

Briefing

KEEP ON TAKING THE TABLETS ?

a review of the problem of patient non-compliance

Definition of the problem

There has always been a problem in making sure that patients take the medicines which doctors prescribe for them in accordance with their instructions. The problem varies from the patients who forget the occasional tablet, or take rather too large a dose of the mixture, to those who never even bother to get their prescription dispensed. Other patients, for example, 'feel better' half-way through their course of treatment, and leave the remainder in the bathroom cupboard. This can be particularly serious in a course of antibiotic therapy, when resistance can develop in the bacteria as a result of insufficient length of exposure to the full dose of the medicine which was intended completely to eradicate the infection. Another major problem is typified by the treatment of asymptomatic raised blood pressure. Here the patient may even feel worse as a result of side-effects of the medication, and may disregard the long-term potential benefit of a reduced risk of suffering from a stroke or a heart attack.

The *Briefing* refers to the methods which are used to try to assess the extent of the problem; it gives some estimates of the degree of non-compliance among patients; it discusses the reasons for this non-compliance; and it proposes strategies to improve the situation. Among other factors, it suggests that the widespread extent of non-compliance indicates a breakdown of confidence and mutual respect between the doctor and patient. In a satisfactory doctor-patient relationship the patient should fully understand all aspects of his treatment and should be careful to follow accurately the doctor's advice; if the patient for any reason disregards this advice he should frankly explain his reasons for doing so to the doctor. Otherwise the doctor is acting in the dark as to what therapy is actually being received and the patient is failing to make a frank and constructive contribution to his own treatment.

With an honest therapeutic dialogue between the patient and the doctor, the pharmacist who dispenses the medicines can also play an important role. At least one experiment has shown how the behaviour of the pharmacist can crucially influence patients' compliance.

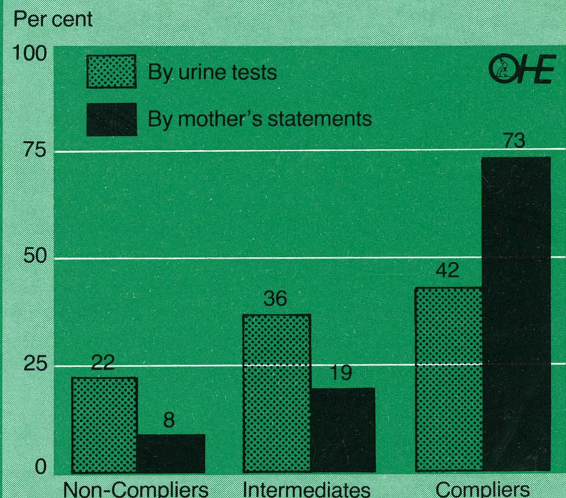
The *Briefing* refers only to the problem of compliance in General Practice. There may also be a problem with hospital patients, which is not discussed in this paper.

Methods of measuring compliance

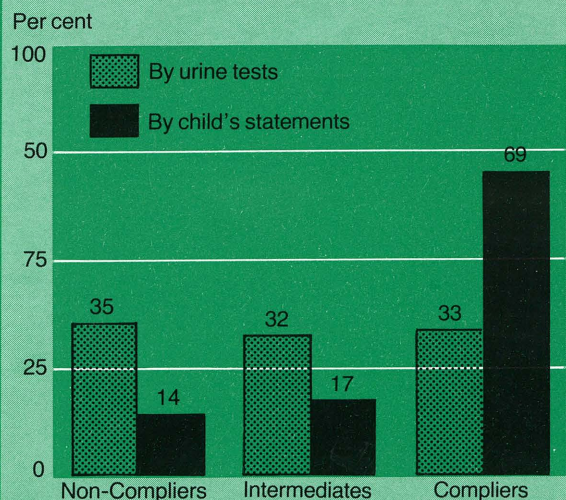
The simplest, but least reliable, method of finding out whether a patient has taken the medicine which has been prescribed for him is to ask him. A second method is to ask a close relative a spouse or a child's mother. However, neither

Figure 1 Degree of compliance measured by interview and urine test.

(a) Clinic compliance based on mother's statement compared with urine tests. (N=45)



(b) Clinic compliance based on child's statement compared with urine test. (N=103)



Source: Gordis et al (1969)(i)

of these methods can be very precise, nor can they detect deliberate attempts to conceal a failure to take the medicine.

A more sophisticated approach is to count the number of tablets used over a given period. If a patient is supposed to be taking three tablets a day, 21 should have been used out of the container over a seven day period. Individual research studies have often used this method, and a suspicious prescriber may sometimes ask a patient to bring any unused tablets into the surgery when a repeat prescription is due. However, even this method cannot cope with the behaviour of a patient who puts his tablets down the lavatory instead of down his throat.

The only reliable method to check on a patient's compliance with his treatment is to perform analyses on his blood or urine to ensure that the expected quantity of medication is present in the body. If necessary, specific markers can be added to the medicine, whose presence can then be easily detected, for example in the urine (Pearson 1982). Routine analyses are increasingly carried out during clinical trials, when it is essential to know that the medicine which is being tested is actually being taken by the patients in the trial. Urine and blood tests have also been used in specific studies on patient compliance, particularly as a check on the reliability of patients' reported behaviour.

Figure 1 shows a comparison of estimates of compliance and non-compliance with a regimen of oral prophylaxis against rheumatic fever in two groups of children. In Figure 1(a) the mothers' reports are compared with the results of urine tests. 73 per cent of mothers claimed that their children had complied; urine tests indicated a figure of only 42 per cent. In Figure 1(b) the children's account of their compliance is similarly compared. The children reported 69 per cent compliance; objective analysis reduced the figure to 33 per cent. Thus in each case, the degree of compliance is considerably overstated in the interview, as against the more objective assessment made by the urine analysis.

The extent of the problem

Looking first at the question of the extent to which patients fail to present their prescriptions for dispensing, the substantive evidence is that this is a minor problem. Estimates of the number of prescriptions written in Britain are available from Intercontinental Medical Statistics Ltd, and the precise number of prescriptions dispensed is known from the Government's Prescription Pricing Authority, which checks every prescription dispensed in order to calculate the dispensing pharmacists' remuneration. Using these sources, there is a good accord between the estimates of numbers of items prescribed and the numbers dispensed.

However, when it comes to the question of how accurate patients are in taking the medicines in accordance with their prescriptions, there are many studies which show that –

particularly with long-term therapy – their performance is very poor. Figure 2 shows the results of eight studies, giving compliance rates of between 41 per cent and 69 per cent. On average only about 50 per cent of patients were taking their medicine reasonably in accordance with the doctors' instructions. The conclusion that nearly half of all patients do not take their medicine or do not take it as prescribed is confirmed in recent surveys by Evans and Spelman (1983) and O'Hanrahan and O'Malley (1981).

When it comes to assessing the significance of non-compliance, the study of childhood prophylaxis against rheumatic fever (referred to in Figure 1) gives some indication (Gordis et al 1969). Roughly one-third were taking none of the medicine, one-third were taking it as prescribed, and the rest were divided between these two extremes. A similar pattern has been found among steel workers on anti-hypertensive medication (Sackett et al 1975; Hayes et al 1976). Although these studies relate to prophylaxis rather than therapy, the pattern is probably similar in the two cases.

With short-term medication for treatment, the situation is predictably better. Two studies, one based on a count of tablets and the other on interviews, both suggested that more than three-quarters of patients complied with their prescription (Donabedian et al 1964; Mushlin A I 1972). Short-term *preventive* medication seems to result in slightly lower rate of compliance, but is still better than the results for long-term therapy.

In another analysis of the overall problem, Ley et al (1976) found a mean figure of *non-compliance* with health advice of 44 per cent with patients on para-aminosalicylic acid and other antitubercular medicines, 27.5 per cent for antibiotics, 48.7 per cent for psychotropics and 38.6 per cent for other medicines. In a review of fourteen studies, Evans (1980) found a mean of 40 per cent of non-compliance, with a range from 24 per cent to 72 per cent.

From all these studies, there is clearly sufficient evidence to cause concern about the failure of patients to take the medicines which are prescribed and dispensed for them.

Factors affecting compliance

Figure 3 sets out a list of factors which have been found in many studies of non-compliance either to increase or decrease adherence to the prescribed treatment. The commonest factor recorded as decreasing compliance is the complexity of the regimen. In particular, most studies have found that if three or more medicines are being prescribed concurrently, compliance falls significantly (Haynes et al 1979). On the other hand, evidence is more equivocal in respect of the number of doses which have to be taken daily. The same source quotes three studies which showed that compliance was reduced, respectively if two, four or eight

Figure 2 *Extent of compliance on long-term therapy.*

Long-term medications for treatment or cure

Regimen	Sample	Measure	Definition	Compliance	Reference
Various medications	178 elderly ambulatory patients (USA)	Interview	Taking medications correctly	41%	Schwartz et al 1962
Various medications	357 patients with diabetes or congestive heart failure (USA)	Interview	Taking medications correctly	42%	Hulka et al 1975; 1976
Various medications	217 patients in homes for the aged (Finland)	Interview	Taking medications correctly	69%	Hemminki et al 1975
Antituberculous chemotherapy	1,000 tuberculous patients (Canada)	Interview and urine testing	Taking drugs throughout follow-up	55%	Allen et al 1964
Antituberculous chemotherapy	1,828 tuberculous patients (Canada)	Record review	Continuing in therapy	63%	Drolet et al 1949
Chemotherapy for leprosy	8,655 patients with leprosy (Tanzania)	Record review	Continuing in therapy	68%	Hertroijs, A. 1974
Tranquillizers in a randomized trial	254 neurotic outpatients (USA)	Pill counts	Pill counts within 25% of prescribed amount	54%	Lipman et al 1965
Tranquillizers	374 schizophrenic outpatients (USA)	Interview	Taking medications correctly	42%	Hogarty et al 1973

Figure 3 Factors which affect adherence.

Factors that increase adherence	
Factor	Number of studies in favor
Patient views disease as serious	7
Family stability	7
Compliance with other aspects	5
Patient satisfaction	1
Close supervision by physician	4
Private practice versus clinic	2
Patient expectations met	2
Physician accepts patient	2
Mother agrees with physician	2
Degree of disability	2

Factors that decrease adherence	
Factor	Number of studies in favor
Complexity of regimen	12
Behaviour change required of patient	4
Clinic waiting time	4
Block versus individual booking	2
Therapy painful	2
Psychological problems	2
Low frustration tolerance	2
Nervous symptoms	2
Working mothers	2

Source: From Blackwell 1976

daily doses were exceeded. However, three other studies showed no significant relationship between the number of daily doses and the extent to which patients conformed with the prescribed treatment. This suggests that long-acting 'once-a-day' preparations may be more important for convenience than for ensuring compliance. On the other

hand, if different therapies can be combined in a single combination tablet or mixture this is likely to improve the degree of adherence to the prescribed treatment, by reducing the number of different medicines which have to be taken.

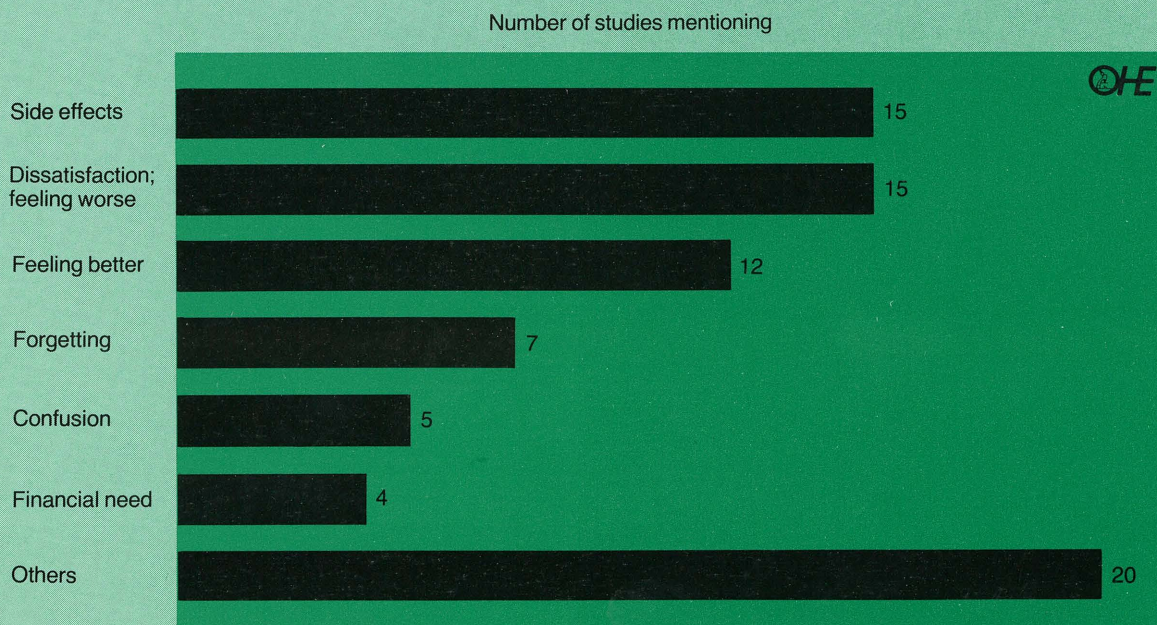
Interestingly, there is a marked contrast between these factors which studies have shown to affect compliance, and the reasons which patients give for their non-compliance. Figure 4 shows the number of studies listed in Haynes et al in which patients are reported to have given their reasons for failing to comply with their prescribed treatment. Overwhelmingly the reasons given are due to dissatisfaction with the treatment, either because of side-effects or because the patients are feeling worse after the medicine. These reasons were mentioned in thirty out of seventy-eight studies in which patients gave some explanation for their non-compliance.

By contrast, only twelve studies included patients who stated that they had failed to maintain their treatment because they already felt better, and in only seven cases had patients admitted to forgetfulness as the cause of their non-compliance. In particular contrast to the impression gained from Figure 3, only five out of the seventy-eight studies referred to confusion as a cause of non-compliance. The reference to 'financial need' as a reason for non-compliance relates to the particular situation in the United States, where patients usually pay the whole cost of their medicines.

The frequency with which patients mention dissatisfaction with their treatment as the reason why they did not adhere to it raises two issues. The first has been referred to as 'intelligent non-compliance' by some clinical pharmacologists. The suggestion is that the patient who is actually taking the medicine may be in a better position to judge its effects than the doctor who prescribes it. This is, of course, often true in the sense that the patient knows best how he feels after taking the medicine. With minor tranquillisers or pain relievers, for example, the patient may be able accurately to titrate his own dosage (within prescribed maximum limits) according to the degree of anxiety or pain which he is actually experiencing.

However, the problem which has been described relates most often to long-term preventive or curative therapy. Here there needs to be more frankness on the part of the doctor in discussing the relative benefits and possible disadvantages and side-effects of the treatment. The patient and the doctor should be able to reach an understanding on

Figure 4 Reasons patients give for non-compliance.



Source: Hayes et al (1977)

whether the medication is worthwhile, and when this is agreed the patient should then accurately follow the doctor's directions. In this context, the word 'compliance' is perhaps inappropriate; the patient should be motivated to want to get the benefit from the medicine, rather than blindly following a therapeutic 'dictat' from the doctor.

This raises the second issue. A frequent criticism of the pharmaceutical scene is that there are too many alternative medicines, containing different pharmaceutical chemical ingredients, available for prescription for the same illness. The evidence in Figure 4 suggests that too often the prescriber may not have taken enough trouble to choose from among these alternatives the particular medicine which is best suited to the individual patient. The patient will only benefit from the wide range of similar medicines available if he reports his dissatisfaction to the doctor and receives an alternative to the doctor's first choice which has been causing the trouble. Thus to the extent that non-compliance is actually due to side-effects or dissatisfaction with the therapy, there is an implication that neither doctors nor patients may be taking advantage of the range of alternative medicines available to them.

Naturally, this cannot explain the problem in all cases. There are undoubtedly some illnesses where no medicine will be entirely successful or acceptable, and here the patient may be right to abandon his medication. However, he should only do so after consultation with his doctor, rather than by a deliberate failure to pursue an agreed

course of treatment. The present situation represents therapeutic anarchy on the part of the patient.

Strategies for improving compliance

Figure 5 sets out some of the strategies which have been suggested and tried out for improving patients' compliance.

Clearly, if patients' reasons for failing to adhere to the treatment are correct, the most important way to improve compliance is to try to find more effective and acceptable treatments for the individuals. The frequency with which there is a choice of alternative therapies with different pharmacological actions and different patterns of side-effects has already been mentioned. Similarly, if doctors and researchers are correct in believing that the complexity of multiple medicines are the cause of non-compliance, a simplification of the therapeutic regimen could make an important contribution to improved compliance. This could mean dropping less essential items which have been prescribed, or the use of combination products if they are available. The importance of the simplification of the pattern of treatment calls into question the clinical pharmacologists' frequent objections to medicines which contain more than one active ingredient (Snell 1982).

Better labelling of prescribed medicines is an obvious way of improving compliance. The occasional method of labelling tablets simply 'To be taken as directed' is clearly inviting non-compliance amongst all but the most systematic and conscientious of patients. Precise directions should appear on every package. Preferably these should indicate not only the number of times the medicine is to be taken daily, but should also specify the times when it should be taken. 'Three times daily before meals' may be much more helpful advice to the patient than simply 'Three times a day'.

However even more important than good labelling is carefully designed packing. The calendar packs, or 'Dial Packs', which are routinely used for oral contraceptives are a great improvement over a plain labelled bottle or vial. Similarly, the use of 'medication calendars', on which patients mark off the doses they have taken, can be helpful either when they are attached to the medication or are separate from it. Figure 6 shows the results of a study by Linkewich et al (1974). This indicates that the number of patients taking within ten per cent of the correct number of tablets was increased from 28 per cent to 88.5 per cent by changing from a plain labelled vial to a 'Dial Pack' with an instruction card.

Figure 5 Strategies for improving compliance.

- 1 Changing to more acceptable treatment
- 2 Simplification of treatment regimen
- 3 Tailoring dosage regimen to lifestyle
- 4 Better labelling of medicines
- 5 Special packaging, including calendar packs
- 6 Education and communication by the doctor
- 7 Instruction from dispensing pharmacists
- 8 Systematic monitoring of compliance
- 9 Reassurance, especially over side effects
- 10 'Goal setting' with the patient
- 11 'Rewards' for accurate compliance
- 12 Family and group support

Figure 6 Effect of packaging on patient compliance.

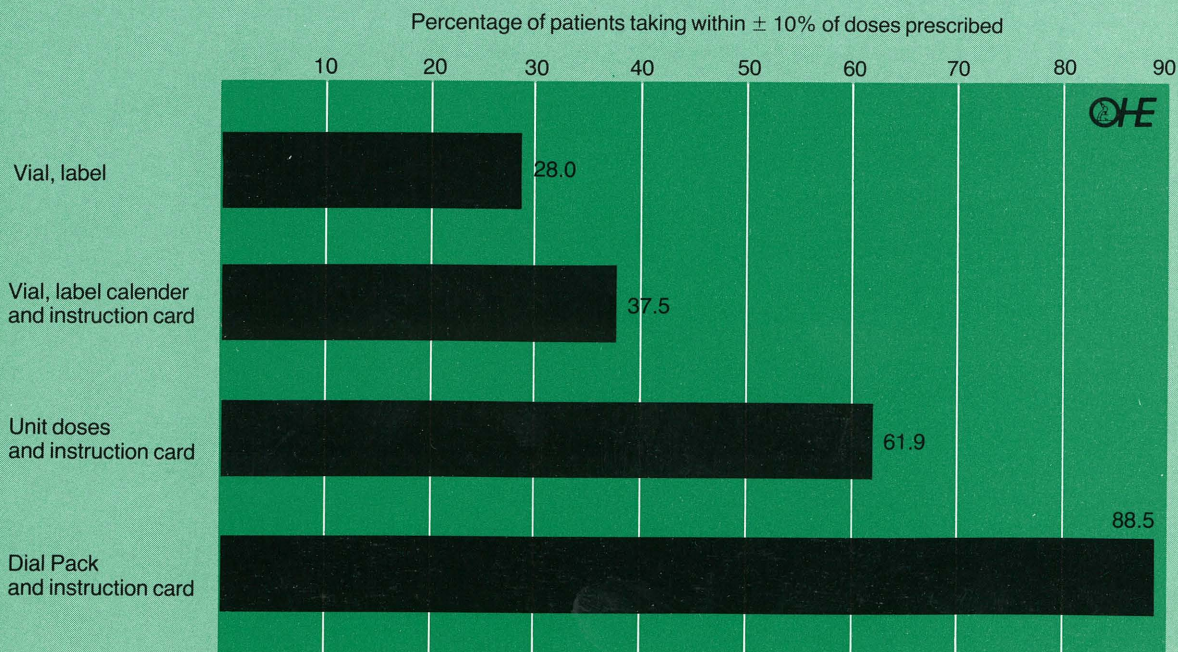


Figure 7 Comparison between patient satisfaction with pharmacy services and compliance.

Variables	Satellite pharmacy	Traditional pharmacy
Composite satisfaction		
Very unsatisfied to acceptable	0	7 (18.4%)
Satisfied	16 (43.2%)	25 (65.8%)
Very satisfied	21 (56.8%)	6 (15.8%)
Compliance		
Less than 25% deviation	15 (93.8%)	8 (47.1%)
Mean compliance	89%	70%

Source: Ludy et al 1977

Figure 8 Effect of pharmacist counseling/monitoring services on compliance and therapeutic response.

	Control Group			Study Group		
	Before	During	After	Before	During	After
Number of patients	24	24	21	24	24	24
Average consumption	63%	56%	60%	67%	92%	70%
Patients complaint	16%	17%	16%	25%	79%	25%
Normotensive	44%	20%	14%	20%	79%	42%

Source: McKenney et al 1973

Proper education of the patient by the doctor is also an important aspect of the problem and a part of the process of therapeutic consultation which has already been discussed. However, in addition to this, special emphasis should be placed on the role of the dispensing pharmacist. In the doctor's surgery the patient is often nervous and distracted by his own thoughts about his illness and diagnosis. When the patient reaches the pharmacy, he may be in a better position to think specifically about the medicine he is to receive and about the way he is to take it. Ludy et al (1977) have undertaken a study in which they compared the effect on compliance of improving the setting in which the medicine was dispensed. In a new satellite pharmacy arrangements were made for patient counselling, and the effects on patient satisfaction and compliance with medication were compared with the situation in the original traditional pharmacy. The results are shown in Figure 7. The proportion of patients taking more than 75 per cent of their medication correctly increased from 47.1 per cent to 93.8 per cent in the new setting. However, if the pharmacist is to fulfil a valuable role in this context, the prescribing decision by the doctor must have been logical in the first place.

In addition to providing advice to patients, both the doctor and pharmacist can take specific steps to monitor compliance with the prescribed medication. Normally this would be done by asking patients to bring back their unused tablets, and to check the numbers actually consumed against the theoretical number which should have been taken. McKenney et al (1973) undertook a study in which hypertensive patients were divided into a control group and a study group. The latter received advice and systematic monitoring of the number of tablets taken from the pharmacist. Figure 8 shows that the number of patients complying with their treatment increased from 25 per cent to 75 per cent during the study but fell back to the previous figure when the study was discontinued. By contrast, the control group achieved only about 16 per cent compliance. The degree of compliance was matched by a corresponding reduction in blood pressure during the study period, and this improvement was to some extent maintained after the

study amongst those who had taken part in it.

Other strategies suggested to improve compliance include reassurance, the setting of 'therapeutic goals' for the patient, the construction of 'rewards' which the patient can earn for keeping to his therapeutic regimen, and support from groups of fellow patients and from the patient's family. These approaches are similar to those used, for example, in the 'Weight Watchers' movement to maximise compliance with dietary restraints and other measures to reduce obesity.

Overall, it is clear from the studies quoted above that quite considerable improvements can be achieved in compliance by the various strategies which have been suggested.

Conclusion

The problem of patients failing to take the medicines which are prescribed for them is a serious one. It is estimated that as few as 50 per cent of patients comply accurately with long-term treatments prescribed for them. Even for short-term courses of treatment, such as five days on an antibiotic, a quarter of all patients may fail to take the medicine as they should.

The degree of non-compliance increases with the number of medicines to be taken concurrently, and hence must be expected to be especially acute in the elderly (Bliss 1981; Kiernan et al 1981). They frequently receive multiple therapies for a variety of disorders, and confusion in any case tends to become more of a problem as part of the process of ageing. One general practitioner provides his elderly patients with a card with sample tablets attached to it with 'Sellotape', showing when each is to be taken and what their function is (Horner 1983).

However, some clinical pharmacologists have suggested that 'intelligent non-compliance' may be rational behaviour on the part of the patient. For analgesics or even minor tranquillisers this may be the case but for antibiotic treatment, on the other hand, it can be seriously harmful. In general, if patients are dissatisfied with their treatment, they should discuss this with their doctor, who will often be able to amend the treatment to remove the patients' dissatisfaction. The prescribing process should be a collaborative act between the doctor and the patient, with the latter fully understanding and accepting the value of taking the medicine exactly as the doctor has advised. The concept of blind 'compliance' with an apparently useless or unacceptable regimen is inappropriate, and, in so far as it still exists, it indicates a failure to establish a proper doctor-patient relationship in respect of modern pharmacology.

In addition, various strategies ranging from better advice to special packaging and monitoring have been proposed to improve compliance, particularly in the cases where the patient is simply forgetful. Most of these would cost money and consume scarce health care resources. However, effective prescribing is recognised as a cost-effective aspect of medicine; it can often reduce the need for hospitalisation or even surgery. Hence measures to make pharmacology more scientific at the point of consumption may be well worth the money spent on them.

In particular, this *Briefing* has pointed to the important role which the pharmacist can play in helping patients to become more precise in the taking of the medicines dispensed for them. This would mean the pharmacist spending more time with his customers, and less in his dispensary. This, in turn, could form an important part of the pharmaceutical profession's current campaign to enhance the public perception of the pharmacist's role. In addition, it is a strategy which would involve few direct costs, and which could make a major contribution to the effectiveness of the National Health Service.

A medicine which is thrown away rather than being consumed may not cost the Health Service much in terms of wasted materials because so much of the price of a medicine represents the cost of research and innovation rather than production. However, it does represent a substantial waste of resources in terms of ineffective treatment. For that reason alone the widespread problem of non-compliance needs to be tackled more systematically than in the past.

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This *Briefing* was written by George Teeling Smith. Amongst other sources, it draws heavily on studies reported in 'Compliance in Health Care', edited by Brian Haynes, Wayne Taylor and David Sackett and published by Johns Hopkins Press in 1977.