

Review article

Patients' compliance with medical treatments in the third world. What do we know?

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Responding to the slogan of Health for All for the Year 2000, third world governments have expanded the provision of primary health services, and with it, the number of prescriptions has increased phenomenally. However, we know very little about how third world patients are using prescribed medicines. In order to assess the available information, we reviewed 37 empirical studies on compliance located through electronic lines and networking.

By and large, the orientation of the studies is biomedical. The authors measure levels of compliance and advance recommendations to increase them. We found little consistency in the definition of compliance and a variety of methodologies used in its measurement. In spite of methodological problems, most researchers found low levels of adherence to medical regimens. Low levels of adherence raise questions about the quality of care, iatrogenic effects caused by the inadequate use of modern medicines, and the health and economic impact of health investments. At the same time it is recognized that, given current prescribing practices and lack of efficacy of many medicines, compliance may add little to the quality of care. Compliance and prescribing behaviours should always be examined together and as part of quality of care assessments.

Introduction

Modern pharmaceutical preparations are now part of the armament of all types of healers. William Osler stated, 'The desire to take medicines is perhaps the greatest feature that distinguishes man from animals' (Olatunde 1979). People throughout the world have great expectations of such 'magic bullets'. Medicines tempt people with the illusion that there is a pill for every ill, provided you can afford to pay for it.

Research in several third world countries has shown that patients' confidence in Western drugs is greater than in physicians' care and that many patients go to health centres to obtain medicines rather than a diagnosis (Alland 1970; Bleek 1979; Ugalde 1984; Hunte and Sultana 1992). Van der Geest (1982) summarized this attitude by affirming: 'The perception of the role of the medical

doctor as secondary to his medicines may well apply very widely in developing countries.'

As shown in many studies, patients themselves are an important source of medication (for a comprehensive bibliography see Hardon et al. 1991). Ledogar (1975) reported that in a South American country 75% of the medicines sold were purchased by consumers for self-medication, but not all the blame for the 'pharmaceuticalization' of life should fall on the consumers. Self-medication is encouraged by poor and unaffordable health services coupled with few regulations controlling the sale of drugs, or weak enforcement of the existing regulations, and aggressive marketing by the pharmaceutical industry.

Physicians and health workers, retailers, pharmacists, peddlers, and traditional practitioners

are also responsible for the high consumption of medicines. For healers, prescribing has a powerful symbolic effect. It assures them that they are treating the patient properly and gives tangible proof to a patient that the healer has correctly identified the cause of the malady, that a cure is available, and that the patient has taken the correct course of action by coming to see a healer. It also symbolizes the healer's interest in the patient, and confirms his/her own sick role (Kapil 1988). Many patients, even in rural areas of the third world, are inclined to believe that a physician who does not prescribe drugs is not providing quality care. Another reason for prescribing is economic. In a number of countries, particularly in Asia, it is common practice for physicians to sell patients the recommended medicines (see sources cited by Kapil 1988). The result is a tacit complicity between the prescriber and the patient, a complicity that includes the pharmaceutical industry because of its questionable promotional practices.

In response to Alma Ata's request for the expansion of primary care, many third world countries have built a large number of health centres, many of which, particularly in Latin America, are at present staffed by physicians. Their prescribing practices and inefficient purchasing and supply systems explain, in part, why a large percentage of public health resources are spent on drugs. According to Morice (1985) about 40% of public health funds in the third world are allocated to the purchase of pharmaceuticals, compared to 7.7% in industrial nations.

A vital, yet unanswered question is whether the proliferation of drugs is on balance helpful or harmful, or even justified in terms of opportunity costs. The argument could be made that the easy accessibility to pharmaceuticals and self-medication, coupled with the wide array of health practitioners, including physicians, who prescribe medicines with inaccurate knowledge of their effects, is a threat to the health of the population.

Moved by these concerns, international organizations and some governments have begun to promote a more 'rational' use of medicines (WHO Chronicle 1988). Unfortunately, there have been very few studies of the adequacy of drug therapies, patients' adherence to medical

regimens, how closely users follow manufacturers' specifications, and reasons for non-compliance. In fact, very little is known today about how third world patients actually use prescribed drugs.

This article is an effort to bring together the existing information on this topic; we reviewed all available empirical studies on compliance, examined definitional and methodological problems, summarized the characteristics of the studies and main findings, and identified gaps in research.

To comply or not to comply: is this the question?

As of 1990 students of compliance with medical regimens have identified at least 8000 entries on the topic (Donovan and Blake 1992).¹ Most of these studies have been carried out in a few Western nations. In comparison, we have located through library research (namely searches in Index Medicus, Bireme, Medline, and Lilacs) and networking only 37 empirical compliance studies in the third world.²

Studies in developed countries indicate that approximately 50–60% of patients do not comply with medical regimens (Becker 1985). Why patients seek medical care and then disregard the physician's instructions is a topic studied but unanswered in a satisfactory fashion. In the West, there is a growing debate about the desirability of patients to comply. It is not our purpose to expand this discussion here; however, we will summarize its salient points and examine its applicability to the third world.

The mainstream of the research on compliance assumes that health seekers approaching a practitioner have a problem that they want to overcome. Researchers also assumed that the practitioner is sought because of the expertise that allows him/her to diagnose the problem and prescribe a therapy to overcome, ameliorate, or control it. Ideally, good compliers are patients who adhere strictly to the advice given by the health practitioner. In this ideal world, the diagnosis is accurate, the therapy efficacious, and the patient obedient. This combination assures – the argument goes – that when a solution is available, patients will improve. From an

economic point of view, good compliers are utilizing health resources adequately. To seek expert advice and not to follow it appears to be irrational behaviour; to be given or purchase medicines and not to use them according to recommendations is economically wasteful. In sum, the role of the patient is to obey and comply (Parsons 1951; Bloom and Wilson 1979: 280); non-compliance is considered undesirable and on some occasions deviant.

Research on compliance has identified multiple reasons for patients' failure to comply: patients' unwillingness to accept the unpleasantness of the therapy, their lack of responsibility and/or motivation, their loss of faith in the therapy, early recovery, or other reasons which generally tend to blame the patient, and of course, their inability to afford the medication. Another line of research emphasizes the poor communication between physicians and patients to explain the failure to comply. Patients fail to understand prescribers' advice or forget it because of low educational levels, old age, or other causes. At times, part of the blame for the poor communication is ascribed to physicians. They may have failed to adequately explain the regimen, or place due emphasis on the need for continuity, or to motivate the patient. In turn, the communication failure is explained by poor training in medical schools and/or the physicians' unwillingness to take the time during the consultation.

Findings from compliance research have been used to build behavioural models to overcome the above constraints and improve adherence to medical regimens. Examples of such efforts include the Health Belief Model (Becker et al. 1979), the Cognitive Model (Ley 1986), and the Health Decision Model (Eraker et al. 1984).

There is, however, a contrasting view of compliance. Opposing Parson's submissive and passive sick role behaviour, some authors have shown the advantages for some patients of self-care and controlling the management of their illness (Conrad 1985; Donovan and Blake 1992). Under some circumstances, patients' experimenting with dosage, discontinuing the regime, and testing alternative therapies are considered to be positive dimensions of self-care. This position can be seen as a reaction to the dominance of the

medical profession in the health sector, the imposition of the biomedical model of health care, and the profit orientation of the pharmaceutical companies (Trostle 1988). Patients should be the ones to assess the advantages and the disadvantages of prescribed therapies, since they are the ultimate judges of their own quality of life and able to set life priorities for themselves. Lay solutions could differ from those advanced by professionals and adjust better to the ultimate goals of the patient. Departures from recommendations should not be judged negatively. These scholars also criticize compliance studies because, according to them, their findings are fed back to prescribers who use the information to increase their power of manipulation of the patient.

The study by Conrad (1985) of epileptic patients showed that some preferred to discontinue the treatment for lengthy periods of time or modify the dosage. The stigma attached to medication, and the attitudes of some patients for whom the control of seizures was not the highest priority justified, according to the author, the departure from the recommended regimen.

Donovan and Blake (1992) documented in their study of rheumatoid arthritis that non-compliance was not caused by failures on the part of the patients (forgetting the message, misunderstanding the advice, etc.) or on the part of the prescribers (poor communication) but by the patients' *reasoned* decision. These authors advocate that more information be made available to patients to facilitate their active participation in the choice of therapies and conclude the study affirming: 'perhaps the issue now should not be compliance, but how medical staff can understand and participate in the decisions that patients already make about their medications!'

Compliance issues in the third world

In the next paragraphs we will discuss the relevance of the above discussion to the third world. Health conditions and the delivery of care are very different in third world countries where the large majority of the population have only recently been given access to 'modern' medical care. By and large, the availability of biomedicine is considered an improvement over pre-

vious traditional care and the out-of-necessity *chosen* self-care. Many patients use modern biomedical services of their own choice and want to comply with recommendations but fail to do so. At a first look, the reasons for non-compliance appear similar to those mentioned by the mainstream of compliance research in the West (misunderstanding the recommendation, early disappearance of symptoms, etc.). At closer observation, the contextual circumstances are very different.

Communication between doctor and patient

The extreme socioeconomic, educational, cultural, and linguistic differences between providers and users of services make the communication problem particularly troublesome. Due to these barriers, low income patients, who constitute the vast majority, seldom ask for clarification and additional information, much less question practitioners. For example, during the 404 consultations that we observed in Costa Rica, patients were prescribed 1023 medications and asked clarification for only 10.

Because of patients' illiteracy or low educational levels (they may have never been exposed to the most basic biology principles) and physicians' inability to translate scientific concepts into the culture of their patients, it is difficult for most physicians to explain the nature of the disease and provide additional information to help patients make a 'reasoned' decision in the selection of therapies and possible alternatives available to them. In the third world, to transform the poor from passive to active patients when they receive modern Western care is an interesting, and probably urgent, but little discussed issue.

Western drugs in third world homes

There are other differences between the West and the third world. Some would suggest that to foster self-care with modern pharmaceuticals among patients who for the first time have access to professional care is to go backwards. The literature has also documented the health risks of self-medication with modern drugs in the third world (Ferguson 1981; Abosedo 1984; Hardon 1987; Kapil 1988). Variations of the recommended dosage or shortening the treatment could have serious undesirable effects frequently unknown to the patient. For example, the large

majority of third world patients are unaware of the negative health consequences of incomplete antibiotic therapy and frequently stop it as soon as symptoms disappear.

Lowering the dosage or discontinuing the treatment could lead to the accumulation of medicines in the home, particularly when drugs are freely distributed or subsidized (Ugalde and Homedes forthcoming). The presence of medicines, frequently poorly stored, in substandard housing, in harsh climates, among illiterate and low educated individuals, in crowded households with many children - all conditions present among the third world poor - creates high risks of accidental and therapeutic poisoning and fosters self-medication of household members and neighbours (Madhi et al. 1984; Minchola de Perez 1984; Abdulaziz Al-Sekait 1989; El Tom 1991).

In the West the holistic health movement and those who support patients' control of the management of their illness point to the greater opportunities available today for active patient involvement in self-care. These include information from professionals other than physicians, e.g. alternative therapists, friends, and mass media (Donovan and Blake 1992), but such conditions are not present among the masses of the third world.

It should also be noted that much of the support for illness self-management in industrial nations results from studies of chronic diseases. The applicability of this concept to acute life-threatening conditions or diseases with serious sequelae for which there is a known cure can be questioned. The same can be said of contagious-communicable diseases (both acute and chronic) that have community implications. It is doubtful that helping patients, including those with little motivation, to adhere to medical regimens for the treatment of diseases such as tuberculosis, malaria, leprosy, and onchocerciasis can be seen as a manipulation to foster professional control or the promotion of biomedicine in the third world. The community implications of contagious - communicable and degenerative diseases, such as hypertension, rheumatism, or high cholesterol, are very different.

Another important consideration in the present discussion is the wealth difference between the

West and the third world. Wasting resources should be discouraged everywhere, but when resources are extremely scarce the need to reduce waste is even more pressing. Third world countries seldom spend more than 4 or 5% of their low GNP on health and, as indicated earlier, a relatively high percentage of this amount goes to the purchase of pharmaceuticals. Consequently, measures to use medicines adequately should be encouraged.

Based on the above considerations, one might be tempted to conclude that efforts to improve adherence to medical regimens would be welcome in the third world. Unfortunately, third world realities are complex, and there are other considerations which suggest the opposite view.

Physician error

In many parts of the third world, the ideal world of biomedicine is very far from the real one. Basic diagnostic procedures are rarely followed due to lack of equipment such as laboratories, deficient medical training, or ill disposition of the middle- and upper-class urban physician towards the poor who use the services (Maitai and Watkins 1980). Physicians' diagnostic errors which also occur in the West, are considerably augmented. For example, in a study of high blood pressure control in Zimbabwe, Kitai et al. (1986) suspected unreliable blood control measurements. Incorrect prescribing and over-prescribing are common everywhere (WHO 1985; Kunin 1985; Carruthers et al. 1987) but more extreme in the third world where authors have reported very questionable prescribing practices (Bouraoui and Douik 1981; Bygbjerg 1978; Soumerai 1988; Soumerai et al. 1989). In her insightful study of drug prescribing in India, Greenhalgh (1987: 316) commented:

'... many doctors showed an alarming ignorance of the dangers of commonly used drugs - they were often unaware of teratogenic effects of the high dose estrogen-progesterone drugs routinely used for pregnancy testing, and of the effect of pyrazole derivatives on the marrow. Ignorance cannot, however, account for all of the drug misuse. For example, while some doctors extolled the anti-inflammatory properties of corticosteroids, others stated candidly that in private medicine one was in the business of relieving the patient's symptoms before he decided to change his doctor.'

In the Dominican Republic, diazepam was one of the 33 basic medicines freely distributed by the Ministry of Health to all rural primary health care posts. Every month thousands of diazepam pills were prescribed by physicians fulfilling obligatory rural service and not yet licensed to practice. Frequently, the prescription was given for the treatment of conditions other than anxiety, such as insomnia, with little or no information on side effects or manufacturer's warnings. In Indonesia, antimicrobials were prescribed for 88% of the cases of a common cold (Gan and Gan 1978). Unnecessary prescribing was also reported by Isenalumhe and Oviawe (1988) in Nigeria. We also observed in the Dominican Republic a physician chastising a mother for failing to follow his previously given advice to stop breastfeeding when her child got sick with diarrhoea.

Efficacy of drugs

To the above we should add the issue of drug efficacy. Many studies confirm that the pharmaceutical industries' curative claims for many of their products are exaggerated, and the iatrogenic effects are not fully disclosed (Silverman et al. 1982). Kitai et al. (1986) concluded that one possible explanation of the limited impact of treatment on the control of high blood pressure was the inadequacy of drugs prescribed. They also suspected that the efficacy of B blockers was lower in black than in white patients. A survey of pharmaceutical markets in India, Indonesia, the Middle East, Africa, and the Caribbean by Chetley and Gilbert (1986) showed that 80% of anti-diarrhoeals are ineffective in the treatment of acute diarrhoea, 85% of the cough and cold remedies on the markets are irrational combinations, and 70% of all the products are unnecessary or hazardous. Given these realities it is reasonable to conclude that in many instances non-compliance could be a blessing in disguise.

Finally, it should be recognized that many illness episodes resolve themselves without any interventions. A frank acknowledgement of this fact is made by Axton and Zwambila (1982) who, in their study of PHC compliance in Zimbabwe, commented that 'favourable (health) outcome would be expected, with or without treatment'.

In sum, in the third world, under present conditions, to advocate patients' management of modern drug therapies could have undesirable health consequences. On the other hand, given the quality of care, efforts to improve compliance could also be undesirable. Aware of this no-win situation, we now turn to assess the experience learned from third world studies on compliance.

Third world studies on compliance

As indicated earlier, we have been able to locate only 37 empirical studies on compliance with medical pharmaceutical regimens, all of which have followed the biomedical orientation of mainstream Western research. Studies on compliance with family planning methods were excluded from our analysis because adherence to birth control methods is strongly influenced by cultural and religious values, marital relationship, and the user's commitment to avoid pregnancies, which generally are different variables from those influencing compliance with therapeutic drugs.

Appendix I presents information on the location and setting of the studies, the definition of compliance used by the authors, the sample size and methodology, the type of illness/medication studied, and a summary of the findings of each study.

Defining compliance

Understanding a physician's advice is a precondition to complying with it. Adherence to medical regimens cannot take place unless the patient understands and remembers the recommendation. Of the 37 studies reviewed, 4 analyzed understanding, 30 compliance, and 3 examined both.

Ideally, a good complier is a patient who adheres strictly to the recommendation on dosage, duration, and time and manner of administration of the medication. Only four studies followed this rigorous definition of compliance (Ramos de Fernandez and Riera Zubillaga 1983; Homedes et al. 1989; Carrasco et al. 1990; Ngoh 1992). Some researchers defined good compliers as those patients who took the recommended dosage without taking into account the other three dimensions.

There are other definitions of compliance in the studies we analyzed. In cases in which the treatment was administered at the clinic, good compliers were patients who kept a percentage of the appointments for a determined period of time but the period varied in each study. For example, studies of TB patients defined good compliers as those who completed the treatment given at the clinic. This was also the case in the study of prophylaxis of rheumatic fever.

Studies that used biochemical tests defined good compliers as those patients whose urine or blood showed traces of the medication. As will be discussed in the next section, there is frequently a relation between the methodology used and the definition chosen.

Setting and methodology: measuring compliance

As indicated in Table 1, 19 studies were carried out in Latin America, 13 in Africa, and 5 in Asia. The large majority of the studies took place in urban hospitals or clinics, and only seven studied users of rural services.

Table 1. Rural and urban location of compliance studies by regions

| Region | Number of Studies | Rural | Urban | Total |
|---------------|-------------------|-------|-------|-------|
| Africa | 13 | 5 | 10 | 15 |
| Asia | 5 | 0 | 5 | 5 |
| Latin America | 19 | 2 | 18 | 20 |
| Total | 37 | 7 | 33 | 40* |

*Adds more than 37 because some studies were conducted both in urban and rural areas.

The sample size varied widely from study to study, ranging between 24 and 48 345. The research subject was the patient, except in two studies in which the subject was the family of the patient.

Methods of measuring compliance include self and collateral reports, behavioural measures, and biochemical tests. Each one of these methods presents different problems. The reliability of the patient self-report method is

limited by the patient's tendency to overestimate compliance and the well-known problem of recall. However, in spite of the limitations, some researchers have suggested that this method is the most desirable. Feinstein's (1979: 312) research in the West concluded that the best way of finding out what a patient has done is to ask the patient directly. From the reply, an investigator can obtain the qualitative and quantitative information that is not provided by other techniques. Carrasco et al. (1990) and Homedes (1990) compared the information from a pill count with patients' self-report in Chile and Costa Rica respectively, and supported Feinstein's findings. However, other studies have arrived at the opposite conclusion. A study in Brazil (Bezerra Alves et al. 1987) and one in India (Kumar and Balakrishnan 1983), which included self-reporting and biochemical tests, found that self-reports were not reliable.

The accuracy of collateral reports, by physicians, nurses, and family members is a function of familiarity with the patient and/or the quality of record keeping in the clinics.

The most commonly employed behavioural measures include verifying appointment keeping at the clinic, pill/bottle counts (measuring the percentage of medication taken), and observation of behavioural performance. Verifying appointment keeping is a reliable method but can only be used for those medications that are administered at the health centre. In countries such as Zimbabwe where patients keep their own medical records, some may be lost.

The pill/bottle count does not provide information on dosage, manner of administration, or time; additionally, there is the possibility of error when left-over medication is used in the treatment under study. Bottle count is logistically complicated because of the lack of standardized containers, and because measuring the percentage used of inhalations, drops, ointments and creams is very difficult, if not impossible. Observation of personal behaviour is highly reliable, but time consuming, and impossible in the case of outpatients since the observer may not be able to be with the patient twenty-four hours.

Biochemical markers also have serious limitations. Not every drug can be detected in blood or

urine. The tests only reveal whether the patient took the last dosage(s) of medication and do not provide information on how regularly the medication has been taken. In addition, biochemical markers are expensive and may not be possible in rural areas or in countries with few laboratory facilities.

There are a variety of ways to find out the physician's recommendation: by observing the consultation, by examining the clinical records or medicine labels, or by the patient's own recollection. The first method is the most accurate but the most time consuming; furthermore, not all patients consent to the presence of observers during the consultation.

The recommendations given by the physician and the pharmacist do not always coincide. In our study in Costa Rica (Homedes et al. 1989), we found that there were dosage and frequency discrepancies in 8% and 5%, respectively, of the medicines under study. In such a situation, the researcher has to decide which of the two recommendations he/she is going to select in order to verify adherence.

In summary, there is no perfect method to measure compliance. At times the nature of the treatment may dictate which is the most adequate methodology. For example, for treatments that need to be administered at health facilities, keeping appointments may adequately measure compliance. Very frequently, considerations of feasibility, availability of resources, and logistics determine the methodology to be followed, and in turn the definition of compliance.

Given the limitations of each method, a combination of methods is preferable. Homedes et al. (1989) observed the medical consultation and took notes of physicians' recommendations. Several days later, during a home visit, the researchers asked patients their recollection of the recommendation and how they were administering the medication, later comparing the notes and the recollection with the recommendations written on the medicine labels. Pill and bottle counts were also used to verify the reliability of respondents.

Of the studies of compliance that we have analyzed, only seven used a combination of at

least two methods. As indicated in Table 2, the method most commonly used was the review of medical records (45%), followed by self-report (29%), pill count (14%), and biochemical measures (12%).

Table 2. Types of methodologies used in compliance studies

| Methods | number | % |
|---------------------------|--------|-----|
| Review of medical records | 19 | 45 |
| Self-report | 12 | 29 |
| Pill/bottle count | 6 | 14 |
| Biochemical markers | 5 | 12 |
| Total | 41* | 100 |

* Adds more than 37 because some studies used more than one method.

The studies that measured patients' knowledge of medical regimens obtained the information through interviews with the patient, either at the clinic or at the patient's home a few days after the medical encounter. Ugalde et al. (1986) examined the effect of time on patient's retention of the physician's recommendation by interviewing one group of respondents four to six hours after the consultation, a second group 25 to 36 hours after the consultation, and a third group 54 to 60 hours later.

Focus of studies

Table 3 presents the types of pathologies or medication covered by the 37 studies. As can be seen, the large majority of researchers looked at a single chronic disease and a few examined several: HBP (9 studies), TB (7), leprosy (4), diabetes (3), upper respiratory diseases (2), psychiatric disorders (2), and one study each of gastrointestinal diseases, skin diseases, epilepsy, and malaria and rheumatic fever prophylaxis. There are only six studies on primary health care morbidity attended at health centres and three on morbidity at outpatient hospital clinics.

Three studies have focused specifically on compliance with antibiotic therapies. Another study on antibiotics was conducted in the state of Tlaxcala in Mexico in 1988, but results are yet to be analyzed.

Table 3. Types of diseases/treatments of compliant studies

| | |
|-------------------------------|-----|
| High blood pressure | 9 |
| Tuberculosis | 7 |
| Primary health care | 6 |
| Ambulatory hospital care | 3 |
| Leprosy | 4 |
| Diabetes | 3 |
| Antibiotic therapy | 3 |
| Psychiatric disorders | 2 |
| Upper respiratory infections | 2 |
| Cardiovascular diseases | 1 |
| Dermatology | 1 |
| Epilepsy | 1 |
| Gastrointestinal diseases | 1 |
| Infectious diseases | 1 |
| Malaria (chemo-prophylaxis) | 1 |
| Rheumatic fever (prophylaxis) | 1 |
| Total | 44* |

* Adds more than 37 because some studies included more than one disease.

There are five studies that include some experimentation. In Nigeria, as early as 1979, Sechrist conducted a study on patients' knowledge of physicians' recommendations for antibiotic therapy and studied how patients could be better educated on its correct usage. Ngoh (1992) studied women's compliance with antibiotics in rural Cameroon and measured the impact of visual aids and advanced organizers in increasing the patients' comprehension of regimens and compliance. There are two other control studies on HBP and one on TB that measure the effects on compliance of explaining the therapy to patients.

Findings

All the articles reviewed study compliance from a biomedical perspective: adherence to medical regimens was always considered desirable. None of the studies approached the topic from an emic perspective, that is, from the subject's own point of view. The research objectives of all of the studies are to measure levels of compliance (or understanding of medical regimens) and identify compliance predictors or variables that could explain default. Adequacy of the treatment to the morbidity conditions of patients is very seldom examined.

Differences in definition, methodology, residential patterns, types of medication, or patients'

socio-demographic characteristics explain the contrasting, and at times contradictory, results found in the literature. The range of good compliers varied between 26% and 100%, although the overall level of compliance reported tended to be low. There was little consistency in factors associated with compliance. In some studies variables such as age, sex, SES, levels of education, number of medications prescribed, and the perceived seriousness of the health problem were statistically significant, and in others they were not.

Given the overall patients' lack of familiarity with the diseases and the therapies, a point which will be discussed later, it is unlikely that a significant percentage of lack of compliance responded to an 'informed' decision to choose other therapies, to experiment with dosage, or to the patients' knowledge of the lack of efficacy of the drug. It is also questionable that patients discontinued the treatment due to questions of long-term side effects of the medication. Would patients have decided not to follow the recommendation with full knowledge of the illness prognosis or of the adverse effects of discontinuing the therapy? This is a question that cannot be answered with the available information.

However, there are a few general propositions that we have been able to summarize from the corpus of compliance studies in the third world. Patients know very little about the nature of their own illness or why they are taking a particular medicine and its potential side effects. For example, in their study of chronic diseases in Chile, a middle-income country, Roizblatt et al. (1984) found that only 4% of the patients knew the nature of their disease and less than 6% the side effects of the medication. In the same country, Carrasco et al. (1990) reported that only 36% of mothers understood the treatment prescribed for their children's upper respiratory infections. In Zimbabwe, 93% of HBP patients had no understanding of the disease, and 36% did not know why they were taking the medication (Nyazema 1984). In the same study none of the diabetes patients knew why they had to sterilize the needle and the syringe. As indicated earlier, we observed 404 PHC consultations by 12 physicians in Costa Rica, a nation considered to have one of the most attractive health care systems in the third world. Medicines prescribed included

drugs such as corticosteroids, tranquilizers, anti-depressants, and diuretics, and none of the physicians provided any information on side effects or on risks from improper use (Homedes et al. 1989).

It is not surprising that a frequent finding in the studies is the need for increasing the patients' knowledge of their diseases, as well as prescribed medicines and their administration. This recommendation is reinforced by findings from experimental studies in locations as diverse as Mexico, Cameroon, Brazil, Nigeria, and Chile, all of which reported that teaching patients in the administration of the therapies increased compliance. However, it should be noticed that one study of hypertensive patients found that educating patients led to much better knowledge but not greater success with treatment (Florenzano et al. 1981b).

Several studies expressed the need to involve other health workers beside physicians in the process of informing patients of their conditions and in the administration of the therapies. Importantly, two studies found that nurses were able to communicate with patients more adequately than physicians (Wagstaff et al. 1982; Artigas Giorgi et al. 1985). In the study by Wagstaff et al. the difference is very remarkable. When physicians recommended the duration of the therapy 40% of the patients were able to recall it; the percentage increased to 74% when the information was given by the nurse. Similarly, when physicians provided the information on the treatment's purpose only 26% of the patients knew it; the percentage increased to 65% when the information was given by nurses. Knowledge of diagnosis increased from 28% when given by physicians to 63% when provided by nurses. The author attributes the nurses' success to the closer cultural proximity with patients and less time pressures. It is possible that patients themselves are aware of the advantages of care provided by nurses. Thus, one study reports that hypertensive patients preferred to go to municipal clinics that were staffed by nurses rather than to the physician-staffed hospital (Kitai et al. 1986).

Buchanan and Mashigo (1977) recommend that nurses and orderlies play a more active role in encouraging patients' compliance, and that

physicians should confer more closely with the pharmacist and accept him/her as part of the health team. Carrasco et al. (1990) suggest that pharmacists take a larger role in educating patients in the use of drugs, and Ugalde et al. (1986) urge that health promoters supervise and assist patients in drug therapy.

Only a few studies confirmed that patients who complied improved their conditions, but a positive correlation between compliance and improvement from the disease cannot be taken for granted. Thus, in two HBP studies in Brazil one reported that better compliance was not associated with high blood pressure control, and the other found that only 19% of patients dropped BP to normal and 10% to borderline levels, but 7% increased the BP levels.

Not too many studies have explored the reasons for non-compliance, but, among those which have, there is a general agreement that failure to comply responds to some of the following conditions: poor communication between practitioners and patients (the most commonly cited problem), poorly organized health services (long waiting at the clinics, conflict between clinic hours and work, difficulties in obtaining an appointment, distance to the clinic), the nature of the treatment (undesirable side effects, lack of trust in the medicine, too many medicines), and the patients' feeling of improvement or difficulties in following the treatment. Cost rarely appears as a constraint to compliance, in part, because in many of the studies drugs were provided at no cost, a condition uncommon in most third world countries.

Suggestions made to improve communication between patients and practitioners include: the use of the native language (Axton and Zwambila 1982), feedback of test results to patients (Asbeck-Raat and Becx-Bleumink 1986), the use of symbols with illiterate patients (Ngoh 1992), and verifying that the communication has been understood (Ugalde et al. 1986; Tovar Espinosa and Tamez 1987). Two studies (Florenzano 1981a; Kitai et al. 1986) noted that lack of continuity in patient-physician interaction contributed to low compliance.

Several studies found an inverse association between compliance and the number of medicines

prescribed, and recommended the reduction of the number of prescriptions per patient. For Henderson (1984) the use of combined preparations was one way to simplify the administration of pharmaceuticals, and some authors observed that parental medicines were more appreciated and easier to comply with. Another suggestion advanced by several authors was to involve the family in the administration of prescribed medicines.

Discussion and conclusions

The survey of third world compliance studies suggests that there is very little information on how patients are using prescribed medications, that levels of compliance are low, and that the adequacy of the treatment has not been assessed in the studies. These findings raise questions about quality of care, possible iatrogenic effects, and the health and economic impact of health investments. To recommend that providers of health services make efforts to improve compliance levels is a risky oversimplification. Little can be accomplished by better compliance under current deficient prescribing practices and usage of medicines of doubtful therapeutic value.

Perhaps an important flaw in compliance is the analytical separation between compliance and prescribing behaviours. This is not to suggest that compliance and prescribing research cannot be carried out independently when logistic and financial considerations require it. There is also a need to incorporate an emic approach to compliance research, which so far, probably because of the biomedical orientation of the studies, has been entirely lacking. While partial studies (understanding of regimens, compliance without prescribing behaviour) are always useful since they provide information, *policy decisions on compliance should not be made without a previous assessment of prescribing behaviour and patients' reasons for non-compliance.*

On the other hand, when 1) the efficacy of the therapy is well known, 2) the possibility of error in the diagnosis is minimal, and 3) the patient requests the medical service and is eager to adhere to the medical recommendation, the desirability of increasing adherence to medical regimens is obvious. This is the case particularly in the treat-

ment of communicable diseases, such as tuberculosis, leprosy, and onchocerciasis. Studies of adherence with medical regimens for the treatment of single diseases with the above characteristics are much needed in the third world, as well as research to develop adherence models specific to third world countries.

There are at least four types of patients who request medical advice but do not follow it:

- those who are motivated to comply but do not know, or have forgotten, all or part of the recommendations;
- those who are knowledgeable but insufficiently motivated to follow them;
- those who may not be able to comply because of poverty, inaccessibility to medication or other external constraints; and
- those who have a change of mind and for a variety of reasons decide not to follow the recommendations (side effects, cost-benefit analysis, early improvement, etc.).

The following comments assume accuracy of diagnoses and drug efficacy, conditions that, as discussed earlier, are not always present.

Patient group 1: motivated but lacking knowledge

For the first type of patients, as indicated in the section on findings, the literature suggests the need to improve communication. Training physicians to communicate effectively with patients should be an important component of medical school curricula. Before patients leave the office, physicians should routinely verify that they have understood the regimen. Clearly written materials help patients recall drug information and simple drug information leaflets can help to improve patients' knowledge about their medicines. In countries where pharmacists write the medicine labels, these should be clearly written and include information on all aspects of the treatment: dates of issuance and of expiration, dosage, interval, time of the day, duration of treatment, warnings and side effects. As several authors have indicated, instructions must be provided in a permanent form. For the millions of illiterate and functionally illiterate patients, visual symbols should be developed in accordance with local cultures and used routinely.

Nurses and pharmacists should participate in reinforcing and, when needed, clarifying the advice given by physicians. Health promoters should be taught to work closely with physicians to aid patients more at risk of non-compliance such as the illiterate, ethnic minorities, elderly, and those on multiple medications; health promoters' home visits, many of which presently are wasteful, could be used to supervise medical regimens and the adequate storage of medication.

The presentation or quality of the container is another aspect to be taken into consideration, because if patients do not like the containers, they might choose to keep the medicines elsewhere, perhaps mixed with other drugs, and lose the label information.

In this respect, it can be said that the organization of the health system influences patient adherence. The way most clinics function means services are fragmented. There is little communication, if any, between the physician and the dispenser, and between the physician, the dispenser, and other health workers such as health promoters. As indicated above, it would be extremely useful if dispensers, health promoters, and other auxiliary personnel assist patients to adhere to the regimen. Physicians would also benefit if made aware by the other health workers of the problems and the reasons for the non-compliance of their patients. The feedback would assist them in improving the communication with patients.

In many third world societies, family cohesiveness is still very strong. The potential role of the family in patient compliance is not to be neglected. Families affect patients expectations, their illness explanatory model, and their use of health services.

Patient group 2: knowledgeable but insufficiently motivated

Motivating the second type of patients requires a better understanding of non-compliance, since there could be very different reasons for non-compliance. For example, mothers who lose patience in the administration of medication to infants should be assisted, patients who find the medication unpalatable should also be encouraged to overcome their ill-disposition, and,

when applicable, patients should receive explanations about the advantages of early treatment. It is recognized that health professionals can influence the patients motivational levels by employing factors such as interpersonal warmth and behaviour modification techniques.

Patient group 3: unable to comply due to external constraints

For patients who cannot comply because of factors beyond their control, health professionals need to explain to policy makers the causes of non-compliance in order to find solutions, such as free medication programs for the indigent, the subsidy of medicines for the poor and patients with chronic conditions, and the delivery of drugs by health promoters to isolated patients and the elderly.

Patient group 4: decide against the recommendations

Information obtained from studies using an emic approach can assist in determining the best strategy to help this last type of patients. In some cases the most correct strategy could be to do nothing. In the case of these patients, failure to follow the medical recommendation should not always be judged in a negative way. Only when deviance from the recommendation causes nonreversible health consequences, should efforts be made to avert the ill effects.

People's high dependency on drugs might be in itself an impediment for the adequate use of prescribed medicines. Physicians often have to prescribe medicines to satisfy the patient's expectation. In countries where medicines are dispensed freely or are subsidized, physicians are placed in an uncomfortable position if they deny a prescription. Most countries, would benefit from a mass media campaign that would teach patients the limited usefulness of medicines, the harmfulness attached to drugs misuse, and the value of nonpharmacological therapies.

Physicians' training also requires modification. Their dependence on drug therapies, sometimes viewed as a liberal and questionable prescribing behaviour, has been discussed in a few of the studies analyzed in this article. In sum, compliance and prescribing behaviour always need to be analyzed together as part of quality of care assessment studies.

A better understanding of the problems of patient compliance with physician advice in developing countries provides useful information that could serve as a basis to design necessary changes in the formal health delivery system, improve drug management, and reduce undesirable economic and health effects associated with drug misuse.

Endnotes

¹ We are aware of the debate surrounding the use and meaning of the terms 'compliance' and 'adherence'. We do not intend to address the discussion in this paper and use the two terms indistinctly.

² We identified some third world compliance studies published in domestic journals not included in the electronic files, but were not able to include all of them in our analysis because the sources did not provide correct or complete information or the publications could not be located.

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Biographies

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Appendix I.

Third World Studies on Compliance

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|--|--|--|--|--|
| Argentina Egbert et al. (1986) | Urban TB clinic Tuberculosis | 390 patients of low SES, over 12 years of age. | Non-compliers = those patients who abandoned the treatment. Review of medical records. | 62% of patients completed the treatment. All medical problems with drugs occurred during the first two months of treatment. |
| Brazil Artigas Giorgi et al. (1985) | Urban HBP clinic High blood pressure | Study had two phases. During 1st phase n = 547, during 2nd phase n = 422. Total number of patients = 969. | Non-compliers = those that did not go to clinic for 3 months in a row. Second phase patients received education by nurse. Review of medical records. | Illiterate men under 40 years, more likely not to comply. 1/3 of non-compliers quit in first month, 90% before 7th month. Compliance decreased with time from 59% during first year to 44% in second year. Group educated by nurses were better compliers. Better compliance was not associated with BP control. |
| Brazil Barros et al. (1986) | Urban HBP clinic High blood pressure | 564 patients of high SES, 60% women. | Compliers = those patients who kept appointments. Review of medical records. | Only 28% were good compliers at the end of the first year and 24% at the end of the second year. |
| Brazil Bezerra Alves et al. (1987) | Urban pediatric hospital All conditions | 121 discharged children (1 month to 14 years) | Compliers = those who followed instructions. Self-report and pill count. | 52% complied with treatment. Compliance was independent of patient's age, sex, origin and presence of member during previous hospitalization. Self-report is not a reliable measure. |
| Brazil Lessa et al. (1983) | Urban HBP clinic High blood pressure | 109 patients of low SES, 80 females. 18% black, 29% white, 52% mulatto. | Compliers = patients who kept appointments for 2 years. Review of medical records. | Over 34% quit the program in the first 6 months. Almost 37% were compliers. Compliance was independent of sex, number of drugs, and cost. Only 19% dropped BP to normal, 10% were borderline, almost 7% had higher levels of BP. |
| Cameroon Ngho (1992) | 3 rural clinics Antibiotics | 78 illiterate women, 15-55 years of age, divided into 3 groups: 1 control group n = 26, and 2 experimental groups of equal size. | Non-compliers = those who took wrong dosage at any one time, or followed the wrong interval at any one day, or discontinued the drug therapy before time, or used the wrong route. | Experimental groups had higher post and follow-up comprehension test scores than the control group ($P < 0.05$). Experimental group 2 had significantly higher comprehension test scores than the experimental group 1 ($P < 0.05$). |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|--|---|--|---|--|
| | | | Self-report. Experimental group 1 = received information on drug use by means of visual aids. Experimental group 2 = received education on drug use using advanced organizers and visual aids. | The two experimental groups had higher compliance scores (90% and 95%) than the control group (78%). The difference on the level of compliance between the two experimental groups was not statistically significant. Comprehension test scores were positively correlated with the level of compliance. |
| Chile Carrasco et al. (1990) | Urban PHC Upper respiratory infections | 90 children < 6 years. | Compliers = those who followed physicians instructions as recorded in medical records and took between 85 and 115% of the prescribed medication. Self-report and pill count and review of medical records. | Mothers understood treatment in 36% of the cases. Better understanding was associated with frequency of health care consultations, smaller amount of medicines, mother's education, and dissatisfaction with treatment. Better understanding was associated with better compliance. Compliance was associated with the amount of medicines (worse compliance if 2 medicines) and with families' affordability to buy the medicine. Compliance was independent of mother's satisfaction with the medical encounter, child's perceived health, and seriousness of the health problem. Pharmacists could play a larger role in educating patients to use pharmaceuticals. |
| Chile Cornejo et al. (1982) | Urban cardiovascular hospital clinic Rheumatic fever prophylaxis | 162 children | Non-compliers = those who have not had treatment at least 3 months in a row. Review of medical records. | 48% were not compliers at one point in the study, and 13% abandoned it completely. The older the child and the longer he/she had been under control, the less likely to comply. |
| Chile Florenzano Urzua et al. (1981a) | Urban HBP clinic High blood pressure | 24 patients, mean age = 60, 22 women, 2 men. | Non-compliers = those that after at least one month of treatment did not keep follow-up appointments. Review of medical records. | Older females with low education and insufficient knowledge on disease were more likely to quit. Reasons for drop-out: - difficulties getting appointment - long waiting time - bad relations with clinic staff - changing doctors |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|--|--|---|--|---|
| | | | | <ul style="list-style-type: none"> - bad patient-MD relationship - conflict between clinic hours and work |
| Chile Florenzano Urzua et al. (1981b) | Urban HBP clinic High blood pressure | 80 cases, 34 controls. 28% illiterate. | <p>Compliers = those who kept appointments.</p> <p>Case-control study. Influence of having nurses educating patients.</p> <p>Review of medical records.</p> <p>After six months of treatment, patients were asked about HBP knowledge and to report on compliance.</p> | <p>Patients in control group were more likely to interrupt the treatment than patients educated by nurses.</p> <p>Level of education was positively associated with knowledge of HBP.</p> <p>Educating patients leads to much better knowledge of disease but not to greater success with treatment.</p> |
| Chile Roizblatt et al. (1984) | Urban specialized clinics Chronic diseases (HBP, cardiovascular, diabetes, psychiatric disorders) | Psychiatric patients: 101 women, 19 men. The rest: 77 women, 23 men. | Study of patient's knowledge about disease treatment and side effects. | <p>Only 4% in each health problem group knew everything about diagnosis and treatment. Psychiatric patients knew less about diagnosis than the rest. Treatment knowledge was better for psychiatric patients. Treatment effects were better known by psychiatric patients. Less than 6% of patients knew about side effects.</p> |
| Chile Valenzuela et al. (1984) | Urban TB clinic Tuberculosis | 2312 patients. | <p>Non-compliers = those who abandoned treatment.</p> <p>Review of medical records.</p> | <p>Easier treatment regimens had better compliance rates.</p> <p>The % of non-compliers decreased from 22 in 1978 to 7 in 1982.</p> |
| Costa Rica Homedes et al. (1989) | Family medicine 50% urban 50% rural 1 rural clinic 1 urban hospital outpatient clinic 1 small town hospital outpatient clinic PHC | 404 patients. 988 medicines. | <p>Compliers = those who followed advice on medicine labels or physicians' recommendation.</p> <p>Self-report and pill count.</p> | <p>8% of patients leave the clinic without information on dosage, 21% without information on interval, 69% without information on time of the day to take the medicine, and 79% without the information on the duration of the treatment.</p> <p>In 5% of the medicines, there are discrepancies between the physician's advice and what is written on medicine labels.</p> <p>People relied more on written advice than on oral recommendations.</p> |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|--|--|---|--|---|
| | | | | <p>Following the pill count method, 77% of the medicines that could cause iatrogenic problems were taken appropriately.</p> <p>According with patients' self report, 78% complied with dosage, 67% complied with interval, 56% with time of the day, and 53% with the duration of the treatment.</p> <p>Compliance was independent of the duration of the consultation.</p> |
| Costa Rica Vargas et al. (1978) | Urban clinic. Family medicine (74%), pediatrics (24%), psychiatry (2%) PHC | 476 patients, 66% women. | <p>Compliers = those who took the medicine following the physician's instructions as reported during the post-encounter interview.</p> <p>Pill count.</p> | <p>43% of patients took over 76% of the prescribed amount of medicine. Lower education and lower income were associated with lower compliance.</p> <p>Compliance was better if patients were taking 3 or 4 medicines, and if they were injections or pills.</p> <p>Reasons for non-compliance were:</p> <ul style="list-style-type: none"> - side effects - feeling better - lack of trust in medicine - too many medicines. <p>Children under 1 year had the lowest level of compliance.</p> |
| Dominican Republic Ugalde et al. (1986) | Rural PHC clinic PHC | 119 patients. | <p>Study of comprehension of physician's advice.</p> <p>Household visit to collect information on retention and understanding of medical advice on dosage, interval, time, and duration.</p> | <p>Only 50% of physician's advice was recalled properly.</p> <p>The elderly, those with < 7 years of education, and those who were prescribed several drugs had more problems retaining the information.</p> |
| Ethiopia Asbeck-Raat et al. (1986) | Urban outpatient clinic Leprosy | 721 patients attending follow-up visits. | <p>Compliers = positive urine spot test.</p> <p>Biochemical test.</p> | <p>91% of patients complied.</p> <p>Compliance was independent of age, sex, prevalence of disability, or having a leprosy contact in the family.</p> <p>Compliance was negatively associated with duration of treatment.</p> |
| India Koticha et al. (1979) | Urban hospital outpatient and its 10 peripheral clinics Leprosy | 48 345 patients attending the hospital between 1950 and 1979. | <p>Compliers = those who took the treatment for 9 months a year for a minimum of 3 years.</p> | <p>13% were taking treatment regularly.</p> <p>More patients in the 30-59 years age group were regular compliers.</p> |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
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| | | 27% were bacteriological positive and 37% had deformities. | Review of medical records. | <p>Bacteriologically positive cases ($P < 0.0001$) were more regular attendees than non-infectious cases.</p> <p>The type of leprosy was predictive of compliance (11.5% of lepromatous complied, 12.5% of tuberculoid cases and 20.8% of intermediate cases $P < 0.0001$).</p> <p>Non-deformed cases were more regular in seeking treatment (12.4% vs 13.5%, $P < 0.01$).</p> <p>Students and blue-and-white collar workers were better compliers than beggars.</p> |
| India Kumar et al. (1983) | 6 mobile treatment units Leprosy | 319 patients, 24% < 15 years, and 46% females. | <p>Compliers = those who took medicine as prescribed.</p> <p>Patients visited clinic every two weeks. Pill count took place during three home visits 7–10 days after the 1st, 6th, and 12th visit.</p> | <p>Only 36% of patients went to the clinic.</p> <p>About 10% of patients who collected the medication did not take it.</p> <p>Urine spot tests taken during the three visits were positive in 85% of the patients.</p> <p>Between 3 and 9% of patients (variations correspond to different days of the home visit) had negative urine spot test and DDs/Cr ratios even though the number of DDs tablets counted corresponded to those expected. Between 30 and 40% of patients' self-report (variations correspond to different days of the home visit) on the regularity of their drug intake were found to be unreliable.</p> |
| India Uppal et al. (1987) | Urban hospital outpatient dermatology clinic Skin diseases | 100 patients, 50% literacy rate. | <p>No definition of compliance.</p> <p>Self-report during follow-up visit to clinic.</p> | 100% of the patients said they were following the prescribed treatment. |
| Kenya Feksi et al. (1991) | Rural and semiurban region Epilepsy | 302 patients (173 males), 6–65 years with at least 2 seizure attacks in previous year. No treatment with anti-epileptic drug in previous 3 months. | <p>Compliers = patients who take the medicine and complete one year of treatment.</p> <p>Biochemical tests.</p> | Patients were visited by health workers at least once a month. A nurse took a blood test every 3 months, and each patient had 6 encounters with physicians throughout the year. |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
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| | | No history of drug abuse. | | After 1 year only 11% of the patients were non-compliant. Health workers can efficiently monitor epilepsy treatment. |
| Mexico Martinez et al. (1982) | Urban TB clinic Tuberculosis | 40 families 20 were good compliers, and 20 were not. | Non-compliers = those who abandoned treatment. Review of medical records. | Most cases of non-compliance were due to patients not understanding the problem and miscommunication between family and health providers. Non-compliers were of low SES, had poor nutrition and deficient housing, and came from dysfunctional families. When non-compliers receive education, they comply. |
| Mexico Ramirez Aranda et al. (circa 1987) | Urban Diabetes, high blood pressure | 195 adults over 45 years. | Compliers = patients who follow physician's instructions. Self-report. | 61% HBP patients complied with drug treatment and 46% with with diet. 79% diabetics complied with drug treatment and 61% with diet. Compliance was associated with satisfaction with treatment but there was no relation between compliance and treatment complexity, SES, and disease severity. There was some association between compliance and BP improvement but not between compliance and reduction of glucose levels. |
| Mexico Tovar Espinosa et al. (1987) | Urban PHC clinic Gastro-intestinal, upper respiratory infections | 154 patients of low SES. | Compliers = those patients who followed prescribed instructions. Self-report. | 63% of patients complied with drugs. 61% complied with life style recommendations. Compliance was independent of number of medicines and schooling. Reasons for non-adherence were: - lack of improvement (15%) - cost of medication (15%) - feeling better (12%) - not understanding advice (8%) - instructions difficult to follow given the living conditions (12%). |
| Nepal Henderson (1984) | Urban TB clinic Tuberculosis | 3095 patients, double number of males, mean age = 28. | Non-complier = those patients who lapsed from chemotherapy for a period of at least 28 days. | 32% of patients defaulted, men defaulted 3 times more than women; 9% defaulted before starting; 72% defaulted within 6 months. |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
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| | | | Review of medical records. | Predictive factors for default were sex, side effects, lower education, and distance to clinic. |
| Nigeria Sechrist (1979) | Urban hospital (in and out patients) Infectious diseases Antibiotics (sulfa or tetracycline) | 41 adults. | Case control study. Cases were twice instructed on how to administer the medication. | Instructions increased knowledge on drugs to be taken at home by 35%. The characteristics most often missed were the drug name and the side effects. |
| Pakistan Mull et al. (1989) | 2 leprosy centres in Karachi slums Leprosy | 128 patients: - 69 inpatients - 59 outpatients living in slum communities. 86 males, low SES 65% no formal schooling. | Compliers = all inpatients except those who waited 3 years or more between the initial diagnosis and the beginning of treatment; and outpatients except those who failed to obtain treatment for at least 3 most recent months preceding the study (n = 46). Review of clinical records. | No relationship between compliance and type of leprosy, or degree of disfigurement, age, ethnicity. Non-compliers were more likely to be males, had experienced undesirable treatment side effects, more likely to deny they had the disease, and more likely to have used folk healers and folk treatments. Family pressure, stigma and lack of understanding of the disease process led to non-adherence. The major contributor to non-compliance is poor communication between health personnel and patients. |
| Panama De Leon et al. (1985) | Urban hospital clinic Bipolar disorder (psychiatry) | 30 families | Compliance = no definition given. Interview with patients. A cluster analysis differentiated patients along clinical outcome measures, drug compliance, education and migration status. | Family variables measuring empathy, affection, and expression of feelings predicted compliance and clinical outcome. Lower compliance was associated with low educational levels and with rural residence. Older females with more than one episode were better compliers than the rest. |
| South Africa Buchanan et al. (1977) | Outpatient clinic of urban pediatric hospital All conditions | 200 black children, 86% with acute health problems. | Compliers = those patients who took expected proportion of medicine. Pill count (home visit 5-8 days after consultations). | 2.13 compounds were prescribed by patient. 46% were not compliers: - in 71% of these cases the medicine involved was an antibiotic. - 78% did not take a portion of the treatment as they should have (lower dosage or longer intervals). - 22% of the patients had more left-over medicine than anticipated. |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|--|---|--|--|---------------------|----------|----------|--|--|--|---------------|----|----|-----------|----|----|------------------------------------|--|--|---------------|----|----|-----------|----|----|-----------------------------------|--|--|---------------|----|----|-----------|----|----|---------------------------|--|--|---------------|----|----|-----------|----|----|---------------------------------------|--|--|--------------|----|----|-----------|----|----|
| | | | | - 58% of the medicines involved were penicillins. Physicians and nurses instructed patients on how to take the medicine in 38% and 9% of the cases, respectively. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| South Africa McFarland (1984) | Clinic attending mining workers and families Tuberculosis | Group (a): 198 patients treated in 1979-80 were first to receive a rifampicin-containing, streptomycin-excluding intermittent regimen (NST) and comprising rifampicin, isoniazid, ethambutol and pyrazinamide. Group (b): 247 patients treated in 1978 and 1979 who received streptomycin-containing, rifampicin-excluding daily regimen ('standard'), comprising streptomycin, isoniazid, ethionamide and thiacetazone. | Compliers = those patients who completed the treatment. Review of clinical records. | In group (a) 71% of patients completed the treatment. In group (b) only 41% finished the treatment. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| South Africa Wagstaff et al. (1982) | Urban PHC clinic PHC | Two studies, 1977, 1980. n = 200 black children in each study. | Study of understanding of regimens. Compares understanding of patients instructed by nurses and patients instructed by physicians. Interviews at the clinic. | <table border="1"> <thead> <tr> <th>Patients' knowledge</th> <th>1977 (%)</th> <th>1980 (%)</th> </tr> </thead> <tbody> <tr> <td>Knowledge about dosage and route of administration</td> <td></td> <td></td> </tr> <tr> <td> by physicians</td> <td>88</td> <td>79</td> </tr> <tr> <td> by nurses</td> <td>93</td> <td>87</td> </tr> <tr> <td>Knowledge about treatment duration</td> <td></td> <td></td> </tr> <tr> <td> by physicians</td> <td>33</td> <td>40</td> </tr> <tr> <td> by nurses</td> <td>63</td> <td>74</td> </tr> <tr> <td>Knowledge of purpose of treatment</td> <td></td> <td></td> </tr> <tr> <td> by physicians</td> <td>51</td> <td>26</td> </tr> <tr> <td> by nurses</td> <td>61</td> <td>65</td> </tr> <tr> <td>Knowledge about diagnosis</td> <td></td> <td></td> </tr> <tr> <td> by physicians</td> <td>28</td> <td>28</td> </tr> <tr> <td> by nurses</td> <td>63</td> <td>63</td> </tr> <tr> <td>Knowledge about follow up appointment</td> <td></td> <td></td> </tr> <tr> <td> by physician</td> <td>--</td> <td>51</td> </tr> <tr> <td> by nurses</td> <td>--</td> <td>43</td> </tr> </tbody> </table> | Patients' knowledge | 1977 (%) | 1980 (%) | Knowledge about dosage and route of administration | | | by physicians | 88 | 79 | by nurses | 93 | 87 | Knowledge about treatment duration | | | by physicians | 33 | 40 | by nurses | 63 | 74 | Knowledge of purpose of treatment | | | by physicians | 51 | 26 | by nurses | 61 | 65 | Knowledge about diagnosis | | | by physicians | 28 | 28 | by nurses | 63 | 63 | Knowledge about follow up appointment | | | by physician | -- | 51 | by nurses | -- | 43 |
| Patients' knowledge | 1977 (%) | 1980 (%) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge about dosage and route of administration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by physicians | 88 | 79 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by nurses | 93 | 87 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge about treatment duration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by physicians | 33 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by nurses | 63 | 74 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge of purpose of treatment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by physicians | 51 | 26 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by nurses | 61 | 65 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge about diagnosis | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by physicians | 28 | 28 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by nurses | 63 | 63 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Knowledge about follow up appointment | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by physician | -- | 51 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| by nurses | -- | 43 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| South Africa Yeats (1986) | TB clinics: 9 in urban and 6 in rural areas Tuberculosis | 50 patients, 25 were referred to urban clinics and 25 to rural clinics. | Compliers = patients who attended the clinic and received at least 80% of the treatment. | 48% of patients complied. Compliance in urban clinics was considerably higher than in rural centres (68% vs 28%). | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|-------------------------------------|--|---|---|---|
| | | | Review of clinical records. | The more remote the clinic the worst the compliance. In remote areas, health professionals are less motivated to do things well. |
| Venezuela Ramos et al. (1983) | Urban hospital outpatient pediatric clinic All conditions | 312 randomly chosen patients. | Compliers = patients who followed physician's recommendations in terms of dosage, interval, and time. Self-report. | 68.6% of patients were good compliers. Compliance was negatively associated with the number of medicines prescribed, SES, level of education. Compliance was positively associated with disease perceived severity. |
| Zimbabwe Armstrong et al. (1984) | Urban TB clinic Tuberculosis | 290 patients, all ages, 3 times more females. | Non-compliers = those patients who interrupted treatment for at least one month. Review of medical records. | 58% completed treatment without default; 24% were traced and recalled interruption of treatment, lasted less than one month; 18% defaulted and were lost. At greater risk of defaulting were unemployed, housewives, and children labourers, independently of age and sex. |
| Zimbabwe Axton et al. (1982) | Urban PHC PHC (50% antibiotics) | 83 children. | Compliers = those patients who went to the clinic for follow-up treatment as recommended by physicians. Review of medical records which in Zimbabwe are kept by patients themselves. In the records, researchers can read if patients went to clinic for treatment. | Rate of compliance was 93%. High rate of compliance is explained by the nurses' use of local language, the large number of prescribed injections, and the short distance to the clinic. Authors concede that health improvement of patients was unrelated to compliance. |
| Zimbabwe Kitai et al. (1986) | Urban hospital outpatient clinic High blood pressure | 101 patients, mean age 49, 63 females. 55% of those active in the labour force had a semi-skilled | Compliers = those patients who follow treatment as recorded in medical records (in Zimbabwe, hospitals | Medical records of 6 patients did not indicate current regimens. In 30% of the cases there was a discrepancy between the daily |

| Country and author | Setting and type of problem | Sample | Definition and method | Findings |
|-------------------------------------|---|--|--|---|
| | | occupation. 57% had between 4 and 7 years of schooling, only 12% were illiterate. | do not keep the records, they are kept by patients themselves). Self-report and review of medical records. Patients were divided into two groups (A) DBP < 100, and (B) DBP > 100. | dosage prescribed and that identified by the patient. 83% of this group were taking less medicine than prescribed. 5 patients were taking higher dosages. There was a statistically significant association between poor compliers and group B. All patients taking higher dosage were in group A. It was easier to comply with regimens of one or two intakes per day than regimens of more frequent intakes. Often, patients were seen by different practitioners. 44% of patients had seen two or three practitioners and 26% four or more. The assignment of different physicians to the same patient was perceived as an obstacle for compliance. |
| Zimbabwe Nyazema (1984) | Urban hospital clinic PHC, diabetes, high blood pressure | 288 records of non-compliers, 69 interviews, ages 18-69, 45 had HBP, 16 diabetics, 49 women. | Compliers = patients who attended follow-up appointments. Review of medical records. Interviews to measure knowledge. | 25% of defaulters had HBP, 15% were diabetics, 10% had asthma, and 8% were epileptics. 42% of patients with HBP (n = 45) did not understand disease and 16% did not know why they were taking the medication. About half of them said that they skip dosages. All the patients on insulin did not know why they had to sterilize the needle and syringe. |
| Zimbabwe Taylor et al. (1987) | Farmers from 2 large plantations (76 000 and 21 000) Malaria chemoprophylactic | 424 persons, from four villages on each plantation. | Compliers = those patients who took the medicine as prescribed. Biochemical test, and review of medical records. | According to urine test 52% were taking medication, 55% from one plantation and 48% from the other. Only 61% of those recorded on their health chart as having taken the medicine had actually taken it. |