

Discharge education and sepsis re-admission: An integrative review

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Abstract

Introduction: Hospital readmission has long been a threat to our country's healthcare system. Sepsis has recently become the number one disease condition resulting in readmissions following an initial inpatient hospital discharge. Increase in the number of sepsis survivors causes a huge burden to the healthcare system secondary to increased morbidity, mortality, utilization of health care resources, and transition to hospice. This integrative review explored the existing literature on the effect of post sepsis care education on reducing all cause readmission among sepsis survivors.

Methods: Pubmed, CINHAL, Cochrane, and Embase were used to survey the literature. The Preferred Reporting Items for Systematic Reviews and Meta- Analyses (PRISMA) flow chart was used to organize the search strategy and results.

Results: The results of this review suggest that hospitalization characteristics, in particular discharge education could be modified and targeted towards preventing readmissions following sepsis hospitalization. The sepsis discharge education needs to entail the signs and symptoms of infection, and significance of monitoring comorbidities, attending follow up visits, and peer support groups.

Keywords: Sepsis; Hospital readmission; Patient discharge education.

Introduction

Hospital readmission has long been a threat to our country's healthcare system. Acute myocardial infarction, heart failure, chronic obstructive pulmonary disease, and pneumonia were the primary disease conditions which were closely tracked by the CMS for readmission [1]. Sepsis has recently become the number one disease condition resulting in readmissions following an initial inpatient hospital discharge [1]. Out of 49 million people who are hospitalized with sepsis worldwide, 38 million survive (World Health Organization) [2]. Mortality associated with sepsis has declined over the past few decades resulting in large number of sepsis survivors with chronic comorbidities and new symptoms requiring medical care which eventually contributes to hospital readmissions [3].

According to the 2013 nationwide readmission database, the readmission rate following an index sepsis hospitalization was higher compared to that for AMI, Heart Failure, COPD, and Pneumonia [1]. Increase in the number of sepsis survivors causes a huge burden to the healthcare system secondary to increased morbidity, mortality, utilization of health care resources, and transition to hospice [4,5]. The annual costs associated with sepsis readmission in the U.S healthcare system

is estimated to be \$17.4 billion among Medicare recipients alone [6].

Given the vicious consequences associated with rehospitalizations, acquiring evidence to guide strategies to prevent rehospitalizations among adult sepsis survivors from the inpatient units is of foremost importance. Education on post sepsis care and the risk for readmission would be an ideal approach in preventing readmissions. Despite sepsis readmissions being potentially preventable, no standardized educational material on post sepsis care currently exists. This integrative review explored the existing literature on the effect of post sepsis care education on reducing all cause readmission among sepsis survivors.

Methods

This integrative review was guided by the question "What are the best practices for discharge education on post sepsis care among the hospitalized patients with an index hospitalization diagnosis of sepsis?". The following electronic databases were used to survey the literature: Pubmed, CINHAL, Cochrane, and Embase. The search was performed on September 12, 2019. No restrictions were applied in order to get an extensive over-

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view of published literature. The search strategy included the key words: Sepsis [Mesh] OR Bacteremia [Mesh] OR Fungemia [Mesh] OR "Shock, Septic"[Mesh] OR sepsis OR septic OR severe sepsis OR septic shock OR septicemia OR urosepsis AND Patient Readmission [Mesh] OR readmit* OR readmission* OR rehospital* OR hospital readmission AND patient discharge[Mesh] OR patient discharge education OR patient education OR hospital discharge OR discharge planning OR aftercare.

The Preferred Reporting Items for Systematic Reviews and Meta- analyses (PRISMA) flow chart was used to organize the search strategy and results (Figure 1). Initially, 302 articles were obtained by searching the databases. An additional 13 articles were obtained by screening the reference list for similar articles. After removal of duplicates 310 articles remained for review. An additional 291 articles were excluded by screening the titles and abstracts for criteria relevant to the practice question. Remaining 19 full text articles were reviewed for eligibility in final analysis based on exclusion criteria including publication date before 2000 and language other than English. Inclusion criteria of study population of hospitalized patients

with an index sepsis admission and discharge process with all-cause unplanned readmission was also used. Finally, 13 articles were excluded with the above reasons, and 6 articles were retained for evaluation and appraisal based on the Johns Hopkins Nursing Evidence-Based Practice Model, and analysis for review [7].

Results

Eight articles published between 2002 and 2018 were included in the final analysis and were found to contain explicit description of the factors contributing to readmission after sepsis discharge and the various strategies including education to prevent readmission. The selected articles consisted of one qualitative study, one randomized control trial, one integrative review, two non-research paper, and three quantitative studies. The studies took place at a range of outpatient/ inpatient sites throughout the world; six articles based in the United States, and the other two in other parts of the world. Using the Johns Hopkins Nursing Evidence- Based Practice Model and guidelines, each article was assessed for evidence level

Table 1: Table of Evidence.

Article Number	Author and Date	Evidence Type	Sample, Sample Size, Setting	Findings That Help Answer the EBP Question	Observable Measures	Limitations	Evidence Level, Quality
1	Di Palo, K. E. (2017) [8]	Quasi Experimental Quantitative	Sample includes 51Navigator Team patients and 43 control patients who were admitted with a primary diagnosis of heart failure. Setting: Montefiore Medical Center. Navigator Team consists of an RN trained in heart failure and a pharmacist who gives medication counselling and makes follow up appointments.	<ul style="list-style-type: none"> 30-day readmission rate was lower at 17.6% after interventions as compared to 25.6% with no intervention. There was statistically significant increase in education and follow up in the group that received navigation team intervention compared to those that didn't. 	30-day readmission rate	<ul style="list-style-type: none"> Small sample size (N=94) Conducted during summer and fall (seasonal trends of increased admission and mortality during winter months) Cardiac telemetry unit (not easily reproducible in non-cardiac telemetry unit) Quasi-experimental study (Not blinded or randomized) Standard of practice of the medical center affected readmission rate of the control group. 	Level III Quality B
2	Gehrke-Beck, S. (2017). [9]	Qualitative	Semi-structured interviews with 19 patients and 13 General Practitioners across Germany who participated in an aftercare program for post-sepsis patients, which included patient education and case manager monitoring.	<ul style="list-style-type: none"> Patients and general practitioners appreciated the education given by the case managers during the education session. Patients felt safer and cared for. Some patients disliked as it reminded them of their serious illness. 	Answers to semi-structured interviews.	<ul style="list-style-type: none"> Authors have concern about education for patients and delegation of tasks and care for GPs. There is possibility of bias accounting for the fact that data was obtained from two categories of people. There is a possibility of selection bias of motivated GPs and healthier patients as some of the GPs and patients declined due to various reasons. 	Level III, Quality A

3	Krumholz, H. M. (2002) [10]	Randomized Controlled Trial	<p>Sample:88 patients hospitalized with heart failure (44 in intervention group and 44 in control group) excluding patients transferred from other hospitals, patients admitted from nursing homes, patients with HF secondary to high-output states or noncardiac diseases and patients with terminal illness in addition to HF. Setting: Yale New Haven Hospital . Intervention: Patient education on heart failure management and survivorship by an experienced nurse trained in cardiology.</p>	<ul style="list-style-type: none"> Heart failure education was associated with a 39% decrease in the total number of readmissions (intervention group: 49 readmissions; control group: 80 readmissions, p=0.06). After adjusting for clinical and demographic characteristics, the intervention group had a significantly lower risk of readmission compared with the control group 	One -year readmission rate	<ul style="list-style-type: none"> Intervention was conducted at a single center which might hinder generalizability. Small sample size of 88. since the intervention lasted only one year, the optimal length of education is unknown 	Level 1 Quality B
4	Paratz, J. (2016) [11]	Randomized Controlled Trial	<p>Sample includes 20 post sepsis patients in intensive care and receiving respiratory support for greater than 48 hours (9 intervention and 11 control). The intervention group attended an outpatient clinic twice monthly for six months and received screening and targeted intervention.</p>	<ul style="list-style-type: none"> Patients in the intervention group were able to attend the follow up appointments which helped them improve the quality of life. Patients were satisfied by the content and explanation of clinic visit. 	Short form (36) health survey (SF36v2) result, re-admission to hospital, mortality in the first 12 months, and use of health resources in the first year	Sample size 20 is not adequate for a quantitative study.	Level I Quality B
5	Prescott, H. C. (2018) [12]	Integrative Review	<p>Analysis of 12 studies in the inpatient setting in the United States.</p>	<ul style="list-style-type: none"> Sepsis survivors experience new functional disability, cognitive impairment, and increased medical setbacks. It is important to educate on post sepsis syndrome, challenges of sepsis survivorship, strategies to promote recovery and adaptation and the importance of follow ups. Palliation of symptoms and peer support are essential to improve quality of life. 	Opinions on strategies to prevent readmission	Studies were not of high evidence, instead they were cohort studies.	Level V Quality A

6	Sun et al. (2016) [13]	Nonexperimental	444 adult sepsis survivors discharged home and at risk for unplanned readmission from the three acute care hospitals of University of Pennsylvania Health-System, between May 2012 and July 2012	<ul style="list-style-type: none"> Infection is the most common reason for readmission Infection prevention should be a key component of post sepsis care education. 	<ul style="list-style-type: none"> Relationship between acute hospitalization and 30-day readmission rate after sepsis discharge. Relationship of readmission with hospital-acquired infection and duration of antibiotics. 	<ul style="list-style-type: none"> Because of the use of a claims-based screening method, there is a possibility of missing improperly coded cases. In spite of adjusting for known risk factors, there is a potential for residual confounding. As admitted by the authors, primary ICD-9 readmission diagnosis often differs from the readmission cause from the chart review 	Level III Quality A
7	Venkatesan, C. (2014) [14]	Quality Improvement	A large community-based hospital in Virginia, United States. Residents were asked to carry out the interventions. Sample includes 254 patients in the intervention group and 331 in the comparison group.	<ul style="list-style-type: none"> 30-day readmission rate, within the 5 hospital health systems, in the intervention group was lesser than the comparison group. Interventions include determining the risk of readmission using RISK Assessment Tool, reminders to arrange early follow up, EHR prompts for patient education, and in person patient education using teach back. 	30-day readmission rate.	<ul style="list-style-type: none"> Multiple discharge diagnoses make it hard to generalize the finding to sepsis survivors. Difference in sample size between comparison and intervention group poses a question of consistency. 	Level V Quality A
8	Wiens, M. O. (2018) [15]	Nonexperimental	Setting-The Mbarara Regional Referral Hospital and the Holy Innocents Children's Hospital, both in Mbarara, Uganda. Sample included 202 children between ages 6 months and 5 years who were admitted with a suspected or proven infectious disease and then discharged home.	<ul style="list-style-type: none"> A bundle of interventions at discharge, including brief educational counseling and a post-discharge referral, can improve post-discharge care among children discharged from the hospital Discharge education likely played an important role in motivating the parents to bring their children for follow up, even though it did not bring down the readmission rate. 	<ul style="list-style-type: none"> Compliance with discharge referral for a follow-up visit at a health center or with a community health worker. Caregiver satisfaction with the interventions (the discharge kit and post-discharge referral). Post-discharge mortality rate, readmission rate, post discharge health care use. 	<ul style="list-style-type: none"> Small sample size compared to the earlier observational study makes it difficult to appreciate the difference. It may be difficult to incorporate post-discharge follow-up in the research context in a non-research context Age range was narrow. Bundle of interventions, makes it impossible to identify which components were critical in the outcome. 	Level III Quality C

and quality rating [7] (Table 1). The levels of evidence ranged from I-V, and the quality of the articles were good (Quality A or B) except for one.

Four articles pointed out the importance of discharge education in reducing readmission [9,12,14,15]. Two articles highlighted the importance of training nurses to educate patients on heart failure management and survivorship in reducing readmission [10,8]. Main concepts that emerged from the literature include modifiable causes and risk factors with special emphasis on index hospitalization characteristics, importance of post sepsis care education and the factors to be included in post sepsis care education.

Modifiable causes and risk factors

Longer length of stay, discharge to a facility, hospital acquired infection, volume overload, aspiration, medication reconciliation error, prolonged use of antibiotics, delayed sepsis recognition, delayed ambulation, lack of discharge instruction and proper follow up planning were found to be the potentially modifiable risk factors [12]. The most common cause for readmission following sepsis discharge is a new infection leading to an episode of sepsis [12,13]. Exacerbation of chronic medical conditions was also found to be contributing to readmission following sepsis discharges [12].

Effectiveness of post sepsis care education

Patients greatly appreciated the information given by the case managers on sepsis and post sepsis care [9,14]. Most of them

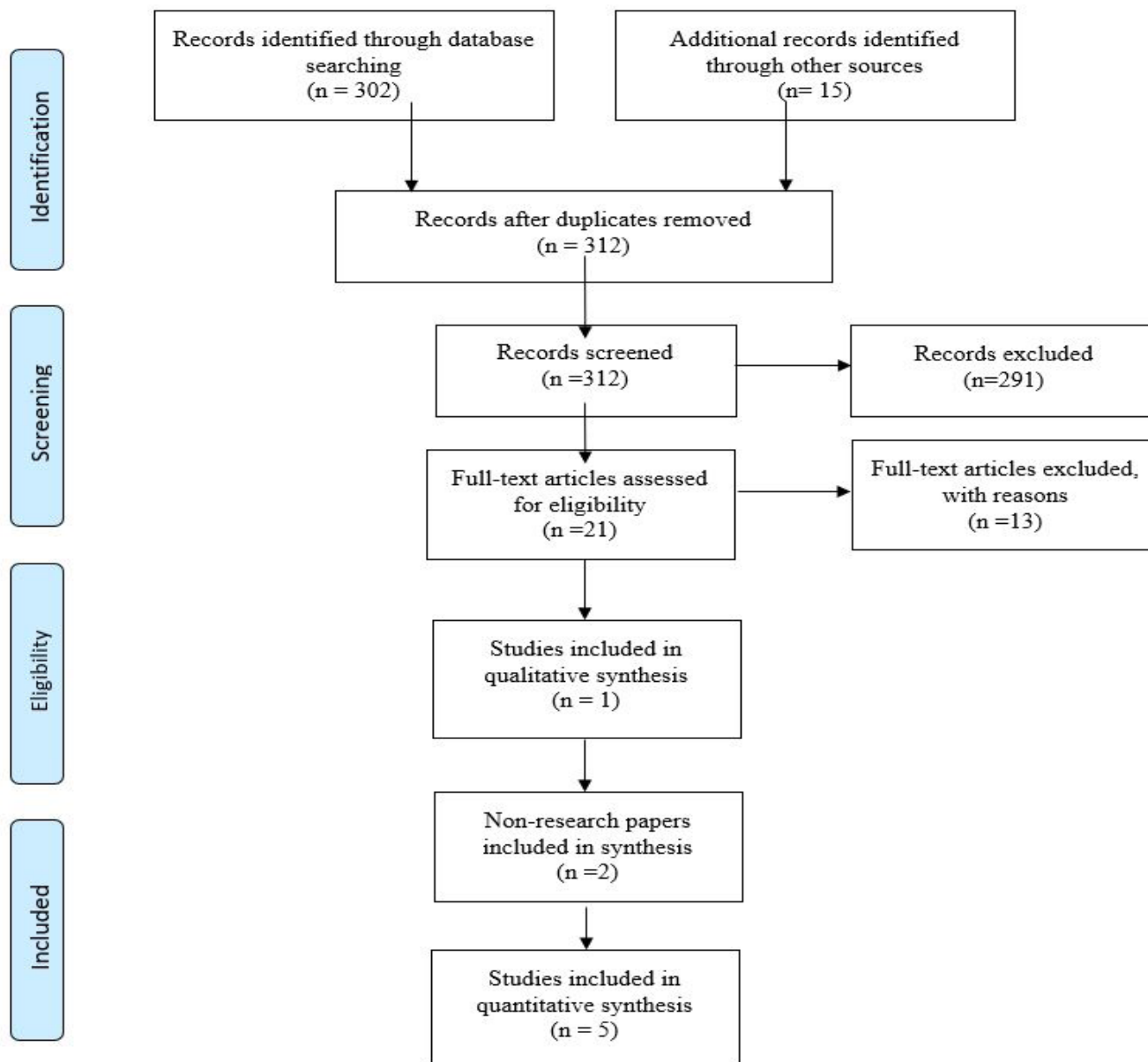


Figure 1: PRISMA flow diagram [16].

felt safer and cared for. Some patients disliked the education as it reminded them of their serious illness [9]. Brief educational counselling upon discharge improved post discharge care and motivated patients and their families to attend follow up appointments though it did not reduce the rate of rehospitalization [15].

Factors to be included in post sepsis care education

Medical care following sepsis hospitalization should be tailored to alleviate the risk for potential preventable causes of rehospitalization including infection and exacerbation of chronic medical conditions [12,13]. Post sepsis care education should include strategies to reduce the risk for infection-related readmission including vaccine currency and counseling regarding risk for recurrent infection and when to seek medical care [12]. Identification of infection especially when accompanied by signs and symptoms of acute organ dysfunction such as confusion and decreased urine output needs to be an unavoidable educational point [12]. It is important to follow up with primary care within a week following discharge and to be

aware of the alternatives in case of an emergency [11,14,15]. Patients should also be educated on aspiration precautions [12].

Discussion

There are modifiable and non-modifiable causes and risk factors which result in readmissions after a sepsis hospitalization. Patient socio-demographics, comorbidities, and hospitalization characteristics are associated with 30-day readmission following a sepsis hospitalization [17,18]. Modifiable hospitalization characteristics include longer length of stay, discharge to a facility, hospital acquired infection, volume overload, aspiration, medication reconciliation error, prolonged use of antibiotics, delayed sepsis recognition, delayed ambulation, lack of discharge instruction and proper follow up planning. Infection was found to be the most common cause for rehospitalization among sepsis survivors [12]. Discharge education on post sepsis care and the risk for readmission would be an ideal approach in preventing readmissions. Currently there is a gap in applying the existing evidence for standardized educa-

tion on post sepsis care.

This integrative review explored the existing literature on the effect of post sepsis care education on reducing all cause readmission among sepsis survivors. Main aspects related to post sepsis care that emerged from the literature include modifiable causes and risk factors with special emphasis on hospitalization characteristics, importance of post sepsis care education and the factors to be included in post sepsis care education.

Infection, in particular a new infection being the common cause for readmission among sepsis survivors, preventing infection in all the possible ways including vaccine currency and counseling regarding risk for recurrent infection and when to seek medical care can be thought of as a significant component of post sepsis care [12,13]. Comorbidities are common among sepsis survivors [3]. Monitoring and controlling comorbidities are also of prime importance in preventing readmissions.

Out of the six studies analyzed, five included adult population except for the one study which had children between the ages of 6 months and 5 years as the population. Discharge education was received by their parents. Even though discharge education on sepsis did not reduce the rate of readmission, it greatly influenced post sepsis care and encouraged the patients and their families to attend the upcoming appointments [15]. Hygienic practices, signs and symptoms of infection, and importance of early and nearby care were included in the education.

Despite its importance in post sepsis care, follow up visits should be weighed against potential benefits. Burden of multiple comorbidities might make it impossible for patients to attend multiple appointments. Follow up planning should be done wisely so that multiple issues could be addressed in a single visit. Patients need to be made aware of the new challenges including difficulty with memory and concentration, anxiety and depression, and weakness and difficulty completing routine tasks [12]. Strategies to promote recovery following sepsis include working to build up strength and stamina and attending peer support groups [12].

Peer support has been recognized as an intervention to improve the quality of life for sepsis survivors. Through peer support groups patients get an opportunity to know how other sepsis survivors are coping up with the challenges of survivorship and to share their experiences with their peers. Discussion about palliation of symptoms is unavoidable [12]. Aspiration precautions and early mobility were also found to be closely related to better sepsis survivorship.

This review has demonstrated the importance of modifying the risk factors for readmission and improving sepsis survivorship through effective discharge education. It also reminds us about the importance of considering patient's emotions while delivering information about the disease. The results of this review can be utilized while developing protocols for discharging patients with sepsis. Additionally, this review suggests that certain patients may be more likely to be readmitted, so additional research is needed to determine if targeting specific groups would be most beneficial.

Limitations

This review has several limitations. There was only one study which was level 1 [11]. More high-quality articles would have strengthened this review. Most of the studies were with moderate evidence as they were cohort studies. The study by [9] only emphasized the importance of education on post sepsis care but did not provide the details of patient education by the case managers. The study by [15] provides the details included in patient education, but the study did not bring down the rate of readmission. Three studies included in the review were not US based, which makes it difficult to generalize the findings to the US population.

Conclusion

The purpose of this integrative review was to identify the best practices for post sepsis care education and its effect on reducing all cause readmission among sepsis survivors. The results of this review suggest that hospitalization characteristics, in particular discharge education could be modified and targeted towards preventing readmissions following sepsis hospitalization. Relevant findings from six studies were identified and integrated into three main themes, which then provided the framework for recommendations that could be merged into the current discharge education. Those recommendations include recognizing the signs and symptoms of infection, monitoring comorbidities, and attending follow up visits, and peer support groups. This review ultimately acts as a foundation for future exploration into the relationship between post sepsis care education and the quality of life of patients who received that education. Further research should address the limitations and gaps in knowledge acknowledged in this review; moreover, it will be critical to the development and implementation of best practices to combat the escalating all cause readmission among sepsis survivors.

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