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Characteristics Associated With Postdischarge Medication Errors

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Abstract

Objective: To examine the association of patient- and medication-related factors with postdischarge medication errors.

Patients and Methods: The Vanderbilt Inpatient Cohort Study includes adults hospitalized with acute coronary syndromes and/or acute decompensated heart failure. We measured health literacy, subjective numeracy, marital status, cognition, social support, educational attainment, income, depression, global health status, and medication adherence in patients enrolled from October 1, 2011, through August 31, 2012. We used binomial logistic regression to determine predictors of discordance between the discharge medication list and the patient-reported list during postdischarge medication review.

Results: Among 471 patients (mean age, 59 years), the mean total number of medications reported was 12, and 79 patients (16.8%) had inadequate or marginal health literacy. A total of 242 patients (51.4%) were taking 1 or more discordant medication (ie, appeared on either the discharge list or patient-reported list but not both), 129 (27.4%) failed to report a medication on their discharge list, and 168 (35.7%) reported a medication not on their discharge list. In addition, 279 participants (59.2%) had a misunderstanding in indication, dose, or frequency in a cardiac medication. In multivariable analyses, higher subjective numeracy (odds ratio [OR], 0.81; 95% CI, 0.67-0.98) was associated with lower odds of having discordant medications. For cardiac medications, participants with higher health literacy (OR, 0.84; 95% CI, 0.74-0.95), with higher subjective numeracy (OR, 0.77; 95% CI, 0.63-0.95), and who were female (OR, 0.60; 95% CI, 0.46-0.78) had lower odds of misunderstandings in indication, dose, or frequency.

Conclusion: Medication errors are present in approximately half of patients after hospital discharge and are more common among patients with lower numeracy or health literacy.

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Frequently, the discharge process is rushed and disjointed, despite the critical importance of communicating with patients about postdischarge medications. Health care professionals may not effectively counsel patients regarding medications on the discharge instructions.[1] Likewise, patients may have difficulties understanding the changes to their medication regimen because of limitations in health literacy, numeracy, and other patient factors.[2-4] Postdischarge medication errors are common,[2] but the patient-related factors associated with such errors are not well understood.

Health literacy, the ability to understand and act on medical information,[5] and numeracy, "the ability to use and understand numbers in daily life,"[6] have been associated with medication

understanding and adherence.[7-9] In addition, other patient factors, such as cognitive impairment,[10] poor social support,[11] and depression,[12] have been associated with postdischarge outcomes, such as unscheduled health care use or adverse events in patients with cardiovascular disease. However, the independent association of these factors with postdischarge medication errors has not been examined in this population.

Postdischarge medication errors are important because they significantly contribute to adverse drug events (ADEs) or harm due to medications.[13-15] Medication errors include omissions, commissions, and misunderstandings in indication, dose, or frequency.[10-13] Errors can be due to differences between medications the patient thinks he/she should be

taking and what is prescribed, often due to poor physician-patient communication or patient-related factors, as mentioned above.[16,17]

Prior studies have found that 30% to 70% of patients have medication errors between the discharge list and the patient-reported regimen after discharge,[17-21] although few studies have focused on patients with cardiovascular disease. Because multiple types of medications are prescribed and cardiac medications can cause serious harm, patients with cardiovascular disease are at higher risk for errors and ADEs after discharge.[13,15,17,22-24]

This article describes predictors of medication errors among patients recently hospitalized for cardiovascular disease. On the basis of our conceptual model of factors associated with postdischarge outcomes,[25] we hypothesized that low health literacy and numeracy, more medications on discharge, more changes to medications during hospitalization, impaired cognition, poor social support, low preadmission medication adherence, and depression would be associated with postdischarge medication errors.

METHODS

Study Setting and Design

The Vanderbilt Inpatient Cohort Study (VICS) is a prospective study of patients admitted with cardiovascular disease to Vanderbilt University Hospital. The purpose of VICS is to investigate the effect of patient and social factors on postdischarge health outcomes, such as medication safety, quality of life, unplanned hospital utilization, and mortality. The rationale and design of VICS are detailed elsewhere.[25] Briefly, participants completed a baseline interview while hospitalized, and follow-up telephone calls were conducted at approximately 2 to 3, 30, and 90 days after discharge. We conducted an interim analysis of patient- and medication-related factors associated with medication errors after hospital discharge. The study was approved by the Vanderbilt University Institutional Review Board.

Patients

Eligibility screening shortly after admission identified patients with an intermediate or high likelihood of acute coronary syndrome (ACS) or acute decompensated heart failure (ADHF)

per a physician's review of the clinical record. Exclusion criteria included age younger than 18 years, inability to communicate in English, unstable psychiatric illness, delirium, low likelihood of follow-up after discharge, receiving hospice care, or otherwise too ill. To be included in this analysis, patients must have completed the medication review portion of the follow-up interview.

Baseline Assessment

Consenting patients completed an interviewer-administered baseline assessment of demographic information, including self-reported race, ethnicity, educational attainment, and marital status. Household income was collected using the strata from the Behavioral Risk Factor Surveillance System questionnaire.[26]

Social support was assessed using the 7-item Enhancing Recovery in Coronary Heart Disease Social Support Inventory.[27,28] Patients were asked the questions regarding emotional and instrumental support. Scores range from 8 to 34, with higher scores indicating more social support.

Patients completed the short form of the Test of Functional Health Literacy in Adults,[29] a timed test administered in a maximum of 7 minutes. Scores may be categorized as inadequate (score range, 0-16), marginal (score range, 17-22), or adequate (score range, 23-36).

We used a 3-item version of the Subjective Numeracy Scale (SNS), which quantifies the patients' perceived quantitative abilities and preferences for numerical information.[30] The 3-item SNS has a correlation coefficient of 0.88 with the full-length (8-item) SNS. The internal consistency reliability of the 3-item SNS was high (Cronbach α=0.78).[30,31] The SNS is reported as the mean on a scale from 1 to 6, with higher scores reflecting better numeracy.

We assessed cognition using the Short Portable Mental Status Questionnaire, a 10-item measure,[32] which is adjusted for educational attainment. Higher scores reflect worse cognitive status and may be categorized as not impaired (0-2 errors) or impaired (3-10 errors).

Self-rated health status was assessed using 5 of 10 items from the National Institutes of Health Patient Reported Outcomes Measurement Information System global health status questionnaire.[33] These questions ascertain overall health,