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# Optimizing Adherence to Pharmaceutical Care Plans

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## Abstract and Program Preview

### Abstract

Nonadherence can be viewed as a behavioral disorder -- a condition that is best treated by identifying individual risk factors and designing targeted interventions.

### Program Preview

In the past few decades, hundreds of research articles have been published on nonadherence, and dozens of devices and programs have been developed to assess and resolve adherence-related problems. Yet, despite the tremendous efforts of pharmacists and other health care providers, medication nonadherence remains a major public health problem. Indeed, the National Council on Patient Information and Education (NCPPIE) has aptly termed noncompliance "America's other drug problem."<sup>[1]</sup>

Pharmacists are in an ideal position to assess and treat adherence-related problems that can adversely affect patients' health outcomes. Strategies to monitor and improve adherence are key components of pharmaceutical care plans, especially for patients with chronic diseases, such as hypertension, diabetes, and atherosclerotic heart disease.

This article looks at nonadherence from a relatively new perspective: as a behavioral disorder that can be assessed and managed through a carefully devised pharmaceutical care plan. In this article, we review the behavioral and social factors that influence adherence, highlight the high-risk populations that are especially vulnerable to nonadherence, and present best practice strategies that could serve as appropriate models for pharmaceutical care services.

## Nonadherence: Definition and Scope of the Problem

Medication nonadherence is most simply defined as the number of doses not taken or taken incorrectly that jeopardizes the patient's therapeutic outcome.<sup>[2]</sup> NCPPIE<sup>[1]</sup> has noted that nonadherence can take a variety of forms, including not having a prescription filled, taking an incorrect dose, taking a medication at the wrong time, forgetting to take doses, or stopping therapy too soon. In this article, we use the term "adherence" instead of compliance, because the former connotes an interactive, collaborative relationship between pharmacist and patient. Compliance originates from a practitioner-centered paradigm and is more control oriented. It relies on patient obedience and sometimes stigmatizes the patient as engaging in deviant behavior if another course of action is chosen.<sup>[3,4]</sup> A patient-centered approach is one in which the pharmacist engages patients to become more active in the continuum of decision making about their treatment and the consequent health outcomes.

Although medication nonadherence is the primary focus of this article, it is only one form of nonadherence. Poorer health outcomes may also result when a patient does not adhere to recommended lifestyle changes, such as exercise or smoking cessation, or to prescribed nonpharmacologic interventions, such as physical therapy or dietary plans. Pharmacists who counsel patients with chronic diseases, such as asthma, hypertension, or diabetes, need to assess and promote adherence to these nonpharmacologic treatments as well.

Medication nonadherence is a major public health problem that has been called an "invisible epidemic."<sup>[5,6]</sup> Nonadherence to pharmacotherapy has been reported to range from 13% to 93%, with an average rate of 40%.<sup>[7]</sup> The problem encompasses all ages and ethnic groups. It has been estimated that 43% of the general population, 55% of the elderly, and 54% of children and teenagers are nonadherent.<sup>[8]</sup> A host of individual characteristics also influence adherence, such as the patient's religion, health beliefs, social support system, and ethnicity.

Rates of nonadherence vary with different disease states. For example, the nonadherence rate for hypertension is reported to be 40%, while that for arthritis has been found to range between 55% and 70%.<sup>[9]</sup> Nonadherence rates are especially high among patients with chronic diseases.<sup>[10]</sup> These patients, who typically require long-term, if not lifelong, medications to control symptoms and prevent complications, often must make significant behavioral changes to adhere with pharmacotherapy. Such changes can be difficult to integrate into everyday life.

Nonadherence to pharmacotherapy has been shown to decrease productivity and increase disease morbidity, physician office visits, admissions to nursing homes, and death.<sup>[1,9,11]</sup> For example, an estimated 125,000 deaths per year have been attributed to nonadherence to treatment for cardiovascular disease.<sup>[11]</sup> Many studies have documented poorer

health outcomes due to nonadherence, especially in patients with chronic diseases such as hypertension, diabetes, and epilepsy.<sup>[5,6,12,13]</sup>

Finally, nonadherence places a huge burden on the nation's economy. Its direct and indirect costs have been estimated to be \$100 billion per year in the United States alone.<sup>[12]</sup> Pharmacies also lose revenue because patients often fail to refill prescription medications, especially for chronic diseases.<sup>[14]</sup> According to the Task Force on Compliance,<sup>[9]</sup> only 25% of prescriptions for chronic conditions are refilled after 1 year.

For pharmacists, the message is clear: To improve adherence to pharmacotherapy, and hence to improve health outcomes, we must assess each patient individually, then provide targeted interventions that are responsive to his or her unique risk factors and needs (see Figure 1). Recent research, such as the APhA Foundation's Project ImPACT: Hyperlipidemia,<sup>[15]</sup> has clearly documented the value of pharmacist-led patient care in fostering better adherence and outcomes.

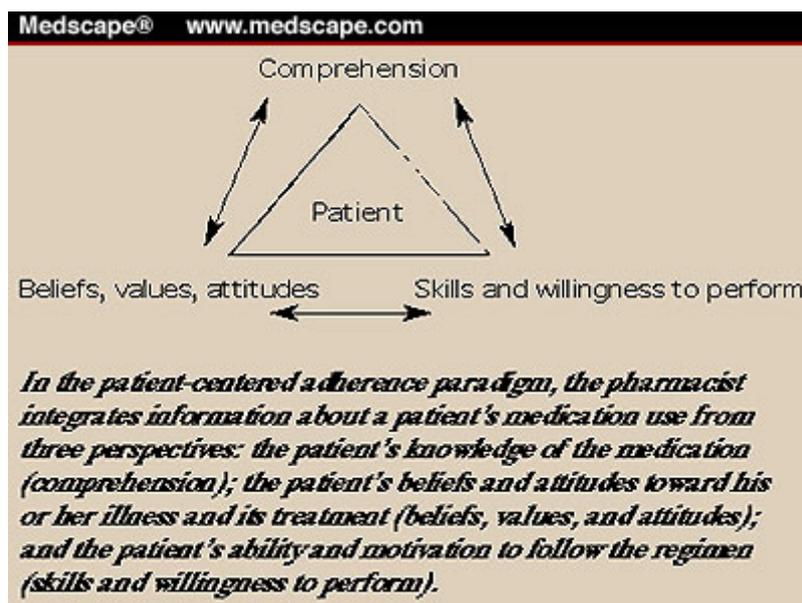


Figure 1. Patient-Centered Adherence Paradigm.

## Nonadherence as a Behavioral Disorder

Nonadherence has been studied widely by behavioral scientists whose models, such as the Health Belief Model and the Theory of Reasoned Action, attempt to explain and predict nonadherence.<sup>[16]</sup> However, despite the numerous articles that have been published on this topic, nonadherence remains a problem of epidemic proportions. An alternative model that can be useful for understanding and treating nonadherence is to view the problem as a disorder -- a behavioral disorder.<sup>[3]</sup> Although not a true physiological disease, nonadherence shares many of the same characteristics as a medical disorder. For example:

- **Numerous risk factors for nonadherence have been identified.** Clearly, nonadherence is a multifactorial problem, and a host of contributing social, economic, medical, and behavioral factors have been identified.<sup>[5,6,9,17-19]</sup> As shown in Table 1, some risk factors for nonadherence relate to the disease (for example, a chronic or asymptomatic illness), others relate to the patient (forgetfulness, sensory impairment, and economic problems), and still others relate to the drug regimen (concerns about cost, real or perceived adverse effects, or dosing schedule).
- **Nonadherence can be assessed and monitored.** A variety of direct and indirect methods are available to assess the presence and severity of nonadherence. As pharmacotherapy specialists, pharmacists may be the best suited of health providers to evaluate adherence problems on an ongoing basis.
- **Effective interventions are available to treat nonadherence.** Many cases of nonadherence can be treated with carefully selected interventions. However, other cases may not be resolvable, despite the best efforts of health care providers.<sup>[5]</sup>
- **Nonadherence frequently leads to increased morbidity and mortality.** Just as untreated medical disorders often progress to serious complications, nonadherence has a well-documented adverse impact on health outcomes.<sup>[17,20,21]</sup>
- **Nonadherence tends to have a variable course.** Nonadherence is not a stable condition, but tends to progress or change overtime in a given patient.<sup>[7]</sup> Just as most chronic medical conditions require periodic reevaluation and therapeutic adjustments, patients with adherence problems also should be reassessed on a regular basis.

## Assessing Adherence

Before effective strategies can be devised to improve adherence, pharmacists need to evaluate how well a patient is adhering to pharmacotherapy and identify risk factors that may predispose the individual to nonadherence. Both direct and indirect methods are available to assess adherence.

### Direct Methods

Direct and objective methods of assessing adherence include blood-level monitoring and urine assay for the measurement of drug metabolites or marker compounds. Collecting blood or urine samples can be expensive and inconvenient for patients, and, moreover, only a limited number of drugs can be monitored in this way. The bioavailability and completeness of absorption of various drugs, as well as the rate of metabolism and excretion, are factors that make it difficult to correlate drug levels in blood or urine with adherence. The ability of direct methods to identify nonadherence also depends on the accuracy of the test and the degree to which the patient was nonadherent before the urine or blood sample was taken.

### Indirect Methods

Indirect methods of assessing adherence include patient interviews, pill counts, refill records, and measurement of health outcomes. In one study, the use of patient interviews identified 80% of nonadherent patients, as verified by pill counts.<sup>[22]</sup> The interview method is inexpensive and allows the pharmacist to show concern for the patient and provide immediate feedback. A drawback of this method is that it can overestimate adherence, and its accuracy depends on the patient's cognitive abilities and the honesty of his or her replies, as well as the interviewer's correct interpretation of responses. Pill counts provide an objective measure of the quantity of drug taken over a given time period. However, this method is time-consuming and assumes that medication not in the container was consumed. The refill record provides an objective measure of quantities obtained at given intervals, but assumes that the patient obtained the medication only from the recorded source.

Pharmacists can generally obtain reliable information on medication-taking behaviors from the patient or a family member or caregiver. The interview should be systematic and include specific questions on forgetfulness, the patient's understanding of medication instructions, and the conditions for which therapy has been prescribed. The patient's health beliefs and the degree of support available from friends and family should also be assessed.<sup>[4]</sup>

Interviewing patients to detect nonadherence is most effective when indirect probes are used. For instance, the probe "Most people have trouble remembering to take their medications. Do you have any trouble remembering to take yours?" will solicit more reliable information than asking "Are you taking your medications as prescribed?" Table 2 gives examples of specific probes that the pharmacist can use to assess whether or not a patient has been or is likely to be adherent.

Pharmacy computerized prescription records provide perhaps the most practical and least intrusive method for assessing adherence. This method allows the pharmacist to review and monitor prescription records to determine whether the patient is refilling medications in a timely manner. Computer algorithms can be incorporated into the pharmacy computer software system as a tool for monitoring adherence and measuring the timeliness of prescription refills.<sup>[23]</sup> This method also has the potential to flag potential adherence problems that may develop over the course of several refills. One disadvantage of this method is that it does not assess actual medication-taking behaviors (for example, this method would not detect a patient who was swallowing a sublingual tablet or improperly inhaling an asthma medication from a metered-dose inhaler).

Factors that have a negative or positive influence on medication adherence are shown in Table 3. This table may be used both to identify factors that contribute to nonadherence and to develop interventions to address adherence problems.

## Designing Patient-Focused Interventions for Nonadherence

Strategies to improve adherence should target the specific risk factors and causes identified during the patient assessment. Adherence aids may be used alone or in combination, but should be tailored to the individual patient. For example, a forgetful patient may benefit from a special package or container that provides a visual reminder that a medication was taken (for example, blister packaging or a computer-aided compliance package). Forgetful patients also can be advised to take dosages in conjunction with other routine daily activities, such as at mealtimes or before tooth brushing. Refill reminders or automatic delivery to the home also can be valuable for the forgetful patient, as can simplification of the dosage schedule, such as changing to a once-daily prescription.

Once the initial adherence plan is implemented, follow-up is important to gauge how well the plan is working and whether changes are needed. Most studies have reported that almost all adherence strategies, regardless of their initial acceptability, will decline in responsiveness over time.<sup>[7]</sup> Therefore, the pharmaceutical care plan must include periodic

reinforcement strategies for long-term success. The plan should also be reevaluated from time to time to assess its effectiveness and determine how well it meets patient expectations.

Identifying and measuring the outcomes of a pharmaceutical care adherence plan is also important. Objective measures of improved health status and/or reduced health care expenditures document success in a well-designed pharmaceutical care plan. Examples of measurable outcomes include a reduction in inappropriate use of the health care system (for example, fewer emergency department visits for asthma exacerbations) or improved control of the patient's disease (for example, HbA<sub>1c</sub> levels below 7% in a patient with type 2 diabetes).

The recently published results of Project IMPACT: Hyperlipidemia demonstrate that a pharmacist-oriented program to improve adherence can dramatically improve health outcomes.<sup>[15]</sup> Project IMPACT, which stands for *Improve Persistence And Compliance with Therapy*, was conducted in 26 community-based ambulatory care pharmacies in 12 states. The program's objective was to demonstrate that pharmacists, working collaboratively with patients and physicians, could improve patients' adherence to prescribed therapy for dyslipidemia and help them achieve their National Cholesterol Education Program (NCEP) goals.

Remarkably, over an average of 24.6 months, 93.6% of Project IMPACT patients adhered to their prescribed therapy and 90.1% persisted with therapy through the study's end.<sup>[15]</sup> Among patients with existing coronary artery disease, 48% attained their NCEP goal, far better than in any previously published national study of patients with hyperlipidemia. The authors stated that collaboration between pharmacists, patients, and physicians, using pharmacy-based testing for blood lipids and pharmacist-led counseling, could reduce the risk of heart disease and stroke by one-third.

## Strategies for Enhancing Adherence to Pharmacotherapy

Although pharmaceutical care plans should be individualized, some adherence-promoting strategies tend to be helpful in the majority of patients. Whenever possible, the pharmacist should strive to:

- **Promote self-efficacy.** Encourage patients to assume an active role in their own treatment plans. In general, the more confident people feel about their ability to manage a problem, the more likely they will be to take positive action to solve that problem. Involving patients in decisions about their care is important for promoting self-efficacy. For example, a study by Nessman and colleagues<sup>[24]</sup> showed that patients with hypertension who were highly involved in decisions about their therapy and trained to take their own blood pressure had significantly better health outcomes than patients who did not have these characteristics. The authors attributed their improved outcomes to the patients' ability to make choices about health care decisions and follow through on a monitoring plan.
- **Empower patients to become informed medication consumers.** A pharmaceutical care plan to enhance adherence should first focus on educating the patient and family members or caregivers about the patient's disease and medications. Pharmacists should provide both written and oral information to address such basic questions as: What is the disease? Which treatments have been prescribed or recommended and why? What is the patient's role in managing the disease? Which adverse effects may occur? Perhaps surprisingly, the amount of factual information that a patient has about his or her medication is *not* highly correlated with adherent behavior.<sup>[7]</sup> Instead, the patient's functional knowledge -- that is, information that is directly useful and meaningful to the patient -- and clear instructions for medication use are more significant.<sup>[25]</sup> Opportunities to impart functional knowledge begin with the physician and/or nurse at the time of the initial prescription, and should be reinforced by the pharmacist when the prescription is filled or refilled.
- **Avoid fear tactics.** Scaring patients or giving them dire warnings about the consequences of less-than-perfect adherence can backfire and may actually worsen adherence.<sup>[26]</sup> A more constructive approach is to help the patient focus on ways to integrate medication taking into his or her daily routine.<sup>[27]</sup>
- **Help the patient to develop a list of short-term and long-term goals.** These goals should be realistic, achievable, and individualized. The pharmacist can also make "contractual" agreements with the patient to encourage development of constructive behaviors, such as getting more exercise or beginning a smoking cessation program.
- **Plan for regular follow-up.** The pharmacist should plan to interact with the patient at regular, usually brief intervals to reinforce the adherence plan. For example, brief appointments can be scheduled when patients visit the pharmacy for prescription refills. The plan should be adapted to the patient's lifestyle and be reevaluated from time to time to adjust for life changes, such as aging or a change in work or school schedules. If possible, the time for counseling on adherence should be separated from the dispensing and pick-up functions.
- **Implement a reward system.** Giving prescription coupons or specific product discounts for successfully reaching a goal in the treatment plan can help to increase adherence, particularly in patients with low motivation.

## Considerations for Special Populations

Although the problem of nonadherence affects all ethnic and age groups, some populations are more vulnerable than others. Pharmacists should be especially alert for adherence problems in high-risk populations, such as the elderly,

children, low-literacy individuals, and some ethnic minorities. Table 4 provides resources that can aid pharmacists in improving adherence in these high-risk groups.

**The Elderly.** Although older Americans (aged 65 and older) account for less than 15% of the population, they consume about 33% of all prescription medications and 40% of nonprescription drugs.<sup>[28]</sup> Poor adherence in the elderly often leads to additional physician or emergency department visits, hospitalization, and uncontrolled chronic diseases. One study estimated that about 17% of elderly hospitalizations are due to adverse medication reactions -- nearly six times the rate in the non-elderly population.<sup>[29]</sup>

A variety of often-interacting risk factors increase the risk of nonadherence among the elderly. Risk factors in this population include:

- **Polypharmacy.** Elderly patients are more likely to take multiple medications, including both prescription and nonprescription products. Whenever possible, the medication regimen should be simplified. The pharmacist also should consider the extent to which the mode of drug delivery (e.g., pill, patch, or inhaler) may influence adherence.
- **Physical impairments.** Age-related physical disabilities, such as difficulty getting out of bed or a chair, may limit an elderly person's ability to take medication consistently. Traditional packaging of medication also may be an impediment to some elderly patients; for example, individuals with arthritis in their hands may have trouble opening containers. For these patients, consider options such as use of unit-of-use packaging, unit-dose packing, or blister packaging. The pharmacy environment should also be friendly to senior citizens. For example, elderly patients with hearing problems may need a quiet place to receive patient counseling so as not to be distracted by ambient noise. Written materials should be available in large type (14-point font size) for people with vision problems.<sup>[30]</sup>
- **Cognitive limitations.** Memory loss and other cognitive problems may interfere with adherence by causing patients to fail to understand or remember medication instructions.<sup>[30]</sup> For these patients, pharmacists may need to provide medication instructions several times and in different formats, such as both verbal and written information.
- **Limited access to or affordability of health care services.** Many elderly patients are on fixed incomes. A recent study conducted by the consumer advocacy group Families USA reported that over the past 5 years, the prices for the 50 prescription drugs most commonly used by the elderly have increased faster than inflation.<sup>[31]</sup> Elderly patients who are unable to afford certain medications may be eligible for various forms of state or federal aid, or special discounts from pharmaceutical manufacturers.

Pharmacists should also consider how an elderly patient's relationship with other health care providers might influence adherence. For example, research shows that the elderly tend to favor partnership-type relationships with their physicians and that satisfying patient-provider relationships contribute to better adherence.<sup>[32]</sup> However, with the growing number of managed care and group practices, these relationships are often more difficult to develop. A good pharmaceutical care plan can help elderly patients relate more effectively with primary care providers by helping these patients understand the nature of their diseases and how to better communicate their needs to physicians.

The role of a patient's caregivers in helping or hindering medication adherence also should be considered. A motivated and well-informed caregiver can be essential for optimizing adherence in an elderly patient. On the other hand, caregivers can sometimes hinder adherence efforts. For example, a caregiver who is having trouble coping with an elderly patient's behavioral or cognitive problems may demand medications to sedate the patient. Pharmacists who serve communities with a large elderly population may wish to hold special classes to teach caregivers about medication management, addressing topics such as medication administration and how to monitor and report adverse effects.

**Low-Literacy Patients.** Patients who read poorly or not at all are at high risk for poor adherence. According to the U.S. Department of Education Health Literacy Survey,<sup>[33]</sup> 40 million people in the United States are functionally illiterate and another 55 million are only marginally literate. Patients with low literacy skills are less likely to be adherent to their medication regimens and appointments, or to present for care early in the course of their disease.<sup>[34]</sup>

Inadequate health literacy skills have been shown to adversely affect the management of a number of chronic diseases, including diabetes and hypertension. For example, in a study of hospitalized patients, 49% of patients with hypertension and 44% of those with diabetes were found to have inadequate health literacy.<sup>[35]</sup> In that study, as many as 50% of patients did not understand how many times a prescription should be refilled. After examining a standard appointment slip, up to 33% could not describe when a follow-up appointment was scheduled, and as many as 50% could not determine whether they were eligible for financial assistance based on their income and number of children.<sup>[35]</sup>

People with low health literacy may not understand the health risks associated with errors in medication management. Shame or embarrassment about their low literacy may deter them from seeking help with medication instructions. Pharmacists can assess health literacy using nonobtrusive screening tests such as the Test of Functional Health Literacy in Adults (TOFHLA), which is available in English and Spanish versions.<sup>[36]</sup> This test includes items that assess the patient's ability to understand labeled prescription vials, blood glucose test results, clinic appointment slips, and financial information forms.

On a more practical level, pharmacists also should strive to provide patient educational materials that are written at a low-literacy level. The National Work Group on Literacy and Health<sup>[37]</sup> recommends that materials should be at the fifth-grade level or lower, yet most patient education materials are written at the eleventh-grade level. Patient education

materials should be short, simple, and contain culturally sensitive graphics. Easy-to-read written materials should be combined with verbal instructions, which ideally should be repeated on several different occasions to reinforce patient understanding. Involving family members in the patient education process also can promote adherence.

Many literacy organizations recommend that pictograms and warning stickers be affixed to prescription bottles and nonprescription product packages. A detailed list of pictograms and a summary of research on their usefulness for low-literacy populations are available from the United States Pharmacopeia (USP) at [www.usp.org](http://www.usp.org). In addition, multimedia computer-based educational programs are available that permit patients to choose to see or hear information about their particular medical condition.

**Ethnic Minorities.** An extensive literature documents persistent differences in health outcomes between ethnic minorities and white Americans. These disparities include differences in health care access and utilization as well as health status and outcomes. Wolinsky<sup>[38]</sup> showed that differences in access and use of health services by various ethnic groups stems in part from their varying cultural traditions. Pharmacists can assist in closing this gap in health outcomes by providing culturally sensitive patient care. Information about patients' cultural health care beliefs and practices is essential for devising interventions to improve adherence. To provide care that is responsive to cultural differences, pharmacists should strive to develop the following three skills:<sup>37</sup>

- **Communicate information that is both accurate and understandable to the patient.** This skill involves the use of interviewing techniques to assess the patient's literacy level, possible language barriers, and cultural health beliefs. Insufficient English language skills are a major barrier for some minority patients. Depending on the pharmacy's location and clientele, Spanish or other foreign language versions of patient education materials may be necessary.
- **Openly discuss racial or ethnic differences.** A patient's cultural health beliefs can contribute greatly to adherence problems. For example, a patient may believe that the body needs periodic rests from medications during long-term therapy or that daily medication use is dangerous because it can lead to addiction. Getting to know the patient and his or her beliefs requires time, but it fosters the development of a trusting relationship. The pharmacist should try to ascertain the answers to the following questions: Does the patient understand his or her diagnosis and the purpose of the medication? How do the patient's cultural health beliefs influence his or her understanding of the illness? Is the patient using any other therapies, such as complementary or alternative medicine, in addition to prescription medications? Does the patient have any religious beliefs that might affect the decision to adhere to the treatment plan?
- **Use community and other resources on behalf of the patient.**<sup>[37]</sup> A disproportionate number of patients in some minority groups have limited incomes, which can be a major barrier to obtaining medications. Patients with low or fixed incomes who do not qualify for Medicare and Medicaid often have difficulty in securing the appropriate supply of their medications. A number of programs are in place to provide free medication and counseling for low income patients. For example, the volunteer-managed "Crisis Control Pharmacy" in North Carolina provides free medications that range from one-time-only prescriptions to long-term maintenance therapy. Each patient is evaluated on the basis of his or her financial need. Another example is the Medical Access Program (MAP), offered by the University of Georgia College of Pharmacy through the Carlos and Marguerite Mason Trust. The mission of MAP, which serves an ethnically diverse low-income population, is to increase medication access for organ transplant patients who live in Georgia.<sup>[39]</sup>

**Children.** With a growing number of prescription drugs being developed and marketed specifically for children and adolescents, nonadherence is becoming a significant problem in the pediatric population. According to NCPIE,<sup>[40]</sup> only one-third of children take medications as prescribed or recommended by physicians. In a study by Bush et al.,<sup>[41]</sup> one-third of the children in grades 3 to 7 reported they had used one or more prescription or nonprescription medications in a 48-hour period. Another study of children 9 to 16 years old, who were attending summer camp, revealed that almost one-half had brought and used a supply of medications, many without the knowledge of camp personnel.<sup>[42]</sup> Adherence plans for children often require innovative approaches to teach them how to use their medications appropriately and to encourage active participation in caring for their own health.

The literature offers a number of recommendations that can help pharmacists to improve adherence in children. Some suggestions:

- **Teach children early in life to assume some responsibility for taking their medications.** According to the "Children's Health Belief" model developed by Bush et al.,<sup>[43]</sup> children formulate health beliefs and expectations about medication use early in their development. The authors recommend that children, especially those with chronic illnesses, assume some responsibility at an early age for taking their medications. Young children who are taught to use medications wisely may be less likely in later life to engage in high-risk behaviors such as illicit drug use or medication abuse.<sup>[44]</sup> Such children may also be more discerning about the quality of information they receive about medications from their peers, and from television and other media.
- **Educate the parents, too -- particularly the mother.** In young children, most risk factors for nonadherence reside in the parent. In most cultures, the mother plays an extremely important role in supervising the care of a sick child. For example, even though young children may have an aversion to the "bad taste" of the drug, they usually take their medications because their mothers tell them it is necessary in order to feel better. Research shows that children internalize parental beliefs, which greatly influence their attitudes and behaviors toward health problems as they mature into adults.<sup>[41]</sup>
- **Adapt the educational program to the child's cognitive level and stage of development.** Education should be based on the child's maturity and ability to grasp essential concepts about the disease and medication. According to one study, physicians and pharmacists rarely talked with children about medications,

yet most children wanted to know about their medicines and would ask their physicians or pharmacist if they could.<sup>[41]</sup> Children as young as 5 years of age knew there was a difference between medications for children versus those for adults.<sup>[41]</sup> They could grasp the concept that medications for adults would be "too powerful for a little body." Older children perceived the risk for adverse reactions better than the younger children did. Older children also could understand the "cost-benefit" of getting well despite the need to take a bad-tasting medicine. These children wanted to have more personal control and independence in making decisions about their medication use. Finally, although most children did not know how medications worked, they were very much interested in this topic.

Bush and her colleagues<sup>[45]</sup> have developed a cognitive developmental model for educating children about medications that is based on Piaget's cognitive development theory. This model recommends teaching children about the therapeutic purpose of their medications and that medications can be both helpful and harmful (i.e., good drugs versus bad drugs, or poisons). For younger children, learning activities should be interactive and fun. For older children, education should correct earlier misconceptions and naïve theories about medications that may have been learned earlier in their development. Older children may enjoy learning about medications through the use of computer games, videos, and reading materials.

- **Relate the need for medications to a child's past experiences with the illness.** For example, if child is being recalcitrant about receiving immunization against influenza, the pharmacist might use a probe such as, "Do you remember the yucky flu you had last year? Would you like to avoid that this year?" This approach can help the child remember previous bouts of the flu as an awful-feeling illness. The child then can understand the need to prevent the illness by receiving the flu vaccination.

Specific guidelines for developing interventions to address adherence problems in children can be found in the USP's *Ten Guiding Principles for Teaching Children and Adolescents about Medicines*. These principles were developed on recommendations from more than 100 health care professionals, educators, and consumer representatives who attended the USP's fall 1996 open conference, *Children and Medicines: Information Isn't Just for Grownups*. The proceedings of this conference and the recommendations can be accessed at [www.usp.org/information/programs/children/principles.htm](http://www.usp.org/information/programs/children/principles.htm).

## Patient-Centered Adherence Management for Chronic Diseases

Each chronic disease presents its own constellation of adherence problems. A brief overview of adherence strategies for two major public health problems -- hypertension and type 2 diabetes -- illustrates disease-specific risk factors for nonadherence and shows how pharmaceutical care services can enhance adherence.

### Hypertension

Because hypertension is usually a silent disease, most patients do not experience symptoms that remind them of the need for taking medications. Without symptoms, it is more difficult to establish a link in the patient's mind between taking the medication and controlling hypertension and its complications. Because patients often do not feel or perceive the benefits of their treatment, the first step in enhancing adherence is to educate them about hypertension and its serious complications, such as coronary heart disease, stroke, and renal failure.

Pharmacists who want to maximize adherence to pharmaceutical care programs for hypertension should first read the *Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation and Treatment of High Blood Pressure*.<sup>[46]</sup> This report encourages a greater interdisciplinary role for pharmacists in monitoring medication use and providing patient information. Adherence to therapy is a key consideration for reaching the 2010 national goals for blood pressure control.<sup>[46]</sup> Only one-half of patients with hypertension still take their medications after the first year of treatment, and one-third of them do not take enough medications to keep their blood pressure under control.<sup>[7]</sup>

The primary goals of a pharmaceutical care plan for hypertension are to improve patient adherence, decrease the risk of developing complications, and reduce the cost of unnecessary emergency department visits and hospital stays. Simplified dosage regimens, such as once- or twice-daily dosing, have been shown to enhance adherence in hypertensive patients. In one study, adherence rates were 73% and 70% for once- or twice-daily regimens, respectively, versus 52% and 42% for three- and four-times-a-day regimens.<sup>[47]</sup> Improving adherence is particularly important with the newer regimens, because drug concentrations may be subtherapeutic when dosing delays or omissions occur.<sup>[48]</sup> Common adverse effects of antihypertensive therapy, such as fatigue, impotence, and lightheadedness, also can adversely affect adherence.

Patients may need advice on how to incorporate medications and other antihypertensive treatments, such as exercise recommendations, into their daily activities and lifestyles. One useful strategy is to help patients establish cues that will serve as reminders to take medication, such as after breakfast, after brushing teeth, or just before bed.

As with other chronic diseases, education of caregivers and family members is crucial. In one study, 70% of patients wanted their family members to know more about hypertension. The patients reported that negative attitudes, insufficient

family support, and lack of confidence in the management of their blood pressure were contributing factors to their long-term adherence problems.<sup>[49]</sup> Whenever possible, a family member or caregiver should be included in educational sessions to help the patient follow instructions and stay on track over time.

Social or group support can also help to boost the patient's confidence and sense of self-efficacy. Group social support may be available from a patient advocacy organization, such as a local chapter of the American Heart Association.

To promote adherence to long-term therapeutic interventions, the pharmacist and patient may agree on a "contract" that includes a series of mutually agreed-upon and realistic health goals. Once a target goal has been achieved, the pharmacist can provide the patient with a reward, such as a discount on a prescription, a coupon for store merchandise, or a colorful certificate announcing successful goal attainment. Rewards should be carefully staged so they serve as motivators and are not so ostentatious as to overpower the effect of personal satisfaction from a job well done. The pharmacist and patient also can collaboratively develop periodic reports about the patient's progress for the primary care physician.

The pharmaceutical care plan should include outcome measures to gauge the success of adherence strategies for hypertensive patients. Outcomes might include refill patterns for patients taking long-term medications and periodic measurement of blood pressure control over time. Quality-of-life measurements and patient satisfaction surveys are also appropriate outcome measures. The former are useful to monitor the progress or potential complications in patients receiving lifelong therapy for asymptomatic diseases such as hypertension.<sup>[50]</sup>

## Type 2 Diabetes

Type 2 diabetes is reaching epidemic proportions in the United States, largely because of rising rates of obesity, physical inactivity, and an aging population. Studies have conclusively demonstrated that the complications of type 2 diabetes can be greatly reduced or delayed by intensive medical management.<sup>[51]</sup> However, it is estimated that only 7% of patients with diabetes adhere fully to all aspects of their regimen.<sup>[52]</sup> Adherence rates for insulin-injection regimens range from 20% to 80%, adherence to dietary recommendations is about 65%, and adherence to exercise regimens varies from 19% to 30%. Glucose-monitoring adherence rates range from 57% to 70%.<sup>[52]</sup>

Hsiao and Salmon<sup>[53]</sup> reported that patients' beliefs about the benefits of diabetes therapy are important in determining whether they obtain and use medication. In general, the more severe the patient's disease and the greater the perceived susceptibility to complications, the more likely the patient is to be adherent. Patients must be convinced of the seriousness of their disease and empowered to monitor themselves for diabetic complications. Patients with diabetes who were at high risk for nonadherence included older people, men, and those with low socioeconomic status.<sup>[53]</sup>

Pharmacist-led programs can be extremely effective in improving adherence to diabetes care, as two independent pharmacies in Richmond, Virginia, recently demonstrated in a year-long program. During the first 6 months of the program, enrolled patients experienced an average decrease in their morning glucose values from 178.6 mg/dL to 159.3 mg/dL.<sup>[54]</sup> Remarkably, over the 12-month study period, participants had an average adherence rate of 90% for their use of diabetes medications.

To help the pharmacists identify medication problems, a prescription record review was performed 6 months after the start of the study. In addition, a computerized "diabetes checklist" was generated and given to each patient to complete at every prescription refill. Along with other information, the checklist asked about any medication-related problems the patient had experienced since the last refill and assessed the patient's pattern of blood glucose self-monitoring. The program also included a systematic review of appropriate medication dosages, potential drug or disease interactions, and potential adverse drug reactions.

At each refill visit, the pharmacist reviewed the plan with the patient and provided reminders about the need for other preventive care, such as yearly eye exams and proper foot care. When appropriate, the physician was contacted, with the patient's consent, regarding specific treatment recommendations. In summary, this diabetes monitoring program showed the value of combining multiple interventions to improve adherence and outcomes.

## Time and Money: Practical Aspects of Adherence Services

### Payment for Adherence Services

Considering that pharmacies lose nearly \$8 billion yearly from unrefilled prescriptions, improving adherence is well worth the effort.<sup>[14]</sup> Huffman and Jackson<sup>[55]</sup> estimated that by increasing the number of refills by only 10%, a pharmacy could increase its annual sales by \$55,000 and net profit by more than \$8,000. Adherence screening, monitoring, and implementation of interventions also take time, and pharmacists may seek compensation for the hours they spend in those activities. Third party payers have begun to realize the value of adherence management, and some payers may

be willing to pay for adherence-related services. Patients also may be willing to pay out of pocket for these services. To increase the likelihood of reimbursement, pharmacists should be sure to document their adherence-related activities, such as patient assessment, education, and counseling.

Pharmacists also can benefit from building professional relationships with a core network of physicians who can refer patients to the pharmacy for adherence-related services. Reimbursement for cognitive services or disease state management programs is often tied to provider referrals. Providers usually make referrals to other specialists based on trust and their expertise and professional competence. A physician is more likely to refer a patient to a pharmacy when he or she has confidence in the content of the services and the competence of the pharmacist administering the therapeutic plan. Accountability (that is, having the name of an individual, rather than an organization, responsible for the services rendered) is also important.

## Space Considerations

Assessment of and counseling on adherence is best done face to face. The use of a special counseling area is recommended, especially when counseling requires more time or privacy. Although extensive renovation of the pharmacy is usually not needed, the environment should be conducive to open communication, with enough privacy for patients to feel free to discuss personal matters.

Environmental barriers, such as a desk or prescription counter, may pose a physical barrier to communication and should be avoided, if possible. Adequate privacy is also important, especially when patients are discussing sensitive medical matters and others could overhear. Ideally, the counseling area should be free of distractions, such as ringing telephones or other conversations. The counseling area should have enough space for the pharmacist to demonstrate the use of medications or devices, to write instructions, and to store written materials for distribution. A chair should also be available for patients to sit during counseling sessions.

## Making Time for Adherence Services

It can be challenging for pharmacists to find ways to incorporate adherence screening and monitoring into their current organizational structures. Use of pharmacy technicians to perform routine dispensing duties can free time for the pharmacist to provide cognitive services, such as assessment and counseling. Innovative scheduling methods may also free up time for patient education and counseling. For example, there may be a brief overlap of pharmacist coverage during the times immediately before and after work shifts. Another strategy is to schedule patient appointments during times when the pharmacy workload is lighter.

## Summary

Adherence to pharmacotherapy is essential to optimal therapeutic outcomes. The pivotal role of the pharmacist in optimizing adherence encompasses many actions: assessing the adherence problem, identifying predisposing factors, providing comprehensive counseling, and recommending specific adherence strategies targeted to the patient's needs. Patients who have chronic conditions, physical or cognitive impairments, or cultural backgrounds outside the mainstream may have special needs that should be addressed in the adherence plan. Pharmaceutical care plans also should take into account the patient's age, stage of life, and literacy level. Although a wide range of adherence aids and strategies are available, the key to success is to tailor the intervention to the individual patient and, when necessary, to combine interventions to optimize adherence.

## Tables

### Table 1. Major Risk Factors for Nonadherence

Asymptomatic conditions

Chronic conditions  
Cognitive impairments, especially forgetfulness  
Complex regimens  
Multiple daily doses  
Patient fears and concerns related to medication effects  
Poor communication between patients and practitioners  
Psychiatric illness

## **Table 2. Probes Pharmacists Can Use to Assess Adherence**

Assessing the patient's medication knowledge or medication-taking behavior

- What is the reason you are taking this drug?
- How do you take this medication?
- Are you taking the medication with food or fluid?
- Where did you receive information about this medication?
- Are you taking nonprescription drugs while on this medication?
- Do you use any memory aids to help you remember to take your medication?
- Do you depend on anyone to help you remember to take your medication or to assist you in taking it?

Assessing attitudes, values, and beliefs regarding medication-taking behaviors

- What results do you expect to receive from this medication?
- What are the chief problems that you feel your illness has caused you?
- Do you have any concerns about your illness and its treatment?
- Are you satisfied with your current treatment plan?
- How well do you usually follow a treatment plan?
- What is the main concern you have about your medication?
- Do you feel comfortable asking your physician or pharmacist questions about your medications?

Assessing whether the patient has the proper skills and is motivated or willing to follow through on the therapy plan

- Have you encountered any problems with your medication- or pill-taking procedure?
- Are you confident that you can follow your treatment plan?
- What might prevent you from following the recommended treatment plan?
- How likely is it that you will ask your physician or pharmacist about your medications?
- Can you explain how you remind yourself to take your medication on schedule?
- Do you normally write down questions to ask your physician or pharmacist before an appointment?

## **Table 3. Factors that Affect Medication Adherence**

Factors that promote adherence

Disease-related factors

- Perceived or actual severity of illness
- Perceived susceptibility to the disease or developing complications

Treatment-related factors

- Perceived benefits of therapy
- Written and verbal instructions
- Convenience of treatment
- Medication provides symptomatic relief

#### Patient-related factors

- Good communication and satisfactory relationship with physician
- Participation in devising the treatment plan
- Confidence in the physician, the diagnosis, and the treatment
- Support of family members and friends
- Knowledge about the illness

#### Factors that reduce adherence

##### Disease-related factors

- Chronic disease
- Lack of symptoms

##### Treatment-related factors

- Treatment requires significant behavioral changes
- Actual or perceived unpleasant side effects
- Regimen complexity and duration
- Medication takes time to take effect

##### Patient-related factors

- Sensory or cognitive impairments
- Physical disability or lack of mobility
- Lack of social support
- Educational deficiencies (literacy problem) or poor English fluency
- Failure to recognize the need for medication
- Health is a low priority
- Conflicting health beliefs
- Economic problems
- Negative expectations or attitudes toward treatment

Source: References 3, 56-58.

## **Table 4. Resources for Improving Patient Adherence**

#### Organizations

- National Council on Patient Information and Education (NCPIE)  
4915 Saint Elmo Ave., Suite 505  
Bethesda, MD 20814-6053  
301-656-8653  
[www.talkaboutrx.org](http://www.talkaboutrx.org)

Among other resources, NCPIE publishes Prescription Medicines and You: A Consumer Guide, a large print brochure available in English, Spanish, and Asian languages.

- United States Pharmacopeia (USP)  
12601 Twinbrook Parkway  
Rockville, MD 20852  
800-822-8772  
www.usp.org

USP's many resources include "MedCoach" patient information leaflets, which are available at two reading levels and may contain pictograms.

#### Resources for Special Populations

- For low literacy patients
  - Responding to the Challenge of Health Literacy. The Pfizer Journal. Spring 1998;2(1):1-37.

Available from: Impact Communications, Inc.  
330 Madison Avenue, 21st Floor  
New York, NY 10017  
212-490-2300

- For older adults
  - The ElderCare Patient Education Series

The Peter Lamy Center for Drug Therapy and Aging  
University of Maryland School of Pharmacy  
506 West Fayette Street, Suite 101  
Baltimore, MD 21201  
<http://gerontology.umaryland.edu/docs/lamy.html>  
e-mail: [lamycenter@rx.umaryland.edu](mailto:lamycenter@rx.umaryland.edu)

- For children
  - The Pediatric Medication Text (Patient information for 200 commonly prescribed pediatric medications; available in English and Spanish)

American College of Clinical Pharmacy  
3101 Broadway, Suite 380  
Kansas City, MO, 64111  
816-531-2177, ext. 20  
[www.accp.com/ped\\_medtxt.html](http://www.accp.com/ped_medtxt.html)

- For ethnic minorities
  - Closing-the-Gap.com

This online magazine provides resources for health care providers and consumers to promote minority health through culturally relevant care.

## References

1. National Council on Patient Information and Education (NCPPIE). *The Other Drug Problem: Statistics on Medicine Use and Compliance*. Bethesda, Md; 1997 Available at: [www.talkaboutrx.org/compliance.html#problem](http://www.talkaboutrx.org/compliance.html#problem). Accessed May 8, 2000.
2. Smith DL. *Patient Compliance: An Educational Mandate*. McLean, Va: Norwich Eaton Pharmaceuticals, Inc. and Consumer HealthInformation Corp; 1989.
3. Poirier S, Jackson RA, Perri M, et al. Compliance enhancement: all have a stand, all stand to gain. *Am Pharm*. 1999;June:31-42.
4. Felkey BG. Adherence screening and monitoring. *Am Pharm*. 1995;NS35:42-51.
5. Smith MC. Predicting and detecting noncompliance. In: Smith MC, Wertheimer AI, eds. *Social and Behavioral Aspects of Pharmaceutical Care*. New York, NY: Pharmaceutical Products Press, Inc; 1996.
6. Fincham JE, Wertheimer AI. Using the health belief model to predict initial drug therapy defaulting. *Soc Sci Med*. 1985;20(1):101-5.
7. Bond WS, Hussar DA. Detection methods and strategies for improving medication compliance. *Am J Hosp Pharm*. 1991;48:1978-88.
8. Gladman J. Pharmacists paid to improve drug compliance, persistency. *Payment Strategies Pharm Care*. 1997;October:4-8.
9. *Noncompliance with medications: an economic tragedy with important implications for health care reform*. Baltimore, Md: The TaskForce for Compliance; 1994:1-39.
10. Blandford L, Dans PE, Ober JD, et al. Analyzing variations in medication compliance related to individual drug, drug class, and prescribing physician. *J Managed Care Pharm*. 1999;5(1):47-51.
11. Burrell CD, Levy RA. Therapeutic consequences of noncompliance. In: *Improving Medication Compliance: Proceedings of a Symposium*. Washington, DC: National Pharmaceutical Council; 1984:7-16.
12. *Noncompliance with Medication Regimens: An Economic Tragedy. Emerging Issues in Pharmaceutical Cost Containing*. Washington, DC: National Pharmaceutical Council. 1992;1-16.
13. Cramer J. Relationship between medication compliance and medical outcomes. *Am J Hosp Pharm*. 1995;52(suppl 3):S27-9.
14. Jackson RA, Worthen DB, Barnett CW. *The financial aspects of improved refill management. Practice Opportunities*. Cincinnati, Ohio: Proctor & Gamble Health Care; 1998:1-15.
15. Bluml BM, McKenney JM, Cziraky MJ. Pharmaceutical care services and results in Project ImPACT: Hyperlipidemia. *J Am Pharm Assoc*. 2000;40:157-65.
16. Ried LD, Christensen DB. A psychological perspective in the explanation of patients' drug taking behavior. *Soc Sci Med*. 1988;27(3):277-85.
17. Berg JS, Dischler J, Wagner DJ, et al. Medication compliance: a healthcare problem. *Ann Pharmacother*. 1993;27(9 suppl):S1-24.
18. Morris LS, Schultz RM. Patient compliance and overview. *J Clin Pharm Therap*. 1992;17:283-95.
19. Stephenson BJ, Rowe BH, Haynes RB, et al. Is this patient taking the treatment as prescribed? *JAMA*. 1993;269:2779-81.
20. Hepler CD, Strand LM. Opportunities and responsibilities in pharmaceutical care. *Am J Hosp Pharm*. 1990;47:533-43.
21. Healthcare Compliance Packaging Council. *Noncompliance. The invisible epidemic. Drug Topics*. 1992;August 17:1-11.
22. Stewart M. The validity of an interview to assess a patient's drug taking. *Am J Prev Med*. 1987;3(2):95-100.
23. Christensen DB, Williams B, Goldberg HI, et al. Assessing compliance to antihypertensive medications using computer-based pharmacy records. *Med Care*. 1997;35(11):1164-70.
24. Nessman DG, Carnahan JE, Nugent CA. Increasing compliance. Patient-operated hypertension groups. *Arch Intern Med*. 1980;140:1427-30.
25. Hulka BS, Kupper L, Cassel JC, et al. Medication use and misuse: Physician-patient discrepancies. *J Chron Dis*. 1975;28:7-21.
26. Rudd P. Maximizing compliance with antihypertensive therapy. *Drug Therap*. 1992;22:25-32.
27. Mullen PO, Green LW, Pessinger GS. Clinical trials of patient education for chronic conditions: a comparative meta-analysis of intervention types. *Prev Med*. 1985;14:753-7.
28. National Council on Patient Information and Education. *Medication communication needs of select population groups*. Available at: [www.talkaboutrx.org/select.html#hold](http://www.talkaboutrx.org/select.html#hold). Accessed May 8, 2000.
29. Nanada C, Fanale J, Kronholm P. The role of medication noncompliance and adverse reactions in hospitalizations of the elderly. *Arch Intern Med*. 1990;150:841-6.
30. Mallet L. Counseling in special populations: the elderly patient. *Am Pharm*. 1992;NS32(10):835-43.
31. Families USA. Available at: [www.familiesusa.org](http://www.familiesusa.org). Accessed May 8, 2000.
32. Stewart RB, Caranasos, GJ. Medication compliance in the elderly. *Med Clinics North Am*. 1989;73(6):1551-63.
33. Kirsch I, Jungeblut A, Jenkins L, et al. *Adult Literacy in America*. US Department of Education. National Center for Educational Statistics. National Adult Literacy Survey. Princeton, NJ: Educational Testing Service; 1993.
34. Malveaux JO, Murphy PW, Arnold C, et al. Improving patient education for patients with low literacy skills. *Am Fam Physician*. 1996;53(1):205-11.
35. Williams MV, Baker DW, Parker RM, et al. Relationship of functional health literacy to patient's knowledge of their chronic disease: a study of patients with hypertension and diabetes. *Arch Intern Med*. 1998;158(2):166-72.
36. Nurss JR, Parker RM, Williams MV, et al. *Test of functional health literacy in adults (TOFHLA)*. Atlanta, Ga: Georgia State University and Emory University School of Medicine; 1995.
37. Weiss BD. Communicating with patients who have limited literacy skills. Report of the National Work Group on Literacy and Health. *J Fam Pract*. 1998;46(2):168-76.
38. Wolinsky FD. Racial differences in illness behavior. *J Community Health*. 1982;8:87-101.

39. Medical Access Program (MAP). The University of Georgia College of Pharmacy, Clinical Pharmacy Program at the Medical College of Georgia, Augusta, Ga.
40. Children and America's Other Drug Problem: Guidelines for Improving Prescription Medicine Use Among Children and Teenagers. National Council of Patient Information and Education. Available at: [www.talkaboutrx.org/select.html#child](http://www.talkaboutrx.org/select.html#child) Accessed May 9, 2000.
41. Menacker F, Aramburuzabala P, Minian N, et al. Children and medicines: what they want to know and how they want to learn. *J Soc Admin Pharm.* 1999;16(1):38-51.
42. Rudolf CJ, Alaria AJ, Youth B, et al. Self-medication in childhood: observations at a residential summer camp. *Pediatrics.* 1993;91:1182-5.
43. Bush PJ, Ianotti RJ. A children's health belief model. *Med Care.* 1990;28(1):69-83.
44. United States Pharmacopeia. USP recommends: children and adolescents have a right to information and direct communications about medicines. Available at: [www.usp.org/aboutusp/releases/pr\\_9819.htm](http://www.usp.org/aboutusp/releases/pr_9819.htm). Accessed May 8, 2000.
45. Bush PJ, Trakas DJ, Sanz EJ, et al, eds. *Children, Medicines and Culture.* New York, NY: Pharmaceutical Products Press, Inc;1996:131;263-70.
46. The Sixth Report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-VI). *Arch Intern Med.* Available at: [www.nhlbi.nih.gov/guidelines/hypertension/jncintro.htm](http://www.nhlbi.nih.gov/guidelines/hypertension/jncintro.htm). Accessed May 8, 2000.
47. Greenberg RN. Overview of patient compliance with medication dosing: a literature review. *Clin Therapeutics.* 1993;6:590-9.
48. Rudd P. Clinicians and patients with hypertension: unsettled issues about compliance. *Am Heart J.* 1995;130(3):573-9.
49. Becker MH, Maiman LA. Strategies for enhancing patient compliance. *J Community Health.* 1980;6(2):113-30.
50. MacKeigan LD, Pathak DS. Overview of health-related quality-of-life measures. *Am J Hosp Pharm.* 1992;49:2236-45.
51. Ohkubo Y, Kishikawa H, Araki E, et al. Intensive insulin therapy prevents the progression of diabetic microvascular complications in Japanese patients with non-insulin dependent diabetes mellitus: a randomized prospective 6-year study. *Diabetes Res Clin Pract.* 1995;28:103-17.
52. McNabb WL. Adherence in diabetes: can we define it and can we measure it? *Diabetes Care.* 1997;20:215-8.
53. Hsiao LCD, Salmon JW. Predicting adherence to prescription medication purchase among HMO enrollees with diabetes. *J Manag Care Pharm.* 1999;5 (4):336-41.
54. Berringer R, Shibley MC, Cary C, et al. Outcomes of a community pharmacy-based diabetes monitoring program. *J Am Pharm Assoc.* 1999;39(6):791-7.
55. Huffman DC, Jackson RA. The financial benefits of improved patient compliance. *NARD J.* 1995;October:108-11.
56. Lasagna L, Hutt PB. Health care, research, and regulatory impact on noncompliance In: *Patient Compliance in Medical Practice and Clinical Trials.* Cramer JA, Spilker B, eds. New York, NY: Raven Press, Ltd; 1991.
57. Morrow D, Leirer V, Sheikh J. Adherence and medication instructions. Review and recommendations. *J Am Geriatric Soc.* 1988;36:1147-60.
58. Horne R. One to be taken as directed: reflections on non-adherence (non-compliance). *J Soc Admin Pharm.* 1993;10 (4):150-6.

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