

Pharmacist Collaborative Care in Heart Failure Management in Kirkuk City- Iraq

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ABSTRACT

Background: In spite of advances toward the treatment of heart failure (HF), the number of hospital readmissions, and their associated health care costs are very high, and anticipated to rise exceptionally over the next decade that put an expanded load on the healthcare system. Drug-related problems (DRPs) is among the leading cause of hospital readmission. DRPs occur frequently upon discharge due to changes in medication regimen or suboptimal discharge instructions given to patients. Which can cause harm to patients. A need was therefore identified to update systems of care for HF. Recent policy is an increasing focus on delivering of intensive pharmaceutical care for these patients with the aim of reducing hospital admissions.

Objective: To clarify the role of clinical pharmacist (CP) in the care of patients with HF in reducing rehospitalization, discrepancies, improving adherence and health related quality of life (QOL).

Methods: A prospective, randomized, controlled intervention study was conducted on 100 patients with chronic HF were recruited from the Cardiac Clinic and Internal Medical Ward, at Azadi Teaching Hospital in Kirkuk City from March to August 2019.

Patients have been randomized to two groups (50 patients per each) standard care (control) or standard care plus a follow-up program (intervention) that includes medication review and interview. Intervention participants are scheduled for a 30-min appointment with the clinical pharmacist, following their standard follow-up appointments at the Cardiac Clinic, patients in the intervention group were seen individually two times (baseline and follow-up) or as required over six weeks, at the Cardiac Clinic. An intervention agenda was set to check and manage any problems with prescribing and adherence. Additional information supplied on the discharge medication related to dose adjustments and

discontinued medication.

The data were analyzed using Statistical Package for the Social Sciences (SPSS) V.22, chi-square (X²) test, and t-test, and the significance level was < 0.05.

Results: Ninety- three out of 100 patients were completed the study distributed between intervention and control group (47, 46) patients respectively. Both groups were nearly similar in term of age, gender, education level and smoking. After 6 weeks, there were statistically significant reductions in the following parameters of the intervention group; the total number of hospitalization (49 vs 23; P < 0.003), length of stay (LOS) (131 days' vs 53 days; P < 0.002). Number of medication discrepancies, with a significant improvement in Patients' adherence (P value ≤ 0.01) and QOL.

Regarding control group, no significant difference in the number of rehospitalization but the LOS there was a significant difference, a significant difference in one type of discrepancies, no improvement in adherence and QOL.

Conclusions: The results of the current study revealed that pharmacists' contribution to providing medication care for patients with HF has a great impact on reducing the number of rehospitalization, LOS, medication discrepancies, and improving patient's adherence and QOL, as well.

Keywords: Heart failure, DRPs, length of stay, rehospitalization

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INTRODUCTION

Recent changes in the health care delivery system have opened new doors for clinical pharmacists (CP) to provide more comprehensive disease state management in the hospital and community care settings. While CP continue to develop their role in team-based care, it is important to demonstrate the value of CP services and expertise in chronic disease management (1). Additionally, based on the incidence of de novo HF in the United States (US) (10 of 1000 people aged ≥65 years, per year), have a new onset of heart failure, with the aging population and the rising prevalence of various cardiovascular risk factors, such as hypertension and diabetes, it is evident that a significant number of people will continue to develop HF every year in the region (2). More than two-thirds of all cases of HF can be attributed to four underlying conditions: ischemic heart disease (IHD), chronic obstructive pulmonary disease (COPD), hypertensive heart disease, and rheumatic heart disease.

HF results from injury to the myocardium from a variety of causes including ischemic heart disease, hypertension, and diabetes. Less common etiologies include cardiomyopathies, valvular disease, myocarditis, infections, systemic toxins, and

cardiotoxic drugs. As the heart fails, patients develop symptoms which include dyspnea from pulmonary congestion, and peripheral edema and ascites from impaired venous return. Constitutional symptoms such as nausea, lack of appetite, and fatigue are also common (3). HF development and progression can be affected by many risk factors as : age, genetic factors, sex, coronary artery disease (CAD), myocardial infarction (MI), hypertension, diabetes mellitus (DM), and obesity which considered the most important risk factors Also, sedentary lifestyle, diet, and smoking may have a noticeable effect in increasing the risk of HF development (4).

One of the misleading in diagnosing patient with HF is that in both HFrEF and HFpEF, the heart fails to pump adequately, causing symptoms of fluid overload and cardiac stress, such as breathlessness, ankle swelling, and fatigue, which can be associated with a variety of conditions, not just HF. On top of that the patients already are on multiple medication (co-existing conditions) this can complicate the picture further (5).

No treatment has yet been shown to reduce morbidity or mortality in patients with HFpEF. Management of HFpEF is directed towards managing the underlying comorbidities

(e.g. hypertension, IHD and DM) alongside diuretic use to manage symptoms of fluid overload (6). In the UK, furosemide is commonly used as a first-line loop diuretic. Doses will be adjusted according to symptoms and clinical status. Clinical examination of peripheral edema, pulmonary edema and jugular venous pressure are used in this assessment. Typically, doses of 40–80mg daily are used with doses up to 80mg twice daily in more severe cases. Bumetanide, another loop diuretic, has a higher and more consistent bioavailability than furosemide (>90%), whose bioavailability ranges from 10–90% with food intake delaying absorption and reducing peak concentration (7).

ACEIs together with BBs are considered first-line agents in the treatment of HFrEF, and both have been demonstrated to reduce morbidity and mortality. Both agents should be titrated up to maximum tolerated doses in order to replicate results from the large randomized controlled trial that demonstrated their benefits. ARB is used in patients whom cannot tolerate ACEIs. Despite the strong evidence base, in clinical practice the majority of patients receive sub-optimal doses of ACEIs and BBs, with around 30% of patients reaching target doses (8).

BBs can be given with ACEIs at low doses and in a similar way, with doses doubled at intervals of no quicker than two weeks. But when the patient has acute decompensated HF BBs should not be started but can be initiated in clinically stable patients. Given the side effects of BBs that can mimic symptoms of HF (particularly fatigue and, in some instances, shortness of breath), titration should adopt a low and slow approach. The maximum tolerated dose should be aimed for with both BBs and ACEIs. BBs should not be withheld because of age or the presence of peripheral vascular disease, erectile dysfunction, diabetes, interstitial lung disease or COPD (9).

Teamwork, communication and collaboration between health professionals are important for the safe and effective delivery of health care. The increasing burden of chronic disease present opportunities and imperatives for health professionals to practice collaboratively (10). It is in the additional role of managing medication therapy, in collaboration with prescribers, that pharmacists can now make a vital contribution to patient care. To do so, the role of the pharmacist needs to be redefined and reoriented. The traditional relationship between the doctor as prescriber, and pharmacist as dispenser, is no longer appropriate to ensure safety, effectiveness and adherence to therapy. Pharmacists need to pay more attention to patient-centered, outcomes focused care to optimize the safe and effective use of medicines. Dispensing is, and must remain, a responsibility of the pharmacy profession, but prescribing and dispensing should not be done by the same person. By taking direct responsibility for individual patients' medication-related needs, pharmacists can make a unique contribution to the outcome of medication therapy and to their patients' QOL (11). One strategy being explored to support chronic disease

management involves embedding clinical pharmacists in primary care to facilitate patient education, supplemental patient interaction, and population management activities (12). Furthermore, pharmacist involvement in patient care may help to reduce inappropriate medication use, specifically in the elderly.

Pharmacists can play a vital role in highlighting the problem of medication-related harm. In recent years, we have seen a profound change in the role of community pharmacists. Their role has shifted from compounding and dispensing medications to providing integrated pharmaceutical care. The concept of pharmaceutical care emphasizes the **pharmacists' responsibility to pursue the best possible patient outcomes of medication therapy** (13).

Last but not least, the work of the NDPs is clinically focused, consisting of clinical medication reviews, consultations for medication related questions and targeted pharmaceutical care programs to systematically improve the quality of prescribing. It starts with individual or population-based problem identification and subsequently targets the problem in a patient-centered way (14).

The Heart Failure Society of America (HFSA) in conjunction with the American College of Clinical Pharmacy (ACCP) published a position paper that outlined roles for pharmacists in the care of the heart failure patient and the specific activities pharmacists should perform in the HF patient to reduce the risk of hospital admissions. It includes therapeutic drug monitoring (TDM), medication reconciliation, prevention of adverse drug reactions (ADR) and medication errors (ME), evaluation of access to medications and adherence to medications, documentation of processes of care, and dealing with specific DRPs (15).

METHODOLOGY

Study design, setting and population

A prospective, open randomized, controlled intervention study was conducted on 100 patients with CHF, were recruited from the Cardiac Clinic and Internal Medical Ward, at Azadi Teaching Hospital in Kirkuk City from March to August 2019.

Patients have been randomized to two groups (50 patients per each) standard care (control) or standard care plus a follow-up program (intervention) that includes medication review and motivational interview. Ethical approval has been obtained from the Ethical Committee of College of Medicine, University of Sulaimani (Meeting NO. 8 Date 28-April-2019). A total number of 100 patients with HF were seen in the hospital, 93 of them were completed the study. The number of patients were 47 and 46 in intervention and control group respectively.

Study Parameters and Data collection

Baseline assessment data, including demographics, age, gender, level of education, civil status, previous history, comorbidities, smoking status, and number of prescribed

medicines, number of hospitalization and length of admission within previous 6 weeks, and NYHA class were collected after randomization.

Inclusion criteria

≥18 years of age, male or female
HF with NYHA Class II, III

Exclusion criteria

NYHA Class I and Class IV
Concurrent serious systemic disease (other than HF) likely to reduce life expectancy (e.g. advanced malignancy)
Sever cognitive impairment
Sever psychiatric illness
Chronic renal impairment requiring dialysis
Patients who were difficult to follow-up

Standard Care (control)

Participants in the control group were received a standard care only at the Cardiac Clinic of the Azadi Hospital in Kirkuk City, which comprises an appointment with a cardiologist, physical examination, laboratory investigations, repeating or filling a new prescription. Unless the patient requires specialist follow-up or more treatment at the Cardiac Clinic, referral is made to the primary care facility for continuing follow-up.

Intervention Protocol

Following their standard follow-up appointments at the Cardiac Clinic, patients in the intervention group were seen individually by a clinical pharmacist two times appointments (~30-mins each) at the Cardiac Clinic and/or Wards at baseline (week 0) and after 6 weeks, but this is adjusted according to the patient's needs.

First visit

The clinical pharmacist uses motivational interview when meeting the patient. The pharmacist reviewed each patient's medication to check and manage any problems with prescribing and adherence. Additional information supplied on the discharge medication related to dose adjustments and discontinued medication.

An intervention agenda was set to focus the interview on:

How the medication works for the patient, what it means in terms of side effects, route of administration, dosing frequency, the patient's worries, their understanding of the purpose of the medicines, and their thoughts about risks and benefits.

At the end of the consultation, the pharmacist prepares a written summary of the discussed issues and the agreed next steps. The summary is given to the patient together with the next scheduled appointment time.

Identifying any drug-related problems (DRPs) that cannot be solved by the pharmacist and patient together are discussed with the cardiologist after the visit either in person.

Encourage patients to identify DRPs and contact the Cardiac Clinic or the Pharmacist if problems arise. The goal was that the patient should feel safe and secure with their medication, and that any problems affecting adherence or quality of life will be found and solved together.

Second Visit/ Follow up

The patients in intervention groups were followed up by the researcher throughout the study period in the hospital or in the private clinic of doctor or by phone and 2nd interview performed after 6 weeks of their first visits.

Three out of 50 patients of intervention group and four out of 50 patients of the control group were not completed the study.

Medication Use Review

We prepare documentation list for the medications that been used by patients in HF treatment, only heart failure related one, with all in depth details such as dosing & frequency, documented as a baseline before initiation of interventions, later on followed up for six weeks.

Rational of classifying patients into three groups according to number of medications used, were fundamentally based on physician prescriptions which individualized case by case accordingly, the three groups are:

- A. patients who used one to two drugs
- B. patients who used three to four drugs
- C. patients who used five to six drugs

Along with counseling patients about their medications, lifestyle changes, identified DRPs, initiated treatment when indicated, scheduled appropriate follow-up, managed adverse drug reactions and drug interactions as well as order.

Discrepancies

In addition, the patient's medications were checked for discrepancies. Discrepancies discussed with the patient and the cardiologist. The patients asked about some discrepancies such as: restart of discontinued medication, discontinuation of prescribed discharge medication, use of higher or lower dose, more or less frequent use than prescribed and incorrect time of taking medication. According to above discrepancies we allocated the patients in to three levels:

- (0-1) refer to patients with high level of discrepancy.
- (2-3) refer to those with medium level of discrepancy.
- (4-5) refer to those with low level of discrepancy.

Most patients who would benefit from pharmacist intervention were those with high level of discrepancy.

Quality of life (QOL)

Research has shown that certain diets raise risks for chronic diseases. As a part of the motivational interview, the patients provided with knowledge and advice to increase their awareness concerning their lifestyle and to change behavior that may hurt their QOL. According to Dietary Guidelines

for Americans that designed to help patients choose diets that will meet nutrient requirements, promote health, support active lives, and reduce chronic disease risks. The patients encouraged to:

Have a healthy diet rich in fiber and potassium and maintain a healthy weight.

Take less than 2,000 milligrams (2 grams) of sodium per day.

Limit foods high in fat, cholesterol and sugar.

Exercise regularly. A regular cardiovascular exercise program prescribed by the doctor in order to strengthen the heart and reduce HF progression.

Reduce fluid intake to reduce edema.

Use extra pillows to minimize breathing and sleeping difficulties.

Smoking cessation and reduce alcohol consumption.

Statistical Analysis

Data were entered in to excel sheet then transferred to the statistical package for social sciences program (SPSS, Version 22) was used for data analysis. For comparison of differences

in prevalence between groups χ^2 (chi-square) analysis was applied and t test for comparison of numbers. P-Values < 0.05 will be considered as statistically significant.

RESULTS

Patient characteristics

A total of 100 patients were included in this study, out of which 93 patients were completed the study; distributed randomly between intervention group (47) patients and control group (46) patients. More than half 54.8% (51) of the patients were male and 45.2% (42) were female. The majority, 68.8% (64) were had primary education. Nearly half of the patients 49.4% were with reduced LVEF (<40), 51.6% (48) patients displayed NYHA II and 48.4% (45) displayed NYHA III.

Table 1 shown that the Mean and Standard deviation (SD), Number of cases (No.) and Percentage (%) for each Intervention and Control groups over Age, Gender, Education, Smoking, LVEF, NYHA class variables.

Table 1: Baseline patient demographics (n= 93)

Characteristics		Intervention No (%)	Control No. (%)	P Value
Patients Number		47	46	--
Age (years): mean \pm SD		60.66 \pm 12.01	60.67 \pm 10.42	0.533
Gender	Female	20 (42.6)	22 (47.8)	0.705
	Male	27 (57.4)	24 (52.2)	0.731
Education	Primary	32 (68.1)	32 (69.6)	0.931
	Secondary	8 (17.0)	10 (21.7)	0.605
	Tertiary	7 (14.9)	4 (8.7)	0.384
Smoking	Yes	26 (55.3)	22 (47.8)	0.615
	No	21 (44.7)	24 (52.2)	0.603
LVEF	< 40	27 (57.4)	19 (41.3)	0.268
	\geq 40	20 (42.6)	27 (58.7)	0.273
NYHA class	II	21 (44.7)	27 (58.7)	0.346
	III	26 (55.3)	19 (41.3)	0.331

There were no significant differences between participants in intervention and control groups in terms of the mean of age (60 years), gender, education levels, smoking behavior, and NYHA classes.

Medication used

Most patients 65 (70%) in the two groups were taken loop diuretics, the second most common medication used were aldosterone antagonist 50 (54%). Ten percentage of patients taken digoxin. (Table 2).

Table 2: Medication of HF in the intervention and control groups

Drug class	Intervention No. (%)	Control No. (%)	P Value
Angiotensin-Converting Enzyme (ACE) Inhibitors	11 (23.4)	8 (17.4)	0.521
Angiotensin Receptor Blockers (ARBs)	17 (36.2)	26 (56.5)	0.148
Aldosterone antagonists (Spironolactone)	27 (57.4)	23 (50.0)	0.624

Beta blockers	23(48.9)	24(52.2)	0.826
Digoxin	4(8.5)	5(10.9)	0.714
Loop diuretics (furosemide)	33(70.2)	32(69.6)	0.970
Thiazide diuretics	10(21.3)	7(15.2)	0.494
Angiotensin Receptor Neprilysin Inhibitor (ARNI)	9(19.1)	9(19.6)	0.963

Two third of patients in both groups used three to four drugs for HF, other one third of patients used one to two drugs (Table 3) and (Fig. 1).

Table 3: Percentage of HF medications used for intervention and control groups

Groups	No. (%) of medications			Total
	A (1,2) drugs	B (3,4) drugs	C (5,6) drugs	
Intervention	15 (31.9%)	31 (66%)	1 (2.1%)	47
Control	13 (28.3)	32 (69.6)	1 (2.2%)	46

(A: one to two drugs, B: three to four drugs, C: five to six drugs)

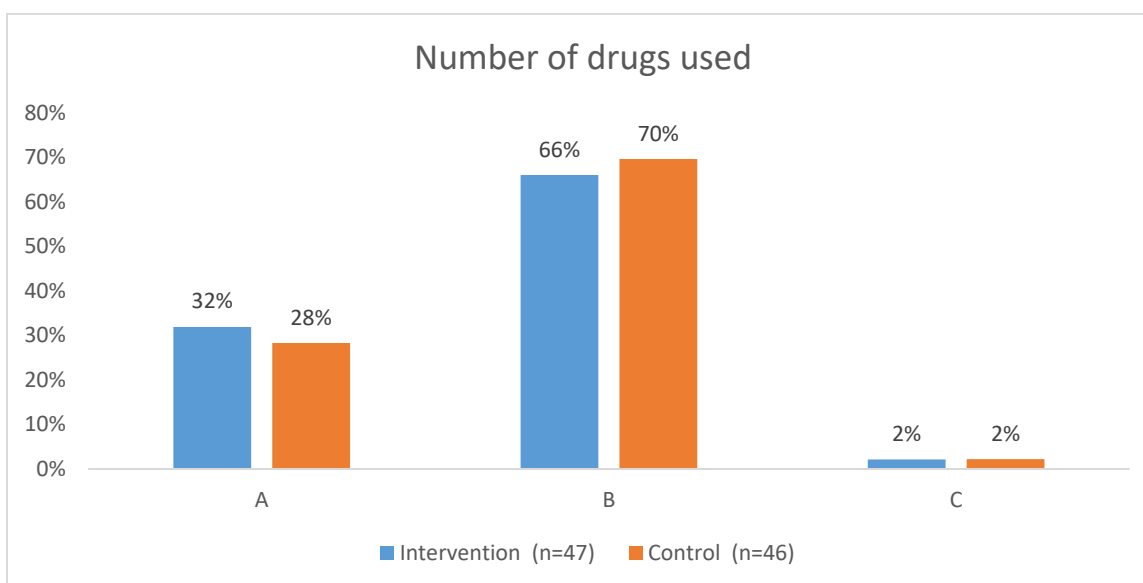


Figure 1: Percentage of HF medications used for intervention and control groups

(A: one to two drugs, B: three to four drugs, C: five to six drugs)

Admissions to hospital

After six weeks of follow up period in intervention group, the mean number of admissions was significantly reduced (p value < 0.05). However, in control group the change was not significant.

Regarding means of LOS (days) in both groups, there were significant decrease between baseline and follow up after six weeks of intervention in both groups (Table 4) and (Fig. 2).

Table 4: Number of admissions and LOS

Hospital Admission/ Stay	Intervention Mean ±SD			Control Mean ±SD		
	Baseline	Follow up (6 weeks)	P value	Baseline	Follow up (6 weeks)	P value
No. of admission	1.04±0.859	0.49±0.882	0.003	0.80±0.806	0.52±0.722	0.080
Length of staying (days)	2.79 ± 2.71	1.13 ± 2.18	0.002	2.0 ± 2.05	1.17 ± 1.82	0.045

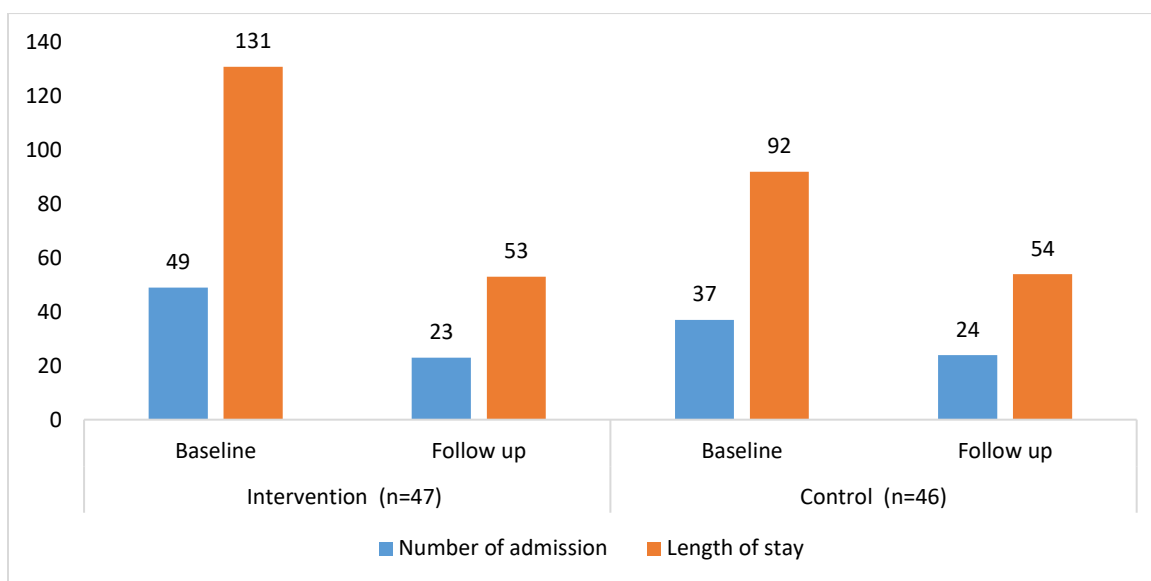


Figure 2: Number of admission and LOS (days) in the intervention and control groups

Discrepancies

For the whole medications used, 115 medication discrepancies were found in 47 (51%) patients of intervention group (11 were related to restart of discontinued medication, 31 were related to discontinuation of prescribed discharge medication, 22 were related to change in dosage, 22 were related to a change in frequency and 29 related to incorrect time of taking medication). Discontinuation of prescribed discharge medication was the most common discrepancy.

While in control group 77 medication discrepancies were found, the most common discrepancy was incorrect time of taking medication. There were significant reductions in discrepancies regarding (restart of discontinued medication, discontinuation of prescribed discharge medication and change in dosage) after six weeks of intervention, while in control group there was a high significant reduction just in restarting of discontinued medication. (Table 5), (Fig. 3) and (Fig. 4).

Table 5: Discrepancies within intervention and control groups

Discrepancies	Intervention N (%)		P Value	Control N (%)		P Value
	Baseline	Follow up (6 wks)		Baseline	Follow up (6 wks)	
Restart of discontinued medication	11(23.4)	1(2.1)	0.0038	12(26.1)	0(0.0)	0.0005
Discontinuation of prescribed discharge medication	31(66.0)	6(12.8)	0.001	18(39.1)	18(39.1)	1
Use of higher or lower dose	22(46.8)	4(8.5)	0.0004	12(26.1)	10(21.7)	0.669
More or less frequent use than prescribed	22(46.8)	17(36.2)	0.423	11(23.9)	9(19.6)	0.654
Incorrect time of taking medication	29(61.7)	22(46.8)	0.326	24(52.2)	22(47.8)	0.768

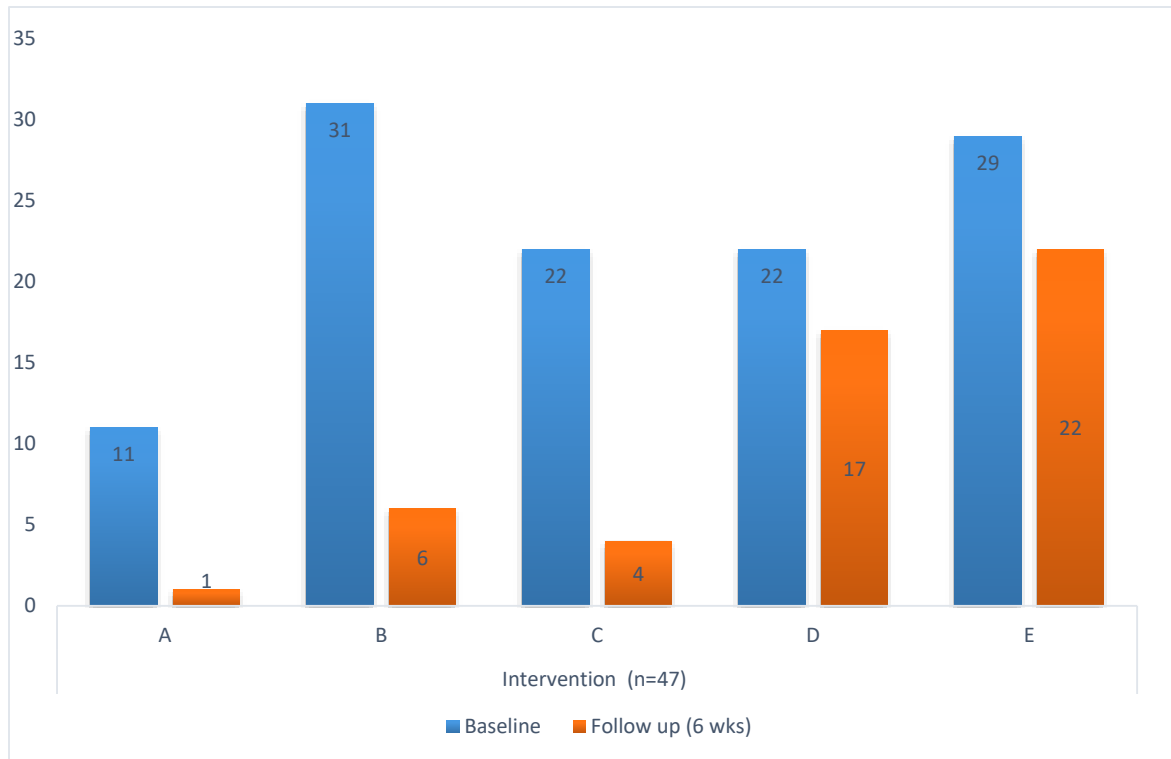


Figure 3: Discrepancies in the intervention group after six weeks of intervention

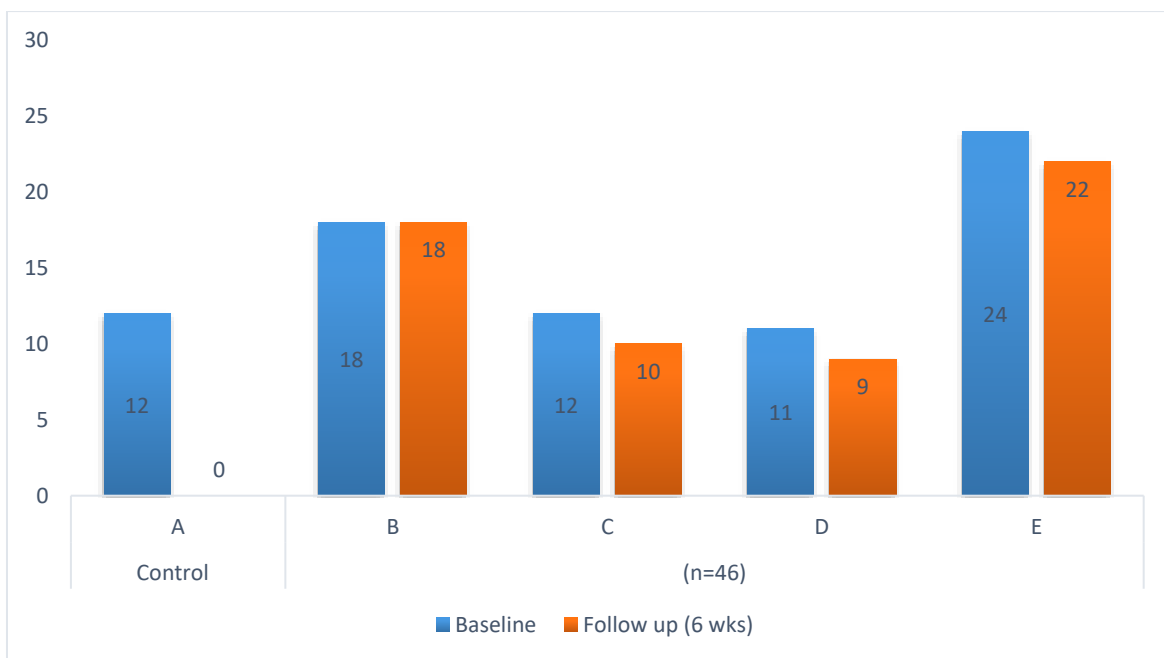


Figure 4: Discrepancies in the control group after six weeks of follow up

In intervention group high discrepancies were reduced, and the low discrepancies were increased after six weeks of intervention. In control group also there were reduction in the levels of discrepancies but in lower percentage than intervention group (Table 6) and (Fig. 5).

Table 6: Level of discrepancies in the intervention and control groups

Level of discrepancies	Intervention N= 47 (%)		Control N =46 (%)	
	Baseline	Follow up (6 wks)	Baseline	Follow up (6 wks)
High	15 (31.9)	0 (0.0)	4 (8.7)	2 (4.3)
Medium	21 (44.7)	24 (51.1)	23 (50.0)	19 (41.3)
Low	11 (23.4)	23 (48.9)	19 (41.3)	25 (54.3)

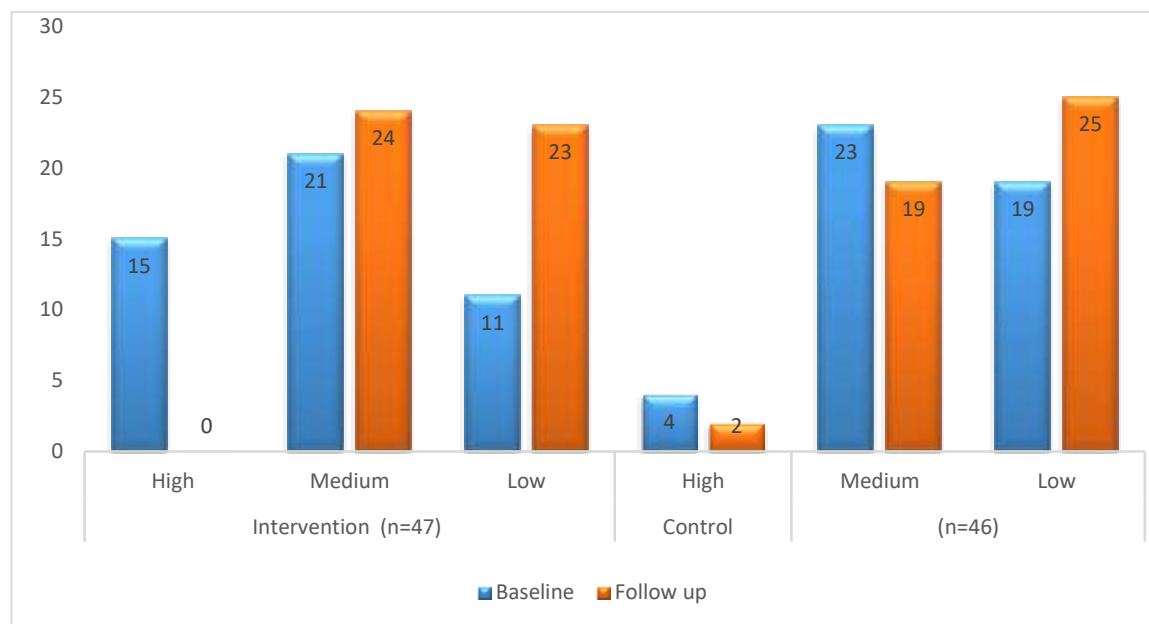


Figure 5: Level of discrepancies in the intervention and control groups

DISCUSSION

The goal of HF management in patients who are already diagnosed with CHF is to improve symptoms, reduce hospitalization rates, and prolong survival (16, 17).

Collaborations between pharmacists and physicians in developed countries have managed to produce more effective, safer, and cost-effective drug therapy (18). This study raises questions about the effectiveness of pharmacist intervention in the management and delivery of health care to patients with HF, including medication reconciliation, patient education, and early identification and prevention of ADRs. Besides, improving medication adherence, access to medications, and transition of care (TOC). Many researchers have argued that counseling by an experienced pharmacist has a positive and effective impact on controlling and treating chronic diseases and promoting community health (19).

Table 1 shows that no significant differences were found for patients' characteristics in terms of variables such as gender, age, education, and smoking, between both control and intervention groups. Forty-nine percent of total patients are HFrEF and 51 percent are HFpEF. This agrees with

Gomez-Soto FM. et al. that found the prevalence of HFpEF was higher than that of HFrEF (20).

The demographics' table shows that HF was more common in men (55%) than women (45%). This agrees with Bleumink GS. et al. and Gomez-Soto FM. et al. That found males are affected slightly more than females, with an estimated lifetime risk of HF at the age of 55 years (20, 21).

Effect of pharmacist intervention on hospital admission

Patients in the intervention group had fewer HF exacerbations during the study period, since the mean number of hospital admissions at baseline were (1.04) and significantly reduced to (0.49) after six weeks of intervention and the total number of hospital admissions were reduced (49 vs 23; $P < 0.003$). So, pharmacist collaborative care (close follow up & monitoring for dose adjustments) led to greater reductions in the rate of HF hospitalization, which revealed a significant benefit with pharmacist care in HF patient's management.

The mean LOS (days) at baseline were (2.79) days and significantly reduced to (1.13) days after six weeks of intervention and the total number of LOS were significantly

reduced after six-weeks of intervention and follow up (131 days' vs 53 days; $P < 0.002$). We believe the interventions made by the CP led to the positive outcomes of the HF patients who completed the post-intervention period.

The above results disclose the great role that been played by CP in HF patient's therapeutic plan which change the old idea that limit the role of the pharmacist (only medications collector), that eventually lead to; reducing hospitalizations, emergency department visits and improved monitoring effect.

Regarding control group, the mean number of hospital admission at baseline were (0.80) and insignificant reduced to (0.52) after six weeks of follow up (P value 0.08). This insignificance showing the lack of pharmacist role in dose adjustment and follow up. The mean LOS at baseline were (2) days and significantly reduced to (1.17) days after six weeks of follow up but with lower percent than intervention group. This improvement may occur as a result of treatment effects or close follow up with other health care provider. (Fig. 2).

This result is aligning with the results of a study done by Singh-Franco et al., that found a statistically significant reduction in the total number of hospitalizations (50 vs 23; $P < 0.018$) and LOS (263 days' vs 108 days; $P < 0.03$) at post-intervention, there was (22).

In agreement with the current study results, López C.C. et al. also reported that fewer patients in the intervention group were admitted again vs. the control group (23).

In a study done by Jackevicius CA et al., lower percentage of patients were readmitted for HF within 90 days in the intervention group compared with control group (24).

Many researchers stressed on the importance of pharmacists' role in the TOC for patients with HF and the impact of their contributions on decreasing high rates of hospital readmissions (25, 26).

Effect of pharmacist intervention on discrepancies

There were significant reductions in discrepancies regarding three types of discrepancies which are {restart of discontinued medication (11 vs 1; cases p value 0.003), discontinuation of prescribed discharge medication (31 vs 6; cases p value 0.001), and change in dose (22 vs 4; cases p value 0.0004)} after six weeks of intervention, these positive outcomes resulted from impact of pharmacist intervention through separating the discounting drugs from recommended drugs and encouraging patients to continue on their recommended drugs and dosing as prescribed. But there were insignificant reductions in the rest two type of discrepancies which are {change in frequency (22 vs 17; cases p value 0.42) and incorrect time of taking medication (29 vs 22; cases p value 0.32)}, this insignificance may have attributed to high percent of HF patients who participated in our study were elderly, not educated and used multiple drugs for other diseases, so they forgot to take their medications as prescribed frequency and time (Table 5) and (Fig. 3).

While in control group, there was a high significant reduction in one type of discrepancies which is restarting of discontinued medication after six weeks of follow up (12 vs 0; cases p value 0.0005)}, this may be resulted from patients stop taking their medications (recommended & discontinued). But there was insignificant reduction in rest four types of discrepancies. This confirms the added value of pharmacist role in reducing discrepancy in intervention group (Table 5) and (Fig. 4).

On the other hand, the level of discrepancies was also reduced in the intervention group, at baseline 32% of patients with high discrepancy and 23% with low discrepancy and after six weeks of intervention the percent will become 0% and 49% for high discrepancies and low discrepancies, respectively, so the patients with high discrepancies reduced by hundred percent. While in the control group, the level of discrepancies was also reduced after six weeks of follow up but in lower percent than in intervention group, the patients with high discrepancies reduced by fifty percent. (Table 6) and (Fig. 5).

This results agree with study done by Eggink RN et al. that conclude the CP discharge service significantly reduces the risk of discrepancies and MEs of patients with HF in the 1st month after discharge (27).

Also, our results were in accordance with results of the study done by Bolas H et al. show that preparation of an accurate medication record at admission by a community liaison pharmacist reduces the number of these discrepancies. A combination of admission and discharge consultations could have led to a further decrease in the number of discrepancies (28).

clinical pharmacist discharge service significantly reduces the risk of discrepancies and prescription errors in medication of patients with heart failure in the 1st month after discharge
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clinical pharmacist discharge service significantly reduces the risk of discrepancies and prescription errors in medication of patients with heart failure in the 1st month

This results agree with study done by Tahir et al., that found the pharmacist intervention improved the accuracy of patient current medication list. Since medication reconciliation can enhance delivery of high value cost conscious care to the patients by reducing MEs and discrepancies (29).

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