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Medication Discussions with Cardiovascular Patients in the Emergency Department: An Opportunity for Emergency Nurses to Engage Patients to Support Medication Reconciliation

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Abstract

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Ethics

The study was reviewed and approved by Vanderbilt University Institutional Review Board.

Introduction—To investigate the level of patient involvement in medication reconciliation (MedRec) processes and factors associated with that involvement in patients with cardiovascular disease (CVD) presenting to the emergency department (ED).

Methods—An observational and cross-sectional design was used. Cardiovascular patients presenting to the adult ED of an academic medical center completed a structured survey inclusive of patient demographics and measures related to the study concepts. Data abstracted from the electronic medical record included the patient’s medical history and ED visit data. Our multivariable model adjusted for age, gender, education, difficulty paying bills, health status, numeracy, health literacy, and medication knowledge, and evaluated patient involvement in medication discussions as an outcome.

Results—Participants (N=93) median age was 59 years old (IQR = 51, 67), 80.6% white, 96.8% not Hispanic, and 49.5% were married or living with a partner. Approximately 41% reported being employed and 36.9% reported an annual household income of less than \$25,000. Almost half (n=44, 47.3%) reported difficulty paying monthly bills. Patients reported moderate medication knowledge (Median: 3.8; IQR: 3.4 - 4.2) and perceived involvement in their care (mean = 41.8, SD = 9.1). After controlling for patient characteristics, only difficulty paying monthly bills ($\beta=0.36$, $p=.005$) and medication knowledge ($\beta=0.30$, $p=.009$) were associated with involvement in medication discussions.

Discussion—Some patients presenting to the ED demonstrated moderate medication knowledge and involvement in medication discussions, but more work is needed to engage patients.

Keywords

Medication reconciliation; patient involvement; medication; cardiovascular; emergency department

BACKGROUND

Unintentional medication discrepancies (UMDs) are unexplained mismatches in patients’ medication orders across different care areas, and they occur in nearly half of hospitalized patients.¹⁻³ The majority of these errors have the potential for moderate to severe patient harm.^{2,4-6} Patients receiving care in emergency departments (EDs) are in a high-risk environment for these errors.⁷⁻⁹ A hallmark of the dynamic, complex ED setting is the existence of several care transition points including: 1) home to ED evaluation; 2) ED discharge to home; 3) ED admission to inpatient hospitalization; and, 4) ED evaluation to skilled nursing facility. At each of these care transition points, the risk for unintentional medication errors is high,^{10,11} making ED patients particularly vulnerable to adverse drug events.

Due to the high rates of patients with cardiovascular disease (CVD) encountered in ED settings, which are a high-risk environment for medication errors, this patient group is highly vulnerable to medication errors.^{12,13} As of 2019, nearly 900,000 deaths in the US were attributed to CVD, with coronary heart disease as the leading cause of death (41.3%) followed by other minor CVD (17.3%), stroke (17.2%), high blood pressure (11.7%), heart failure (9.9%), and diseases of the arteries (2.8%).¹⁴ A recent report by the American Heart

Association¹⁴ indicates the cost of CVD to the healthcare system as \$378.0 billion with direct costs accounting for \$226.2 billion and lost productivity/mortality as \$151.8 billion. ¹⁴ Nearly 668,000 annual ED visits for acute heart failure (AHF) occur in the US and of these 83.7% are admitted. ¹⁵ More importantly, their high 30-day hospital readmission rate¹⁶ and increased exposure to the healthcare setting, age (> 65 years), high comorbidity burden^{3,17,18} and associated polypharmacy, increases the risk of adverse drug events and medication non-adherence. ¹⁹ One possible way to reduce these patients' risk for adverse drug events could be through in-depth medication discussions in the ED setting.

Medication reconciliation (MedRec) is the formal process whereby patients' medication orders are verified, compared, and documented during care transitions.^{1,2,16-19} MedRec significantly reduces UMDs.^{17,18,20} A key MedRec component is obtaining a best possible medication history (BPMH) using at least two sources of data (e.g., the patient, their family or caregivers, the medical record or outside pharmacy). The BPMH constitutes a "comprehensive, systematically derived"²⁰ medication list that is usually initiated in the ED, can be completed by any healthcare practitioner and culminates in the pre-admission medication list, a critical foundation for subsequent MedRec.²¹⁻²³ The detailed and systematic BPMH process increases the accuracy of medication lists and reduces the potential for medication errors.^{22,24-26} Patients are an integral part of BPMH and their engagement with health professionals during the MedRec process is crucial for an accurate pre-admission medication list.²⁷ Importantly, patient engagement reduces the potential for adverse drug events²⁸ and improves patient safety during care transitions.²⁹ Patient involvement in medication discussions may reduce the potential for adverse drug events,²⁸ improve patient safety during care transitions,²⁹ and enhance the continuity of care following discharge.^{30,31} Patient characteristics (i.e., age³²⁻³⁴, education level³⁵, race³⁶, or gender³³), patient health status,³⁷ social support,¹⁰ and perceived health competence³⁸ are also important in medication discussions. However, data measuring ED patients' desire for or involvement in medication discussions are lacking. The Emergency Nurses Association position paper on medication management highlights the important role Emergency Nurses play in preventing UMDs.^{39,40} While pharmacists and pharmacy technicians are increasingly used in ED settings to obtain medication histories and facilitate MedRec,⁴¹ nurses remain the largest workforce per 10,000 health professionals (85.3%)⁴² and provide patient care 24-hours a day. Moreover, the feasibility of pharmacy staff to conduct MedRec in EDs is limited by contextual factors such as resource and staffing limitations.^{43,44} Because ED clinical practice is complex and diverse, nurses' function as specialist generalists carrying various responsibilities. By engaging patients in discussions surrounding their medications, a robust medication list can be generated as the foundation for subsequent medication reconciliation.⁴⁰ For this study, patient engagement is defined as patients' participation and involvement in treatment decisions, information sharing with healthcare providers, their perception of healthcare providers facilitation of patient decision-making, and information sharing during medication history taking.²⁸

OBJECTIVE

The purpose of this study was to investigate the level of patient involvement in MedRec processes and to explore factors associated with that involvement in patients with CVD

presenting to the ED. We hypothesized that patient characteristics (age, gender, socioeconomic status, and health literacy/numeracy), health status, social support, and perceived health competence would be associated with patient involvement in the MedRec processes (Figure 1).

METHODS

Study design, Setting, and Sample

We conducted an observational and cross-sectional study using an in-person structured survey and chart abstraction for data collection. A convenience sample of patients was drawn from the population of patients with CVD presenting at the time of the study to an academic medical center in the Southeastern United States (annual census ~70,000 patients per year) who met the study inclusion criteria. Patients were eligible if they were

18 years old, English speaking, clinically stable, had a medical history of CVD (i.e., hypertension, heart failure, myocardial infarction, unstable angina, arrhythmia, pulmonary embolism or DVT), and willing and able to give informed consent. We excluded patients with altered mental status, hemodynamic instability, transferred from assisted living or long-term care, on isolation precautions, or from a vulnerable population (i.e., prisoners, cognitively impaired, and children/minors). Patients were required to be alert and stable and able to express their thoughts during interviews without compromising patient safety. The Vanderbilt University IRB (IRB# 171196) approved the study.

Data collection and Study Measures

Senior undergraduate or graduate students approached eligible ED patients and introduced them to the study. Patients who were interested were provided with a hard copy consent document, which was reviewed with the patient. Following consent, students facilitated completion of the patient survey during the patients' ED visit. Students received training on the study protocol and associated procedures and also completed training in the ethical conduct of research before starting data collection. Surveys were administered in written and verbal format via a paper form. Patients were provided the option to either complete the survey themselves or have the student read the questions and note patient responses using a paper copy of the survey document. Subsequently, all paper responses were entered into a REDCap (Research Electronic Data Capture) study database within one week following the interview. REDCap is a secure, web-based software platform designed to support data capture for research studies.^{45,46} To ensure the reliability of the data collected, all responses were double-entered into the REDCap database. The two entries were compared and discrepancies corrected until all data matched the paper responses. If patient demographic information was not clear from the patient responses or otherwise needed to be verified, key study personnel reviewed the electronic medical record (EMR) for the patient to collect that information.

Measurement.—Survey questions were derived from the literature but also included existing measurement scales with established validity and reliability.⁴⁷⁻⁵² Descriptive survey items were reviewed by experts and subsequently pilot tested in a group of ED patients for clarity and appropriateness and to establish content and face validity.

After providing consent and while still in the ED, patients completed a survey of socio-demographic characteristics (age, gender, socio-economic status, and health literacy/numeracy), health status, social support, medication knowledge, and medication involvement).

Self-rated health status was assessed using five of ten items from the NIH Patient Reported Outcomes Measurement Information System (PROMIS) global health status questionnaire.⁴⁷ A 5-point Likert scale was used to ask about overall health, quality of life, physical and mental health, and satisfaction with social activities and relationships. A score was generated by averaging the responses of the five items (range 1- 5, Cronbach's alpha = 0.76).

Numeracy was assessed using the Subjective Numeracy Scale (SNS-3). Each of the three items comprising the scale has a scale from 1 to 6. A score is generated by summing responses to the items (possible range 3 to 18), with higher scores reflecting better subjective numeracy (Cronbach's alpha = 0.71). Health literacy was assessed using the Brief Health Literacy Scale (BHLS), which consists of three items on a 5-point Likert scale summed to create a total score. Scores have a possible range of 3 to 15 with higher scores indicating higher subjective health literacy (Cronbach's alpha = 0.77).

For assessing patient medication knowledge, this study used five items from an existing scale previously created to assess patient-perceived medication knowledge and confidence for medication use (general knowledge and drug interaction knowledge) on a 5-point Likert scale of strongly disagree to strongly agree. A multidisciplinary group of experts established content validity and psychometric evaluation indicated a one factor model and high internal consistency (Cronbach's alpha = 0.74).^{53,54} Responses in this study were averaged for a knowledge score (Cronbach's alpha = 0.68).

Patient engagement in MedRec processes was assessed using the modified perceived involvement in care scale (M-PICS). The original PICS is a self-report tool to assess patients' perception of doctor-patient communication occurring during medical encounters.^{49,55} It is comprised of a total of 14 items, with each item response ranging from '1' (strongly disagree) to '5' (strongly agree). The PICS and M-PICS were previously administered only to outpatient samples,^{49,56} thus the wording of questions was modified to fit with the ED and MedRec context. In this study, the modified PICS (M-PICS) phrase "healthcare provider (HCP)" was replaced with "Emergency room staff". Furthermore, because the focus of this study was patient involvement in medication discussions, the items were slightly adapted, including using the term "medication(s)" to replace references to treatment, procedures, or symptoms. The three M-PICS subscales included in this study were: HCP Facilitation (HCP-FAC) (5 items) (eg, *Emergency room staff encouraged me to talk about personal concerns I may have about my medications*"), Patient Information (PI)(5 items) (eg, *I asked emergency room staff to explain my medicines to me in greater detail*"), and Patient Decision-Making (PMD)(4 items) (eg, *I expressed concern about the new medicines they recommended and prescribed*).⁵⁶ Responses to the 14 items were totaled to arrive at an overall M-PICS score with a possible range of 14 to 70 (Cronbach's alpha = 0.83).

Data Analysis

IBM SPSS Statistics (version 27) was used for data analysis. Frequency distributions were used to summarize the categorical data. Normally distributed continuous data were summarized using mean and standard deviation (SD); skewed data were summarized using median and inter-quartile range (IQR). Pearson correlations and multiple linear regression analyses were used to assess the associations of the patient characteristics with their reported involvement in medication discussions. Skewed distributions were transformed to normal using the square root function prior to inclusion in those parametric statistical procedures. An alpha of .05 was used for determining statistical significance ($p < .05$).

RESULTS

Sample Characteristics

The median age of the 93 participants who completed the key study measures was 59 years old (IQR =51, 67). A majority of participants were White or Caucasian ($n=75$; 80.6%), not Hispanic or Latino ($n = 90$; 96.8%), and married or living with a partner ($n =46$; 49.5%). In addition, 34 patients (41%) reported being employed and 31 patients (36.9%) reported an annual household income of less than \$25,000. Almost half ($n = 44$, 47.3%) reported that paying their monthly bills was somewhat or always difficult. See Table 1 for details.

Summaries of the participant's responses to how they manage their medications and how comfortable they were discussing medications with the ED staff are shown in Table 2. Most were quite comfortable talking with the ED staff about their medications ($n = 84$, 90%). Most reported using either the original bottles ($n = 55$, 59%) or a pillbox ($n = 53$, 57%) to keep track of their medications. While 62% ($n = 58$) reported that they took either their original pill bottles or some type of list of medications with them on a visit to their physician, only 42% ($N = 39$, 42%) brought any of those items or lists with them to the ED. Finally, more than half ($n = 54$, 58%) stated they were able to fully manage their medications on their own. Of those who stated they had a family member who assisted them with their medications and reported how they assisted them ($n = 39$), the most commonly reported type of assistance was with picking up the medications from the pharmacy ($n = 30$, 76.9%) and reminding them to take the medications ($n = 25$, 64.1%). (Table 2).

Patient involvement in medication discussions

The mean score for overall perceived involvement in care was in the middle of the possible range of scores for that measure (Table 3, mean \pm SD: 41.8 ± 9.1). Of the sub-scale scores, health care provider facilitation of involvement in care scored the highest (3.6 ± 0.8), followed by patient information (2.8 ± 0.9) and patient decision-making (2.5 ± 0.9). Patient-reported subjective numeracy (median; 75th lower and upper interquartile range: 4.6; 3.6 - 5.4), brief health literacy scores (12.1; 10.0 – 15.0), and medication knowledge (3.8; 3.4-4.2) trended towards the upper range of each scale.

As shown in Table 4, compared to participants reporting no difficulty paying bills, those reporting it was very difficult to pay bills had significantly higher patient involvement in medication discussion scores ($\beta = 0.35$, $p = .002$). This finding was very similar

after controlling for all other patient characteristics ($\beta = 0.36, p = .005$). Furthermore, a statistically significant positive association was observed between participant medication knowledge scores and their reported involvement in medication discussions (unadjusted: $\beta = 0.33, p = .001$; adjusted: $\beta = 0.30, p = .009$). None of the other patient characteristics demonstrated statistically significant associations with level of involvement in medication discussions while in the ED. (Table 4)

DISCUSSION

This study addressed important knowledge gaps of patient involvement in MedRec processes and associated factors with involvement in patients with CVD presenting to the ED. To our knowledge, the current study is the first to highlight patient factors associated with CVD patients' involvement in ED medication discussions. Awareness of these factors could aid healthcare workers in how to target and engage CVD patients less involved during medication discussions. Additionally, these findings may increase overall understanding of the reasons for why some patients are more involved in these discussions and why others are not, with the possibility to inform interventions designed to increase patient engagement.

Difficulty paying monthly bills and medication knowledge were associated with greater patient involvement during medication discussions in the ED. Patient characteristics such as demographics (eg, age, gender, education), health literacy, health status, and social support were not associated with statistical significance. This study found those participants who indicated paying bills as most difficult were more involved in their medication discussions. Underlying financial difficulties and stress could explain difficulty paying bills. Patients without steady or sufficient income may be more astutely aware of their medical needs and monitor the necessity and affordability of medications prescribed. Close managing of finances related to medications could result in patients being overall more aware of what medications they are taking, and thus, may account for more involvement in their medication management than patients without difficulties paying bills. Another possible explanation for patients of lower socioeconomic status (SES) having greater involvement in medication discussion is that lower SES patients typically have more severe level of disease and more co-morbidities⁵⁷ that require more patient involvement than less severe disease. Healthcare workers should remain diligent in knowing the disparities observed in patients with financial difficulties including affording their medications. Therefore, ED clinicians (nurses, providers, pharmacists, pharmacy technicians) and social workers or case managers should discuss resources (eg, food, transportation, generic medication choices versus name brands, pharmacy coupons, and free trials) and monetary aids with these patients during discussions about medication.

In this study, a lack of medication knowledge was associated with less involvement in medication discussions. Previous studies demonstrated a lack of medication knowledge among CVD patients⁵⁸ may contribute to medication non-adherence.⁵⁹ Enhancing patients' medication knowledge is therefore imperative to affect the downstream effects of poor medication knowledge on patients' medication adherence. Less medication knowledge may leave a patient feeling helpless and result in difficulty engaging the patient in the conversation. Healthcare professionals should work with patients to educate them on CVD

medication, risk factors⁶⁰, and non-pharmacological prevention, and use education as a tool to increase patient involvement in medication discussions.⁶¹ Additionally, greater medication knowledge among HF patients was found to be associated with less ED visits.⁶¹ Thus, patients' education concerning medications could lead to more involvement in medication discussions and less subsequent ED admissions. Future research should examine the interactions between paying bills and medication knowledge to deduce the nature of the relationship of each factor on involvement in medication discussions.

Involvement in treatment decisions and medication behavior can be promoted by healthcare providers as they share information with patients and enhance shared-decision making.⁶² For patients with CVD, shared-decision making can be integrated to assess patient risk and inform them about the risks of medications. As Wai et al⁶³ demonstrated, most patients (n = 98; 87%) are willing to use a self-administered medication history form to improve ED workflow efficiencies.⁶³ Prey et al⁶⁴ similarly found patients were willing to engage in MedRec processes using an electronic medication review tool.⁶⁴ This study suggests patient involvement in medication discussions are not always ideal and are influenced by patient factors. Yet, deploying shared-decision making tools like a self-administered medication history form or an electronic medication review tool might facilitate patient engagement. As the Emergency Nurses Association noted³⁹, medication management involves multiple disciplines and requires a collaborative partnership. While pharmacists and pharmacy technicians are the ideal persons to perform medication history taking and MedRec, ED nurses can support MedRec efforts through collaboration and effective communication.⁴⁰ Furthermore, nurses can promote important facilitators of patient engagement in patient safety initiatives by encouraging patients, sharing information, and establishing patient-centered care.⁶⁵

As this study demonstrated, patients use a variety of medication management skills to keep track of their medications, with pillboxes and pill bottles being predominantly used. However, when asked what they brought to the ED to manage their medications, the majority of patients reported none, while 21.5% reported bringing the original pill bottles and 10.8% indicated the use of a medication list. Therefore, ED nurses' education of patients on accurate medication lists are vital to MedRec efforts and patient medication safety. Mechanisms to alert primary care providers when patients present to the ED without their medications or a medication list would also facilitate additional patient instructions.

Study limitations

The use of self-report increases the risk for bias, including social desirability, response bias and nonresponse bias. Social desirability was limited by ensuring participant confidentiality and privacy. Nonresponse bias is possible as those who decline to participate may be inherently different from those who agreed to participate. Selection bias is also possible as we excluded those patients who were in extremis (eg, trauma patient) or unable to talk to study staff (eg, delirious or dementia). Steps to enhance the rigor of the study included training of staff in the study protocol and procedures, using valid, reliable survey measures, and pilot testing the survey before use. The study was conducted in the ED of only one academic medical center which may not reflect the patient and staff experiences of other

EDs. Patients were included as they presented to the ED and we aimed to include patients with diverse demographic backgrounds. However, our sample was predominantly white, older individuals and therefore may not be reflective of other ED patient populations.

IMPLICATIONS FOR CLINICAL CARE

Targeted patient engagement strategies and the use of secondary information sources (e.g., family members, EMR medication lists, community pharmacy data) might be key to establish the patient's pre-admission medication list, a foundation for subsequent MedRec. When patients and families actively partner with the health care system to improve their health and health care, the risk of adverse drug events diminishes²⁸ and patient safety during care transitions improves.²⁹ The lack of knowledge about their medications might put patients at an increased risk for medication discrepancies and poor medication adherence. Subsequently, more discrepancies and poorer adherence may contribute to repeat ED visits, hospital readmissions, and higher healthcare costs. Repeated encounters with the healthcare system further expose patients to medication discussions and further risk for discrepancies. Therefore, patients who lack medication knowledge should be prioritized when conducting MedRec and teaching patients about their medications. Furthermore, an assessment of patients' level of difficulty paying bills and their medication knowledge during ED evaluation might help to identify and target those patients who would benefit from more in-depth discussions on their medications during the ED visit. Although some patients reported the use of pillboxes and pill bottles to manage their medications, the use of medication lists or smartphone apps to manage their medications were rarely reported. Furthermore, most patients did not bring their medications with them to the ED. With the wide adoption and use of smartphones, ED nurses teaching patients to record medication lists on their smart phones or educating them in the use smartphone apps to manage their medications would increase the availability of patient medication lists during ED visits and facilitate medication reconciliation.

CONCLUSIONS

Patient characteristics are drivers of patients' involvement in medication discussions during the ED visit including difficulty paying bills and high medication knowledge. Engaging patients in medication discussions during ED visits are an important step in reducing medication discrepancies and potential adverse events.

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Conflicts of interest

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REFERENCES

1. Lehnbohm EC, Stewart MJ, Manias E, Westbrook JI. Impact of medication reconciliation and review on clinical outcomes. *The Annals of pharmacotherapy*. Oct 2014;48(10):1298–312. doi:10.1177/1060028014543485 [PubMed: 25048794]
2. Belda-Rustarazo S, Cantero-Hinojosa J, Salmeron-Garcia A, Gonzalez-Garcia L, Cabeza-Barrera J, Galvez J. Medication reconciliation at admission and discharge: an analysis of prevalence and associated risk factors. *Int J Clin Pract*. Nov 2015;69(11):1268–74. doi:10.1111/ijcp.12701 [PubMed: 26202091]
3. Gleason KM, McDaniel MR, Feinglass J, et al. Results of the Medications at Transitions and Clinical Handoffs (MATCH) study: an analysis of medication reconciliation errors and risk factors at hospital admission. *J Gen Intern Med*. May 2010;25(5):441–7. doi:10.1007/s11606-010-1256-6 [PubMed: 20180158]
4. Eggink RN, Lenderink AW, Widdershoven JW, van den Bemt PM. The effect of a clinical pharmacist discharge service on medication discrepancies in patients with heart failure. *Pharmacy world & science : PWS*. Dec 2010;32(6):759–66. doi:10.1007/s11096-010-9433-6 [PubMed: 20809276]
5. Vasileff HM, Whitten LE, Pink JA, Goldsworthy SJ, Angley MT. The effect on medication errors of pharmacists charting medication in an emergency department. *journal article. Pharmacy world & science : PWS*. Jun 2009;31(3):373–9. doi:10.1007/s11096-008-9271-y [PubMed: 19043801]
6. Walker PC, Bernstein SJ, Jones JN, et al. Impact of a pharmacist-facilitated hospital discharge program: a quasi-experimental study. *Arch Intern Med*. Nov 23 2009;169(21):2003–10. doi:10.1001/archinternmed.2009.398 [PubMed: 19933963]
7. Medication reconciliation: another change planned. *ED management : the monthly update on emergency department management*. Nov 2010;22(11):suppl 3–4.
8. Vira T, Colquhoun M, Etschells E. Reconcilable differences: correcting medication errors at hospital admission and discharge. *Quality & Safety in Health Care*. Apr 2006;15(2):122–126. doi:10.1136/qshc.2005.015347 [PubMed: 16585113]
9. Gleason K, Brake H, Agramonte V, Perfetti C. Medications at Transitions and Clinical Handoffs (MATCH) toolkit for medication reconciliation. Prepared by the Island Peer Review Organization, Inc, under Contract No HHS2902009000 C. 2011;13
10. Mixon AS, Neal E, Bell S, Powers JS, Kripalani S. Care transitions: a leverage point for safe and effective medication use in older adults—a mini-review. *Gerontology*. 2015;61(1):32–40. doi:10.1159/000363765 [PubMed: 25277280]
11. Kripalani S, Jackson AT, Schnipper JL, Coleman EA. Promoting effective transitions of care at hospital discharge: a review of key issues for hospitalists. *J Hosp Med*. Sep 2007;2(5):314–23. doi:10.1002/jhm.228 [PubMed: 17935242]
12. Dickstein K, Cohen-Solal A, Filippatos G, et al. ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure 2008†. *European journal of heart failure*. 2008;10(10):933–989. [PubMed: 18826876]
13. Blank FSJ, Tobin J, Macomber S, Jaouen M, Dinoia M, Visintainer P. A “Back to Basics” Approach to Reduce ED Medication Errors. *Journal of Emergency Nursing*. 2011/03/01/2011;37(2):141–147. doi:10.1016/j.jen.2009.11.026 [PubMed: 21397127]
14. Tsao CW, Aday AW, Almarzooq ZI, et al. Heart Disease and Stroke Statistics—2022 Update: A Report From the American Heart Association. *Gradation*. 2022;145(8):e153–e639. doi:doi:10.1161/CIR.0000000000001052
15. Storrow AB, Jenkins CA, Self WH, et al. The burden of acute heart failure on U.S. emergency departments. *JACC Heart failure*. Jun 2014;2(3):269–77. doi:10.1016/j.jchf.2014.01.006 [PubMed: 24952694]
16. Calvillo-King L, Arnold D, Eubank KJ, et al. Impact of social factors on risk of readmission or mortality in pneumonia and heart failure: systematic review. *J Gen Intern Med*. Feb 2013;28(2):269–82. doi:10.1007/s11606-012-2235-x [PubMed: 23054925]

17. Parejo MIB, Borrego AMJ, Ruiz JA, et al. Medication List Assessment in Spanish Hospital Emergency Departments. *Journal of Emergency Medicine*. Apr 2015;48(4):416–423. doi:10.1016/j.jemermed.2014.06.063 [PubMed: 25547811]
18. Mendes AE, Lombardi NF, Andrzejewski VS, Frandoloso G, Correr CJ, Carvalho M. Medication reconciliation at patient admission: a randomized controlled trial. *Pharmacy practice*. Jan-Mar 2016;14(1):656. doi:10.18549/PharmPract.2016.01.656 [PubMed: 27011775]
19. Maher RL, Hanlon J, Hajjar ER. Clinical consequences of polypharmacy in elderly. Expert opinion on drug safety. Jan 2014;13(1):57–65. doi:10.1517/14740338.2013.827660 [PubMed: 24073682]
20. Johnston R, Saulnier L, Gould O. Best possible medication history in the emergency department: comparing pharmacy technicians and pharmacists. *The Canadian journal of hospital pharmacy*. 2010;63(5):359–365. doi:10.4212/cjhp.v63i5.947 [PubMed: 22479003]
21. De Winter S, Vanbrabant P, Spriet I, et al. A simple tool to improve medication reconciliation at the emergency department. *Eur J Intern Med*. Aug 2011;22(4):382–5. doi:10.1016/j.ejim.2011.03.010 [PubMed: 21767756]
22. Remtulla S, Brown G, Frighetto L. Best possible medication history by a pharmacy technician at a tertiary care hospital. *The Canadian journal of hospital pharmacy*. 2009;62(5):402–405. doi:10.4212/cjhp.v62i5.828 [PubMed: 22478923]
23. MacDonald N, Manuel L, Brennan H, Musgrave E, Wanbon R, Stoica G. Reliability of Best Possible Medication Histories Completed by Non-admitted Patients in the Emergency Department. *The Canadian journal of hospital pharmacy*. Jul-Aug 2017;70(4):263–269. doi:10.4212/cjhp.v70i4.1675 [PubMed: 28894309]
24. Mueller SK, Sponsler KC, Kripalani S, Schnipper JL. Hospital-based medication reconciliation practices: A systematic review. *Archives of Internal Medicine*. Jul 23 2012;172(14):1057–69. doi:10.1001/archinternmed.2012.2246 [PubMed: 22733210]
25. Schnipper JL, Mixon A, Stein J, et al. Effects of a multifaceted medication reconciliation quality improvement intervention on patient safety: Final results of the MARQUIS study. *BMJ Qual Saf*. Dec 2018;27(12):954–964. doi:10.1136/bmjqs-2018-008233
26. Mueller SK, Kripalani S, Stein J, et al. A toolkit to disseminate best practices in inpatient medication reconciliation: multi-center medication reconciliation quality improvement study (MARQUIS). *Jt Comm J Qual Patient Saf*. 2013;39(8):AP1–AP1-AP3.
27. Tobiano G, Chaboyer W, Teasdale T, Raleigh R, Manias E. Patient engagement in admission and discharge medication communication: a mixed studies review. *Int J Nurs Stud*. 2019;
28. Manias E, Rixon S, Williams A, Liew D, Braaf S. Barriers and enablers affecting patient engagement in managing medications within specialty hospital settings. *Health expectations : an international journal of public participation in health care and health policy*. Dec 2015;18(6):2787–98. doi:10.1111/hex.12255 [PubMed: 25186633]
29. Manias E, Hughes C. Challenges of managing medications for older people at transition points of care. *Res Social Adm Pharm*. May-Jun 2015;11(3):442–7. doi:10.1016/j.sapharm.2014.10.001 [PubMed: 25455760]
30. Bradley EH, Sipsma H, Curry L, Mehrotra D, Horwitz LI, Krumholz H. Quality collaboratives and campaigns to reduce readmissions: what strategies are hospitals using? *Journal of hospital medicine*. 2013;8(11):601–608. [PubMed: 24038927]
31. Carman KL, Dardess P, Maurer M, et al. Patient and family engagement: a framework for understanding the elements and developing interventions and policies. *Health Aff (Millwood)*. Feb 2013;32(2):223–31. doi: 10.1377/hlthaff.2012.1133 [PubMed: 23381514]
32. Al-Foraih M, Somerset S. Factors Affecting Adherence to Statins in Hypercholesterolemic Kuwaiti Patients: A Cross-Sectional Study. *Med Princ Pract*. 2017;26(1):35–40. doi: 10.1159/000450644 [PubMed: 27607329]
33. Damlien L, Davidsen N, Nilsen M, Godo A, Moger TA, Viktil KK. Drug safety at admission to emergency department: an innovative model for PRIORitizing patients for MEducation Reconciliation (PRIOMER). *Ear J Emerg Med*. Dec 11 2015;doi: 10.1097/MEJ.0000000000000355

34. Lee YY, Kuo LN, Chiang YC, et al. Pharmacist-conducted medication reconciliation at hospital admission using information technology in Taiwan. *International journal of medical informatics*. Jun 2013;82(6):522–7. doi:10.1016/j.ijmedinf.2013.01.006 [PubMed: 23410659]
35. Osorio SN, Abramson E, Pfoh ER, Edwards A, Schottel H, Kaushal R. Risk factors for unexplained medication discrepancies during transitions in care. *Fam Med*. Sep 2014;46(8):587–96. [PubMed: 25163036]
36. Street RL, Gordon H, Haidet P. Physicians' communication and perceptions of patients: is it how they look, how they talk, or is it just the doctor? *Social science & medicine*. 2007;65(3):586–598. [PubMed: 17462801]
37. Dolansky MA, Hawkins MA, Schaefer JT, et al. Association Between Poorer Cognitive Function and Reduced Objectively Monitored Medication Adherence in Patients With Heart Failure. *Circ Heart Fail*. Dec 2016;9(12):doi:10.1161/circheartfailure.116.002475
38. Bachmann JM, Goggins KM, Nwosu SK, Schildcrout JS, Kripalani S, Wallston KA. Perceived health competence predicts health behavior and health-related quality of life in patients with cardiovascular disease. *Patient Educ Couns*. Dec 2016;99(12):2071–2079. doi:10.1016/j.pec.2016.07.020 [PubMed: 27450479]
39. Vasileff HM, Whitten LE, Pink JA, Goldsworthy SJ, Angley MT. The effect on medication errors of pharmacists charting medication in an emergency department. *Pharmacy World & Science*. Jun 2009;31(3):373–9. doi:10.1007/s11096-008-9271-y [PubMed: 19043801]
40. Navaroli JE. Emergency Nurses Association Position Statement: Medication Management and Reconciliation in the Emergency Setting. *Journal of Emergency Nursing*. 2022;48(1):88–93. [PubMed: 34996575]
41. Rubin EC, Pisupati R, Nerenberg SF. Utilization of Pharmacy Technicians to Increase the Accuracy of Patient Medication Histories Obtained in the Emergency Department. *Hospital Pharmacy*. 2016;51(5):396–404. doi:10.1310/hpj5105-396 [PubMed: 27303094]
42. The Centers for Disease Control and Prevention National Center for Health Statistics. Website. March 9, 2020, 2020. Updated June 25, 2019. Accessed March 7, 2020. https://www.cdc.gov/nchs/about/fact_sheets.htm
43. Boockvar KS, Santos SL, Kushniruk A, Johnson C, Nebeker JR. Medication reconciliation: barriers and facilitators from the perspectives of resident physicians and pharmacists. *Journal of hospital medicine*. Jul-Aug 2011;6(6):329–337. doi:10.1002/jhm.891 [PubMed: 21834114]
44. Kenelty KA, Cheung B, Wise M, Kind A, Roberts T, Kreling D. Barriers and facilitators of medication reconciliation processes for recently discharged patients from community pharmacists' perspectives. *Research in social & administrative pharmacy*. Jul-Aug 2015;11(4):517–530. doi:10.1016/j.sapharm.2014.10.008 [PubMed: 25586885]
45. Harris PA, Taylor R, Minor BL, et al. The REDCap consortium: Building an international community of software platform partners. *Journal of Biomedical Informatics*. 2019/07/01/2019;95:103208. doi:10.1016/j.jbi.2019.103208 [PubMed: 31078660]
46. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)—a metadata-driven methodology and workflow process for providing translational research informatics support. *Journal of biomedical informatics*. Apr 2009;42(2):377–81. doi:10.1016/j.jbi.2008.08.010 [PubMed: 18929686]
47. Hays RD, Bjorner JB, Revicki DA, Spritzer KL, Cella D. Development of physical and mental health summary scores from the patient-reported outcomes measurement information system (PROMIS) global items. *Quality of Life Research*. 2009;18(7):873–880. [PubMed: 19543809]
48. Smith MS, Wallston KA, Smith CA. The development and validation of the Perceived Health Competence Scale. *Health Educ Res*. Mar 1995;10(1):51–64. [PubMed: 10150421]
49. Lerman CE, Brody DS, Caputo GC, Smith DG, Lazaro CG, Wolfson HG. Patients' Perceived Involvement in Care Scale: relationship to attitudes about illness and medical care. *J Gen Intern Med*. Jan-Feb 1990;5(1):29–33. [PubMed: 2299426]
50. Smith MY, Winkel G, Egert J, Diaz-Wionczek M, DuHamel KN. Patient-physician communication in the context of persistent pain: validation of a modified version of the patients' Perceived Involvement in Care Scale. *Journal of pain and symptom management*. Jul 2006;32(1):71–81. doi:10.1016/j.jpainsymman.2006.01.007 [PubMed: 16824987]

51. Chew LD, Bradley KA, Boyko EJ. Brief questions to identify patients with inadequate health literacy. 2004;
52. Fagerlind Stahl AC, Gustavsson M, Karlsson N, Johansson G, Ekberg K. Lean production tools and decision latitude enable conditions for innovative learning in organizations: a multilevel analysis. *Applied Ergonomics*. Mar 2015;47:285–291. doi:10.1016/j.apergo.2014.10.013 [PubMed: 25479999]
53. Okere AN, Renier CM, Morse J. Development and validation of a survey to assess patient-perceived medication knowledge and confidence in medication use. *Journal of nursing measurement*. 2014;22(1):120–34. [PubMed: 24851668]
54. Okere AN, Renier CM, Tomsche JJ. Evaluation of the influence of a pharmacist-led patient-centered medication therapy management and reconciliation service in collaboration with emergency department physicians. *Journal of managed care & specialty pharmacy*. Apr 2015;21(4):298–306. doi:10.18553/jmcp.2015.21.4.298 [PubMed: 25803763]
55. Brody AA, Gibson B, Tresner-Kirsch D, et al. High prevalence of medication discrepancies between home health referrals and centers for medicare and medicaid services home health certification and plan of care and their potential to affect safety of vulnerable elderly adults. *Journal of the American Geriatrics Society*. 2016;64(11):e166–e170. [PubMed: 27673753]
56. Smith MY, Winkel G, Egert J, Diaz-Wionczek M, DuHamel KN. Patient-physician communication in the context of persistent pain: validation of a modified version of the patients' Perceived Involvement in Care Scale. *Journal of pain and symptom management*. Jul 2006;32(1):71–81. doi:10.1016/j.jpainsymman.2006.01.007 [PubMed: 16824987]
57. Ali S, Moghei M, Krahn M, Chessex C, Grace SL. Health care use and associated time and out of pocket expenditures for patients with cardiovascular disease in a publicly funded health care system. *Canadian Journal of Cardiology*. 2018;34(1):52–60. [PubMed: 29275883]
58. Mochari H, Ferris A, Adigopula S, Henry G, Mosca L. Cardiovascular disease knowledge, medication adherence, and barriers to preventive action in a minority population. *Preventive cardiology*. 2007;10(4):190–195. [PubMed: 17917515]
59. van Dalem J, Krass I, Aslani P. Interventions promoting adherence to cardiovascular medicines. *International journal of clinical pharmacy*. 2012;34(2):295–311. [PubMed: 22271222]
60. Espejo M, Magabo S, Rivera-Castro A, et al. Qualitative study of knowledge, perception, and behavior related to hypertension and cardiovascular disease risk reduction among hypertensive African-Americans in urban Inner City of south Bronx, New York. *Journal of racial and ethnic health disparities*. 2019;6(1):197–206. [PubMed: 30117092]
61. Hope CJ, Wu J, Tu W, Young J, Murray MD. Association of medication adherence, knowledge, and skills with emergency department visits by adults 50 years or older with congestive heart failure. *Am J Health Syst Pharm*. Oct 1 2004;61(19):2043–9. doi:10.1093/ajhp/61.19.2043 [PubMed: 15509127]
62. Kambhampati S, Ashvetiya T, Stone NJ, Blumenthal RS, Martin SS. Shared decision-making and patient empowerment in preventive cardiology. *Current cardiology reports*. 2016;18(5):1–7. [PubMed: 26694723]
63. Wai A, Salib M, Aran S, Edwards J, Patanwala AE. Patient completion of self-administered medication history forms in the emergency department. *Australasian Emergency Care*. 2019;22(2):103–106. [PubMed: 31042529]
64. Prey JE, Polubriaginof F, Grossman LV, et al. Engaging hospital patients in the medication reconciliation process using tablet computers. *Journal of the American Medical Informatics Association*. 2018;25(11):1460–1469. [PubMed: 30189000]
65. Chegini Z, Arab-Zozani M, Shariful Islam SM, Tobiano G, Abbasgholizadeh Rahimi S. Barriers and facilitators to patient engagement in patient safety from patients and healthcare professionals' perspectives: A systematic review and meta-synthesis. *Nurs Forum*. Oct 2021;56(4):938–949. doi:10.1111/nuf.12635 [PubMed: 34339525]

Contribution to Emergency Nursing

- The purpose of this study was to investigate patient engagement in medication discussions and patient characteristics associated with those discussions.
- This study found a positive association of medication knowledge with engagement in medication discussions and that patients with financial vulnerabilities (ie, difficulty paying bills) were more likely to engage in medication discussions than those with no such vulnerability.
- Key implications of this study are that assessments of patients' financial vulnerabilities and medication knowledge can help identify opportunities for clinicians to use enhanced patient engagement strategies to facilitate medication discussions during the ED visit for patients at higher risk of potential medication adverse events.



Figure 1:
Proposed relationship between study variables

Table 1.

Demographic characteristics (N = 93)

<i>Characteristics</i>	
	Median (IQR)
Age	59.0 (51, 67)
	n (%)
Sex	
Male	46 (49.5)
Female	47 (50.5)
Race	
White or Caucasian	75 (80.6)
Black or African American	16 (17.2)
Other	2 (2.2)
Hispanic or Latino	
No	90 (96.8)
Yes	3 (3.2)
Highest level of education (N = 92)	
Less than high school	32 (34.8)
High School	31 (33.7)
Bachelor's degree and higher	29 (31.5)
Employment Status	
Employed	34 (41.0)
Self-employed	3 (3.6)
Not employed and not seeking employment	3 (3.6)
Retired	29 (34.9)
Unable to work (disabled)	14 (16.9)
Household income (N = 84)	
< \$25,000	31 (36.9)
\$25,000 - 50,000	15 (17.9)
\$51,000 - \$100,000	26 (31.0)
> \$100,000	12 (14.3)
Difficulty paying bills	
Very difficult	14 (15.1)
Somewhat difficult	30 (32.3)
Not very difficult	16 (17.2)
Not at all difficult	33 (35.5)
Marital status	
Married / Partnered	46 (49.5)
Separated / Divorced /Widowed	25 (26.9)
Single	22 (23.7)

Companion at the hospital with patient	
None indicated	31 (33.3)
Spouse / Partner	32 (34.4)
Adult child	9 (9.7)
Other relative	10 (10.8)
Friend	3 (3.2)
Other (ex-husband; neighbor)	2 (2.2)
> 1 companion	6 (6.5)

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Table 2.

Medications Management (N=93).

	n (%)
Comfort asking questions during the ED visit	
Very uncomfortable	7 (7.5)
Uncomfortable	0 (0.0)
Neutral	2 (2.2)
Comfortable	20 (21.5)
Very comfortable	64 (68.8)
Medication tracking methods *	
Original pill bottle(s)	55 (59.1)
Pillbox	53 (57.0)
Hand-written list	24 (25.8)
Printed list	23 (24.7)
App	7 (7.5)
Electronic list	9 (9.7)
Pictures	2 (2.2)
Other	10 (10.8)
None	0 (0.0)
Medication identification methods during physician office visits *	
Original pill bottle(s)	19 (20.4)
Pillbox	3 (3.2)
Hand-written list	16 (17.2)
Printed list	14 (15.1)
App	2 (2.2)
Electronic list	4 (4.3)
Pictures	1 (1.1)
Other	7 (7.5)
None	35 (37.6)
Medication identification methods during emergency department visits *	
Original pill bottle(s)	20 (21.5)
Pillbox	3 (3.2)
Hand-written list	7 (7.5)
Printed list	10 (10.8)
App	1 (1.1)
Electronic list	3 (3.2)
Pictures	1 (1.1)
Other	2 (2.2)
None checked	54 (58.1)

	n (%)
Companion contribution to medication management	
No, I am able to manage my own	54 (58.1)
No, but would like to have someone	0 (0.0)
Yes, someone helps me	39 (41.9)
If someone helps, what do they do (N=39) *	
Keep hand-written list	8 (20.5)
Keep printed list	3 (7.7)
Use app	1 (2.6)
Keep electronic list	0 (0.0)
Pictures	0 (0.0)
Assist with pick up from pharmacy	30 (76.9)
Assist with payment	13 (33.3)
Assist with understanding how to take	20 (51.3)
Remind	25 (64.1)
Organize meds	15 (38.5)
Other	3 (7.7)

Note:

* Response option "Check all that apply"

Table 3.

Patient Factors (N=93).

<i>Measure</i>	Possible Range	Observed Range	Mean (SD)
Modified PICS (Perceived Involvement in Care Scale) Overall Score	14-70	26-67	41.8 (9.1)
HCP Facilitation Subscale	1-5	2-5	3.6 (0.8)
Patient Information Subscale	1-5	1-5	2.8 (0.9)
Patient Decision-Making Subscale	1-5	1-5	2.5 (0.9)
Global Health Status (PROMIS)	1-5	1-5	3.0 (0.8)
			Median (IQR)
Subjective Numeracy Scale (SNS)	1-6	1-6	4.6 (3.6, 5.4)
Brief Health Literacy Scale (BHLS)	3-15	4-15	12.1 (10.0, 15.0)
Medication Knowledge	1-5	2-1	3.8 (3.4, 4.2)

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Table 4.

Summaries of regression analysis results: univariate and multivariate associations of patient factors with involvement (N=93).

Factors	Unadjusted		Adjusted	
	beta	p-value	beta	p-value
Age	-.06	.571	.02	.851
Female	.02	.883	-.04	.750
Highest level of education (<= H.S.)				
Some college	-.04	.727	-.01	.952
Bachelor's degree	-.15	.204	-.05	.738
Difficulty paying bills (None)				
Not very	.03	.803	.06	.642
Some	.16	.172	.19	.147
Very	.35	.002	.36	.005
Global health status (PROMIS)	.03	.759	.07	.530
Numeracy (SNS) ^a	.15	.162	.10	.371
Health literacy (BHLS) ^a	-.03	.753	-.08	.520
Medication knowledge ^a	.33	.001	.30	.009

^a Square-root transformed to normal distributions.

Multiple $R = .49$, $p = .020$; $R^2 = .24$ (Adjusted $R^2 = .13$)