



MEDICATION ADHERENCE BEFORE AND AFTER A STAY IN CRITICAL CARE: WHAT NURSES NEED TO KNOW

The last time you admitted a patient into your unit and asked about the medications he was taking, did you inquire whether he took each of those medications in the manner in which they were prescribed, that is, that he took them every day, at the right time(s), with or without copious water, with or without food, with or without maintaining a particular body position for a certain time, with or without ingesting other potentially synergistic or antagonistic or incompatible medications or supplements? Or did you assume, as most of us likely would do, that the patient self-administered each of his prescribed medications as directed? Why might you pause to even consider these questions?

About 3% to 5% of all hospital admissions are due to medication-related factors.¹ However, researchers also note that the reported prevalence of medication-related hospitalizations ranges from a low of 0.1% to a high of 54%, depending on patient acuity (only acutely ill or all admissions), the specific patient population (all hospital units, only specific units, patient populations or age groups), event outcome (adverse drug reaction vs an adverse drug event), the data collection method used, and the continent where the research is conducted.¹

In the United States, medication-related problems were the cause of 4.7% of all hospital stays and 0.8% of treat-and-release visits to the emergency department in 2008. Antibiotics, benzodiazepines, chemotherapeutic agents, corticosteroids, insulin, anticoagulants, and other

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cardiovascular drugs were associated with more than 2.7 million hospital stays and emergency department visits, according to the Agency for Healthcare Research and Quality.²

Description of Medication Adherence

A number of terms are used to characterize whether patients take their medications as prescribed by their health care providers.³ In addition to medication adherence, these terms include medication persistence, therapy adherence, and compliance.⁴ The National Consumers League defines medication adherence as “taking medication as directed by a health care professional—whether taken in pill or liquid form, inhaled, injected, or applied topically.”^{5(p1)} The NIH Adherence Research Network defines the term *adherence* within a research context as the extent to which the person’s behavior in taking prescribed medications coincides with current evidence-based health care advice.⁶

On the surface, medication adherence may appear to be relatively simple, but in reality, it represents a fairly complex series of behaviors that typically encompass most of the following³:

- making and keeping an appointment with one’s health care provider,
- delivering the prescription to a pharmacy,
- taking the medication in the manner and frequency prescribed,
- monitoring supply of the medication to avoid running out,
- securing any necessary renewals of the prescription from the health care provider,
- returning to the pharmacy for refills in sufficient time to avoid missing a dose, and

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- making and keeping an appointment for the provider to appraise the effectiveness of the medication.

Description of Medication Nonadherence

Medication nonadherence can be manifested in a variety of forms including the following:

- *Primary nonadherence*, or medication nonfulfillment, refers to the patient's failure to fill a new prescription.⁷
- *Medication nonpersistence* refers to filling a new prescription but discontinuing to take it during the first year it is prescribed.⁸
- *Medication nonadherence* encompasses medication-related behaviors ranging from initially delaying to have a prescription filled to reducing the dosage or frequency of administration, taking a dose higher or lower than that prescribed, taking the medication at the wrong time of day, skipping or forgetting to take the medication, or discontinuing the medication prematurely.⁵

Scope of the Problem

Nearly 30 years ago, only 1 of every 3 patients fully complied with their medication regimen, one-third followed it only sometimes, and one-third never complied with it.⁹ Over the past 15 years, more studies have determined that patients with chronic health disorders adhere to only 50% to 60% of their medications.^{8,10-14} For nearly that long, there has been evidence that between 12% and 20% of patients take medications that were prescribed for other people.¹⁵ When researchers examined the degree to which adult patients with diabetes completed all aspects of self-care, as recommended by the American Diabetes Association, including self-testing blood glucose, following dietary restrictions, and taking diabetic medications, they found that fewer than 2% of patients adhered to those guidelines.¹⁶ Findings spanning a timeline longer than the past decade reveal that the problem of low adherence to prescribed medications has not improved substantially.

2003: In developed countries such as the United States, the World Health Organization found that overall adherence among patients with chronic conditions averaged only 50%, with lower rates for some conditions (asthma 43%) and higher rates for others (depression 70%).¹⁷

2005: Nearly 50% of the 3.2 billion prescriptions dispensed annually in the United States are not taken as prescribed.³

2006: Despite the many recognized cardiac, cardiovascular, and neurovascular risks associated with hypertension, only 51% of patients with this disorder take the medications prescribed for them. In a sample of 17 000 US patients who were prescribed β -blockers subsequent to acute myocardial infarction, only 45% regularly took these medications throughout the first year, with the steepest decline in adherence arising in the first few months after discharge.¹⁸

Late in 2006: The National Community Pharmacists Association¹⁹ found that nearly 75% of American consumers report not always taking their prescription medicine as directed, 49% indicated they had forgotten to take their medicine, 31% neglected to fill a prescription, 29% discontinued taking it before it ran out, and 24% took less than the recommended dosage.⁴

2010: After meeting with 8 focus groups consisting of health care professionals, family caregivers, and consumers in 4 US cities to identify perceptions, opinions, and attitudes about medication adherence, the National Consumers League found the following⁵:

- Most patients do not understand the potentially harmful effects of not following a prescribed medication regime.
- Patients define adherence differently from health care staff.
- Patients may not recognize how their medications can benefit them.

2011: Despite almost 45% of the US population having one or more chronic conditions that require medication, nearly 75% indicate they do not always take their medications as directed and approximately 33% neglect to have their prescriptions filled.⁵

Among critical care patient populations, rates of medication nonadherence have fared no better. Albert²⁰ highlighted that 31% to nearly 60% of patients in heart failure are nonadherent in taking their medications. Even among health care professionals, adherence to prescribed medications is poor; one study²¹ reported average adherence at only 79%. In the United States, the problem manifests for Americans of all ages, races, income, educational, and socioeconomic levels.⁴

Beyond our national borders, medication nonadherence represents "a problem of international importance that knows no demographic, geographic, or political boundaries"^{22(p187)} and is characterized by the World Health Organization as "a worldwide problem of striking

magnitude,^{17(p11)} which averages over 50% in less developed countries.

Consequences of Nonadherence

The consequences of low adherence to prescribed therapies for known and suspected health problems are 2 primary effects: diminished quality of health outcomes and increased costs of health care.¹⁷

Medication nonadherence is associated with increased rates of hospital readmission,⁵ higher unnecessary progression of disease, unnecessary development of preventable complications, diminished functional abilities, reduced quality of life, and premature death.⁴ An estimated 33% to 69% of medication-related hospital admissions³ and 125 000 deaths are annually attributable to medication nonadherence in the United States.⁵ Short of escalating mortality, adherence neglect may also be the source of negative patient outcomes such as misdiagnosis, misinterpretation of therapeutic efficacy, addition of unwarranted or additional therapies or the same therapy at a higher dose, and exacerbation of the disease process.⁵

In addition, low adherence to prescribed medications is associated with an abundance of avoidable health care costs. Estimates of the total direct and indirect costs for medication nonadherence in the United States range from \$100 billion to \$300 billion annually.^{4,5,23-25}

Contributors to Medication Nonadherence

Before we can devise strategies to prevent these unwanted outcomes and to erase these unwarranted expenses, the factors that cause or contribute to this problem must first be isolated and understood. As the Table shows, the reasons identified for poor adherence to prescription medications can be summarized and sorted into a number of categories.

Over the past 50 years, research has focused on patient-related factors as the chief underlying causes of low adherence. Within this category, recent research²² has found that better adherence was associated with patients' perceptions that their disease severity was high, that their need for a specific medication was greater, there were fewer concerns about side effects, and they had greater knowledge about the medication. A more recent study²⁶ both supports the notion that patient beliefs regarding the value versus risks associated with each medication have a strong influence on medication-taking behavior and that the relative priority of patient

beliefs that affect adherence to medications operates in the following order:

1. Whether there is a need for the medication
2. Side effects
3. Safety
4. Cost

These studies suggest that interventions to improve adherence need to be tailored to the individual patient's beliefs about the value, importance, benefits, and safety to them.

Implications for Practice: What Works

Beyond knowing that strategies to improve adherence must be individualized, focused on the patient's perceptions of his/her disorder and the benefits versus risks from each medication, and as simple and straightforward as possible, critical care nurses need to be cognizant of the existing evidence to provide optimal patient care and of current initiatives aimed at improving both outcomes and costs of care. Although medication nonadherence has been recognized for at least the past 50 years²⁷ and despite considerable research in this area over that time, 2 recently completed meta-analyses of randomized controlled trials can be summarized in the following rather disheartening results^{28,29}:

- For short-term prescription therapies, although written materials, individual telephone calls and counseling afforded some favorable results, fewer than half the studies demonstrated any benefits and the improvements that could be cited were inconsistent.
- For longer-term prescription medications, none of these relatively simple measures significantly improved adherence and only a few of the more complex approaches helped. The more complex approaches required multiple measures provided over an extended time and included combinations such as several sessions of education and counseling, feedback and reinforcements of information, reminders, mailed messages, telephone follow-up, self-monitoring strategies, supervision, counseling, as well as family and psychological therapy.

In response to this problem, the National Council on Patient Information and Education issued a national call to action in 2007.⁴ The following year, the National Consumers League answered that call by designing a national campaign called "Script Your Future," a 3-year program heralded as "the first campaign of its kind to raise

Table Factors contributing to medication nonadherence^{4-5,7,19,26-28,30-32}

Category	Factor
Patient-related	Lack of knowledge about the medication Declining ability to hear verbal instructions or read written instructions Limited or diminishing cognitive ability necessary to understand or act on instructions Occasional forgetfulness, persisting memory impairment Perceptions/beliefs related to nature and severity of illness, need for medication if feeling better or if not experiencing symptoms, effectiveness of the medication, value of taking medications for prophylaxis, taking too many medications, benefit medication will provide Denial of illness Fears of side or untoward effects, of becoming drug dependent, of needles Limited language proficiency Low functional health literacy and numeracy Lack of health insurance, inability to pay
Disease- or disorder-related	Nature of disorder Duration required to treat disorder Whether disorder produces symptoms patient recognizes or finds distressing Whether disorder produces symptoms such as dyspnea, immobility, confusion that interferes with adherence
Medication-related	Complexity of the regimen, such as multiple medications, multiple times per day Requiring the need to master techniques such as using lancets, needles, inhalers, or other devices to take medication Duration for which medication needs to be taken Side effects Safety High cost Difficulty of administration or ingestion Storage requirements
Prescriber-related	Multiple prescribers Lack of coordination among prescribers
Health care team-related	Lack of adequate or effective patient instruction about the medications prescribed, including name, reason(s) for taking, what medication looks like, time(s) to take, how much to take, substances such as water or food to include versus avoid, possible side effects, what to do if side effects occur, how to manage any potential untoward effects, and ongoing self-testing Lack of time for patient counseling or follow-up Lack of reimbursement for time expended in patient education Inability to communicate effectively in patient's native language Lack of coordination of care related to medications
Pharmacy-related	Multiple visits to the pharmacy required Attitudes of pharmacist related to teaching patients Operational constraints in pharmacy: lack of space or privacy to meet with patients, lack of time or staff, lack of management support for teaching role

awareness among consumers and their family caregivers about the importance of taking medication as prescribed as a vital first step toward better health outcomes.^{5(p6)}

Notable features of this campaign include the following⁵:

- More than 80 public and private stakeholder organizations are participating in designing and implementing this public education effort.
- Targeted patient populations are those with diabetes mellitus, respiratory disease, and cardiovascular disease.
- An interactive consumer Web site to lend support in medication adherence to patients and caregivers

is available at <http://scriptyourfuture.org>, with tools for managing, using, and taking medications.

- A Web site for health care professionals (www.scriptyourfuture.org/hcp) to assist patients and caregivers in taking medications, including a wallet card to list all medications and health supplements; worksheets for managing medications and disorders and for tracking medication adherence; videos on topics such as how to take medications; and questions to ask health care providers (“Build Your Questions List” available at www.ahrq.gov/questionsaretheanswer/questionBuilder.aspx).

Critical care nurses can learn more about this campaign by visiting www.ScriptYourFuture.org. A recent review article on this topic³⁰ provides a good summary of several other online provider resources and patient education materials to support medication adherence. As of January 2011, the National Institutes of Health has also debuted a scientific interest group for this issue.

Two additional considerations that critical care nurses might add to their practice in this area are to solicit information related to the patient's actual adherence to prescribed medications when the patient's health history is being elicited at admission and to make every effort to provide that personalized instruction necessary to influence patient attitudes and behaviors related to medication adherence in preparation for discharge. **CCN**



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References

- Leendertse AJ, Visser D, Egberts ACG, van den Bemt PMLA. The relationship between study characteristics and the prevalence of medication-related hospitalizations: a literature review and novel analysis. *Drug Saf*. 2010;33:233-244.
- Lucado J, Paez K, Elixhauser A. Medication-Related Adverse Outcomes in U.S. Hospitals and Emergency Departments, 2008. Healthcare Cost and Utilization Project Statistical Brief #109, Agency for Healthcare Research and Quality, 2011. <http://www.hcup-us.ahrq.gov/reports/statbriefs/sb109.pdf>. Accessed May 28, 2011.
- Osterberg L, Blaschke T. Adherence to medication. *N Engl J Med*. 2005;353(5):487-497.
- National Council on Patient Information and Education. *Enhancing Prescription Medicine Adherence: A National Action Plan*. Rockville, MD: National Council on Patient Information and Education; 2007.
- Bosworth HB, National Consumers League. Medication Adherence: Making the Case for Increased Awareness. 2011. http://scriptyourfuture.org/wp-content/themes/cons/m/Script_Your_Future_Briefing_Paper.pdf. Accessed May 25, 2011.
- National Institutes of Health. NIH Adherence Research Network, 2011. <http://sigs.nih.gov/adherence/Pages/default.aspx>. Accessed May 26, 2011.
- Gadkari A, McHorney C. Medication nonfulfillment rates and reasons for nonfulfillment: narrative systematic review. *Clin Ther*. 2010;26(3):683-705.
- Haynes RB, McKibbon KA, Kanani R. Systematic review of randomised trials of interventions to assist patients to follow prescriptions for medications. *Lancet*. 1996;348(9024):383-386.
- Fedder D. Managing medication and compliance: physician-pharmacist-patient interaction. *J Am Geriatr Soc*. 1982;30:S113-117.
- Flack J, Novikov SV, Ferrario CM. Benefits of adherence to antihypertensive drug therapy. *Eur Soc Cardiol*. 1996;17(suppl A):16-20.
- Avorn J, Monette J, Lacour A, et al. Persistence of use of lipid-lowering medications: a cross-national study. *JAMA*. 1998;279(18):1458-1462.
- Feldman R, Bacher M, Campbell N, Drover A, Chockalingam A. Adherence to pharmacologic management of hypertension. *Can J Public Health*. 1998;89(5):116-18.
- Mallion JM, Baguet JP, Siche JP, Tremel F, de Gaudemaris R. Compliance, electronic monitoring and antihypertensive drugs. *J Hypertens Suppl*. 1998;16(1):S75-79.
- Benner JS, Glynn RJ, Mogun H, Neumann PJ, Weinstein MC, Avorn J. Long-term persistence in use of statin therapy in elderly patients. *JAMA*. 2002;288(4):455-461.
- Marinker M, Blenkinsopp A, Bond C, et al. *From Compliance to Concordance: Achieving Shared Goals in Medicine Taking*. London, UK: Royal Pharmaceutical Society of Great Britain; 1997.
- Beckles GL, Engelgau MM, Narayan KM, Herman WH, Aubert RE, Williamson DF. Population-based assessment of the level of care among adults with diabetes in the U.S. *Diabetes Care*. 1998;21:1432-1438.
- World Health Organization. *Adherence to Long-Term Therapies: Evidence for Action*. World Health Organization; 2003.
- Kramer JM, Hammill B, Anstrom K, et al. National evaluation of adherence to beta-blocker therapy for 1 year after acute myocardial infarction in patients with commercial health insurance. *Am Heart J*. 2006;152(3):454.
- Take As Directed: A Prescription Not Followed. Research conducted by The Polling Company. National Community Pharmacists Association. December 15, 2006.
- Albert NM. Improving medication adherence in chronic cardiovascular disease. *Crit Care Nurse*. 2008;28(5):54-64.
- Cordea RS, Burke HB, Horowitz HW. Adherence to prescription medicines among medical professionals. *South Med J*. 2000;93:585-589.
- McHorney CA, Gadkari AS. Individual patients hold different beliefs to prescription medications to which they persist vs nonpersist and persist vs nonfulfill. *Patient Prefer Adherence*. 2010;21(4):187-195.
- Ho PM, Rumsfeld JS, Masoudi FA, et al. Effect of medication nonadherence on hospitalization and mortality among patients with diabetes mellitus. *Arch Intern Med*. 2006;166(17):1836-1841.
- McDonnell PJ, Jacobs MR. Hospital admissions resulting from preventable adverse drug reactions. *Ann Pharmacother*. 2002;36(9):1331-1336.
- New England Healthcare Institute. Thinking Outside the Pillbox. http://www.nehi.net/news/press_releases/110/nehi_research_shows_patient_medication_nonadherence_costs_health_care_system_290_billion_annually. Accessed April 28, 2011.
- Kreps GL, Villagran MM, Zhao X, et al. Development and validation of motivational messages to improve prescription medication adherence for patients with chronic health problems. *Patient Educ Couns*. 2011;May 20. Published ahead of print. PMID: 21602010.
- Davis S. Variations in patients' compliance with doctors' orders. *J Med Educ*. 1966;41:1037-1048.
- Haynes RB, Ackloo E, Sahota N, et al. Interventions for enhancing medication adherence. *Cochrane Database Syst Rev*. 2008;16(2):CD000011.
- Kripalani S, Yao X, Haynes RB. Interventions to enhance medication adherence in chronic medical conditions: a systematic review. *Arch Intern Med*. 2007;167:540-550.
- Brunton SA. Improving Medication Adherence in Chronic Disease Management. *J Fam Pract*. 2011;60(4 suppl). <http://www.jfponline.com/supplements.asp?id=9428>. Accessed May 31, 2011.
- Solomon DH, Brookhart MA, Tsao P, et al. Predictors of very low adherence with medications for osteoporosis: towards development of a clinical prediction rule. *Osteoporos Int*. 2011;22(6):1737-1743. Published ahead of print September 29, 2010.
- Choudhry NK, Fischer MA, Avorn J, et al. The implications of therapeutic complexity on adherence to cardiovascular medications. *Arch Intern Med*. 2011;171(9):814-822.