N Engl J Med* 1994;331:377-82.

... and Merseyside ...

EDITOR,—Alan P Johnson and colleagues report that the prevalence of resistance to penicillin in pneumococci was 3.9% in Britain in 1995.¹ In some areas, however, the prevalence is higher than this.

In 1995, 60 (7.5%) of 798 of our pneumococcal isolates were resistant to penicillin. Forty one isolates were from children (average age 2.2 years), of whom nine (22%) were infected, and 19 were from adults (average age 64), of whom 16 (84%) were infected. In total, 25 patients developed an infection: chest infection (19), eye infection (3), sinusitis (1), otitis media (1), and bacteraemia (1). Only three patients had a history of travel (to Tenerife, Turkey, and the Republic of Ireland) within the previous three months. Thirty three patients had received antibiotics in the previous three months; 20 (60%) of the prescriptions had been for penicillins or cephalosporins. In comparison, 53% of all antibiotics prescribed in this district are for these drugs.

The most common serotype was serotype 9 (335 isolates), followed by serotype 6 (223), serotype 19 (96), and serotype 23 (96) (*Streptococcus* and Diphtheria Reference Unit, Central Public Health Laboratory). Two hundred and thirty nine isolates (30%) exhibited high level resistance to penicillin (minimum inhibitory concentration >1 mg/l). Full resistance to cefotaxime occurred in only one isolate (2%) (Antibiotic Reference Unit, Central Public Health Laboratory).

The rate of resistance to penicillin in pneumococci in our district has increased inexorably since 1987, when the first resistant isolate appeared. This rise seems likely to continue.

K D ALLEN
Consultant microbiologist
J J ANSON
Senior registrar

Medical Microbiology,
Whiston Hospital,
Prescot L35 5DR

- 1 Johnson AP, Speller DCE, George RC, Warner M, Domingue G, Efstratiou A. Prevalence of antibiotic resistance and serotypes in pneumococci in England and Wales: results of observational surveys in 1990 and 1995. *BMJ* 1996;312:1454-6. (8 June.)

... and Northern Ireland

EDITOR,—Alan P Johnson and colleagues state that while the prevalence of resistance to penicillin in pneumococci in England and Wales is increasing, resistance to cefotaxime is still rare.¹ We report data from similar studies at the Northern Ireland Public Health Laboratory.

In a study of 488 consecutive routine clinical isolates of *Streptococcus pneumoniae* sent to this laboratory in 1988, only four (0.8%) were found to be resistant to penicillin (minimum inhibitory concentration ≥ 0.1 mg/l).² Subsequently, in the late 1980s and early 1990s, sporadic isolates that were resistant to penicillin were detected—on average two a year (table 1). In 1994, however, the figures increased to 3.1% and in 1995 to 10.6%, representing a 12-fold increase in the rate of isolation since 1993. A third of the isolates that were investigated further (16/42) showed high level resistance to penicillin, which usually cannot be overcome by increased doses of the drug. Of further concern is that 93% of the isolates (39/42) showed resistance to cefotaxime and by inference all cephalosporins (minimum inhibitory concentration ≥ 0.5 mg/l). This contrasts with recently reported rates of cross resistance to cefotaxime in Britain of 69%.³ Most of these pneumococcal infections would respond to the high dose schedules of intravenous cefotaxime used in hospitals, though some authors recommend that up to 24 g/day may be necessary. The pneumococci might not, however, respond to the low dose regimens of oral cephalosporins used in the community. A few isolates showed high level resistance to cefotaxime, against which even high dose intravenous regimens may fail.

A large proportion (34/42 (81%)) of the penicillin resistant pneumococci that we investigated were of serotype 9V, compared with only 10% of all the

Table 1—Number (percentage) of isolates of pneumococci that were resistant or sensitive to penicillin, Northern Ireland Public Health Laboratory, 1988-95

Year	Resistant	Sensitive
1988	4 (0.8)	484
1989	0	410
1990	4 (1.0)	400
1991	0	395
1992	0	377
1993	3 (0.9)	345
1994	12 (3.1)	372
1995	46 (10.6)	388

pneumococci in our study in 1988 and 39% in Johnson and colleagues' study. This resistant serotype is prevalent in Spain, which is a common holiday destination for young families from Northern Ireland. A clonal outbreak may be occurring in Northern Ireland after importation of penicillin resistant pneumococci by tourists returning from Spain, as was reported from Iceland in 1988.⁴ Alternatively, the pneumococci may have spread from the rest of Britain, and unrelated isolates may simply be clustered in a small number of serotypes; this is not the case with pneumococci that are sensitive to penicillin. Molecular epidemiological studies are currently under way to confirm the existence of an outbreak.

In conclusion, we agree with Johnson and colleagues that continued surveillance of antimicrobial resistance in pneumococci and the distribution of serotypes is essential, and we recommend the adoption of recent American guidelines establishing nationwide mandatory reporting of penicillin resistant pneumococci.⁵

We acknowledge the help of the Antibiotic and Streptococcal Reference Units of the Central Public Health Laboratory, London.

C E GOLDSMITH
Department of Health and Social Services research registrar in medical microbiology
J E MOORE
Clinical scientist in medical microbiology
P G MURPHY
Consultant medical microbiologist

Molecular Epidemiology Research Unit,
Northern Ireland Public Health Laboratory,
Belfast City Hospital,
Belfast BT9 7AD

- 1 Johnson AP, Speller DCE, George RC, Warner M, Domingue G, Efstratiou A. Prevalence of antibiotic resistance and serotypes in pneumococci in England and Wales: results of observational surveys in 1990 and 1995. *BMJ* 1996;312:1454-6. (8 June.)
- 2 Lafong AC, Crothers E, Bamford KB, Rooney PJ. Distribution of serotypes and antibiotic resistance among pneumococci in N Ireland. *J Infect* 1988;16:235-42.
- 3 Johnson AP, Speller DCE, Patel BC. Sensitivity to cefotaxime of pneumococci isolated in the UK. *J Antimicrob Chemother* 1995;35:443-4.
- 4 Soares S, Kristinsson KG, Musser JM, Tomasz A. Evidence of the introduction of a multiresistant clone of serotype 6B *Streptococcus pneumoniae* from Spain to Iceland in the last 1890s. *J Infect Dis* 1993;168:156-63.
- 5 Centers for Disease Control and Prevention. Defining the public health impact of drug resistant *Streptococcus pneumoniae*: report of a working group. *MMWR* 1996;45:No RR-1.

Prenatal screening for carriers of cystic fibrosis should screen both partners individually

EDITOR,—Screening of pregnant women for mutations in the transmembrane conductance regulator gene for cystic fibrosis is under way in several regions. During the past few years, several papers have been published about such screening, which causes problems.^{1 2}

On the basis of a carrier frequency of 4% in the general population and a feasible rate of detection of mutations of 85%, one can calculate the proportion of couples in each category and