

## Original Research Article

# Impact of pharmacist intervention in patient counseling at point of hospital discharge in a specialized cardiac center in Saudi Arabia

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### Abstract

**Purpose:** To determine the interventions associated with the pharmacist's patient counseling and review of discharge prescriptions of patients from a specialized cardiac center in Saudi Arabia.

**Methods:** This was a prospective interventional study conducted at Prince Sultan Cardiac Center (PSCC) in Riyadh, Saudi Arabia for a duration of 12 months. The pharmacist responsible for providing patient counseling reviewed the patient records, collected patient demographics and clinical data, as well as medical and medication history, diagnosis and discharge (treatment) plan.

**Results:** The study included 2008 patients who met the inclusion criteria. The counseling pharmacist identified and provided interventions to 358 (18 %) patients for 508 (3.4 %) items. About half of counseling pharmacist interventions concerned involved the addition of a drug to treatment regimen followed by drug discontinuation (28.1 %). The most common reason for adding the drug during patient counseling was the omission of medications (35 %). Angiotensin-converting enzyme inhibitors/angiotensin receptor blockers (ACEI/ARBs), antidiabetics and antihyperlipidemics were the classes of drugs often associated with counseling pharmacist interventions. The cost-saving interventions identified were 200 (39.4 %). Out of these, drug discontinuation (n = 143) was the most frequent suggestion provided by the intervening pharmacist, followed by a dose reduction resulting in cost savings of 66.5 % (US \$ 6,590.10) and 8.9 % (US \$ 882.32), respectively.

**Conclusion:** The results indicate that discharge medication discrepancies decrease as a result of pharmacist-facilitated patient counseling at the point of hospital discharge.

**Keywords:** Discharged patients, Cardiac, Counseling, Pharmacist-intervention, Coronary artery disease

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## INTRODUCTION

Medication discrepancies at the point of hospital discharge are a common occurrence [1-3]. A recent study reported that 41.3 % of patients had at least one inadvertent medication discrepancy at hospital discharge, and 55.3 % were at risk for possible unintentional discrepancies [3]. In

addition, a randomized controlled trial among 851 discharged cardiac patients concluded that half of the patients (50.8 %) experienced clinically important medication errors after hospital discharge and 22.9 % of such errors classified to be serious [4]. Also, a Canadian study reported that nearly 23 % of patients experienced at least one adverse event after

hospital discharge and 72 % of which related to medications [5].

Structured patient counseling and medication reconciliation at the time of hospital discharge may help to prevent these discrepancies [3]. Global studies conclude that providing information at the time of hospital discharge to patients and post discharge support decreases the number of readmissions and advance the patient's quality of life [6-8]. Also, in a study, Al-Rashed *et al.* [9] concluded that pre-discharge counseling provided with improved drug information and compliance together with reduced re-admissions and unplanned visits to the physician. A study conducted at a teaching hospital among patients being discharged home from the hospital concluded that a reasonably lower rate of preventable adverse drug events occurred after medication review and discharge counseling by pharmacists [10]. Another study in a tertiary hospital in Saudi Arabia concluded that implementation of the patient counseling program to discharge patients reduced adverse drug events from 24 to 2.3 % [11].

The studies related to the impact of pharmacist's interventions in patient counseling prior to hospital discharge in Saudi Arabia are limited. This study aimed to determine the impact of pharmacist's counseling and review of discharge prescriptions for patients discharged from a specialized cardiac center in Saudi Arabia. Also, we examined the potential financial impact that could result from implementation of counseling pharmacist provided intervention at this cardiac center.

## METHODS

This was a prospective interventional study conducted at Prince Sultan Cardiac Center (PSCC) in Riyadh, Saudi Arabia for 12 months duration (January to December 2012). PSCC is a specialized healthcare center provides comprehensive cardiovascular services to all armed forces personnel, their dependents, and other patients referred to the center for further evaluation and specialized treatment and include about 190 beds dedicated to adult and pediatric cardiac patients. The study included all discharged adult cardiac patients of either sex from adult cardiology wards, including Day-Case post catheterization patients and coronary care unit patients. Exclusion criteria were adult cardiac surgery patients, pediatric patients, patient discharged without medication, transferred patients (to another ward or another care facility), patients with cognitive defect, the patient discharged without patient counseling,

patient who received patient counseling from staff other than a pharmacist, patient who rejected patient counseling and lastly, patients with incomplete patient demographic/clinical data. This study was carried out in accordance with the Declaration of Helsinki [12], and Good Clinical Practice guideline [13]. The pharmacy administration and research department of the hospital reviewed and approved the study (ref no. R&EC03.1.acv).

After the processing of discharged medications and once the medication was available in the ward, the assigned nurse received and checked the medications before contacting patient counseling pharmacist to provide medication counseling to discharge patients. With each plan of discharge, the pharmacist responsible for providing patient counseling reviewed the patient record, identified patient demographics and clinical data, medical and medication history, diagnosis and discharge (treatment) plan. The pharmacist counseling the patients handled the review of the discharge medication and correction of any discrepancy before starting and during a patient counseling session. After completing the session, the pharmacist documented any discrepancy encountered. The pharmacist also required to resolve these discrepancies by contacting the assigned ward clinical pharmacist or treating physician and document that intervention in the patient's file and patient counseling form. The intervention considered in this study was defined as "any action by a pharmacist that directly resulted in a change in patient management or therapy" [14].

## Data analysis

The direct medication cost saving calculated, for interventions that cause discontinuation of medication due to inappropriate use (e.g., duplicate therapy, lack of indication, errors, and drug interactions); medication dose reduction, duration or frequency adjustment; or substitution of less expensive alternative (e.g., oral vs. intravenous route of administrations). With patient discharge medications, the cost savings for the whole prescribed periods (about 3 months) were calculated because the intervention will most probably not to take place until the patient's next visit to a refill or an appointment. Direct medication cost savings calculated by multiplying the medication's average annual unit acquisition price as provided by the supply department - times the number of total daily doses and the number of days reduced. The results expressed in US Dollars (US \$). Annual cost savings calculated by

extrapolating the net cost savings made during the 3 months to over 1 year.

Statistical Package for the Social Sciences (SPSS) version 20 (SPSS Inc., Chicago, IL, USA) used for descriptive statistical analysis. The data are summarized using descriptive statistics and categorical variables expressed as frequencies and percentages (%).

## RESULTS

This study included 2008 patients who met the inclusion criteria. The characteristics of these patients are presented in Table 1.

**Table 1:** Patients' characteristics and clinical data

Variable	Number (N=2008)	(%)
<b>Gender</b>		
Male	1410	70.2
Female	598	29.8
<b>Age (year, mean <math>\pm</math> SD)</b>		
< 45	213	10.6
45-65	1116	55.6
66-80	602	30.0
> 80	76	3.8
<b>Level of education</b>		
None (illiterate)	64	3.2
Elementary	1224	60.9
Secondary	636	31.7
University	84	4.2
<b>Diagnosis</b>		
Acute coronary syndrome		
MI	481	23.9
UA	443	22.1
CAD	422	21.0
HF	233	11.6
V or RHD	222	11.1
Arrhythmia	179	8.9
Other	28	1.4
<b>Risk Factor</b>		
Hypertension	1243	61.9
Diabetes Mellitus	1120	55.8
Hyperlipidemia	715	35.6
Smoking	345	17.2
Heart failure	340	16.9
Coronary artery disease	293	14.6
Acute coronary syndrome	73	3.6
V or RHD	126	6.3
Atrial fibrillation	104	5.2
Hypertension and Diabetes	889	44.3

ACS: Acute Coronary Syndrome; MI: Myocardial Infarction; UA: Unstable angina; CAD: Coronary Artery Diseases; HF: Heart Failure; V or RHD: Valvular/Rheumatic Heart Disease

The study population was predominantly 45-80

years old (85.6 %). Approximately 70 % of the study populations were male and 61 % had an elementary education.

## Diagnosis and risk factors

Acute coronary syndrome (ACS) was the most frequent type of diagnoses, occurring in 46 % of the cases, followed by coronary artery diseases (21 %) and heart failure (12 %). Over 60 % of patients had a history of hypertension, 56 % with diabetes mellitus, 44 % with both and 36 % were hyperlipidemic.

## Pharmacist interventions

During the study period, of 2008 patients, 15087 prescription items screened and dispensed. The average number of items per patient was  $8 \pm 2$ . Among them, pharmacists provided interventions to 358 patients (18 %) for 508 (3.4 %) prescription items, with a range over all of one intervention for every 4 patients. The average daily interventions were 2. Of these, 358 (18 %) intervened patients, 247 patients (69 %) had only one intervention and 111 (31 %) had more than one intervention (Table 2).

**Table 2:** Intervention analysis

Item	Number
Enrolled patients	2008
Prescription items screened and dispensed	15087
Intervention	508*
Patients without any intervention	1650
Patients with one intervention	247**

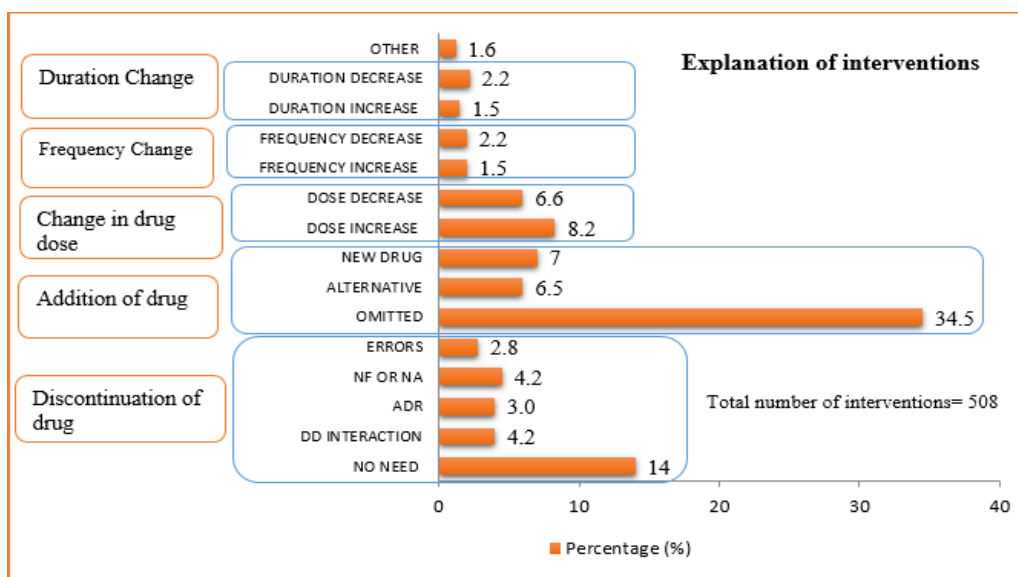
\*This number represents the average of one intervention per four patients. \*\*Total number of patients who received the intervention is 358 (18% of total patients)

## Types of interventions provided during patient counseling

The most often provided pharmacist intervention was the addition of drug (48 %, n = 244) followed by discontinuation of the drug (28 %, n = 143) upon the ward clinical pharmacist or treating physician approval (Table 3).

**Table 3:** Types of intervention provided during patient counseling

Type of intervention	Number (%)
Addition of drug	244 (48.0)
Discontinuation of drug	143 (28.1)
Change in drug dose	75 (14.8)
Change in frequency of administration	19 (3.7)
Change in duration of therapy	19 (3.7)
Other	8 (1.6)
<b>Total</b>	<b>508</b>



**Figure 1:** Explanation of interventions during patient counseling

The most common reason for adding the drug during patient counseling was due to omissions of medications (35 %). Prescribing unneeded medications (14 %) was the common reason associated with drug discontinuation Figure 1.

**Class of drugs intervened during patient counseling**

The majority (15 %; n = 75) of the interventions were associated with angiotensin- converting enzyme inhibitors/ angiotensin receptor blockers (ACEI/ARBs) and antidiabetic drugs followed by antihyperlipidemic (10 %; n = 52) and antiplatelet (9.5 %; n = 49) Table 4.

**Table 4:** Class of drugs involved in the intervention

Class of drugs	N	(%)
ACEI/ARBs	75	15
Antidiabetic	75	15
Antihyperlipidemic	52	10
Antiplatelet	49	9.5
Beta blocker	42	8
Calcium channel blocker	29	6
Diuretic	17	3
Anticoagulants	13	2.5
Antiarrhythmic	5	1
Antibiotics	5	1
Others	146	29
<b>Total</b>	<b>508</b>	<b>100</b>

**Medication errors identified**

About 208 errors documented (41 % of total discrepancies) during the study period. Pharmacy errors represented 13 % of errors, while prescriber errors represented 87 % (Table 5).

**Table 5:** Types of errors identified during patient counseling

Error	Pharmacy error N (%)	Prescriber error N (%)	Total number
Errors of omissions	4 (2%)	172 (98%)	176
Other errors	24 (75%)	8 (25%)	32
Total Number	28 (13%)	180 (87%)	208

**Cost savings**

During the study period, the cost saving intervention identified were 200 (39.4 %). The most frequent intervention provided by the intervening pharmacist was drug discontinuation (n = 143), resulting in savings of cost US \$ 6,590.1 (66.5 %; ) (SAR 3.75 is equal to US \$ 1) followed by dose reduction US \$ 882.3 (8.9 %) and duration reduction US \$ 868.1 (8.7 %). Calculation of the cost saving for pharmacist interventions in patient counseling for the 3 month period resulted in cost saving of US \$ 9,901.6. If the results were extrapolated to the whole year, it is estimated that pharmacist interventions resulting in a cost-saving of US \$ 39,606.4 and US \$ 198.1 per intervention per year (Table 6).

**DISCUSSION**

The present study is one of the few studies that examine pharmacist-provided patient counseling among adult cardiac patients discharged from a tertiary care hospital and to the best of our knowledge, it is the first of such studies

**Table 6:** Cost-saving interventions during patient counseling program

Type of intervention	N	Cost/3 mths (US\$)
Discontinuation of drug	143	6,590.1
Dose reduction	32	882.3
Duration reduction	12	868.1
Frequency reduction	9	827.5
Others	4	733.6
Total	200	9901.6

*mths, months; SAR 3.75 is equal to US \$ 1*

conducted in a specialized cardiac center in Saudi Arabia. In this study, counseling pharmacist identified and provided interventions to 358 (18 %) patients that had medication discrepancy in the time of hospital discharge. This percentage is lower than that (33.5 %) reported by Walker et al in their study [8]. Several other studies have reported incidences of medication discrepancies in 14.1–59.6 % of patients at discharge [3,4,15,16].

A variety of factors contributes to the occurrence of medication discrepancies. Also, prescribers may fail to routinely compare a patient's inpatient medication list to their pre-admission list at the time of prescribing and may not communicate medication information effectively at the time of discharge. Moreover, this study also reported that half of counseling pharmacist interventions concerned with adding a drug to the treatment regimens followed by drug discontinuation (28.1 %), changing the dose or dose schedule of drug and frequency. Furthermore, in an overseas study conducted in Iran, adding a drug to the treatment regimen (20.9 %) and drug discontinuation (19.6 %) were the most frequent clinical pharmacist interventions [17].

In another recently conducted studies in Beirut, it has been illustrated that addition of drugs (31 %) was one of the common interventions recommended by pharmacist [18]. In addition, another study suggested that drugs cessation was the most recurrent (31.9 %) suggestion offered by the intervening pharmacist followed by changes in the frequency of administration (21.3 %) and changes in the drug dose (19.1 %) [19].

Besides, in this study, omissions of medications (35 %) were the most common reason for the addition of the drug during patient counseling. This may happen because of hospital physicians forgetting to prescribe drugs used by patients or inappropriate medication history review on admission and during the hospital stay, which often carries over to discharge. Previous studies have also shown that omission is the most common type of medication discrepancy, with up to 61 % of hospitalized patients having at least

one drug omitted from their regimen [16,20,21]. In addition, un-needed medication (14 %) was the foremost reason associated with drug discontinuation. Un-needed medications include medications prescribed without clear indications or temporary indications and not required to be continued with discharge medication. Also, a study in a large university hospital showed discontinuation of unnecessary drugs (22.7 %) as the most common interventions suggested by intervening pharmacist [22].

Furthermore, in this study ACEI/ARBS, antidiabetic, antihyperlipidemic and antiplatelet were the class of drug often associated with counseling pharmacist interventions. This finding is consistent with the study by Coleman *et al.* who found that angiotensin-converting enzyme inhibitors (10 %) and lipid-lowering agents (10 %) were among the most common medication classes accounted for identified medication discrepancies [23].

The potential financial impact that could result from implementation of counseling pharmacist-provided intervention in this cardiac center was also determined. The net cost saving was about US \$ 9,901.6 per 3 months. If this cost saving extrapolates to the whole year, this would be equivalent to approximately US \$ 39,606.6 per year and US \$ 198.1 per intervention per year. We couldn't compare these results with similar studies because of limited studies published in this area. However, despite different conceptualization, definitions, and methods some studies have reported financial impact of pharmacist interventions on the cost of drug therapy. A study from Thailand reported that interventions made by pharmacist resulted in the direct cost saving of 1,971.43 US \$ over 5 week study period [24]. Another study concludes that clinical pharmacist had a significant impact on the cost of drug therapy as the total net cost savings made over a 7 month study period were US \$ 1796.7 [19]. We encourage further research to validate our findings.

The results from this study have important inferences for those health care organizations that are lacking pharmacist involvement in patient counseling at the time of hospital discharge. Understanding the type and frequency of discrepancies can help clinicians better understand ways to prevent them. Also, this study identifies a few medications discrepancies and highlights some economic consideration.

## Limitations of the study

The study has limitations in some aspects. Medication discrepancies occur at the time of admission were not included in the study. Also, the interventions carried out by a single pharmacist in one hospital and hence the findings of this study cannot be generalized to other healthcare facilities in Saudi Arabia.

## CONCLUSION

Discharge medication discrepancies are common in cardiac discharge patients. Pharmacist-facilitated patient counseling at the point of hospital discharge is associated with a considerable decrease in the total number of discharge medication discrepancies. The most common type of intervention identified in this study was addition of a drug to the treatment regimen due to medication omissions, followed by drug discontinuation and change in drug dose. This study concludes that pharmacist interventions in patient counseling provide a substantial cost saving for the specialized cardiac center of Saudi Arabia. Additional studies are needed to further illustrate the most efficient ways to implement discharge counseling and establish which elements of the discharge process are best targeted to improve clinical outcomes and reduce resource utilization. We recommend applying such program to all discharged patients, especially in a high risk population.

## DECLARATIONS

### Acknowledgement

None declared.

### Conflict of Interest

No conflict of interest associated with this work.

### Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

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