Such measures will probably produce results only in the long term, however. Population-based screening may therefore be a realistic alternative at present and is likely to have a more rapid impact on the problem of hypertension.

Secondly, the prevalence of secondary hypertension was low (5·8%) and that of surgically curable cases ever lower. The prevalence of secondary hypertension in this study was lower than other estimates.[11-17] Our analysis is, however, the first one to be done in subjects derived from screening a total population. Furthermore, we studied only men aged 47-54 years. The prevalence of secondary hypertension might be higher in women or in younger men. Our results suggest, however, that in middle-aged men extensive investigations aimed at detecting secondary hypertension are not necessary in those found to have hypertension at screening. In patients with hypertension referred to hospitals secondary hypertension is probably over-represented and more extensive routine investigations might be justified. Renography as a screening instrument for renovascular hypertension cannot be recommended. The prevalence of renovascular hypertension was low, and there were many false-positive renograms.[18] Our results support the findings of recent cost-benefit analyses of urography and renography as screening instruments for renovascular hypertension[19] and of comparisons of surgical and medical treatment of renovascular hypertension.[20] The tests we used led to surgery for two patients, neither of whom was cured. Both our results and those quoted above thus suggest that in planning for community control of hypertension secondary hypertension should not be sought with advanced investigative methods. Instead, only patients whose history, physical status, or routine test results suggest secondary hypertension should be submitted to further investigation. The remainder, more than 95%, should be given drug treatment.

Whether or not the standard investigations we performed in all men with hypertension are also unnecessary is more difficult to assess. Electrocardiography, chest *x*-ray examination, the tests for albuminuria, and measurements of serum creatinine may show hypertensive organ damage in a relatively high percentage of patients.[21 22] The importance of identifying those with a poorer prognosis, thus enabling more intensive treatment and follow-up, justifies retaining these procedures in the standard investigations of the hypertensive patient.

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Randomised controlled trial of antibiotics in patients with cough and purulent sputum

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Summary

Two hundred and twelve adults with cough and purulent sputum of up to one week's duration were allocated randomly to treatment with doxycycline or placebo capsules for up to 10 days. Cough, purulent sputum, feeling "off colour," and time off work lasted as long in treatment and control groups, but running nose persisted for a shorter time in the doxycycline group. The number of new episodes of lower respiratory tract infections, vaginal infections, gastrointestinal upsets, and otitis media over the next six months were the same in both groups, but fewer new upper respiratory infections were experienced by the doxycycline-treated patients.

There is no consensus among doctors about using antibiotics in patients with cough and purulent sputum, and these results indicate that otherwise healthy people with these symptoms will usually get better without antibiotic treatment.

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Introduction

Respiratory infections are so common and sometimes so trivial that they are not always regarded as diseases. There is also no clear relation between many clinical respiratory syndromes and the organisms isolated, because a range of symptoms and signs is caused by the same organisms and vice versa.[1] Host resistance is equally variable: dietary, socioeconomic, hereditary,

family, and atmospheric factors all modify the individual's experience of respiratory symptoms and diseases. Doctors show diverse diagnostic habits over the individual syndromes.[2] Furthermore, they seem to be eqully inconsistent in their choice of treatment for many respiratory infections, although Howie has shown that an analysis, which takes into account background information about the patient, his symptoms, and his signs, will correlate more closely with the treatment prescribed than will any diagnostic label.[3]

Antibiotics are generally agreed to be overprescribed, and doctors are becoming critical about the justification for antibacterial treatment in many respiratory tract infections.[4-8] Furthermore, there is increasing awareness of the financial and health consequences of too many antibiotics in our environment. If clear therapeutic guidelines are difficult to formulate for the common respiratory infections it is because of the lack of our insight into environmental-host-organism relationships[9] and the field is left wide open for exploitation by advertising, fashion, and dogmatic educators. The randomised controlled trial is probably the best way of helping to provide answers to these awkward therapeutic questions.[8]

Patients with cough and purulent sputum are not treated uniformly by doctors so that no ethical objections can be raised to a double-blind randomised controlled trial to investigate the value of antibiotic treatment in such patients. This study was designed to answer two questions: Does antibiotic treatment modify the clinical course of a cough with purulent sputum production in otherwise healthy adults who have been unwell for up to a week? and Does such treatment influence the incidence of subsequent infections?

Methods

Patients from three group practices who were aged over 14 years and who had cough and purulent sputum of up to one week's duration were admitted to the trial, which ran for two years from October 1973 to September 1975. People were excluded from the trial if they had abnormal clinical signs in the chest on auscultation; persistent sputum expectoration in winter months; any chronic disease; or a history of sensitivity to tetracycline, or if they were pregnant.

At the clinical examination the doctor questioned the patient about the duration of symptoms: day cough, night cough, yellow or green sputum, clear sputum, running nose, a feeling of being "off colour," three further symptoms (to be specified), and time off work (with and without a certificate). The days on which each symptom were present were marked on a card* together with the patient's pulse rate, whether he was clinically febrile, and the general clinical impression (well, intermediate, or ill). Age and sex, occupation, and smoking habits were also recorded. The patient was given a prenumbered bottle (of doxycycline or placebo) containing 11 capsules and a card similar to that already completed by the doctor. The patient took two capsules on the first day and one capsule daily thereafter and recorded the presence or absence of symptoms and days off work as listed above. Patients were reviewed at one week, when, if both doctor and patient were satisfied with the outcome and if sputum was clear, treatment was ended and the tablet bottle returned. Otherwise, patients were given a further card and asked to complete the course of tablets and enter on the card the presence or absence of symptoms for a second week.

Patient compliance over recording symptoms and taking treatment was assessed by counting the number of capsules in bottles returned by patients at the end of treatment and by calling at the homes of a one-in-five sample of patients during the first week of treatment to check whether they were making daily records and taking their capsules as directed. We could end the trial for any person at any stage if necessary, but the reason for termination had to be notified. A follow-up examination of each patient's clinical record was carried out after six months to ascertain whether there had been any subsequent morbidity. The trial was conducted in one group practice in 1973-4 and then extended to include two further group practices in 1974-5. All 22 doctors who entered patients into the trial were briefed about the objectives of the study and the method. They were also subjected to a blind clinical signs interpretation study in which one of us (NCHS) acted as the index examiner. Up to four patients from each participating doctor were auscultated and both clinicians recorded their findings independently. A part-time health visitor was employed to help in the daily checking of cards, to visit a sample of patients during the first week of treatment, to visit patients who did not attend review, and to follow up patients six months after their trial treatment.

Respiratory diagnoses were checked daily from the medical records, and this identified only 12 patients who qualified for the trial but were not entered into it: seven were omitted because a doctor forgot to enter them; one claimed to be unable to swallow capsules; one had been nauseated by doxycycline previously so did not want to participate; and three refused to take part. There were also two patients who entered the trial but were non-responders: one woman did not like green capsules, so she treated herself with "Beechams" and got better, and one man did not return for follow-up and all attempts to trace him failed.

*Details available on request.

Results

Two hundred and twelve patients were allocated at random to treatment with doxycycline or placebo (106 each). Seventy-six per cent of episodes occurred during October to March. The two groups showed only minor differences in age, sex, occupation, smoking habits,* and clinical findings.* Five patients did not complete the trial. Three on placebo suffered alleged side effects (nausea, abdominal pain, and headache), and two on doxycycline became worse and developed clinical signs of lower respiratory infection.

The number of symptoms recorded after admission to the trial and their duration in 207 patients—104 on doxycycline and 103 on placebo are summarised on table I. The general clinical impression was that at the time of the return visit 27 patients were not yet well (10 on doxycycline and 17 on placebo). Only eight of these had failed to improve during the seven to eight days of treatment, however; three had developed signs of lower respiratory infection (one on doxycycline and two on placebo) and five patients on placebo had unchanged symptoms and signs. Twenty patients recorded vomiting (believed to be a side effect of doxycycline) of about two days' duration, but there was no significant difference between the numbers in the two groups. The ninety patients certified off work were equally distributed between the two groups and the time off work clustered around one week. The average (±SD) consumption of capsules was 9·3±2·1 on doxycycline and 9·2±2·0 on placebo. The two groups, therefore, took similar doses over similar periods.

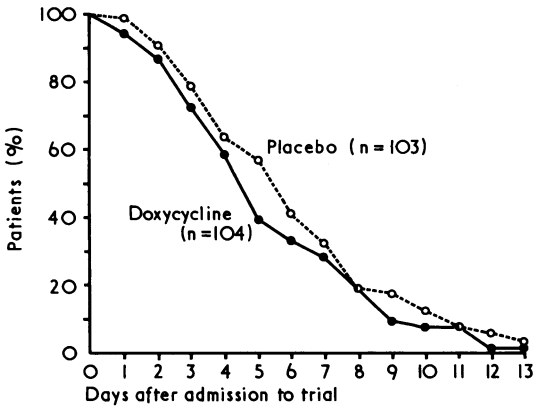
TABLE I—*Clinical state at revisit and duration of symptoms of those who completed trial*

Symptoms	Doxycycline (n = 104)		Placebo (n = 103)	
	No	Duration (Days ± SD)	No	Duration (Days ± SD)
Clinical impression:				
Well	94		86	
Intermediate	9		12	
Ill	1		5	
Day cough	104	6·4±2·6	103	6·3±3·0
Yellow spit	100	4·7±2·9	102	5·3±3·1
"Off colour"	84	3·8±2·2	91	4·4±2·7
Night cough	84	4·2±2·3	84	4·9±3·1
Running nose	77	4·3±2·3	81	5·2±2·9
Clear spit	79	4·1±2·3	75	3·7±2·0
Sore throat	11	3·4±2·2	20	3·9±2·2
General aches and pains	22	3·5±1·9	17	4·9±2·9
Headache	16	3·4±1·8	14	3·4±2·2
Vomiting	12	1·6±0·9	8	2·4±1·7
Off work (certified)	44	6·2±2·8	46	6·2±3·1
Off work (not certified)	18	3·3±2·6	18	2·5±2·0

A cross-sectional analysis of the principal symptoms for the 207 patients on the seventh day after treatment confirmed the results shown in table I, except that on the seventh day a running nose was experienced by more patients on placebo ($\chi^2 = 6{\cdot}7$; $P < 0{\cdot}01$).* The number of patients still showing the principal symptoms of cough, purulent sputum, feeling unwell, and needing to be off work, however, were not significantly different in the two groups. The prevalence of a recording of purulent sputum is shown in the figure, and a significant difference between the treatment and control groups is visible only on the fifth day ($\chi^2 = 6{\cdot}6$; $P \approx 0{\cdot}01$).

The presence of absence on the seventh day of the principal symptoms and their average durations were calculated for identifiable

*Details available on request.



Percentage of patients recording yellow sputum each day after admission to trial.

subgroups of patients. Those who had had purulent sputum for five to seven days before being entered into the trial were no different in their response from those whose sputum had been purulent for one to four days before the trial. Secondly, smoking habits (non-smoker, light or medium, and heavy) did not affect the duration of purulent sputum production after entering the trial. The blind clinical signs interpretation study failed to identify any great differences between the doctors. Nevertheless, some doctors entered many more patients into the trial than others, but we found no significant differences between the symptoms or the outcome in patients who were entered by different doctors. Furthermore, there were no significant differences between the outcome of patients from the three centres that participated in the trial.

The six months' follow-up of patients' records after the trial showed no significant differences between doxycycline and placebo groups in the occurrence of lower respiratory infections, middle respiratory infections, otitis media, diarrhoea and vomiting, asthma, other infections, or other morbidity. Significantly fewer patients in the doxycycline group, however, developed episodes of upper respiratory infections during the six months after the trial (table II).

TABLE II—*Number of patients suffering episodes of illness during six months' follow-up*

Symptoms	Doxycycline (n = 104)		Placebo (n = 103)	
	No of patients	No of episodes	No of patients	No of episodes
Upper respiratory tract infection	13*	16	25	37
Lower respiratory tract infection	7	7	9	11
Otitis media	1	1	1	1
Diarrhoea or vomiting, or both	7	8	5	7
Other infections	20	31	25	36
Asthma	2	—	4	—
Other morbidity	48	75	53	77

*Significantly fewer patients (and episodes) on doxycycline: $\chi^2 = 4{\cdot}0$; $P < 0{\cdot}05$.

Discussion

We have shown that otherwise healthy adults who present to their general practitioners with cough and purulent sputum of up to one week's duration and whose chests show no abnormal clinical signs on auscultation will usually get better as quickly without as with antibiotic treatment. Only five patients out of 212 became worse or developed signs of lower respiratory tract infection while taking trial capsules; three were on doxycycline and two were on placebo. We could not identify characteristics in these five patients that would distinguish them from the others in the trial. On the fifth day after starting treatment the doxycycline-treated patients seemed to be doing better than controls, but the difference was only significant for that day.

Howie failed to find a consensus view among doctors about the use of antibiotics in patients with cough and purulent sputum, but he noted that older Scottish general practitioners prescribed fewer antibiotics than their younger colleagues and that the symptom purulent sputum was a powerful weighting factor in favour of a decision to choose antibiotic treatment.[3] This may be a correct decision in the presence of chronic chest disease or other risk factors, but our findings suggest that it is not correct for otherwise healthy adults who have had purulent sputum for up to one week. Gordon *et al* came to similar conclusions about various respiratory infections in otherwise healthy children, but only 10 of the 89 patients in their study had signs in the chest,[10] and Howie and Clark provided further evidence in their early treatment trial using self-administered demethylchlortetracycline for colds and influenza-like illnesses.[11] We used a carefully defined group of patients with "middle respiratory tract infection" and an antibiotic that is taken once a day, well absorbed, achieves excellent penetration into bronchial and sinus secretions,[12] and is effective against most bacterial and some non-bacterial pathogens of the respiratory tract.[13 14] The patients took the trial capsules with remarkable consistency, which is in agreement with the apparent lack of side effects and the acceptability of a once-daily dosage regimen.

The trial yielded two results that are difficult to interpret. Firstly, more of the patients on placebo had persistent running noses on the seventh day after treatment than those on doxycycline (30:14), although the persistence of purulent sputum was similar in the two groups; and, secondly, the six-month follow-up showed that significantly more patients reported recurrences of upper respiratory infections in the placebo group than in the doxycycline-treated group (25:13), whereas recurrences of lower respiratory infection or any other morbidity during the same six months were the same in the two groups. The numbers were small for both findings, but they were statistically significant, and we report them because they may prove relevant to future hypotheses.

In primary medical care most clinical decisions have to be based on history-symptom-sign complexes rather than on conventional diagnoses, yet doctors often record "diagnoses" alone for the sake of brevity. This shorthand obscures the true clinical findings and is associated with loose definitions of diagnostic terms. Hence we randomised adult patients with cough and purulent sputum who had no abnormal chest signs because there was no consensus view among the doctors who participated in the trial about how this symptom-sign complex should be managed; thus it was not unethical to randomly withhold antibiotic treatment. The results have cast doubt on the value of antibiotics for such patients and the time is now ripe for a further trial to test the doubtful evidence that has been used to support antibacterial treatment for most patients with purulent sputum and signs of lower respiratory infections. Perhaps otherwise healthy patients with abnormal chest signs but little evidence of systemic infection are a logical group to investigate next. Obviously, such studies must be double-blind and controlled if misleading conclusions are to be avoided, yet large-scale uncontrolled studies are still used for promoting drugs.[15]

An idea that is beginning to attract interest is Howie's suggestion that "consensus views" could be used as a basis for teaching therapeutics in primary medical care until definitive studies are published.[3] This pragmatic approach to a difficult problem may make it more difficult to justify randomised controlled trials, which do help to establish scientifically the merits of therapeutic procedures. It would be unfortunate to compound the problems created by the "procrustean bed of medical nomenclature"[16] with those of the "seductive bed of consensus therapeutic views" and Howie's own cautious attitude to the application of consensus views[17] should be heeded.

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Hepatitis B virus infection in dental surgical practice

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Summary

Sixty-one dental surgeons at King's College Hospital were interviewed to establish the incidence of attacks of viral hepatitis and to relate this to environmental risk factors. Six (10%) had a history of hepatitis, in one case due to infection with the hepatitis B virus. Screening blood for HBsAg by radioimmunoassay showed no carriers of the antigen, but transient antigenaemia was observed in one dentist. Antibody to HBsAg, tested by radioimmunoassay, was detected in four dentists (7%), only one of whom had had clinical hepatitis.

Dental surgeons may be more at risk from infection with the hepatitis B virus than the general population, although this should be minimised in hospital practice, where the most infected patients will already have been identified and appropriate precautions can be taken. The risk of transmission from an antigen-positive dentist to his patients is probably much smaller, and there is no evidence to restrict his clinical activities.

Introduction

Several recent studies have suggested that both the attack rate for acute hepatitis B and the incidence of asymptomatic carriage of hepatitis B surface antigen (HBsAg) are higher in dental surgeons than in the general population.[1 2] Inevitably this has led to discussion about the risk of dental staff transmitting HBsAg to their patients. Most of the reports in the UK and USA have based their conclusions on studies of general dental practitioners. Members of staff of a dental school are perhaps more at risk, particularly at centres such as this, where the medical and dental school are on the same site and where medical inpatients are often referred for dental treatment. There are also specialised liver and renal dialysis units and two drug dependency centres in the immediate vicinity. Furthermore, the local population includes many immigrants, many of whom are from areas where HBsAg carriage is highly prevalent.

We report here the results of a detailed survey of the clinical dental staff.

Methods

Of the 80 dental surgeons working at the dental school, 61 with direct clinical responsibility agreed to take part in this study, which was carried out in April to September 1975. Their ages ranged from 24 to 60 years (mean 36); 52 were men and nine were women. Only 12 specialised in oral and maxillofacial surgery.

One of us (GG) interviewed all the dental surgeons. A comprehensive questionnaire was completed in their presence, which included details of type and length of dental practice, including time spent abroad, whether there was a history of blood transfusions or contact with jaundiced patients, drug addicts, or patients with chronic liver or renal disease. If there was a history of jaundice they were asked whether the diagnosis had been confirmed by blood examination and whether the hepatitis was type A or B.

A blood sample was taken at the interview and examined for HBsAg using radioimmunoassay.[3] This was based on a solid-phase technique[4] using polypropylene tubes coated with hepatitis B antibody (Abbott). The guinea-pig antibody possessed anti-a, anti-d, and anti-y specificities. The specificity of all the results was checked by repeating the assay after neutralisation with antibody to HBsAg (HBsAb). HBsAb was detected using a solid-phase radioimmunoassay system similar to that used for detecting the antigen.[5] ^{125}I-labelled HBsAg of human origin was mixed with the serum to be tested and then added in a one-step procedure to polypropylene tubes previously coated with HBsAg. After incubation and washing the radioactivity in each tube was measured in a gamma-scintillation counter.

Results

Analysis of the questionnaire showed that 27 of the 61 dental surgeons had knowingly treated HBsAg-positive patients, some of them many times, but they had always taken appropriate precautions, such as wearing a mask and gloves. Six dental surgeons (10%), five of whom had been engaged in dental practice for long periods (19 to 37 years),

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