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The Impact of Clinical Pharmacist Tele-follow-up on Diabetic Patient's Readmission Due to Reinfection of Methicillin-Resistant Staphylococcus Aureus (MRSA) in Iraqi Patients

Kawthar Faris Nassir [*,1], Besmah M.Ali Ibrahim[1] , Osama Zuhair Salman[1] , Zainab Jumaa[2] Qasim, Ameer A Oudah[1] , Aaya Ayad Okab[1] and Jawad K.Aldiwan[3]

[1]Ministry of Health and Environments, Baghdad, Iraq
[2]Baghdad College of Medical Sciences, Baghdad, Iraq
[3]Department of Community, Baghdad College of Medicine, University of Baghdad, Baghdad, Iraq

Abstract

There are many risk factors significantly associated with readmission of diabetic patients after discharge like surgical site reinfection with methicillin-resistant *Staphylococcus aureus* which has been demonstrated to be associated with more amputations, longer hospitalization , increase healthcare costs and increased mortality .This study was conducted to describe the impact of clinical pharmacist tele-follow-up on diabetic patient's readmission due to reinfection of methicillin-resistant Staphylococcus aureus, rate of referral to inpatients team and, return visits to the emergency department, 203 patients who were randomized into two groups. Group A (interventional group) 103 patients and group B (control group) 100patients who are discharge from hospital after diabetic foot amputation. The reduction in the readmission due to reinfection by methicillin-resistant *Staphylococcus aureus*, reduce the referral to inpatients team and fewer return to the emergency department consider as primary endpoint. there was significant differences between the two groups in rates of readmission, referral to their inpatients team, and return visits to the emergency department with (P-value<0.01) . The conclusion of the pharmacist tele-follow-up was associated with decrease in rates of readmission, fewer referrals to inpatients team and decrease in return visits to the emergency department.

Keywords: Pharmacist tele follow up, Diabetic patients, MRSA

تأثير المتابعة الهاتفية للصيدلاني السريري على إعادة دخول مرضى السكري الى المستشفى بسبب إعادة الاصابة بالمكورات العنقودية الذهبية المقاومة للميثيسيلين من المرضى العراقيين

كوثر فارس *[،١] ، بسمة محمد علي[١] ،أسامة زهير سلمان[١] ، زينب جمعة[٢] ،امير عوده[١] ، ايه اياد [١]و جواد الديوان[٣]

[١] وزارة الصحة والبئية ، بغداد ، العراق
[٢] كلية بغداد للعلوم الطبية ، بغداد ، العراق
[٣] قسم المجتمع، كلية طب بغداد، جامعة بغداد، بغداد، العراق

الخلاصة

هناك العديد من عوامل الخطر المرتبطة بشكل كبير بإعادة دخول مرضى السكري الى المستشفى بعد الخروج من منه مثل إعادة التهاب مكان الجرح بالمكورات العنقودية الذهبية المقاومة للميثيسيلين والتي ثبت أنها مرتبطة بمزيد من عمليات البتر ، زيادة كل من فترة الرقود بالمستشفى ، تكاليف الرعاية الصحية، والوفيات.هذه الدراسة اجريت لوصف تأثير متابعة الصيدلي السريري بالمكالمات الهاتفية على إعادة دخول مرضى السكري الى المستشفى بسبب إعادة الاصابة بالمكورات العنقودية الذهبية المقاومة للميثيسيلين ، ومعدل الإحالة إلى فريق المرضى الراقدين ، واحالة المريض إلى قسم الطوارئ ، ٢٠٣ مريضًا تم تقسيمهم عشوائيًا إلى مجموعتين. المجموعة أ (المجموعة التداخلية) ١٠٣ مرضى والمجموعة ب (المجموعة الضابطة) ١٠٠وهم من المرضى الذين خرجوا من المستشفى بعد بتر القدم السكرية. كانت نقطة النهاية الأولية هي التخفيض في إعادة دخول المرضى الى المستشفى بسبب الإصابة مرة أخرى بواسطة المكورات العنقودية الذهبية المقاومة للميثيسيلين ، وتقليل الإحالة إلى فريق المرضى الراقدين وتقليل العودة إلى قسم الطوارئ. كانت هناك فروق ذات دلالة إحصائية بين المجموعتين في معدلات إعادة دخول المرضى الى المستشفى ، الإحالة إلى فريق المرضى الراقدين والعودة إلى قسم الطوارئ مع قيمة (P-value <0.01)
الخلاصة ارتبطت المتابعة الصيدلانية عن بعد بانخفاض معدلات إعادة دخول المرضى الى المستشفى ، وتقليل الإحالة إلى فريق المريض الراقدين وتقليل العودة إلى قسم الطوارئ

الكلمات المفتاحية: متابعة الصيدلي للمريض هاتفياً، مرضى السكري ، المكورات العنقودية الذهبية المقاومة للميثيسيلين .

Introduction

Diabetes mellitus , is a group of metabolic disorders characterized by a high blood sugar level (hyperglycemia) over a prolonged period of time, Long - term complications of diabetes develop gradually , which include cardiovascular disease, diabetic neuropathy , diabetic nephropathy , retinopathy , skin and mouth conditions ,hearing impairment, Alzheimer's disease, depression related to diabetes, and foot damage with infection[(1)]. Discharging patients from the hospital is a complex process that is fraught with

[*]Corresponding author E-mail: kawther.kf@gmail.com
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challenges and re-admission to the hospital is still an important and crucial health problem, which is very costly to the health system [(1)]. Annually the cost of unplanned readmissions is ranged from 15 to 20 billion dollars in the United States [(2)]. Furthermore, there is evidence that patients that are readmitted have a longer length of stay than for first admissions and a higher risk of complications that lead to increase the rate of morbidity and mortality with high cost effectiveness on health system [(3,4)]. Because of the risks and costs associated with readmission, there is considerable interest in identifying which patients are at risk of readmission [(5)]. There are many risk factors significantly associated with readmission like cancer, chronic obstructive pulmonary disease, ischemic heart disease, heart failure, stroke, and surgical site infection specially infected with multidrug resistance microorganism like ***methicillin-resistant Staphylococcus aureus*** (MRSA), all this risk factors have been associated with high readmission rates[(6)].Wound infection is acknowledged to be a significant problem in surgical wounds like complicated surgical sits after amputation of diabetic foot by infection, Among infected pathogens, are ***Staphylococcus aureus*** which predominates and ***methicillin-resistant Staphylococcus aureus*** (MRSA) which is become more resistant to antibiotics , this leads to increase time to healing, length of hospital stay, increase morbidity and mortality rates and reducing life survival with high cost effectiveness on health system [(7)].The prevalence and reinfection of surgical sit by (MRSA) is about 15–30% and diabetic foot reinfections by ***methicillin-resistant Staphylococcus*** (MRSA) has been demonstrated to be associated with more amputations, longer hospitalization , increase healthcare costs and increased mortality[(8)]. However, comprehensive treatment plan for methicillin resistant Staphylococcus aureus (MRSA) is crucial and effected by many factors especially in uncontrolled blood sugar of diabetic patients [(7,8)].After hospital discharge of patients with amputated diabetic food, many patients encounter problems in the first weeks after discharge from hospital. However, poor adherence to diabetes treatment is common which causes severe health complications and increased mortality [(9)].As well as insufficient, incomprehensible or confusing information or instructions provided by the health care provider to the patients lead to complications and glycemic uncontrolled which consider important factors to reinfection of surgical sit by (MRSA) and increase re-hospitalization [(10)]. Multidisciplinary approaches can support adherence success and can enable a more effective management of diabetes care [(11)].One approach used in the care of diabetic patients prepare an integrated medical plan for the care and follow-up of the patients after discharge by a well-trained health care provider [(11)] [(12)]. Involvement of the clinical pharmacist as a part of a multidisciplinary team, this team normally consists of physician, clinical pharmacist, nurse, technician, microbiologist, and other health care professions[(13)].All of the members in multidisciplinary team have important roles in management of patients to achieving the goal of treatment, improving quality of life, controlling disease and its complications, and decreasing mortality and morbidity rate [(13)].pharmacists involved in discharge planning by providing pharmacists' interventions telephone follow-up after hospital discharge are an important factor to enhance patients outcome and improve life survival by resolution any medication-related problems and prevent complications[(14)].Telephone follow-up (TFU) is reputed to be a good tool for providing medical advice, managing symptoms, identifying complications and giving reassurance after discharge[(15)].

The Aim of Study

The aim of this study was to describe the impact of the follow-up phone call by a pharmacist after discharge of the patients on patient's outcome improvement with controlling disease and its complications by glycemic control and increase patients adherence with treatment orders after hospital discharge to prevent readmission to the hospital due to reinfection by MRSA, rate of referral to inpatients team due to new medical problem and, return visits to the emergency department.

Patients and Methods

A prospective randomized controlled interventional study began from 1st of January to end of December 2020 at Baghdad teaching Hospitals of the medical city complex in Iraq. The study was carried on 230 (111 females (48.26%), 119 males (51.73%) patients who are discharge from hospital after diabetic foot amputation and healing of surgical site infected by MRSA**,** the patients were randomized in a 1:1 ratio into two groups. Group A interventional group115 (65 females (56.52%), 50 males (43.47 %) that followed up by pharmacist intervention (follow up by telephone calls) and group B control group115 (60 females (52.17 %), 55 males (47.82 %)) (no follow up by calls or intervention by pharmacist but the patients reserve one call after 3days from discharge to document the serum blood sugar reading). All patients treated with empirical antibiotic treatment when they have surgical site infection; after the results of the culture and sensitivity test were obtained they treated with antibiotic according to the results of it. Prior to discharge, a personalized medication plan was created by the pharmacist and discussed with the physician. Medication discrepancies were addressed prior to the discharge, instructions being given and discussed with the patients, medication counseling

was performed at discharge by the pharmacist to the patients in two groups. The intervention by a pharmacist introduce to group A which received of a follow-up by phone call, patients received phone calls at day 3 from discharge and then every 3 days for 2 months. During each phone call, the pharmacist introduce the intervention by patients education to controlling disease and its complications, giving instructions about patients compliance with treatment orders after hospital discharge , give the consultations about the medications and asked the patients to confirm their medication regimens including drug, indication, dose, route, and frequency whether they obtained and understood how to take them if any changes to their current therapy with recorded possible side effects if occurred, dose adjustment of anti-diabetic medications with monitoring of blood sugar level and keep it under control, give the patients instruction about the diet ,life style modification, and self-management, treatment with identify and resolve any medication-related problems for patients , if there are new medical problems requiring referral to their inpatients team, return visits to the emergency department and the rates of readmission due to re infection by MRSA after hospital discharge were recorded also, but patients in group B had been given an emergency telephone number to call if they need help and the pharmacist take their data about reinfection ,readmission after discharge , referral , and emergency return visit from patients registration department in the hospital .After continue for 2 months of tele- follow up from 230 patients, just 203 patients stay in this study 103 in group A(interventional group) (59 females (57.28%), 44 males (42.71 %) and 100patients in group B (control group) (55 females (55%), 45 males (45 %) were included in the final analysis , 27 patients were excluded (12 patients from group A with missing communication with them and 15 patients from group B they have missing data). The randomization pattern and demographic characteristics of all patients in two groups were illustrated in table (1) and figure (1) respectively. The primary endpoint was the reduction in the readmission due to reinfection by MRSA, reduce the referral to in patient's team due to any new medical problem and fewer return to the emergency department. The secondary end point was enhancing patient's outcome improvement with controlling disease and its complications after patients discharge by pharmacist intervention telephone call.

The statistical analysis

SPSS 20 (Chicago, IL, USA) software package used to make the statistical analysis; Values were considered significant when P values were less than 0.05. The significance of differences between the percentage values of the rates of readmission due to re infection by MRSA after hospital discharge, new medical problems requiring referral to their inpatients team, return visits to the emergency department in the intervention and control group were compared with Student's Independent t-test. Numbers and percentage use to express the another data of clinical pharmacist intervention and follow up of the patients.

Table 1. Demographic characteristics for patients in two groups

		Group A	Group B	p-value
Numbers		103	100	
Age (years)		47.01±9.051	45.68 ±8.09	0.079
Gender	Females	59 (57.28 %)	55 (55%)	0.745
	Males	44 (42.71%)	45(45%)	
Anti-diabetic medications	Insulin	69(66.99%)	63(63%)	0.553
	Oral Anti diabetic medications	34(33.00%)	37(37%)	0.882
Blood sugar levels	Fasting blood sugar at discharge	127.78±13.68	129.03±12.06	0.49
	Fasting blood sugar after 3 days from discharge	169.68±14.64	170.26± 15.33	0.57
Level of education	High school	37(35.29%)	34(34%)	0.775
	College	19(18.44%)	23(23%)	0.426
	Graduate school	29(28.15%)	26(26%)	0.731
	Other	18(17.47%)	16(16%)	0.78
Comorbidities	Hypertension	15(14.56%)	13(13%)	0.748
	Ischemic heart disease	18(17.47%)	21(21%)	0.526
	Impaired kidney function (GFR <60 ml/min)	6(5.82%)	8(8%)	0.543
	Chronic obstructive pulmonary disease	4(3.88%)	3(3%)	0.732
	Obesity	25(24.27%)	28(28%)	0.548
	Dyslipidemia	13(12.62%)	11(11%)	0.722

Values are presented as numbers, percentage, mean ± SD, P-value > 0.05 considered non-significant

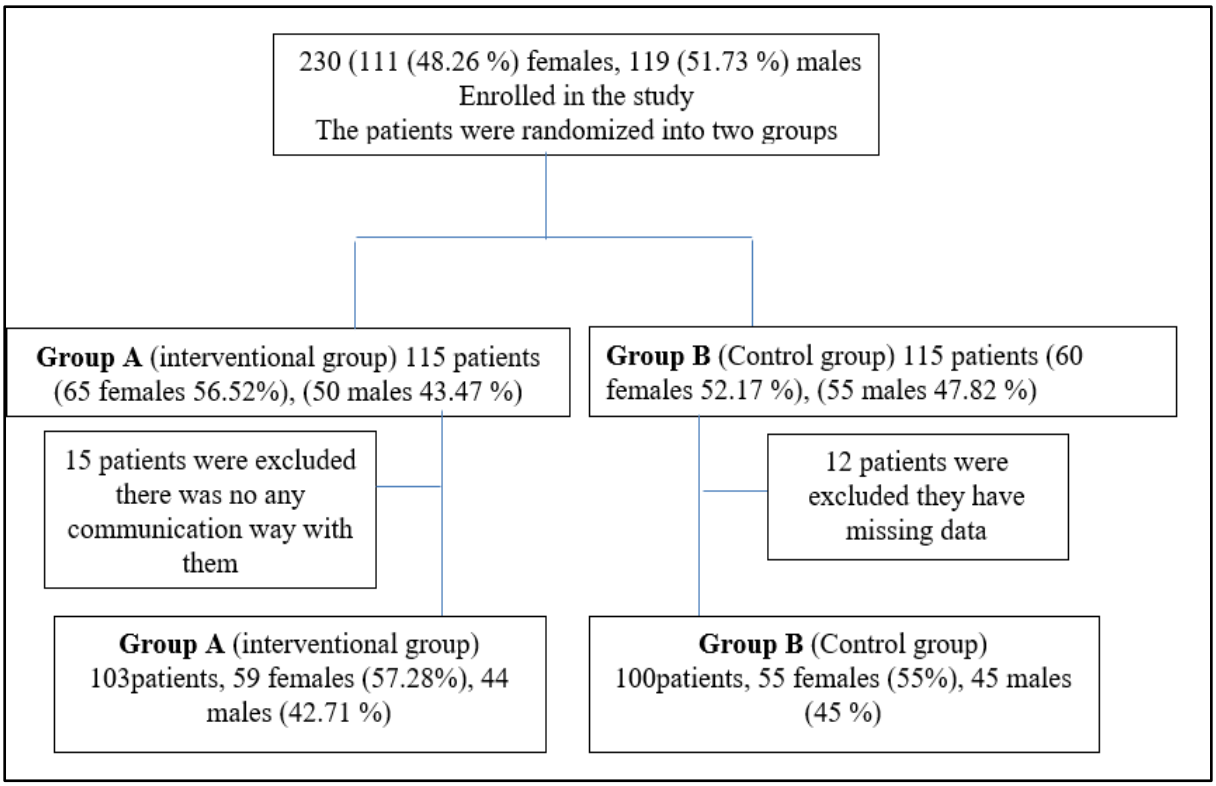

Figure 1. Patients enrolment

Results

There was no significant difference (P > 0.05) in demographic characteristics of patients in the two groups as illustrated in table (1).After 2 months of follow up of the patients post discharge in the study groups, there was significant differences between the percentage values of two groups in rates of readmission due to re infection by MRSA after hospital discharge, new medical problems requiring referral to their inpatients team, and return visits to the emergency department with (P-value <0.01) respectively ,which were 19(19%),21(21%),and 15(15%) in the control group , compared to interventional group 6 (5.8%),4(3.88%),and 3(2.91%) respectively as illustrated in table (2). Major causes of new medical problems requiring refer the patients to their inpatients team, and the most important cause of return visits to the emergency department are summarized in table (3) .During the study the pharmacist intervention in group A as a phone call allowed pharmacists to introduce patients education about the disease to 64 patients (62.13%) , giving instructions encouraged patients compliance with treatment to 39 patients (37.86%),introduce consultation on medications to 36 patients (34.95%), dose adjustment of anti-diabetic medications to 81 patients (78.64%), monitoring of blood sugar and keep it under control to 79patients (76.69%),give the advice about life style modification to 25 patients (24.27%),giving Instructions about diet to 56 patients (54.36%) , identify and resolve any medication-related problems for 45 patients 43.68% as illustrated in table (4) and figure. (2)

Table 2. The impact of follow-up phone on the rate of reinfection, readmission and return visits to the emergency department.

	Group A	Group B	p-value
The rates of readmission due to re infection by MRSA after hospital discharge	6 (5.82%)	19(19%)	0.004
New medical problems requiring referral to their inpatients team	4(3.88%)	21(21%)	0.00017
Return visits to the emergency department	3(2.91%)	15(15%)	0.002

Values are presented as mean ± SD, P-value < 0.01 considered significant

Table 3. The major causes of new medical problems requiring referral to their inpatients team and return visits to the emergency department

Parameters	**Group A**	**Group B**
New medical problems requiring referral to their inpatients	**4(3.88%)**	**21(21%)**
Septicemia	0 (0.0%)	1(1%)
Diabetic retinopathy	1(0.97%)	2(2%)
Diabetic nephropathy	0(0.0%)	4(4%)
Urinary tract infection	1(0.97%)	5(5%)
Respiratory infection	1(0.97%)	5(5%)
Congestive heart failure	1(0.97%)	4(4%)
Return visits to the emergency department	**3 (2.91%)**	**15(15%)**
Diabetic coma	0(0.0%)	3(3%)
Diabetic ketoacidosis	0(0.0%)	5(5%)
Hypoglycemia	1(0.97%)	2(2%)
Asthma	1(0.97%)	1(1%)
Intestinal colic pain	0(0.0%)	2(2%)
Diarrhea and Vomiting	1(0.97%)	2(2%)

Values are presented as number and percentage in two groups

Table 4. Pharmacist intervention during the tele follow up of the patients in group A

Pharmacist intervention	**Group A**	**percentage**
Patients education about the disease	64	62.13%
Instructions about patients compliance with treatment	39	37.86%
Counseling on drug	36	34.95%
Adjustment of anti-diabetic medications	81	78.64%
Monitoring of blood sugar	79	76.69%
The advice about life style modification	25	24.27%
Instructions about diet	56	54.36%
Identify and resolve medication-related problems	45	43.68%

Values are presented as number and percentage

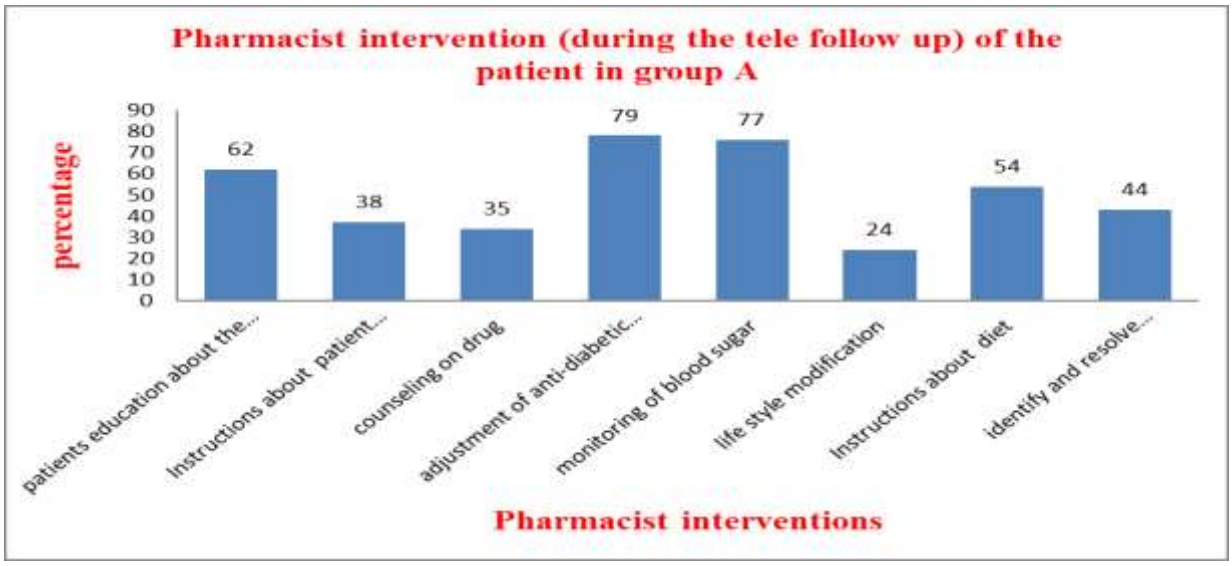

Figure 2. Pharmacist intervention (during the tele follow up) of the patients in group A

Discussion

Discharging patients from the hospital is complex process and hospital readmissions remain health care systems concern despite progress in reducing and preventing its occurrence [16].According to the Agency for Healthcare Research and Quality (AHRQ), more than 3.3 million readmissions occur every year within 30 days of hospital discharge [17].Those 65 and older are more likely to make a return trip to the hospital and account for roughly 55% of all hospital readmissions in the United States [17]. Patients who were readmitted within 8 days of discharge are more likely to be suffering from complications related to the original condition, while those who return to the hospital closer to 30 days after discharge often lacked follow-up care or developed a new condition [18]. Despite advances in the diagnosis and treatment of MRSA, readmission that increases the morbidity and mortality remain unacceptably high [19]. After hospital discharge, keeping the serum blood sugar of diabetic patients under the control and the preventable readmission to the hospital due to reinfection by MRSA is a challenging [19]. Reinfection by MRSA has been associated with more amputation in diabetic foot patients, treatment failure, which lead to increase rate of readmission to the hospital with increase health care costs and increased mortality [19]. Many patients encounter a variety of problems in the first weeks after they have been discharged from hospital to home especially diabetic patients, keeping their sugar level under control is not an easy topic as they need daily monitoring [20]. In order to help combat and prevent this complication and improve the discharge process, the healthcare provider must introduce a good patient's follow up plan after discharged [21]. Telephone follow-up considered as a good tool for patients follow up after discharge and pharmacist involvement in discharge plan is one among many strategies to facilitate the patients discharge process [22]. Pharmacists can play an important role in the hospital discharge plan as a member of the multidisciplinary team that treating the patients [22]. Telephone follow-up after discharge that introduced by pharmacists, is considered to be a good means of exchanging information, providing health education and advice, managing symptoms, recognizing complications early and giving reassurance to patients[23]. When the pharmacist involvement in discharge plan, can facilitate the patients discharge process and improve patients out come by identifying and reconciling medication discrepancies ,introduce patients education, giving instructions about patients compliance with treatment , consultation on medications to reduce adverse outcomes , dose adjustment of anti-diabetic medications , monitoring of blood sugar and keep it under control for diabetic patients ,give the advice about life style modification, giving instructions about diet, identify and resolve any medication-related problems[23]. All this activity can improve the discharge process and decreasing in the rates of readmission due to reinfection and fewer return visits to emergency department [23]. Although there were many previous studies show conflicting results regarding pharmacist involvement in the hospital discharge plan and impact of pharmacist interventions on reinfection and readmissions, this study demonstrated a positive impact of pharmacist involvement in the hospital discharge plan on decreasing in the rates of readmission due to re infection by MRSA after hospital discharge, fewer referral to inpatients team due to new medical problems that requiring referral, and decreasing in return visits to the emergency department, in this study the major causes of new medical problems requiring refer the patients to their inpatients team, and the most important cause of return visits to the emergency department are summarized in table (3) with noticed that all causes are complications related to the original condition and the most common causes of new medical problems requiring referral the patients to their inpatients team are urinary tract infection ,respiratory infection, diabetic nephropathy , congestive heart failure ,diabetic retinopathy, and septicemia . The most common cause of return visits of the discharged to the emergency department are diabetic ketoacidosis, diabetic coma, hypoglycemia, intestinal colic pain, diarrhea and vomiting, and asthma, the result of this study are confirm with previous studies [24]. study that evaluating impact of discharge phone calls on 30-day readmission rates which demonstrate that pharmacist intervention by medication reconciliation and education prior and post-discharge telephone follow-up improve patient's satisfaction and revealed a significant reduction of 17.3% to 12.4% ($p = 0.007$) in hospital readmission. A study that demonstrated the impact of comprehensive medication management by pharmacist tele follow up on hospital readmission rates in which the pharmacist intervention reduces the rate of readmission at 30 days post discharge and may have the largest impact among patients at highest risk of readmission comber with control group (8.6% vs. 12.8%, $P < 0.001$) [25]. Another study that determine the impact of pharmacist telephone intervention as part of a comprehensive discharge protocol on readmission which show there were a positive impact on patients during the transition of care process by reducing incidence of hospital readmission within 30 days of patients discharge and there was significantly reduced in the intervention group, compared with the contact group (0.227 vs 0.519, $p<0.001$) [26].

Although most studies that examining the impact of clinical pharmacist interventions by follow-up calls after hospital discharge with comprehensive medication education has shown positive impact on patients outcome and report reduced and prevent adverse drug effects with improve patients satisfaction but the impact of clinical pharmacists

involvement on readmissions has not been consistently demonstrated and there are conflicting data regarding the effect of clinical pharmacists' involvement in discharge plan on readmissions and return visits to the emergency department, (Pharmacist Assisting at Routine Medical Discharge) which is a prospective study to evaluate the impact of pharmacist interventions by follow-up phone call after discharge this study show patients receiving the pharmacist intervention demonstrated improved primary medication adherence and increased patients satisfaction but there was insignificantly difference between the intervention group and the contact group in the rate of hospital readmission ,it was 20.7% and similar between the intervention and control groups [(27)].

Despite the many studies that dealt with the issue of reducing readmission to hospital and returning visits to the emergency department. Patient's re-admission to the hospital is still an important and crucial health problem, which is very costly to the health system [(28)]. Preventing and avoiding readmission to the hospital required to the development of health care systems plans to include improving the medical and treatment services provided to the patients after discharge to achieve the goal of resolving and treating any medication related problem and reducing hospital readmission with increasing patient's satisfaction due to further improve the quality of life of patients [(29)]. Therefore, health system workers put many strategies to reduce re-admission to the hospital, and many of these strategies focus on follow- up of the patients after discharge from the hospital, especially high risk patients [(29)]. Initial post-discharge contact with patients that made by trained health care provider, good and complete a post-discharge care plan including improving medication management, discharge medical advice, patients education, and medication review to minimizing adverse effects of the drug all can have appositive impact on patients outcome and reducing readmission rates [(30)].

Limitations of this study include small sample size, single institution setting and the study did not address patient satisfaction, quality of life improvement, impact of reinfection on mortality and cost-effective impact of readmission to hospital due to re infection by methicillin-resistant Staphylococcus aureus (MRSA). Future studies should be performed investigating the impact of pharmacist interventions after discharge by follow-up phone call and of introduce clinical pharmacist discharge services in multicenter settings on mortality rate, such studies should also pay attention to aspects as patient's satisfaction and quality of life preferably using cost effectiveness of reinfection and readmissions as a clinical endpoint.

Conclusion

This experience determines that follow-up phone call by a clinical pharmacist after discharge of the patients was associated with improved patient's outcome by resolution of medication-related problems, keeping the serum blood sugar of diabetic patients under the control which lead to decrease in rates of readmission due to re infection by MRSA, fewer referrals to in patient's team due to new medical problems that requiring referral, and decrease in return visits to the emergency department

Recommendations

Development of health care systems plans to include improving the medical and treatment services that provided to the patients post-discharge by trained health care provider like pharmacists who is an important member of the multidisciplinary team in the healthcare system and involved in discharge planning to reach the goals in comprehensive treatment plan of patients and improve patient's outcome.

Ethical Consideration

The study was approved by the scientific committee of the Baghdad teaching hospital. All patients that participant in the study signed their written consent forms before participating in the study and give agreement to use their results.

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References

1. Oscalices MI, Okuno MF, Lopes MC, Campanharo CR, Batista RE. Discharge guidance and telephone follow-up in the therapeutic adherence of heart failure: randomized clinical trial. Revista latino-americana de enfermagem. 2019 Aug 19;27.
2. Alper E, O'Malley TA, Greenwald J, Aronson MD, Park L. Hospital discharge and readmission. UpToDate. Waltham, MA: UpToDate. 2017.
3. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. New England Journal of Medicine. 2009 Apr 2;360(14):1418-28.
4. Hansen LO, Young RS, Hinami K, Leung A, Williams MV. Interventions to reduce 30-day rehospitalization: a systematic review. Annals

of internal medicine. 2011 Oct 18;155(8):520-8.

5. Ravn-Nielsen LV, Duckert ML, Lund ML, Henriksen JP, Nielsen ML, Eriksen CS, Buck TC, Pottegård A, Hansen MR, Hallas J. Effect of an in-hospital multifaceted clinical pharmacist intervention on the risk of readmission: a randomized clinical trial. JAMA internal medicine. 2018 Mar 1;178(3):375-82.

6. Piper K, DeAndrea-Lazarus I, Algattas H, Kimmell KT, Towner J, Li YM, Walter K, Vates GE. Risk factors associated with readmission and reoperation in patients undergoing spine surgery. World neurosurgery. 2018 Feb 1;110:e627-35.

7. Lee AS, de Lencastre H, Garau J, Kluytmans J, Malhotra-Kumar S, Peschel A, Harbarth S. Methicillin-resistant Staphylococcus aureus. Nature reviews Disease primers. 2018 May 31;4(1):1-23.

8. Bhattacharya S, Pal K, Jain S, Chatterjee SS, Konar J. Surgical site infection by methicillin resistant staphylococcus aureus–On decline?. Journal of clinical and diagnostic research: JCDR. 2016 Sep;10(9):DC32.

9. Demoz GT, Wahdey S, Bahrey D, Kahsay H, Woldu G, Niriayo YL, Collier A. Predictors of poor adherence to antidiabetic therapy in patients with type 2 diabetes: a cross-sectional study insight from Ethiopia. Diabetology & Metabolic Syndrome. 2020 Dec;12(1):1-8.

10. Owens DR, Monnier L, Barnett AH. Future challenges and therapeutic opportunities in type 2 diabetes: C hanging the paradigm of current therapy. Diabetes, Obesity and Metabolism. 2017 Oct;19(10):1339-52.

11. Bain SC, Cummings MH, McKay GA. Multidisciplinary Approach to Management and Care of Patients with Type 2 Diabetes Mellitus. DIABETES. 2019 Nov.

12. Pyatak EA, Sequeira PA, Whittemore R, Vigen CP, Peters AL, Weigensberg MJ. Challenges contributing to disrupted transition from paediatric to adult diabetes care in young adults with type 1 diabetes. Diabetic Medicine. 2014 Dec;31(12):1615-24.

13. Preslaski CR, Lat I, MacLaren R, Poston J. Pharmacist contributions as members of the multidisciplinary ICU team. Chest. 2013 Nov 1;144(5):1687-95.

14. Yang S. Impact of pharmacist-led medication management in care transitions. BMC health services research. 2017 Dec;17(1):1-8.

15. Braun E, Baidusi A, Alroy G, Azzam ZS. Telephone follow-up improves patients satisfaction following hospital discharge. European journal of internal medicine. 2009 Mar 1;20(2):221-5.

16. Alper E, O'Malley TA, Greenwald J, Aronson MD, Park L. Hospital discharge and readmission. UpToDate. Waltham, MA: UpToDate. 2017.

17. Kim H, Ross JS, Melkus GD, Zhao Z, Boockvar K. Scheduled and unscheduled hospital readmissions among diabetes patients. The American journal of managed care. 2010 Oct;16(10):760.

18. Hoffman GJ, Liu H, Alexander NB, Tinetti M, Braun TM, Min LC. Posthospital fall injuries and 30-day readmissions in adults 65 years and older. JAMA network open. 2019 May 3;2(5):e194276-.

19. Watkins RR. Preventing Readmissions and Optimizing Outcomes for Staphylococcus aureus Bacteremia: Still a Long Journey Ahead. Infectious Disease Alert. 2020;39(4).

20. Mistiaen P, Francke AL, Poot E. Interventions aimed at reducing problems in adult patients discharged from hospital to home: a systematic meta-review. BMC health services research. 2007 Dec;7(1):1-9.

21. Mistiaen P, Poot E. Telephone follow-up, initiated by a hospital-based health professional, for postdischarge problems in patients discharged from hospital to home. Cochrane database of systematic reviews. 2006(4).

22. Haynes KT, Oberne A, Cawthon C, Kripalani S. Pharmacists' recommendations to improve care transitions. Annals of Pharmacotherapy. 2012 Sep;46(9):1152-9.

23. Harrison PL, Hara PA, Pope JE, Young MC, Rula EY. The impact of postdischarge telephonic follow-up on hospital readmissions. Population health management. 2011 Feb 1;14(1):27-32.

24. March KL, Peters MJ, Finch CK, Roberts LA, McLean KM, Covert AM, Twilla JD. Pharmacist Transition-of-Care Services Improve Patient Satisfaction and Decrease Hospital Readmissions. Journal of Pharmacy Practice. 2020 Sep 18:0897190020958264.

25. Budlong H, Brummel A, Rhodes A, Nici H. Impact of comprehensive medication management on hospital readmission rates. Population health management. 2018 Oct 1;21(5):395-400.

26. Sanchez GM, Douglass MA, Mancuso MA. Revisiting project re-engineered discharge (RED): the impact of a pharmacist telephone intervention on hospital readmission rates. Pharmacotherapy: The Journal of Human Pharmacology and Drug Therapy. 2015 Sep;35(9):805-12.

27. Sarangarm P, London MS, Snowden SS, Dilworth TJ, Koselke LR, Sanchez CO, D'Angio R, Ray G. Impact of pharmacist discharge medication therapy counseling and disease state education: Pharmacist Assisting at Routine Medical Discharge (project

PhARMD). American Journal of Medical Quality. 2013 Jul;28(4):292-300.

28. Fortis S, Weinert C, Bushinski R, Koehler AG, Beilman G. A health system-based critical care program with a novel tele-ICU: implementation, cost, and structure details. Journal of the American College of Surgeons. 2014 Oct 1;219(4):676-83.

29. Gholizadeh M, Delgoshaei B, Gorji HA, Torani S, Janati A. Challenges in patient discharge planning in the health system of Iran: A qualitative study. Global journal of health science. 2016 Jun;8(6):168.

30. Farris KB, Carter BL, Xu Y, Dawson JD, Shelsky C, Weetman DB, Kaboli PJ, James PA, Christensen AJ, Brooks JM. Effect of a care transition intervention by pharmacists: an RCT. BMC health services research. 2014 Dec;14(1):1-3.