Pneumococcal Vaccination: a Practice Based Audit

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Abstract

Objective: To audit the use of pneumococccal vaccine in patients at increased risk of pneumococcal infection, in a general practice setting.
Design: Computer and manual search of patient records - before and one year after intervention.
Setting and subjects: All patients registered at a four partner, inner-city, training practice in Wembley.
Intervention: Practice based pneumococcal vaccination campaign, with implementation of practice protocol, and clinical guidelines issued to all members of the primary health care team.
Outcome Measures: Proportion of patients at risk of pneumococcal infection that had been vaccinated on 16th May 1998, compared with proportion vaccinated on 1st April 1997.
Results: Significant increase in the proportion of patients that had been vaccinated from 2 (0%) before the intervention to 60 (7.6%) one year later ($p<0.001$, 95% CI 5.4 - 9.2%).
Conclusions: A practice based campaign can deliver significant improvements in pneumococcal vaccination uptake in patients considered to be at risk of pneumococcal disease.

Introduction

Streptococcus pneumoniae (the pneumococcus) remains an important cause of morbidity and mortality, despite the introduction of a powerful array of antibiotics, and appreciable advances in medical care[1]. Pneumococcal pneumonia is one of the commonest conditions necessitating acute hospital admission. Admission is often prolonged, requiring intensive treatment, and is associated with considerable mortality. It is estimated that the pneumococcus is responsible for approximately 23,000 deaths a year in England alone[2].

Also of concern is that antibiotic resistant strains of streptococcus pneumoniae are increasing globally. A recent study in Spain revealed that over 50% of isolates are resistant to one or more antibiotics[3]. Similarly, data from 1994, revealed that 2.5% of bacteraemic and meningitis isolates to the Public Health Laboratory Service (PHLS) in England and Wales showed full or intermediate resistance to penicillin, and 11.2% were resistant to erythromycin[4].

In view of the prevalence of pneumococcal infection, the considerable costs to the individual and society, and the associated rise of drug resistant strains of the pneumococcus, there has been a lot of interest in the possibility of disease prevention through the use of vaccination. The 23 valent vaccine (Pneumovac) contains isolates from each of the 23 capsular types of pneumococcus, which together accounts for about 90% of the pneumococcal isolates causing serious infection in Britain.

In 1992 the Department of Health issued guidelines stating that "pneumococcal vaccination should be considered for all those aged over 2 years in whom pneumococcal infection is likely to be more common and/or dangerous"[5]. The guidelines were revised in 1996, on this occasion "recommending" that GPs identify and immunise patients at high risk of pneumococcal infection[6].

As part of GP training it is now a requirement that all GP registrars' initiate a practice based audit. Whilst undertaking my GP vocational training I observed that there was no practice protocol for pneumococcal vaccination of susceptible patients. I decided to undertake an audit to assess our practice's compliance with the Department of Health guidelines, and thereby establish whether there was any need, or scope, for improvement.

Methods

Criteria and standards

The audit was undertaken with the agreement of all members of the primary health care team (PHCT), after discussion at a practice meeting. Draft audit criteria, based on the guidelines, were circulated

amongst all members of the PHCT, and agreed. The criteria for defining those considered to be at overall high risk of infection were based on the guidelines. These were, therefore, expert opinion based, externally agreed criteria. Patients considered to be at high risk of pneumococcal infection are shown in Table 1.

- Asplenia or severe splenic dysfunction
- Sickle cell disease
- Coeliac disease
- Chronic renal disease / nephrotic syndrome
- Immunodeficency or immunosuppression
- Chronic heart disease
- Chronic lung disease
- Diabetes mellitus

Table 1: Patients for whom pneumococcal vaccination is recommended

A literature search was conducted using MEDLINE and CINHAL databases in order to identify previously published audits in this area, to help define a standard. The search terms used were: audit, pneumonia, Pneumovac, and pneumococcal vaccination. As no comparable work was identified, it was decided not to set a standard at the outset.

Identifying patients

Patients considered to be at high risk were identified using a computer search (EMIS), using a combination of Read code diagnosis, and drug treatment. The numbers who had been vaccinated were identified using a computer search using the term Pneumovac.

As the guidelines also encourage pneumococcal vaccination at routine hospital consultations[5], the possibility exists that some patients may have been vaccinated at hospital, and that this information had not been entered into the computer records (as entering data from letters was not routine practice policy). Further, the practice has only been computerised since 1995 - the possibility, therefore, exists that patients have been vaccinated prior to this but the information had not been entered into the computer records. In order to validate this information, the paper records of 20 randomly selected high risk patients were manually searched, to see if there was any record of the patient having been vaccinated.

Pneumococcal campaign

The campaign consisted of raising awareness amongst patients and members of the PHCT regarding those who are considered to be at high risk, and introducing a practice protocol to facilitate their vaccination. This was done using the following means:

Increasing awareness

- Involving all members of the PHCT in the planning of the audit
- Use of posters in the waiting room
- Patient information leaflets kept in reception, the waiting room, and in all consulting rooms
- Guidelines regarding at risk patient groups circulated to all members of the PHCT

Practice protocol

- Ad-hoc immunisation of susceptible patients by doctors and nurses during routine consultations
- A dedicated nurse run pneumococcal vaccination clinic, to take place once a month
- An information sheet summarising all relevant information regarding indications and contraindications to vaccine use, dosage and site of administration, side effects and notes regarding how to record details of vaccination in the patient's records.
- Identifying a lead person to be responsible for ensuring that vaccine stores are kept up to date.
- A commitment to close the audit cycle after a period of 1 year.

Results

The initial computer search, conducted before the campaign, revealed that 725 of the 6008 registered patients (12%) were at high risk of pneumococcal infection. The computer records recorded that only 2 (0%) had been vaccinated. A manual search of the paper records of 20 high risk patients failed to reveal any additional vaccinated patients.

Repeating the exercise approximately one year after the campaign, showed that a total of 60 (7.6%) high risk patients had been vaccinated. Chi-square test was performed, and 95% confidence intervals calculated. Data are summarised in Table 2.

	List Size	Number of patients 'at risk'	Number of patients vaccinated
Before Campaign	6008	725 (12%)	2 (0%)
After6 Campaign	6106	794 (13%)	60 (7.4%)
95% CI: 5.4% - 9.2%; p<0.001			

Table 2: Proportion of patients vaccinated before and after vaccination campaign

Discussion

The results indicate that a practice based audit can result in a small, but highly significant improvement in pneumococcal vaccination coverage amongst patients at high-risk of pneumococcal infection. The improvement achieved is, however, less than that achieved in a health authority based campaign recently reported[7]. The reasons for this are likely to be multiple, including peer pressure from other locally based practices undertaking a similar exercise, acting as an important motivating factor for change. Also likely to be important is that in the health authority based audit, the vaccination campaign was more systematic, involving financial and educational incentives to participating practices, and the patient information leaflets were translated into different languages. Conducting a campaign on such a scale was not possible in the present audit.

Summative assessment is a new development in GP training that has been introduced to help ensure that prospective GPs function above a minimal level of competence[8]. One of the components of the exercise involves the registrar initiating an audit process. At present there is no requirement for the audit cycle to be completed; this appears largely to be due to the time requirement involved in collecting two sets of data[9]. Whilst understandable, such an exercise is likely to be of only limited benefit. It may also serve to reinforce the belief amongst many that performing audit is a purely academic exercise.

I chose to return to my training practice to close the audit loop 8 months after completing my vocational training. The practice were very keen to facilitate this exercise. The results from my evaluation have subsequently been reported back to the PHCT. I have found completing the audit cycle a useful experience as the results were not as impressive as I had hoped. They have therefore provided much food for thought, regarding the process of implementing change[10]. The process has also helped to reinforce the need for on-going audit, in order to achieve improvements in the quality of care provided. On the basis of my experience I would encourage GP registrars to complete the audit process, and try to establish the extent to which their audit achieved (or failed to achieve) the desired result, and importantly, why this was the case.

Conclusion

A practice-based pneumococcal campaign is feasible, and can achieve significant improvements in vaccination amongst patients at high risk of pneumococcal infection.

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A CONTINUING AUDIT ON THE QUALITY OF INFANTS' RECORDS IN GENERAL PRACTICE

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Introduction

There should be close cooperation between the District Health Authority (DHA), the Family Health Services Authority (FHSA) and general practitioners to ensure that all children are fully immunised and receive the recommended core programme of child health surveillance[1]. In Dudley we developed a record card to detail the core programme and to improve communications between the parties concerned. We started to use this card in September 1991 for children attending the surgery for their eight week check and immunisations.

The audit was aimed at improving our records and identifying those children who had received inadequate health promotion. Health promotion includes disease prevention, promotion of a healthy lifestyle and health protection. The general practitioner provision of health promotion to infants is mainly concerned with immunisation and child health surveillance. In our area the health authority provides the neonatal blood screening and hearing tests.

Clear and accurate records are essential. If a procedure has been carried out but there are no records then later legal action is a real possibility[2].

Our objectives were:

1. That the records of all infants aged nine months of age who are registered in the practice should clearly show that all the health checks had been given.
2. That the infant had received the primary course of three immunisations.
3. That the practice should have received full payment from the FHSA for child health surveillance.

Methods

Subjects

We carried out our audit in an urban West Midlands training practice of nine principals with a list size of 19,900 patients. We employed a registered nurse with computer skills as an audit assistant to collect the data.

Definition of Criteria

The records of every infant registered in the practice should be available and should clearly show that all the health checks have been given according to the local protocol. The infant should have received the primary course of three immunisations and records of this should be accurate and up to date.

So that we could measure the quality of the records we held a meeting before the audit was started. The doctors, nurses and health visitors discussed what health promotion should have been offered and agreed that the records of all nine month old children registered with the practice should contain the following core information which was classified under five headings:

Administration

1. Have medical record envelope present
2. Show acceptance by FHSA for child health surveillance by general practitioner
3. Show agreement to immunisation by general practitioner

Neonatal checks

4. Examination findings
5. Birth weight
6. Head circumference
7. Phenylketonuria and thyroid function tests

Eight week check

8. Examination findings
9. Weight
10. Head circumference

Immunisations

11. Primary course of diphtheria, tetanus and polio immunisations started
12. Primary course of diphtheria, tetanus and polio immunisations completed
13. Primary course of pertussis immunisations completed

Hearing testing

14. Record of testing

Data Collection

Each month a list of all children registered with the practice who were born nine months previously was printed by the practice computer. The audit assistant then checked the notes of all these children and recorded on an encounter sheet details of each of the 14 criteria.

This information was then transferred onto a computer database which had been written for the audit. The computer scored one point for each criterion achieved and calculated a subtotal for each heading and total score for each record.

Results

We started in January 1992 by looking at the records of those children born in March 1991. The audit has continued to August 1994. Each month we used the computer database to calculate the score for each criterion achieved and the subtotal score under the five summary headings. We have amalgamated these monthly audits into four audit groups.

The first group of children were born between March 1991 and June 1991 (group one). We audited their records by April 1992. These 64 children received their first immunisation and eight week check before the Dudley form was introduced.

We identified some major problems in group one and therefore took action.

1. Neonatal details in records

The neonatal discharge was usually filed in the mother's record. When possible we made the mothers' records available at the child health surveillance clinic so that neonatal details could be entered onto the Dudley card.

Table 1

	Group One		Group Two		Group Three		Group Four	
Dates of Audit	Jan 92-Apr 92		May 92-Jan 93		Feb 93-Jul 93		Aug 93-Jul 94	
Children's Dates of Birth	Mar 91-Jun 91		Jul 91-Mar 92		Apr 92-Sep 92		Oct 92-Sep 93	
Number in group	64		160		115		217	
	n	%	n	%	n	%	n	%
Administration								
Medical record envelope present	60	93%	150	93%	106	92%	193	88%
Acceptance for CHS by FHSA*	62	96%	160	100%	113	90%	211	97%
Immunisation by general practitioner	59	92%	160	100%	115	100%	216	99%
Total	181	94%	470	98%	334	99%	620	95%
Neonatal checks								
Neonatal Examination findings	0	0%	17	10%	106	92%	210	96%
Birth weight	6	9%	151	94%	106	92%	205	94%
Neonatal Head circumference	0	0%	16	10%	93	80%	157	72%
Phenylketonuria and Thyroid tests	0	0%	78	48%	83	72%	190	87%
Total	6	3%	245	51%	282	82%	552	85%
8 week checks								
8 Week Examination findings	60	93%	154	96%	109	94%	211	97%
8 Week Weight	60	93%	154	96%	112	97%	211	97%
8 Week Head circumference	60	93%	153	95%	112	97%	211	97%
Total	180	94%	461	96%	333	97%	633	97%
Immunisation								
First Dip. tet. and polio immunisations	62	96%	160	100%	113	98%	215	99%
Third Dip. tet. and polio immunisations	62	96%	153	95%	113	98%	214	98%
Pertussis immunisation completed	60	93%	150	93%	113	98%	208	95%
Total	184	96%	463	96%	339	98%	637	98%
Record of hearing test	28	43%	66	41%	97	84%	185	85%

*Acceptance for Child Health Surveillance by Family Health Services Authority

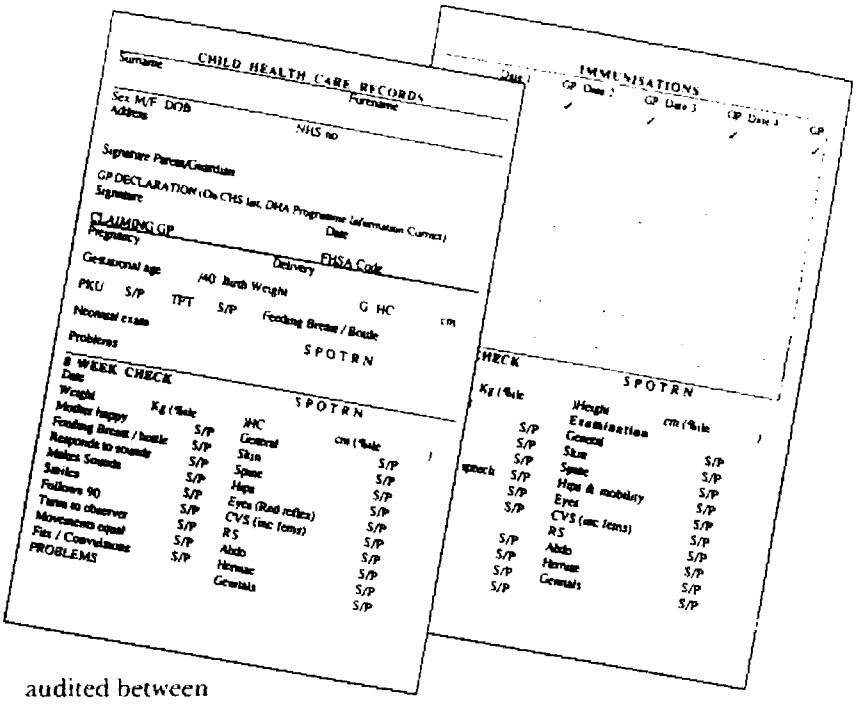
2. Hearing tests

The DHA had records of the hearing tests but these had not reached the practice. Instead of cards being sent to the practice after each immunisation or examination we agreed that only two postcards were needed - one giving neonatal details and the other a summary of all events up to nine months.

3. Practice income

Our practice records showed that forms for child health surveillance by the general practitioner had been submitted for 90% of children. The FHSA had made payment for only 80%. We arranged for a three monthly printout from the FHSA showing all those children accepted by the FHSA for child health surveillance. This list is compared to the practice records and any differences reconciled.

The second group of children were born between July 1991 and March 1992. These 160 children received their first immunisation and eight week check using the initial Dudley form. The third group of 115 children whose records were audited between February 1993 and July 1993 were born after the initial audit in April 1992 and show the benefits of the audit and the simplified Dudley form.

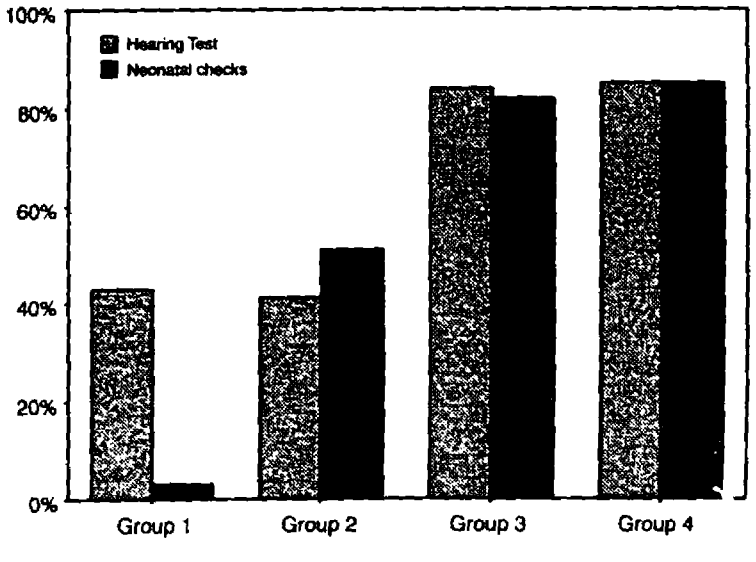


Comparison of Groups Two and Three

Chi square test was used to compare groups two and three. There were significant differences in the recording of neonatal examination findings ($p<0.001$), neonatal head circumference ($p<0.001$), PKU and TFT results ($p=0.001$) and hearing test ($p<0.001$). The fourth group are those we have audited over the past year. This group shows that the records are continuing to reach most of the criteria we initially set.

The bar chart (figure 1) illustrates how we have improved the record keeping of neonatal checks and hearing tests. We maintained our high standards in administration, immunisation and eight week checks (table 1).

Figure 1. The percentages of infants recorded as having hearing tests and neonatal checkes, group 1 born March 1991-June 1991, group 4 October 1992- September 1993



DISCUSSION

As a result of the problems identified in the first audit we changed our administration of the immunisation and child health surveillance clinic. We also suggested changes that the FHSA and DHA could make to improve the quality of our records. The effect of some of these changes did not become apparent for nine months and are reflected in the records of the third group of children. We made contact with the few children who were not fully immunised but their parents refused permission for further immunisation.

An integrated child health service is essential for the care of children[3]. This audit has been

very useful in integrating our services with the FHSA and the DHA. We have become more aware of each others problems. Each month we find that the records of some children are incomplete. These are usually the records of children newly registered. The slight slippage shown in the fourth group of the number of record envelopes received will have to be addressed.

We feel that there is a need for this audit to continue to improve the quality of our records. In Northampton the effectiveness of a surveillance programme was improved by reporting back to the primary health care team[4]. We have brought members of the primary health care team together with monthly audit and have improved our record keeping. Our finances have benefited as each child health surveillance fee missed can cost the practice £50 in lost income.

The 1994 Audit Commission report *Seen But Not Heard*[5] encourages FHSAs to look at the care given to children by general practitioners. It also states that health commissioners and providers of community health services should work together to develop evaluation techniques. We feel that general practice audit based on an agreed list of criteria could be a basis for evaluation and would convince the FHSAs of the high standard of care given to our patients.

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An audit to assess the number and characteristics of patients who fail to attend pre-booked appointments and an evaluation of the effectiveness of instituted changes

Howard Daitz

An audit to assess the number and characteristics of patients who fail to attend pre-booked appointments and an evaluation of the effectiveness of instituted changes. Audit Trends 1997;5:43-46.

Summary

An audit was undertaken in a general practice of the number and characteristics of patients who failed to attend pre-booked appointments without calling in advance to cancel the appointment ('no-shows') and to see if certain measures could be implemented to reduce this rate.

Data were collected over a three week period to identify all those who failed to attend, noting their age and sex. 68 people failed to attend without cancelling. 69.1% of these 'no-shows' were female.

Three measures were introduced to affect patient behaviour: posters were displayed in the waiting room; appointment cards were given out to patients reminding them of the need to cancel appointments if they were unable to attend; and, if patients should book over the telephone, they were again reminded of the need to cancel appointments if necessary.

Data were then collected over a further three week period and after statistical analysis it was found that the number of 'no-shows' had reduced and that this was statistically significant.

In both data collections the age group most likely to fail to attend was those between 16 and 24 years of age and those over 65 years were found to be the least likely to fail to attend. The practice continues to use these measures.

Introduction

After some months as a registrar in general practice the author identified that a number of patients did not attend pre-booked appointments and, in addition, they did not contact the surgery to cancel the appointment in advance. Three research studies were identified which investigated the incidence of 'no-shows' with one examining possible reasons and the other two considering possible measures to reduce the amount of non-attendance.

The audit reported in this paper intended to find out the rate of 'no-shows', whether 'no-shows' within the surgery were more prevalent among certain age groups and whether the patient's sex was also a factor for consideration. I also set out to evaluate the effect of possible measures which could be introduced to reduce the rate of 'no-shows'.

Mosser[1] carried out a study based upon a family practice and looked at 1,380 consecutive appointments. He showed that the overall 'no-show' rate was 13% , demonstrating a correlation between the length of time from booking the appointment and the rate of 'no-show'. He then repeated the study after instituting a postcard appointment system which served as a reminder. This was well received by patients, was simple to institute, but had little effect on improving appointment keeping behaviour.

Danoff et al[2] looked at the effectiveness of telephone reminders to improve the rate of attendance in a paediatric out-patients clinic. Telephone reminders were attempted the evening before scheduled appointments for 238 subjects. 259 controls received no reminders. He was unable to demonstrate any significant difference between the two groups.

Verbof[3] attempted to explain why patients failed to attend appointments. He studied 100 attending patients who had failed to keep their dermatology clinic appointments and asked the reason for their

non attendance. He identified many different reasons but illness (28%) and problems related to appointments (33%) were prominent.

In summary, then, this audit set out to investigate the number of non attendees ('no-shows'), identify any common characteristics and consider whether, by introducing a number of measures, the rate of non attendance could be improved.

Method

In this audit 'no-shows' were defined as patients who failed to keep appointments and who did not telephone to cancel the appointment in advance. The study was carried out over two separate three week periods and was based upon a general practice population of 6,700 patients in Hertfordshire.

Pilot

It was necessary to run a small pilot study over five days to determine if reception staff were able to record 'no-shows' and their characteristics as they would play the most important role in collecting data. They were indeed able to record this information and a fuller scale audit was then prepared.

The audit

Letters were sent out to all members of the reception staff informing them of the audit. Staff were asked to record, on pre-prepared forms, the patient's name, date of birth and date of non-attendance. Five age bands were established. The reception staff were happy to comply with the study.

The first part of the study was carried out over three consecutive weeks in September and data were successfully collected. Before commencing the second part of the study, three measures were introduced, aiming to affect patient behaviour:

Waiting Room Posters: Two large notices were displayed in the waiting areas. These informed patients about the number of 'no-shows' in the three week period. The notice then asked them to inform reception in advance if they wanted to cancel an appointment.

Appointment Cards: All patients who booked their appointments at reception were given an appointment card and, at the bottom of the card, they were again asked to telephone the surgery if they needed to cancel their appointment.

Telephone Appointment Bookings: Finally, reception staff were asked to remind all patients who booked over the telephone to contact the surgery to cancel their appointment in advance, should they need to do so.

These changes were allowed to continue for four weeks before initiating the second part of the audit. Since no appointments were booked longer than one month in advance it was assumed that all patients would be aware of these changes. The study was repeated over a further consecutive three weeks and reception staff continued to collect the same data about 'no-shows'.

Results

There were 1,274 pre-booked appointments in the first three week study. 68 people (5.33%) failed to attend. In the second three week study there were 1,291 pre-booked appointment with 45 patients (3.48%) failing to attend.

In terms of the sex distribution of 'no-shows', in the first study 21 (30.9%) were male. 47 (69.1%) were female. The distribution was very similar in the second study with 12 males (26.7%) and 33 females (73.3%).

In terms of age distribution, using the five age groups established at the outset, results can be seen in figures 1 and 2.

In both studies, the 16-24 year olds were the most common group likely to fail to attend (30.9% vs 35.6%). The least common group to fail to attend were the 65+ age group (13.2% vs 9.5%).

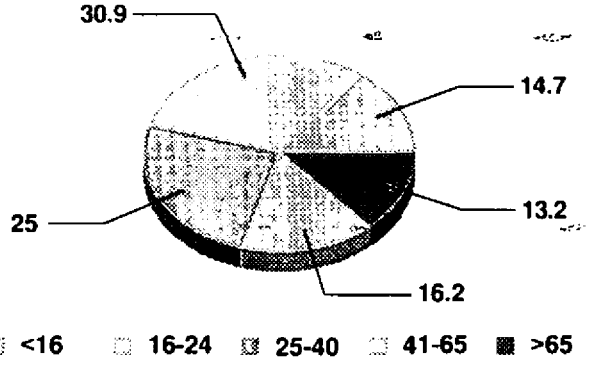

Figure 1. Age Distribution of 'No-Shows' for First Three Week Study. (Figures represent percentages)

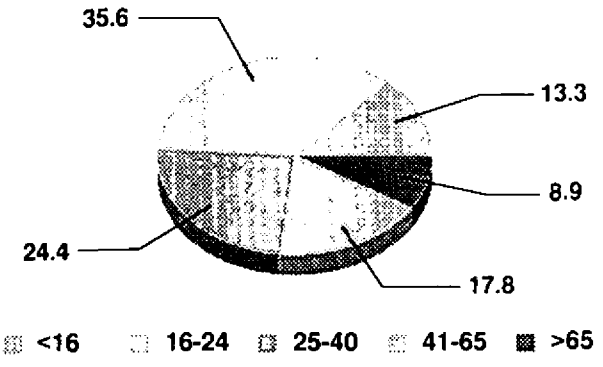

Figure 2. Age Distribution of 'No-Shows' for Second Three Week Study. (Figures represent percentages)

Statistical Analysis

In order to determine if the rate of 'no-shows' had been significantly reduced in the second study, a test of difference between sample proportions was used. A null hypothesis was formulated stating that there was no significant difference between the two sample proportions and that this assumed that the two samples were therefore from the same population. An alternative hypothesis was formulated stating that there was a significant difference between the two sample proportions and that they were likely to be from two different populations. Selecting the 5% significance level, the null hypothesis will be rejected if Z>1.96.

Applying the test of difference between sample proportions:

$$Z = \frac{p_1 + p_2}{\sqrt{\hat{p}\ (1-\hat{p})\ \frac{1}{(n_1+n_2)}}}$$

p_1 and p_2 are the observed proportions in samples 1 and 2 n_1 and n_2 are sample sizes,

$$\text{and } \hat{p} = \frac{p_1 n_1 + p_2 n_2}{n_1 + n_2}$$

$$Z = \frac{0.0533 - 0.0348}{\sqrt{(0.044 \times 0.956)(0.000785 + 0.000775)}}$$

$$= \frac{0.0155}{0.0081}$$

Z=2.28

Since Z>1.96 the null hypothesis must be rejected. The difference is significant.

Conclusion

The audit has produced some very interesting results. Most important is that the 'no-show' rate was significantly reduced by the implementation of the three measures outlined above. The first study showed that the number of 'no-shows' (68) was the equivalent of almost one surgery per week.

Mosser[1] had a 'no-show' rate of 13%. Although not analysed statistically, the 'no-show' rate in this study of 5.33% was significantly better. Mosser showed that there was a direct correlation between the rate of 'no-shows' and the length of time elapsing between the appointment being booked and the appointment itself. It is a notable point that this practice's appointments can only be booked four weeks in advance and this could have an important effect on the 'no-show' rate. This practice is, in fact, keen to extend the appointment booking time and the possible effect on the 'no-show' rate should be a consideration.

'No-shows' were far more likely to be female. Females may book more appointments than males and perhaps fail to attend because of family commitments. This, however, should not prevent them from calling the practice to cancel the appointment in advance.

The 16-24 year old group had the highest number of 'no shows' This may be due to work, study or social commitments, but may also be due more to ignorance and demonstrates that there is a particular need for patient education in this age group. The study also suggests that patients take notice of information displayed on the walls of the surgery and on the booking appointment cards. During the course of the study it was not uncommon for a patient visiting the surgery to comment on the rate of 'no-shows' displayed on the waiting room posters.

In summary the study measured the rate of 'no-shows' and identified the most likely 'no-shows' in terms of age group and sex. The study also identified simple preventative measures for implementation and demonstrated that these measures succeeded in significantly reducing the number of 'no-shows'. Because of the results of the audit, the three measures outlined above continue to be used by the surgery.

Epilogue

A local journalist visiting the surgery had noticed the waiting room posters and had been surprised by the

number of 'no-shows'. She requested further information from the surgery and used this for an article in the main local newspaper, entitled "Selfish Patients Purge".

The article said that doctors were 'cracking down on selfish patients who miss appointments, keeping vital medical time from the genuinely ill'. The article went on to talk about the posters displaying the numbers of patients who fail to attend appointments and mentioned the audit which was in process. The article actually stated that patients could, in theory, eventually be struck-off for non-attendance. However, this is not a policy which is currently enforced by this practice. The article quoted the practice manager as saying: "We try to accommodate everyone.....but it does not make it any easier if people miss appointments".

It would be interesting to run a further study in the near future measuring the rate of 'no-shows', to try to ascertain the possible effects of the article and the part that the media can play in patient education.

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