Addressing drug adherence using an operations management model

Martin Nunlee and Michelle Bones

Abstract

Objective: To provide a model that enables health systems and pharmacy benefit managers to provide medications reliably and test for reliability and validity in the analysis of adherence to drug therapy of chronic disease.

Summary: The quantifiable model described here can be used in conjunction with behavioral designs of drug adherence assessments. The model identifies variables that can be reproduced and expanded across the management of chronic diseases with drug therapy. By creating a reorder point system for reordering medications, the model uses a methodology commonly seen in operations research. The design includes a safety stock of medication and current supply of medication, which increases the likelihood that patients will have a continuous supply of medications, thereby positively affecting adherence by removing barriers.

Conclusion: This method identifies an adherence model that quantifies variables related to recommendations from health care providers; it can assist health care and service delivery systems in making decisions that influence adherence based on the expected order cycle days and the expected daily quantity of medication administered. This model addresses the possession of medication as a barrier to adherence.

Keywords: Statistical model, adherence (medication), medication management, pharmacy practice, disease management, drug use evaluation.

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Martin Nunlee, PhD, is Associate Professor, College of Business, Delaware State University, Dover. **Michelle Bones, PharmD,** is Pharmacist, Walgreens, Harrington, DE.

Correspondence: Martin Nunlee, PhD, College of Business, Delaware State University, 1200 N. Dupont Hwy., Dover, DE 19901-2277. Fax: 302-857-6927. E-mail: mnunlee@desu.edu

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Drug therapy is the mainstay of managing many chronic diseases, and medication adherence is a major component of drug therapy. Adherence is defined by the World Health Organization (WHO) as "the extent to which a person's behavior taking medications ... corresponds with agreed recommendations from a health care provider."[1] Nonadherence is a major hurdle in the realization of optimal drug therapy. As stated by WHO, "Adherence problems have generally been overlooked by health stakeholders, and as a result have received little direct, systematic, intervention."[1]

Recognizing that medication nonadherence occurs when patients fail to take prescribed medications, use medications that have not been prescribed, or take medications incorrectly[2] opens a veritable Pandora's box of root causes of diseases. Clinicians, practitioners, expert panels, and health care economists have studied the phenomenon of nonadherence from numerous perspectives. Studies by clinicians and practitioners have linked drug nonadherence to morbidity and mortality.[3–6] Cross and Franks[7] stated that expert panels increasingly emphasize recommendations toward drug adherence. Health care economists claim that medication nonadherence increases health care cost in the United State by as much as $100 billion, in the form of increased hospitalizations[8]. The IMS Institute for Healthcare Informatics reported that an estimated $105 billion can be attributed to medication nonadherence in annual avoidable health care costs.[9] According to Khandelwal et al.,[8] "Healthcare sponsors have been seeking ways to improve adherence and impact overall healthcare cost."

An abundance of disparate literature addresses adherence to drug therapy.[10–12] Under the umbrella of adherence, drug classifications, disease specificity, assessment methods, and intervention parameters are described in the literature. Although only a few studies address the ability of patients to possess drugs when needed, we know that having access to medication is important in adherence. In addition, few reports mention lack of access to medication as a reason for nonadherence, but we know that patients require emergency refills of maintenance medications. A review of laws across states reveals a codification of refilling medication. Further, in a study on the factors associated with adolescent adherence to oral contraceptive regimens, Scher et al.[13] found that adherence depends on timing of the prescription, information given on potential adverse effects, and a telephone number to call to obtain emergency refills. The inability to possess drugs is a barrier to drug adherence. An underlying assumption exists that medications are readily available 365 days a year. Gaps appear in medication availability as a result of the systems put forth by health stakeholders. In this imperfect world, some patients may become nonadherent to drug therapy due to a lack of availability of drugs.

Many patients go to local pharmacies when they run out of medications as the result of mail service delays. Some pharmacy benefit plans allow for mail delay overrides, but many do not. Billing issues or a lack of medication orders can prevent local pharmacies from providing medications to fill gaps. This presents a lack of medication adherence. Patients do not possess medication waiting on arrival of delivery. The waiting period can vary from as little as a few days to weeks. This is critical for patients with diseases managed with drug therapy.

Examining a specific disease category can provide perspective on the financial contribution associated with the total health care cost. The American Heart Association reported that 32.8% of American mortality can be attributed to cardiovascular disease (CVD) deaths.[14] In 2012, the cost to treat CVD and stroke in the United States was $297.7 billion. The direct cost of prescribed medication for treating CVD and stroke was $32.9 billion. Coronary heart disease (CHD) is the leading cause of cardiovascular deaths. Medical science links CHD with low-density lipoprotein (LDL) and high-density lipoprotein (HDL) lipid profiles. Clinical trials show that CHD decreases when the lipid profile meets medically appropriate guidelines. Cross and Franks[7] documented problems of patient adherence

At a Glance

Synopsis: By identifying an adherence construct model that quantifies variables related to recommendations from health care providers, the reorder point system intervention proposed here can remove barriers to adherence. This model can assist the health care and service delivery systems in making decisions that influence adherence based on the expected order cycle days and the expected daily quantity of medication administered, as well as the variation associated with these two measures. The quantifiable model described here can be used in conjunction with behavioral designs of drug adherence assessment.

Analysis: *Applying a reorder point system requires fundamental changes by payers, providers, and patients. Payers would need to allow patients to obtain initial as well as safety medication supplies. Providers would need to work with patients to facilitate using a reorder point method. Patients would require training to monitor their medication stocks and be aware of the expiration date of their safety stock. Determining the safety stock depends on several varying factors, including transit time and the manner in which prescriptions are processed.*