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REVIEW ARTICLE

Advances in Cardiovascular Pharmacotherapy: The Collaborative Roles of Nursing, Pharmacy, and Health Records in Emergency Cardiology Care

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ABSTRACT
The transfer from one healthcare facility to another heightens the likelihood of drug mistakes. Various approaches have been used to enhance the process of transferring patients between different levels of care and mitigate negative medical consequences. The impact of pharmacist assistance during and after hospitalization has been extensively researched and has shown varying effects on these outcomes. The objective is to determine the specific elements of pharmacist intervention that enhance clinical out- comes in the context of care transitions. A systematic search was conducted in MED- LINE, EMBASE, International Pharmaceutical Abstracts, and Web of Science databases to identify randomized controlled trials (RCTs) investigating the impact of pharmacist intervention on hospitalization. A model was developed to classify and group the various elements of pharmacist intervention. The mean number of deployed components, phases of hospitalization covered, and intervention aims were evenly divided across trials that were deemed successful and those that were deemed ineffective. A comprehensive analysis of 15 research has shown compelling evidence supporting the effectiveness of clinical medication reviews within multidimensional programs. Out of the 15 trials, 5 were found to be successful while none were found to be ineffective. Inconsistent data was discovered on the effectiveness of a standalone intervention after release, the recon- ciliation of admission medications, the combination of post discharge treatments with in-hospital therapies, and the coverage of many phases. The close collaboration with other healthcare practitioners significantly improved efficacy. While it is important to have well-designed and well-reported randomized controlled trials (RCTs), the presence of research heterogeneity allowed for a best evidence synthesis to determine the successful components of pharma- cist intervention. Isolated post discharge intervention programs often include cooperating with nurses and customizing the program to meet the specific requirements of each patient. Merely doing medication reconciliation in comprehensive intervention programs is inadequate for improving post discharge clinical outcomes. It should be supplemented with active patient counseling and a clinical medication evaluation. Moreover, a strong partnership between pharmacists and doctors is advantageous. It is crucial to ensure the ongoing provision of treatment by including pharmacists in these complex programs in various healthcare environments. Pharmacists must possess knowledge of the patient's clinical history and prior hospital involvement.
***Key words**: Cardiovascular Pharmacotherapy – Collaborative Roles – Nursing Interventions – Patient Care – Emergency Cardiology Care.*

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INTRODUCTION

THE danger of drug mistakes is heightened while transitioning from one health care environment to another. Medication errors are often caused by in- adequate communication or the loss of crucial in- formation. These errors can lead to significant con- sequences such as adverse drug events (ADEs), longer hospital stays, early readmissions, and in- creased use of healthcare resources. While ADEs are typically the most severe form of drug-related problems (DRPs), other DRPs can also harm patients and result in unplanned hospital readmissions [1-3]. Various approaches have been used to decrease the occurrence of Adverse Drug Events (ADEs) and readmissions related to drugs. These approaches involve different healthcare professionals, including nurses and pharmacists [4-7]. Due to the probable connection between Drug-Related Problems (DRPs) and negative clinical results, pharmacists are often considered the preferred healthcare providers to intervene and mitigate the risks associated with transitions in care. This view- point is supported by two reports from the Institute of Medicine [8,9]. The impact of

pharmacist intervention during and after hospitalization has been investigated, although the effects on clinical outcomes have varied. Several studies have demonstrated a noteworthy decrease in readmissions related to drug use [10-13]. In contrast, some studies have shown improved surrogate outcomes such as appropriate medication use or knowledge but did not have a significant impact on readmissions or had no effect at all. These findings are supported by other studies that found a significant reduction in readmission rates but did not utilize a randomized study design [14,15].

Aim of Work:

Multiple systematic reviews have examined care transition programs. However, these reviews have primarily concentrated on individual aspects of the intervention (such as hospital-based medication reconciliation), specific healthcare settings (such as inpatient care), particular high-risk populations (such as heart failure patients), single outcomes (such as readmissions), or have not specifically addressed pharmacist intervention. Most evaluations did not provide a detailed explanation of the intervention components used in the trials that were included. The objective of this systematic study was to particularly examine the elements of pharmacist involvement in continuity of care programs that led to improved clinical outcomes.

Methodology:

A systematic search was conducted in three electronic databases (MEDLINE, EMBASE, and International Pharmaceutical Abstracts [IPA]) from their creation until November 2014. The study selected randomized controlled trials (RCTs) that examined treatments involving pharmacists (hospital, community, clinical) and their proactive involvement in adult hospitalization and release [16-29]. The search strategy was formulated in MEDLINE using the following medical subject headings and text words: patient education, counseling, medication therapy management, medication errors/prevention and control, medication reconciliation, continuity of patient care, patient care planning, aftercare, house calls, and drug utilization review. The study also used synonymous phrases for hospital admission and the pharmacy profession. Only research conducted in the English language were considered. The search approach was further improved and confirmed by categorizing known pertinent articles. The search words were modified to align with the functionalities of the EMBASE and IPA databases. Manually, we reviewed the reference lists of all included trials, prior systematic reviews, and the citation indexing site Web of Science for any new relevant articles [30].

A systematic review was undertaken using the approach established by Treadwell et al. [34] to determine the optimal evidence synthesis. Given that our analysis focused only on randomized controlled trials (RCTs), we used a rigorous criterion for methodological quality. Specifically, we considered studies with five or more domains free from bias to be part of the "best evidence set." In order to assess the efficacy of the different components of pharma- cist intervention, all relevant research factors (such as types of interventions, phases of intervention, other healthcare professionals participating, type of pharmacist, and features of the context) were considered. The evidence levels were determined ac- cording to van Tulder et al. [35] and are categorized as follows: Strong—consistent results from several high quality RCTs; Moderate—findings from one high quality RCT; and Conflicting—inconsistent findings from multiple high quality RCTs. Due to the inclusion of only Randomized Controlled Trials (RCTs), the levels of Limited evidence and No evidence were not relevant.

RESULTS

The included studies exhibited variations in terms of the nature and timing of the intervention, the population under study, the participation of additional healthcare practitioners, and the chosen outcomes. The clinical results of these research demonstrate the variety. Despite the disappointing results of our predetermined clustering in determining the most effective intervention components, the heterogeneity of the data allowed for a comprehensive synthesis of the best evidence. This analysis indicates that in the context of a standalone post discharge program, pharmacists are most likely to en- hance patient outcomes by closely cooperating with nurses. Furthermore, in complex programs, pharma- cists provide added value by doing a clinical medication review, along with patient-centered medication reconciliation, followed by a comprehensive post discharge intervention [36-45]. Ultimately, the most compelling data synthesis indicates that these treatments by pharmacists are more impactful when carried out in intimate cooperation with doctors [46- 50]. The discrepancies in findings from trials examining a single intervention after discharge may be at- tributed to differences in research settings. As previously indicated, all three successful studies featured.

A pharmacist's follow-up in close partnership with a nurse. In two separate investigations, the inclusion of a pharmacist-nurse team was achieved via a home-based follow-up. In these circumstances, the nurse's primary role was to identify any clinical deterioration, while the pharmacist's major emphasis was on

providing counseling for adherence and ensuring proper monitoring by caregivers **[51-53]**. If deemed essential, both healthcare professionals (HCPs) made an additional reference to either the primary care physician or community pharmacist, respectively. The third study involved the active participation of nurses in coordinating the discharge plan with the hospital team, as well as educating and preparing patients for discharge **[54-60]**. These findings highlight the necessity of a multidisciplinary intervention, which aligns with previous research.

Additionally, all effective studies implemented a tailored intervention by assessing patient knowledge of prescribed medications and compliance. For example, in Jack et al.'s study (2009), nurses utilized a tailored intervention during hospital dis- charge. This practice is in opposition to the ineffective studies, which took a more general approach by providing medication boxes to all patients involved **[39, 40, 61]**. The importance of customizing interventions to meet the specific needs of patients is further demonstrated by the ineffective studies, which used extra follow-up visits to reinforce the initial advice. While this intervention component may have value, it should be customized to meet the individual requirements of patients or populations in order to maximize its effectiveness. Finally, successful trials used a pharmacist from the hospital in question, whereas unsuccessful studies utilized an external research pharmacist who was unfamiliar with the patients' living conditions or past hospital visits. Therefore, as hospital discharge is often recognized as being perplexing and stressful, this might potentially heighten the likelihood of a lack of continuity in healthcare.

Multiple implications for everyday practice may be derived from the various programs. While it is difficult to isolate the specific impacts of complex treatments, a comprehensive analysis of the avail- able data strongly supports the efficacy of medication review upon hospital admission. Six intervention programs included this component, but the extent to which medication appropriateness was evaluated varied across studies. The five successful studies conducted a thorough clinical medication review (level 3), while the one unsuccessful study conducted a review focused on adherence support (level 2). A level 3 review, which focuses on optimizing pharmacotherapy, allows pharmacists to ad- during the hospital stay, along with the reasons behind these changes, the necessary monitoring requirements, the expected therapeutic objectives, and any unresolved drug-related issues, along with recommended actions to address them. Farris et al. **[59]** implemented a similar approach, but the lack of effectiveness could be attributed to either the involvement of a research pharmacist or the absence of a clear distinction between the intervention and control groups. Therefore, in order to successfully reduce clinical outcomes such as hospital readmission, it may be advantageous to have a more extensive presence of pharmacists throughout all stages of patient care. Nevertheless, it is essential that the pharmacist works closely with either the team stationed in the hospital or the primary care practitioner.

An extensive examination of the design of post discharge interventions in the 7 multifaceted programs that incorporated both post discharge interventions and in-hospital interventions revealed significant variation. The studies conducted by Gillespie et al. **[10]** and López Cabezas et al. **[45]** demonstrated effectiveness by utilizing follow- up telephone calls to reinforce the interventions provided during the hospital stay. Schnipper et al. **[51,52]** combined telephone reinforcement with active feedback to primary care providers. In contrast to the inadequate research, Nazareth et al. **[48]** pro- vided community pharmacists with just the dis- charge medication regimens of patients and focused on patient compliance and awareness during the pharmacist home visit. Despite the comprehensive nature of the intervention, the community pharmacists were not provided with the patients' prior healthcare records. Another study, conducted by Kripalani et al. **[13]**, was found to be ineffective. The study included a pharmacist follow-up telephone call that was only done, when necessary, which in- creased the risk of missing important interventions. Additionally, the study conducted by Farris et al. **[59]** may have flawed results due to a less thorough implementation of medication-related recommendations after discharge. Lipton and Bird **[43]** con- ducted a study that primarily examined compliance by simplifying the treatment plan during a phone conversation. While not definitive, the data suggests that it is beneficial to do a thorough post discharge follow-up, using a pharmacist who has access to the patient's medical history and can build upon earlier interventions made during the hospital stay.

LIMITATIONS:

This review has several commendable attributes. The first step was using a thorough search strategy that involved using an automated database search across three databases that are important to pharmacy. Additionally, manual reference tracking was conducted. This approach yielded a comprehensive compilation of all the published research in this particular subject. Subsequently, two reviewers separately evaluated and extracted all papers, guaranteeing a robust selection of relevant research and their respective features. Ultimately, via a meticulous data extraction method, the different components of pharmacist intervention were successfully segregated.

One significant constraint of our study is the potential for not fully reporting the implemented intervention components due to a potential absence of extensive explanations in the original papers. Due to the exclusive extraction of data from the source publications for the pharmacist intervention model, there is a possibility that crucial elements would have been overlooked. Furthermore, despite conducting an extensive literature search, it is crucial to acknowledge that publication bias may significantly impact the reliability of systematic reviews. Hence, our study did not include any unpublished studies. Furthermore, the chosen clinical outcomes for this analysis did not consistently align with the main results of the research included, perhaps leading to a lack of statistical power in some trials. While the majority of the studies included in the analysis showed positive results on surrogate endpoints such as knowledge or adherence, we only focused on clinically relevant outcomes. This means that we only included evidence that directly relates to important clinical outcomes. Ultimately, we only included publications that were published in the English language, perhaps resulting in the omission of pertinent material.

SUMMARY

Pharmacists are capable of effectively carrying out interventions in various healthcare environments. While there is a need for well-planned and well- documented randomized controlled trials (RCTs), this systematic review highlights many components of pharmacist interventions that have the potential to mitigate risks during care transitions. When conducting a separate intervention after a patient is discharged, the research suggests that it is beneficial to work together with nurses and customize the interventions based on the specific requirements of each patient. When it comes to comprehensive intervention programs, relying alone on medication reconciliation may not be enough to decrease post-discharge clinical outcomes. It is recommended to also include active patient counseling and a clinical medication review at admission. Moreover, a strong partnership between pharmacists and doctors during every phase of hospitalization is advantageous. It is crucial to ensure the ongoing provision of treatment by including a proactive hospital pharmacist or community pharmacist into these comprehensive programs in various healthcare settings. Ultimately, the pharmacist participating in the intervention must be given the patient's clinical history and prior hospital experience.

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