Original Research

Initial development of the Systems Approach to Home Medication Management (SAHMM) model

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Abstract

Background: Adverse drug events and medication nonadherence are two problems associated with prescription medication use for chronic conditions. These issues often develop because patients have difficulty managing their medications at home. To guide patients and providers for achieving safe and effective medication use at home, the Systems Approach to Home Medication Management (SAHMM) model was derived from a systems engineering model for health care workplace safety.
Objective: To explore how well concepts from the SAHMM model can represent home medication management by using patient descriptions of how they take prescription medications at home.
Methods: Twelve patients were interviewed about home medication management using an interview guide based on the factors of the SAHMM model. Each interview was audio-taped and then transcribed verbatim. Interviews were coded to identify themes for home medication management using MAXQDA for Windows.
Results: SAHMM concepts extracted from the coded interview transcripts included work system components of person, tasks, tools & technology, internal environment, external environment, and household. Concepts also addressed work processes and work outcomes for home medication management.
Conclusions: Using the SAHMM model for studying patients' home medication management is a promising approach to improving our understanding of the factors that influence patient adherence to medication and the development of adverse drug events.
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Keywords: Medication management; Patient safety; Medication therapy; Non-adherence; Adverse drug event

Introduction

Two important issues affecting the safety and effectiveness of medication therapy for ambulatory patients are adverse drug events (ADEs) and medication non-adherence.[1] A review article of prospective studies of ADEs by Tache et al[2] reported an overall median prevalence of

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ADEs in an ambulatory care setting is 20.1% (IQR 9.9–34.7%). Of the patients at risk for ADEs, older adults are seven times more likely than younger people to experience an event (e.g. a fall) that results in a hospital admission.[3] Field et al showed that 54% of preventable ADEs among elderly Medicare patients were serious, life threatening or fatal.[4] Although many ADEs in the ambulatory care setting are preventable, these events often result in increased health care cost, especially in elderly patients.

According to the World Health Organization, only about 50% of prescription medications are taken as prescribed.[5] Medication non-adherence has been associated with worse patient outcomes, poor quality of life, reduced physical function, and advanced cognitive impairment.[6–9] The morbidity and mortality associated with non-adherence in the U.S. have been shown to increase health care costs by approximately $100 billion per year.[10] Despite the costs and risks associated with the persistent problems of medication non-adherence and ADEs for ambulatory patients, the factors that influence the management of medications in a patient's home are not well understood. As a result, there is limited information for health care providers to guide their patients and assure safe, effective medication use. The Institute of Medicine has called for studies to improve guidance for patients to avoid and respond to medication errors, especially in the ambulatory care setting.[11]

Previous research has provided examples of interventions to improve adherence and clinical outcomes for patients. Interventions described by Nieuwlaat et al focused on patient training and education, improving communication with health care professionals, pill containers, and reminders for patients.[12] A review identified factors affecting medication adherence in the elderly.[13] However, these studies did not take a systematic approach to addressing the problems with medication adherence and patient outcomes. Two care processes that occur in patients' homes are conducted in a more comprehensive manner: the use of the Outcome and Assessment Information Set (OASIS) by home health nurses in the U.S. and Home Medicines Reviews (HMRs) performed by Australian pharmacists. The OASIS data, which include a drug regimen review, are used by the Centers for Medicare & Medicaid Services (CMS) to track the quality of home health care being provided and as a guide to home health care providers.[14] These data are collected during a comprehensive assessment made at the start of care by home health nurses, usually with a face-to-face visit at the patient's home. OASIS data items address sociodemographic, environmental, support system, health status, functional status, and health service utilization characteristics of the patient. Nurses have reported that the OASIS assessment and documentation is burdensome, usually taking several hours to complete for one patient.[15] For the Home Medicines Reviews, a pharmacist conducts a comprehensive evaluation of a high risk patient's medications, usually involving a face-to-face interview in the patient's home.[16–19] The process of HMRs is to identify medication-related problems for a referred patient and to develop a medication management plan to address the problems identified. While the focus of HMRs is on appropriate clinical aspects of the patient's medication therapy, the patient's home situation can get some attention. However, the clinical focus of HMRs might limit the pharmacist's attention on factors in the home that could inhibit or support proper medication management by the patient.

To advance understanding and to support the systematic development of effective and efficient practitioner actions for ambulatory patients, there is a need for a comprehensive approach to modeling the in-home variables that influence medication management by such patients. An approach that could be helpful is a systems model that examines the tools and technologies, people, internal and external environments, organization and tasks involved in any system. Research in human factors engineering has led to several systems models, one of which is the Systems Engineering Initiative for Patient Safety (SEIPS). The SEIPS model is one of the most widely used approaches for a systematic model of health care delivery. The SEIPS model has been used to study medical errors as well as health care safety in hospitals, and other care settings.[20–22] The SEIPS model has been useful in identifying and resolving unsafe practices in health care work settings.

SEIPS 2.0 models health care work using three main sections: a work system, processes, and outcomes. The work system contains six interacting components: person(s), tasks, tools & technology, organization, internal environment, and external environment.[21] In health care settings, persons include health care professionals, support staff, and patients using equipment to perform care and related activities. Organization refers to structures that organize time, activities and