A multicenter quality improvement initiative on the impact of pharmacists' postdischarge follow-up to reduce medication-related acute care episodes

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Purpose. This multicenter quality improvement initiative aims to measure and quantify pharmacists' impact on reducing medication-related acute care episodes (MACEs) for high-risk patients at an increased risk for readmission due to drug-related problems (DRPs).

Methods. This was a prospective, multicenter quality improvement initiative conducted at 9 academic medical centers. Each participant implemented a standardized methodology for evaluating MACE likelihood to demonstrate the impact of pharmacist postdischarge follow-up (PDFU). The primary outcome was MACEs prevented, and the secondary outcome was DRPs identified and resolved by pharmacists. During PDFU, pharmacists were responsible for identification and resolution of DRPs, and cases were reviewed by physicians to confirm whether potential MACEs were prevented.

Results. A total of 840 patients were contacted by 9 participating academic medical centers during a 6-week data collection period. Of these, 328 cases were identified as MACEs prevented during PDFU by pharmacists, and physician reviewers confirmed that pharmacist identification of DRPs during PDFU prevented 27.9% of readmissions. Pharmacist identified 959 DRPs, 2.8% (27) of which were identified as potentially life threatening. Potentially serious or significant DRPs made up 56.6% (543) of the DRPs, and 40.6% (389) were identified as having a low capacity for harm.

Conclusion. The results demonstrate that PDFU of high-risk patients reduces DRPs and prevents MACEs based on physician confirmation. Implementation of MACE methodology provides health-system pharmacy departments the ability to demonstrate pharmacists' value in transitions of care and assist in expanding pharmacist services.

Keywords: medication-related, pharmacist, postdischarge, readmission

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Pharmacists play a critical role in medication therapy management and ensure medication safety across the continuum of care. More than 50% of patients have medication discrepancies identified at discharge.[1] Hospital readmissions are costly and frequently occur within 30 to 90 days after discharge. The total cost of readmissions ranges from $15 billion to $25 billion per year, with each readmission costing around $7,200.[2] About 20% of readmissions for Medicare beneficiaries occur within 30 days of discharge, with 13% being potentially avoidable and 26% medication related.[2,3] Adverse drug events (ADEs) due to drug-related problems (DRPs) make up 66% of adverse events after discharge.[4] ADEs result in approximately 13% of preventable readmissions.[5] As a result, many organizations are focusing on reducing preventable readmissions by identifying and resolving DRPs.

Pharmacists' education and training in medication use position them as experts in identifying and resolving

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DRPs during medication reconciliation across transitions of care. Pharmacist postdischarge follow-up (PDFU) improved medication discrepancy resolution and reduced 30-day rehospitalization and emergency department visits by 40.5%.[1] Evidence demonstrates that pharmacist PDFU improves the monitoring of drug therapy and medication history accuracy compared with physician visits alone.[6]

However, medication-related readmission rates are challenging to measure consistently, because the reasons for readmissions are multifactorial. Therefore, it is important to develop a metric to quantify the impact of resolving DRPs that may lead to readmissions. It is important to identify pharmacy-sensitive indicators to demonstrate pharmacists' impact on quality of care. The nursing profession has developed nursing-sensitive indicators such as number of falls or rates of nosocomial infections that directly demonstrate their impact on patient outcomes.[7] This multicenter quality improvement initiative is aimed to measure and quantify pharmacists' impact on reducing medication-related acute care episodes (MACEs) for high-risk patients. MACEs prevented is a proposed indicator that can help support pharmacy services because it is both a quantitative and a qualitative measure. It quantifies DRPs and potential MACEs prevented, and the patient cases provide qualitative information illustrating potential for significant risk of ADEs and readmissions.

KEY POINTS

- Pharmacist-conducted postdischarge follow-up of high-risk patients can result in reduction of medication-related acute care episodes (MACEs).
- The MACE toolkit can be used to justify expansion of pharmacist services. It creates prescriber and executive management awareness of drug-related problems and MACEs and serves to educate decision makers about the value of pharmacists in preventing harm and medication-related readmissions.
- Rapid-cycle quality improvement study design can help organizations gather data to demonstrate the impact of pharmacist services on patient care outcomes.

Methods

This was a 6-week prospective, multicenter quality improvement initiative to measure MACE in varying academic medical centers across the country. A rapid-cycle quality improvement project design was used to collect real-time data that is meaningful and applicable to numerous health-system pharmacy practice settings. Nine sites with varying pharmacist transitions-of-care (TOC) program sizes and services participated. This initiative was co-led by two postgraduate year-2 residents under the guidance of their program directors. A baseline assessment of each site's current TOC practice model was performed to evaluate how the MACE toolkit would be adapted to each site (Table 1). Of the nine sites, 7 had some level of pharmacist postdischarge services implemented, while 2 were using the methodology as a foundation to start a new program. Six of 9 sites used pharmacy extenders such as residents, students, and interns. Some sites were performing medication reconciliation at discharge, which the authors hypothesized would impact the PDFU results. Each site received appropriate institutional review board (IRB) review or exemption.

Each site received a toolkit that was the developed at Cedars-Sinai Medical Center (CSMC). The toolkit was developed by residents at CSMC and guides the institution through a step-by-step PDFU workflow for pharmacists and physician review and confirmation of potential MACEs prevented (Figure 1). TOC pharmacists or learners contacted high-risk patients postdischarge within 1-3 days and documented their interventions and classified them as life-threatening, serious or significant, or low capacity for harm. DRP severity classification is derived from a modification of the National Coordinating Council for Medication Error Reporting and Prevention error index.[8,9] The modified rating captures the potential severity of patient harm if the error had reached the patient without pharmacist intervention. High-risk patient population was defined by each participating site. Some examples include age 65 years and older, on at least 10 chronic medications, acute myocardial infarction, congestive heart failure, solid organ or bone marrow transplant, or on oral anticoagulants.

PDFU by a pharmacist was completed by a hospital or ambulatory health-system pharmacist prior to upcoming clinic appointments. Medication reconciliation involved verifying that patients picked up new medications and discontinued any medications that were stopped at discharge. A TOC pharmacist reviewed the patient cases and identified DRPs and determined if the resolution of DRPs prevented a MACE. The cases where a MACE was prevented were reviewed by a second pharmacist to validate the DRPs. MACE cases validated by a second pharmacist were then sent to physicians for review. Physicians determined the likelihood of 30-day readmission based on the key principle that the patient would be seen by a primary care physician within 14 days post discharge. This physician review and MACE confirmation process was developed based on physician feedback.

The MACE toolkit also showed each institution a methodology for identification and severity classification of DRPs and how to measure MACE prevented, including templates for presenting DRPs and formatting MACE for physicians and decision makers. Each site identified its own physician champion and pharmacy staff and reviewed the components of the MACE toolkit.

Table 1. Participant Characteristics[a]

Characteristic	No. Participants (n = 9)
Dedicated transitions-of-care staff	6
Target high-risk patients	8
Physician referrals	4
Admission medication reconciliation/history	8
Medication history technicians	7
Discharge medication reconciliation	6
Discharge prescription service (meds to bed, education)	7
Postdischarge follow-up	7
Via telephone, in clinic, or both	1;1;5
Billing for postdischarge follow-up service	1

[a]Sites included: Cedars Sinai, Cleveland Clinic, Iowa (UIHC), Northwestern, Tampa General Hospital, University of California (UC) Davis, UC Health, UC San Diego, UW Health.

The MACE toolkit training took place to ensure understanding of the MACE review process and to ensure consistency.

All sites participated in monthly phone conferences, which took place starting 4 months before and during data collection to ensure understanding of the toolkit and to provide examples of DRPs and MACEs. The monthly meetings also served as a platform for collaboration, where participating sites could ask questions, share their unique program characteristics, and learn implementation strategies from one another. Initiating the meetings 4 months prior to data collection allowed time for institutional-specific IRB approval or exemption. The institutions then collected data for any 6-week continuous period from January to April 2016. The co-leads created a data collection template to standardize the format of the results among the 9 sites, which each institution customized as needed to collect additional data that is applicable to the institution's TOC program if desired.

Results

A total of 840 patients were reached by 9 participating academic medical centers during each institution's 6-week study period (Table 2). Pharmacists identified 959 DRPs (average, 1.47 DRPs per patient reached [SD, 0.80]). Of the DRPs identified, 2.8% (27) were identified as life-threatening. Serious or significant DRPs made up 56.6% (543) of the DRPs, and 40.6% (389) were identified as having a low capacity for harm. Of the 840 patients reached, 328 cases were identified as MACEs prevented. Physician reviewers confirmed that pharmacist identification of DRPs during PDFU prevented 27.9% of readmissions (institutional range, 9.6% to 93.9%).

Discussion

The key strength of this study is that MACE could be used as a pharmacist-sensitive indicator that quantitatively and qualitatively demonstrates pharmacists' impact on preventing potential readmissions by resolving DRPs. The methodology quantifies DRPs and percentage of MACEs prevented. The case examples provide qualitative information illustrating the potential for significant risk of ADEs and readmissions. The physician validation is one of the key components that provides interdisciplinary support for the value of pharmacist's role at each organization.

Another strength is the quality improvement study design, which allowed for real-time data collection in a real practice setting. These results were shared with executive leadership at more than one institution, which resulted in additional staff and expansion of pharmacy services. The MACE toolkit provides a standardized template for documentation to share with executive leadership at health systems. It also served as a foundation for those sites that were using this study as an opportunity to develop and grow their PDFU program. Implementing an ongoing documentation process is important to consider to ensure continued demonstration of pharmacists' impact on patient outcomes.

Some of the limitations of this study include lack of validity and interrater reliability. To ensure consistent methodology and rating of severity of DRPs and MACEs, co-lead residents shared examples from each site, which were discussed during the monthly phone calls. A small study was conducted inititally to evaluate physician interrater reliability for determing the potential for readmission. The results demonstrated greater than 90% confirmation that physician reviewers rated MACEs similarly based on the definitions. Another challenge was limited staffing resources at each institution. However, this provided a unique opportunity for student and resident projects to participate in a quality improvement project and see a faster turnaround on results. Due to the quality improvement design, there was no comparator group because each site tried to reach as many patients as possible, and no patient randomization occurred.

The percentage of MACEs varied widely from one institution to another. This may be partly due to one of the institutions following up on all patients rather than focusing on institution-specific high-risk patients. Therefore, the results demonstrate that the pharmacist impact is greater for those programs that prioritize high-risk patients for PDFU. There is also potential variability due to students' and residents' level of experience with conducting PDFU or discharge medication reconciliation. Initially, the authors estimated that the percentage of MACEs and number of DRPs would be lower at

Figure 1. MACE Toolkit

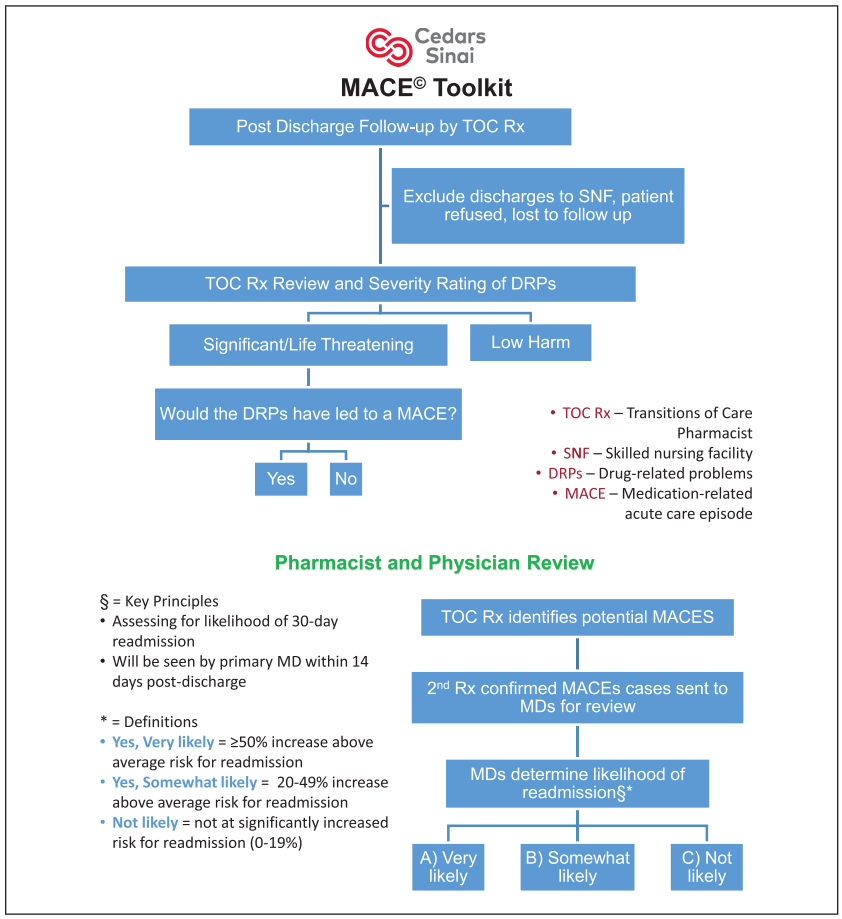

Table 2. Results

Quantitative Measure	Results
Total no. postdischarge follow-ups	840 patients Average: 93.9 patients per site (range, 29-354 patients per site)
Total DRPs identified	959 DRPs Life-threatening: 2.8% Serious or significant: 56.6%
% of MACEs prevented (range)	27.9% (9.6%-93.9%)

Abbreviations: DRP, drug-related problems; MACE, medication-related acute care episodes

those sites that provide discharge medication reconciliation. However, this was found to be false. Those sites with pharmacists performing discharge medication reconciliation were either average or higher than average for number of DRPs identified and percentage of MACEs prevented. There was no observable difference between PDFU conducted via telephone or in clinic.

Engaging physicians and clinical staff on potential ADEs and patient harm from medication errors creates awareness of where and how errors occur across care transitions. When clinical staff are aware that pharmacists can support resolution of various types of DRPS, they can initiate additional referrals of high-risk patients before their DRPs lead to a hospitalization. Additionally, PDFU by pharmacists in the clinic setting helps facilitate direct communication with the primary care physician and ensures that DRPs are acted on and resolved. The pharmacist can continue to follow up with the patient to support improved adherence and ensure success with medication use.

Through individualized MACEs workflow at each institution, the group was able to learn best practices from one another. Many institutions struggled with methods for data collection and storage, whether in the electronic healthcare record (EHR) or a spreadsheet. One institution built a data collection tool within its EHR to standardize and streamline data collection. Many institutions implemented the MACE toolkit as a residency project. This was an opportunity to teach the residents project and time management skills. All but one institution used pharmacy extenders to reach more high-risk patients, which increased the pool of patients eligible for PDFU, resulting in higher percentage of MACEs prevented.

The MACE toolkit not only serves as a methodology to train students and residents on PDFU but also was an opportunity for residents to learn how to conduct a quality improvement project. Two sites conducted the study as a resident longitudinal research project, which provided them the opportunity to collaborate with others across the country.

Conclusion

Pharmacists are well positioned throughout the continuum of care to directly impact medication-related readmissions and adverse events. As pharmacy leaders have recognized, it is imperative that the profession identify and measure key metrics to demonstrate impact on patient care outcomes.

MACEs avoided through resolution of patient- and physician-initiated DRPs is a pharmacist-sensitive indicator related to reduction in readmissions. Physician review of MACEs confirms the value of these resolved DRPs in preventing readmissions. The MACE toolkit was a resource that was

easy to implement with limited resources. This multicenter quality improvement study was an opportunity to define a pharmacist-sensitive indicator for the profession. In addition, it was important to the participants to foster the next generation of leaders by involving students and residents in this research project. Implementation of MACE methodology will allow health-system pharmacy departments to demonstrate pharmacists' value in transitions of care and assist in expanding pharmacist services.

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Disclosures

The authors have declared no potential conflicts of interest.

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