could have tracked through an iatrogenic duodenal perforation sustained at the time of ERCP and papillotomy is supported by the anatomical descriptions outlined below.

The retroperitoneum[4] is an actual space between the posterior parietal peritoneum and the posterior abdominal wall filled with loose areolar tissue. Although it has no bounds, it is limited superiorly by the diaphragm and inferiorly by the levator muscles of the pelvic floor. Areas of fusion exist in the midline, posteriorly around the major anterior branches of the aorta, anteriorly and above the semicircular line, to the posterior rectus sheath, and superiorly to the anterior undersurface of the diaphragm and the ligaments of the liver.

The gastrointestinal structures within the retroperitoneum include the second, third and proximal fourth segment of the duodenum, the pancreas, and the retropancreatic common bile duct. There is therefore a potential communication with the scrotal sac through the inguinal canal.

Our review of this case failed to reveal any other known cause of the surgical emphysema nor has this been described previously in the literature. The question remains — is this a complication of ERCP? We believe it is.

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CLINICAL PRACTICE

Antibiotic prescribing practices for common childhood illnesses in South Africa

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Antibiotic resistance is widespread in respiratory pathogens. The first report of penicillin resistance in the pneumococcus was in 1967,[1] and in 1977 multiply resistant pneumococci were found in South Africa.[2] Data from isolates submitted for pneumococcal serotyping from children between 1995 and 1998 indicated overall antibiotic resistance rates of 38% and penicillin resistance rates of 28.9%.[3] Alarmingly high resistance rates were also found in pneumococci carried in the nasopharynx of children attending private paediatric practices in northern Johannesburg.[4] In that study, resistance to any antibiotic was found in 69.4% of sampled children, resistance to penicillin in 42% and resistance to co-trimoxazole in 53.7%. There is also clear evidence from developed countries of a relationship between patterns of antibiotic use and pneumococcal resistance to antibiotics.[5]

There are few data on patterns of antibiotic use in the face of this global resistance epidemic and none from South Africa. We therefore conducted a mail-out survey to determine the common prescribing patterns for a variety of paediatric conditions in South Africa.

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What was done

Surveys

Bilingual (English and Afrikaans) surveys were mailed to 609 paediatricians registered in 1999 with the Health Professions Council of South Africa (HPCSA). Included with each survey was a covering letter explaining the survey and a stamped, pre-addressed return envelope. The survey included questions on paediatric practice, sources of information, and antibiotic usage for specific paediatric illnesses. The paediatricians' names were not included on the surveys to ensure confidentiality of reporting.

Data analysis

Survey data were entered and analysed using EpiInfo

computer software.[6] Ninety-five per cent confidence intervals (95% CI) were calculated using JMP, Version 4 Statistical Discovery Software.[7]

What was found

Of the 609 surveys mailed, 23 (4%) were returned by the post office, 9 (1%) were returned but not completed by paediatricians who had retired from clinical practice, and 112 surveys (18%) were returned and completed. The median age of the respondents was 46 years (range 33 - 78 years), 93% had received medical training in South Africa, 91% had done specialty training in South Africa, 98% practised medicine in urban areas, 62% practised medicine in the private sector, and 63% of the respondents served patients who had medical aid.

The majority of respondents obtained information on antibiotic prescribing practices from the medical literature or congresses / meetings, while half of those surveyed reported using guidelines, summaries from pathology laboratories or information from pharmaceutical representatives (Table I). The choice of using antibiotics was influenced mainly by concerns over antibiotic resistance and repeated episodes of the same illness (Table II). Cost of treatment, lack of confirmation of the aetiology, and inconvenience to patients of having to return should the problem persist were also of some importance.

Table I. Sources of information regarding antibiotic prescribing practices

Source of information	% of respondents (95% CI)
Pharmaceutical representatives	54 (44 - 62)
Medical literature	86 (77 - 90)
Summaries provided by pathology laboratories	59 (50 - 66)
Congresses / meetings	80 (71 - 86)
South African guidelines	54 (44 - 62)

CI = confidence interval.

Parental pressure and information from pharmaceutical companies were of little importance in influencing treatment.

The antibiotic prescribing practices for individual illnesses revealed the following.

A beta-lactam antibiotic (including penicillin, amoxicillin and amoxicillin / clavulanate) was the overwhelming choice for treatment of penicillin-sensitive pneumococcal pneumonia (91% of respondents, 95% CI: 84 - 95%); otitis media (96%, 91 - 99%) and group A streptococcal pharyngitis (93%, 86 - 96%). Cephalosporins were used most frequently to treat penicillin-resistant pneumococcal disease (53%, 44 - 62% for pneumonia, 49%, 39 - 58% for otitis media), and 47%, 38 - 56% for *Escherichia coli* urinary tract infections, while shigellosis was treated with either a cephalosporin (36%, 28 - 45%) or nalidixic acid (26%, 18 - 35%). Penicillins and amoxicillin were still considered by a large percentage of respondents to be first-line treatment for penicillin-resistant otitis media (47%, 37 - 56%) and pneumonia (38%, 29 - 47%), while they are used less frequently as first-line treatment for urinary tract infections (28%, 20 - 37%) and for shigella dysentery (17%, 11 - 25%). Macrolides were considered first-line agents by only a small minority of respondents for penicillin-resistant pneumococcal pneumonia (4%, 1 - 9%), and as second-line agents for penicillin-resistant pneumococcal pneumonia and otitis media, 16% (10 - 25%) and 17% (10 - 26%) respectively. They were the most important second-line agents for pharyngitis (39%, 29 - 50%). Fluoroquinolones were only considered first line for shigella dysentery by 11% of respondents (6 - 17%) and second line by 10% (5 - 19%). Co-trimoxazole was considered a first- or second-line agent by only a minority of respondents for the treatment of dysentery (7%, 4 - 14% first line; 13%, 7 - 22% second line) and urinary tract infections (13%, 8 - 20% first line; 17%, 10 - 26% second line), and it was only rarely considered first- or second line for the respiratory tract indications.

Duration of therapy ranged from 5 to 10 days for pneumonia, 3 to 14 days for otitis media, 3 to 14 days for pharyngitis, 5 to 10 days for dysentery and 5 to 21 days for urinary tract infections.

Table II. Factors influencing decision to use antibiotic treatment (% (95% CI))

Factor	Very important	Average importance	Least important
Parental pressure	0	29 (21 - 38)	71 (61 - 79)
Information from pharmaceutical company	6 (3 - 12)	54 (4 - 64)	40 (31 - 49)
Inconvenient for patient to return if problem persists	10 (5 - 17)	71 (61 - 79)	19 (12 - 28)
Cost	16 (10 - 25)	71 (61 - 79)	13 (8 - 21)
Uncertain diagnosis	11 (6 - 19)	71 (61 - 79)	18 (12 - 27)
Repeated episodes of same illness	43 (34 - 53)	45 (36 - 55)	12 (7 - 20)
Concerns about antibiotic resistance	78 (69 - 85)	20 (13 - 28)	2 (0.5 - 7)

CI = confidence interval.

Discussion

This survey was conducted to ascertain the antibiotic prescribing practices of South African paediatricians. In light of the current levels of antibiotic resistance in pneumococci isolated from children in South Africa, we were hoping to identify possible reasons for the increase in resistance levels and potential areas for intervention. Treatment of antimicrobial-resistant infections is estimated to cost the USA more than $5 million each year.[8] No data are available from South Africa but use is likely to be increasing as the prevalence of antibiotic-resistant infections increases. Austin *et al.*,[9] using population genetics and epidemiological modelling, showed that the volume of antibiotic use impacts directly on the prevalence of antibiotic resistance in the community. The development of significant levels of resistance occurs at a much faster rate than the decline in the prevalence of resistance once antimicrobial use has been curtailed. Rapid intervention is therefore necessary to curb increasing antimicrobial resistance.

In addition to microbiological considerations, use of antibiotics is influenced by cultural and economic factors.[10] Patients may not be satisfied unless they receive some tangible treatment after having made the effort to come to the physician and having waited to be seen. Physicians may be unwilling to send patients away with no treatment, and the choice of treatment could be influenced by pharmaceutical company marketing campaigns of newer antibiotics or formulations. These did not appear to influence the respondents in our survey.

Numerous studies have shown considerable misuse of antibiotics stemming from diagnostic uncertainty, incorrect choice of drug or improper use of a specific drug.[10] The inability to confirm the aetiology of the disease does appear to play a role in the choice of treatment by South African paediatricians. The South African Department of Health, in conjunction with the World Health Organisation, has drafted guidelines for the management of childhood illnesses.[11] While the guidelines do not cover all of the conditions in our survey, there are recommendations for acute ear infections and pneumonia (5 days of amoxycillin) and for dysentery (nalidixic acid for 5 days). The antibiotic choices for antibiotic-sensitive pneumococcal pneumonia and otitis media were consistent with the guidelines; however, 70% of the respondents would have treated for a longer duration, in most cases for 10 days. Only a quarter of the respondents would have treated *Shigella* dysentery with nalidixic acid; 80% of those choosing nalidixic acid would treat for the recommended 5 days. Cephalosporins appear to be the preferred treatment for many infections, raising concern as to possible overuse of this class of antibiotics. At approximately twice the cost, oral cephalosporins are more expensive than beta-lactams such as amoxicillin and overuse could shorten their efficacy through the development of resistance. A total of 11% of the isolates from children attending private practitioners in northern Johannesburg were resistant to ceftriaxone.[4]

It is also of interest to compare the responses in this survey with those of 24 academic South African paediatricians and microbiologists.[12] The treatment of pneumonia reported in this study is similar to that of the academics, with a somewhat greater emphasis again on the use of cephalosporins. The academics were more aware of the use of nalidixic acid rather then cephalosporins for the treatment of *Shigella* dysentery.[12]

These results show that treatment of childhood illnesses in South Africa appears to be appropriate in terms of most drug choices; however, there seems to be prolonged antibiotic use for some illnesses which could be contributing to increasing antibiotic resistance levels. The low response to the survey was disappointing but not unexpected as no incentives or reminders were offered to physicians for completing the survey. In addition, to encourage more 'open' reporting of treatment practices the names of respondents were not collected, and therefore we could not trace and resurvey those paediatricians who did not return the questionnaires. Paediatricians already concerned about antibiotic resistance levels may have been more likely to answer the survey, and thus the results may not reflect the treatment practices of all of South African paediatricians.

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