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The Impact of Case Management on Reducing Readmission for Patients Diagnosed With Heart Failure and Diabetes

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ABSTRACT

Purpose of the Study: To determine the impact of integrated case management services versus treatment as usual (TAU) for patients diagnosed with diabetes and concomitant heart failure.

Primary Setting: This medical chart review was conducted at a single-site facility. The retrospective study design can be implemented at other facilities with a similar landscape.

Methods: A retrospective, descriptive, comparative analysis of integrated case management services compared with TAU from a medical chart review of 68 patients from September 1, 2015, through July 31, 2017. A medical chart review was conducted to generate the study sample for data collection and analysis. The data were organized, cleaned, and prepared and then analyzed. The data were analyzed using SPSS and verified with SAS and R. Applied were descriptive statistics and statistical tests—*t* test, χ^2 test, Mann–Whitney *U* test, and Logistic Regression.

Results: For the integrated case management group, there were 18.4% who readmitted whereas 81.6% did not. For the TAU group, there were 52.6% who readmitted and 47.4% who did not. The association between readmission and case management was χ^2 (1, n = 68) = 6.372, p = .012.

Nursing Implications: Integrated case management services were statistically significant in reducing readmission for the sample. Demographics tested in this study were not significant predictors for readmission. Extending length of stay for patients who are not medically ready for discharge should be considered because there is a cost difference, as there is evidence of readmission reduction. Policy and procedural amendments can be obtained from this study.

Key words: *case management, diabetes, evaluation, heart failure, readmission*

Quality of care is a national focus in health care (Agency for Healthcare Research and Quality [AHRQ], 2017). To evaluate the quality of care for inpatient prospective payment system (IPPS) hospitals, the Medicare Payment Advisory Commission (MedPAC) analyzes readmission and mortality rates, as well as patient satisfaction (MedPAC, 2014). A quality improvement effort that is associated with improved quality of care is case management (Joo & Liu, 2017). Implementing case management aids clinicians in determining a patient's needs to improve a patient's outcome and support autonomy (Bauman & Dang, 2012; Dunbar et al., 2014; Parker & Smith, 2010), although the efficacy of case management interventions is less well studied. Incorporating case management into the treatment plan for high-risk patients, specifically those who have been diagnosed with diabetes and concomitant heart failure (HF), may improve self-managed care and help reduce both hospitalizations and readmissions (Dunbar et al., 2014).

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For the integrated case management group, there were 18.4% who readmitted whereas 81.6% did not. For the treatment as usual group, there were 52.6% who readmitted and 47.4% who did not. Integrated case management services were statistically significant in reducing readmission for the sample.

The American Nurses Credentialing Center (ANCC) defines nursing case management as a way in which health care services are coordinated and dispensed for a specific population to streamline the disrupted system of health care (ANCC, 2017). Since 1970, the goal of case management has been to reduce costs and increase quality of care (Leonard & Miller, 2012; White & Hall, 2006). Inpatient case management emerged in response to the burgeoning issues of cost and service inefficiencies that resulted in a decline in hospital revenue (White & Hall, 2006). Case management services are implemented in a variety of settings from acute care, home care, to delivery via insurance companies (White & Hall, 2006). The philosophy guiding case management allows for any individual to receive case management services regardless of ethnicity or payor source (Leonard & Miller, 2012). Although anyone is eligible to receive case management services, case management is voluntary; thus, patients are allowed to refuse services (Leonard & Miller, 2012; Sibley, 2017). Dharmarajan et al. (2013) examined patterns of 30-day readmission among patients diagnosed with HF, acute myocardial infarction, or pneumonia. The researchers found that readmission was frequent within 30 days. Developing targeted interventions to reduce readmission was needed. Therefore, the evidentiary support that case management impacts the readmission rate for this sample is beneficial in that it offers a strategy for improving the quality of care at a hospital (AHRQ, 2017).

Pathophysiology

Heart failure in a patient diagnosed with diabetes is complex and multifactorial (Bugger & Abel, 2014). There are three types of cardiomyopathy (HF). The first type is dilated HF, which is the most common type of HF. The second type is left ventricle HF, where the heart does not pump efficiently because it is enlarged or hypertrophic, which is abnormal thickening of heart muscle. This thickening threatens the ability to pump, forcing the heart to work harder. The third type of HF is restrictive where the heart becomes rigid and is unable to fill properly between beats of the heart (University of Iowa, 2017). A typical patient diagnosed with diabetes and concomitant HF presents with edema, possible skin infections due to shortness of breath—even at rest, renal failure due to diabetes, mild proteinuria, irregular pulse, an inability to lie flat, elevated jugular vein distention, and abnormal heart sounds (Black & Hawks, 2005).

Insulin and glucose build up in the bloodstream when the insulin receptors are disrupted because of an accumulation of fat in the cell. This metabolic disturbance causes oxidative stress autonomic neuropathy, activation of renin angiotensin system (RAS), and impaired calcium homeostasis. More than 95% of adenosine triphosphate (ATP) generates in the heart. ATP is derived from oxidative phosphorylation in the mitochondria under normoxic conditions. If ATP is depleted, contractility is impaired, which can induce oxidative stress. Mitochondrial disruption increases oxidative lipids, forcing the heart to use more fatty acids and less glucose but decreasing in strength (Abel, 2018). The RAS is activated because of uncontrolled or chronic hyperglycemia and this threatens vascular pressure (Chawla, Sharma, & Singh, 2010). Autonomic neuropathy occurs because of increased oxidative stress (Vinik, Maser, Mitchell, & Freeman, 2003). Oxidative stress results from overproduction of reactive oxygen species, which is associated with hyperglycemia and metabolic disorders causing chronic inflammation and fibrosis on tissues (Kayama et al., 2015). Impaired calcium homeostasis impairs cardiac contractility because of the diminished ability of ATP to uptake calcium. Endothelial dysfunction occurs in coronary vessels and impairs blood flow, which is important for homeostasis of the body and can exacerbate the development of atherosclerosis. Cardiac fibrosis develops from collagen deposits because of hyperglycemia (Kasznicki & Drzewoski, 2014).

Health Policy

In the 2010 Patient Protection and Affordable Care Act (PPACA), Title III, Section 3502, case management is defined as a process to improve the delivery of health care services. The Act further stipulates that case management should deliver services through the implementation of an effective approach. Title III: Section 3025 of the PPAC further stipulates that the Hospital Readmission Reduction Program (HRRP) should penalize hospitals by recouping reimbursement for readmitting patients with the qualifying

An innovation center through the Centers for Medicare and Medicaid Services (CMS) supported the implementation of 24 active innovation case management models in the District of Columbia alone and 1,683 models nationwide.

conditions of HF, myocardial infarction, and pneumonia. This section also mandates that hospitals publish readmission rates for specific disorders (Centers for Medicare & Medicaid Services [CMS], 2017). Notably, the more recent Patient Freedom Act of 2017 does not include a case management mandate at this time (Cassidy, 2017).

An innovation center through the CMS supported the implementation of 24 active innovation case management models in the District of Columbia alone and 1,683 models nationwide. For example, an innovation model called the Medicare Coordinated Care Demonstration Project designated patients who have two or more chronic illnesses coupled with a readmission history as requiring care coordination. In addition, pilot projects at 15 sites nationwide, including District of Columbia, employ a twofold intervention—case and condition management for the Medicaid population who were also eligible for Medicare Parts A (inpatient) and B (outpatient) were enrolled and evaluated for improvements in patient outcomes and satisfaction, as well as fiduciary responsibility (CMS, 2017).

In addition, the Code of Federal Regulations, Title 42, mandates that hospitals provide case management services, specifically discharge planning, as a basic hospital function (Supplementary Digital Content Appendix A available at http://links.lww.com/PCM/A10). In 2017, penalties under the HRRP required that a 1%–3% payment reduction would be implemented for 92% of major teaching hospitals and 89% of hospitals that treat patients from a low socioeconomic status. The HRRP penalties enacted a reduction in payments to 80% of hospitals where the quality of care across one outcome, in particular, was the readmission for older patients, as the geriatric population diagnosed with multiple comorbidities is most at risk (Bisiani & Jurgens, 2015). According to Jencks, Williams, and Coleman (2009), among the 11,855,702 hospital discharges who were Medicare beneficiaries, approximately 19.6% were readmitted within 30 days. Notably, more than half of the above discharges did not reflect through claims that patients followed up with a primary care physician between the index discharge and readmission (Jencks et al., 2009).

In this project, determining the effectiveness of a case management approach was achievable due to the use of a 30-day end point as the dependent variable for the target population of patients diagnosed with HF and diabetes. The study is impactful because hospital readmission is a quality measure set forth in Section 3025 of the Affordable Care Act and Section 1886(q) of the Social Security Act that mandated monetary penalties for IPPS hospitals. The diagnosis of HF is an additional quality measure the CMS tracks for the HRRP. Furthermore, the hospital policy, where the study was conducted, states that patients with core measure diagnoses should receive case management services.

Financial Implications

Goodell, Bodenheimer, and Berry-Millett (2009) found that the average per capita spending by the number of chronic conditions was $5,062 if the subject was diagnosed with two chronic conditions and $16,819 if the subject was diagnosed with five or more chronic conditions. The case management services, where the study was conducted, was a focused approach that provided higher quality of care and improved efficiency to align with recent health care reform policies (Fraser, Perez, & Latour, 2018).

An estimated $375.9 billion accounts for the aggregate of expenditures for inpatient admissions in the United States (Pfuntner, Wier, & Steiner, 2013). It is the fiscal responsibility of the nurse case manager to be aware that 30-day hospital readmission costs Medicare approximately $17.4 billion per year (Jencks et al., 2009). MedPAC indicated that 30-day readmissions are avoidable (McIlvennan, Eapen, & Allen, 2015; MedPAC, 2018). Furthermore, the MedPAC reported that the cost for every readmitted patient is $7,200 (MedPAC, 2018).

Heart failure in the person with diabetes results in a high rate of readmission (Krumholz et al., 2002). However, disease management programs have a favorable impact on changing this direction. Still, the research is limited as to the effectiveness of a definitive case management approach for this population (Terra, 2007). Therefore, the significance of this study stems from the variety of case management approaches implemented globally to address the prevalence of readmission among patients diagnosed with both diabetes and HF (Terra, 2007).

Diabetes and HF

Approximately 20 million Americans are diagnosed with diabetes mellitus, an equivalent of 8.3% of the adult population. The increased incidence of obesity is directly proportional to the increased prevalence of diabetes mellitus (Sidney, Rosamond, Howard, &

The incidence of heart failure in individuals with diabetes is 9%–22% higher than that in those who do not have diabetes, and its incidence is highest among women aged 70 years and older.

Luepker, 2013). Research shows that there is a link between developing HF in patients with diabetes. Heart failure has increasingly become one of the most common complications of diabetes in recent years as well as a major societal and financial burden owing to deficient outcomes, increased readmissions, and increased incidence (Dunbar et al., 2014; Kilgore, Patel, Kielhorn, Maya, & Sharma, 2017; Sanchez, 2002).

The incidence of HF in individuals with diabetes is 9%–22% higher than that in those who do not have diabetes, and its incidence is highest among women aged 70 years and older (Nesto, Colucci, Nathan, Yeon, & Mulder, 2015). Approximately 5.7 million people have been diagnosed with HF. The general mortality rate for individuals with HF 55 years of age or older is 39.1% for women and 71.8% for men over 15-year total time frame (National Heart, Lung, and Blood Institute, 2015; Shockenn, Arrieta, Leaveton, & Ross, 1992). Heart failure was documented as the underlying cause in 56, 410 out of more than 200,000 individuals (Sidney et al., 2013). Marcinkiewicz, Ostrowski, and Drzewoski (2017) found that persons diagnosed with diabetes who are also diagnosed with HF have a higher mortality rate than their counterparts who do not have a diabetes diagnosis. Furthermore, patients diagnosed with diabetes are two to three times more likely to be diagnosed with HF than people who do not have diabetes. Approximately 30%–47% of people diagnosed with diabetes also suffer from HF (Dunbar et al., 2014). Patients diagnosed with diabetes mellitus are also at a 29% increased risk for developing HF compared with 18% matched control of patients who do not have the diagnosis of diabetes. Heart failure is treated as a first priority when the patient has the comorbidity of diabetes because a poorer prognosis is associated with HF. In comparison with patients not diagnosed with diabetes, patients diagnosed with diabetes who present with reduced and preserved left ventricular ejection fraction are associated with increased mortality and morbidity rates (Rosano, Vitale, & Seferovic, 2017). Of interest, for hospitalized patients diagnosed with HF and diabetes, it is cardiac decompensation that is generally treated over metabolic abnormalities. Beneficial treatment of patients diagnosed with HF and diabetes include beta-blockers and angiotensin-converting enzyme inhibitors, as their use is associated with a reduction in hospitalizations and mortality (Rosano et al., 2017). With an estimated $2 trillion in expenditures on inpatient care in the United States, hospital readmission within 30 days of discharge is a significant problem, and many readmissions within 30 days are avoidable (McIlvennan et al., 2015). Readmissions are problematic because they are associated with an increase in health care costs (Jencks et al., 2009). Jencks et al. (2009) also found that readmissions were associated with increases in length of stay, gaps in care, fragmented follow-up care, and poor patient outcomes.

To address poor patient outcomes, nurses can implement a variety of broad interventions developed to improve chronic illness, specifically HF in a patient diagnosed with diabetes. Nurses are uniquely equipped to provide case management strategies to help improve the quality of care for persons diagnosed with diabetes and HF, while also reducing 30-day readmissions and the risks associated with readmission (Fraser et al., 2018). The purpose of this retrospective medical chart review was to evaluate the effectiveness of the integrated case management (ICM) services provided at a single-site facility as evidenced by readmission reduction. In addition, this research will demonstrate how Donabedian's Quality framework served as a pillar for the aforementioned intervention (Donabedian, 2003; Lukkarinen & Hentinen, 1997; Parker & Smith, 2010; Voors & Horst, 2011; see Figure 1).

Theoretical Framework

According to McDonald et al. (2007), in order for a case management program to optimize its services, the nurse case manager should base the program upon a theoretical or conceptual framework, as the framework is an integral aspect of nursing

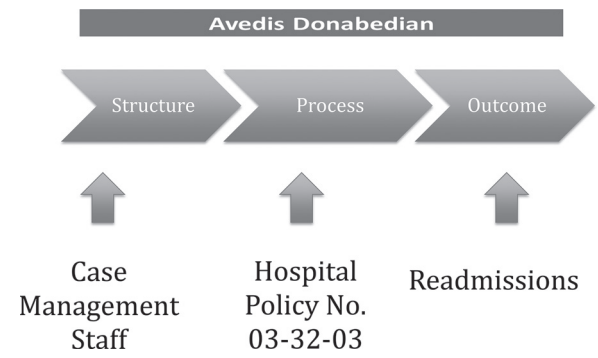

FIGURE 1
The Donabedian Quality Framework applied to integrated case management services for 68 subjects diagnosed with diabetes and heart failure, Case Management Impact, Washington, DC, 2015–2017.

that contributes to the reduction of readmissions for patients with diabetes diagnosed with HF. Furthermore, using evidenced-based guidance in conjunction with a framework is necessary for it to be recognized as credible science (Chinn & Kramer, 2011), and the use of an appropriate theory assists health care professionals in designing relevant programs more efficiently (Edberg, 2015). As such, the Donabedian's Quality Framework (2003) serves as the pillar for this scholarly project. This framework provides a three-categorical approach for evaluating the quality of nursing care, which involves three primary concepts: structure, process, and outcome (see Figure 1). Structure refers to the apparatus employed to provide care to include staff, infrastructure, and fiscal responsibility. The interpretation is that ICM services are directly related to high-quality care. Central to the Donabedian framework is the process aspect. Process reflects the interaction between the health care provider and the patient receiving case management services. Nurse case managers should be knowledgeable to coordinate services effectively for diabetic patients with HF (Hickey & Brosnan, 2017). Applying the core functions of case management including culturally appropriate assessment, planning, implementation, coordination and interaction, monitoring, and evaluation, as well as outcomes, facilitates the care delivery administered for the target population.

Finally, the outcome aspect of the Donabedian Quality Framework specifies the frequency with which people with diabetes and HF are admitted and includes significant identifiers for the target population. The standard is that the readmission rate declines owing to the implementation of the case management services. Establishing criterion and standards to correlate with the approaches of the Donabedian Quality Framework not only clarifies the evaluation of the case management services but also systematizes the assessment.

Intervention

Integrated case management services intervention refers to services provided by the health care team in order to create a comprehensive discharge plan. This study focuses only on the discharge planning aspect of case management services where case managers consisting of social workers and nurses prioritize discharge needs, considering coverage for the length of stay (LOS). Case managers assess, plan, implement, evaluate, and interact to devise a cohesive plan for a defined population in order to defragment the health care system, improve the quality of care provided, decrease costs, and contribute to patient-centered care. For example, case managers coordinate transportation and home health for the client, as needed. In accordance with the CMSA's Standards of Practice, ICM services guides accountability in case management practice. From a single point of contact, its purpose is to address high-risk patients. The assessment of ICM services focuses on the interaction of four domains: biological (medical), psychological (behavioral/mental), social, and health system. The biological domain is defined as symptoms or conditions that the patient presents within the last 6 months. The social domain refers to the patient's support system or the disruption of support. Access to care and associated providers defines the health system domain. The biological, social, and health system domains do not review a patient's history beyond 6 months, except in the case of chronic conditions (i.e., HF and diabetes). The psychological domain examines the lifetime of the patient, however, to determine whether any behavioral conditions exist, as patient's history is a useful indicator for future risk (Fraser et al., 2018).

Findings

Table 1 represents the number of patients who received the intervention and readmitted or did not readmit versus the group of patients who received treatment as usual (TAU) and readmitted or did not readmit. A total of 68 patients were included in the study from September 1, 2015, through July 31, 2017.

Baseline Characteristics

The two groups were well balanced. The average age was 78 years for the intervention group (ICM) and 76 years for the TAU group. Both groups averaged 14

TABLE 1
Thirty-Day Readmission Rates (N = 68), Case Management Impact, Washington, DC, 2015–2017[a]

	Returned in 30 Days *n* (%)	Did Not Readmit in 30 Days *n* (%)	Total *n* (%)
Received the intervention	9 (18.4)	40 (81.6)	49 (72.0)
Did not receive the intervention	10 (52.6)	9 (47.4)	19 (27.9)
Total	19 (27.9)	49 (72.0)	68 (100.0)

[a]Chi-square test with continuity correction: χ^2 (1, n = 68) = 6.372, p = .012. Thirty days is defined as post index admission. % = percentage of subjects within each group.

TABLE 2
Selected Characteristics Overall of 68 Subjects Diagnosed With Diabetes and Heart Failure Categorized by Readmissions, Case Management Impact, Washington, DC, 2015–2017

Characteristics	ICM	TAU	*p*
Age	77.8 (11.7)	76.4 (13.8)	.46[a]
Blood pressure (diastolic)	71.0 (17.0)	72.0 (26.0)	.56[a]
BMI	28.8 (9.8)	23.7 (15.0)	.22[b]
BP SYS	138.0 (23.7)	136.0 (24.4)	.81[b]
BUN/Cr	23.5 (10.0)	24.3 (8.0)	.76[b]
Comorbidity	5.9 (2.3)	5.5 (3.1)	.98[a]
GFR	20.0 (48.0)	14.5 (36.0)	.69[a]
Glucose	190.0 (105.0)	144 (69.0)	.42[a]
HgbA1c	7.8 (0.0)	0.0 (0.0)	.37[a]
Polypharmacy	13.9 (5.1)	13.8 (6.4)	.96[b]
Pulse	80.6 (17.8)	84.6 (19.1)	.41[b]
Respirations	18.7 (5.1)	20.6 (4.6)	.15[b]
Temperature	98.0 (0.0)	97.9 (0.0)	.22[a]
Weight (kg)	85.5 (32.1)	72.4 (38.7)	.16[b]

Note. BMI = body mass index; BP SYS = blood pressure systolic; BUN/Cr = blood urea nitrogen and creatinine; GFR = glomerular filtration rate; ICM = integrated case management services; TAU = treatment as usual.
[a]Mann–Whitney *U* test; median (interquartile range).
[b]Independent samples *t* test; *M* (*SD*).

TABLE 3
Selected Characteristics Overall of 68 Subjects Diagnosed With Diabetes and Heart Failure Categorized by Readmissions, Case Management Impact, Washington, DC, 2015–2017

	ICM		TAU		
Characteristics	*n*[a]	(%)	*n*[a]	(%)	*p*
Ethnicity					1.0[b]
Latino	1	(2.0)	0	(0.0)	
Not Latino	48	(98.0)	19	(100.0)	
Wound					.36[b]
Not present	45	(91.8)	17	(89.5)	
Ileostomy	1	(2.0)			
Cellulitis	1	(2.0)	1	(5.2)	
Rash			1	(5.2)	
Foot ulcer	1	(2.0)	0	(0.0)	
LE edema and blisters	1	(2.0)	0	(0.0)	
Neurological status					.78[b]
Alert and oriented ×3	40	(81.6)	12	(63.2)	
Not alert and oriented ×3	9	(18.4)	7	(36.8)	
Insurance					.27[b]
Medicare	42	(85.7)	17	(89.4)	
Other	7	(14.2)	2	(10.5)	
Discharge disposition					.03[b]
Home/self-care	23	(46.9)	15	(78.9)	
Other	26	(53.0)	4	(21.0)	
Preferred language					1.0[b]
English	48	(98.0)	19	(100.0)	
Spanish	1	(2.0)	0	(0.0)	
Race					.17[b]
Caucasian	25	(51.0)	9	(47.4)	
African American	20	(40.8)	8	(42.1)	
Asian	1	(2.0)	1	(5.3)	
Other	3	(6.1)	1	(5.3)	
Gender					1.0[b]
Male	26	(53.1)	7	(36.8)	
Female	23	(46.9)	12	(63.2)	

Note. ICM = integrated case management services; LE= lower extremity; TAU = treatment as usual.
[a]*n* (%) represents frequency (percentages of the sample).
[b]The *p* value was generated using χ^2, exact test.

medications upon index admission and the average glucose was abnormal (see Table 2). Predominately Medicare carriers were indicated as the primary insurance, 85.7% in the ICM group and 89.4% in the TAU group. In regard to gender, 46.9% indicated female for the ICM group whereas 63.2% indicated female for the TAU group (see Table 3). Most notable, though, was that the hemoglobin A1c (HbA1c) was not drawn for on the index admission, save one patient in the ICM group (see Table 2).

Readmission

Descriptive statistics for the 19 patients who readmitted indicated an average of five comorbidities for the TAU group and six comorbidities for the ICM group (see Table 4). Predominately Medicare carriers were indicated as the primary insurance for both groups. In regard to gender, 33.3% were male in the case management group and 40% were male in the TAU group, for those who readmitted (see Tables 5 and 6). Approximately four medications were reflected on average for the ICM group compared with one medication in the TAU group ($p = .01$; see Table 4). In the intervention group, subjects reflected an average of 191 for glucose and 138 in the TAU group. The age for the ICM group averaged 81 years and 78 years of age for the TAU group (see Table 4). Also in the ICM group, subjects' weight in kilograms averaged 98.1 compared with 91.8 in the TAU group (see Table 4).

Primary End Point

A total of 81.6% of patients received case management services and did not readmit within 30 days for the time period of the study. Among the patients who received TAU, 52.6% readmitted within 30 days and 47.4% did not readmit within 30 days. In the primary end point, the statistical significance between

TABLE 4
Selected Characteristics of 19 Subjects Diagnosed With Diabetes and Heart Failure Categorized by Readmissions, Case Management Impact, Washington, DC, 2015–2017

Characteristics	ICM	TAU	*p*
Age	81.4 (8.9)	78.4 (15.2)	.66[a]
Blood pressure (diastolic)	67.3 (15.0)	77.1 (15.1)	.15[a]
BMI	24.5 (5.1)	30.3 (12.7)	.25[b]
BP SYS	138.0 (25.2)	139.0 (20.3)	.93[b]
BUN/Cr	23.4 (5.2)	21.0 (5.51)	.33[b]
Comorbidity	6.0 (2.6)	5.40 (2.3)	.96[a]
GFR	17.7 (17.6)	17.7 (18.9)	.88[a]
Glucose	191.0 (79.4)	138.0 (77.1)	.05[a]
HgbA1c	0.0 (0.0)	0.0 (0.0)	.0
Polypharmacy	4.0 (3.3)	1.20 (0.6)	.01[a]
Pulse	15.7 (6.0)	12.7 (7.1)	.33[b]
Respirations	81.2 (15.7)	92.4 (22.1)	.22[b]
Temperature	20.2 (3.0)	20.5 (3.8)	.86[b]
Weight (kg)	98.1 (0.33)	91.8 (18.9)	.18[a]

Note. BMI = body mass index; BP SYS = blood pressure systolic; BUN/Cr = blood urea nitrogen and creatinine; GFR = glomerular filtration rate; ICM = integrated case management services; TAU = treatment as usual.
[a]Mann–Whitney *U* test; median (interquartile range). Hemoglobin A1c = 0.0 value indicates that laboratory test results were not documented in the medical record.
[b]Independent samples *t* test; *M* (*SD*).

TABLE 5
Selected Characteristics of 19 Readmitted Subjects Diagnosed With Diabetes and Heart Failure Categorized by Readmissions, Case Management Impact, Washington, DC, 2015–2017

Characteristics	ICM 30-Days End Point *n*[a]	(%)	TAU 30-Days End Point *n*[a]	(%)	*p*
Ethnicity					.86[b]
Latino	0	(0.0)	0	(0.0)	
Not Latino	9	(100.0)	10	(100.0)	
Wound					.54[b]
Not present	8	(88.8)	9	(90.0)	
Ileostomy	0	(0.0)	0	(0.0)	
Cellulitis	1	(11.1)	0	(0.0)	
Rash	0	(0.0)	1	(10.0)	
Foot ulcer	0	(0.0)	0	(0.0)	
LE edema and blisters	0	(0.0)	0	(0.0)	
Neurological status					.12[b]
Alert and oriented ×3	5	(55.0)	7	(70.0)	
Not Alert and oriented ×3	4	(44.4)	3	(30.0)	
Insurance					.99[b]
Medicare	9	(100.0)	8	(80.0)	
Other	0	(100.0)	2	(20.0)	
Discharge disposition					.20[b]
Home/self-care	5	(55.0)	10	(100.0)	
Other	4	(44.4)	0	(100.0)	
Preferred language					1.0[b]
English	9	(100.0)	10	(100.0)	
Spanish	0	(0.0)	0	(100.0)	

Note. ICM = integrated case management services; LE= lower extremity; TAU = treatment as usual.
[a]*n* (%) represents frequency (percentages of the sample).
[b]The *p* value was generated using χ^2 test.

the two groups, which occurred in 82% of the intervention group and 27.9% in the TAU group, was χ^2 (1, n = 68) = 6.372, p = .012 (see Table 1).

Secondary End Point

A secondary outcome was the LOS for the intervention group and usual care groups overall related to the readmissions. The median LOS for patients who readmitted was 2 days for the TAU group and 6 days for the intervention group. Mann–Whitney *U* test confirmed statistical significance in LOS for readmitted (median = 2.5, n = 19) and not readmitted (median = 5, N =49), U = 728.0, $p < .0005$ (see Tables 7 and 8).

Logistic regression was performed to assess predictors of readmission. The model contained three independent variables (polypharmacy, glucose, and LOS). The full model containing all three predictors was statistically significant, χ^2 (3, N = 68) = 12.1, p = .007, indicating that the model was able to distinguish between patients who readmitted and those who did not. The model as a whole explained between 16.4% (Cox and Snell R^2) and 23.6% (Nagelkerke R^2) of the variance in readmissions and correctly classified 77.9% of cases. Only one of the independent variables made a statistically significant contribution to the model (length of stay). The strongest predictor of readmissions reflected an odds ratio of 1.4. This indicated that subjects who received TAU of the target population were 1.4 times more likely to readmit, controlling for all other factors in the model. The mean LOS for the index admission for the patients receiving TAU was approximately 2 days.

Discussion

This retrospective, descriptive, comparative analysis study confirms that case management services in comparison with TAU for hospitalized individuals diagnosed with HF and diabetes are effective in reducing readmissions. Moreover, the LOS was identified as a predictor for readmissions in this target population. Descriptive statistics failed to identify statistical significance for effectiveness by the intervention.

A root-cause analysis further examined the issues of system failure, which resulted in readmission. A logistic regression supported the RCA finding that communication was the underlying cause of the readmissions that resulted in the secondary outcome that patients were discharged too soon.

The evaluation of the case management process was performed on the basis of Donabedian's theory to improve the quality of care using the relationships between the three constructs of structure, process, and outcome. A root-cause analysis (RCA) further examined the issues of system failure, which resulted in readmission. A logistic regression supported the RCA finding that communication was the underlying cause of the readmissions that resulted in the secondary outcome that patients were discharged too soon.

In an examination conducted in 2014, Medicare found that hospitals that initially experienced low occupancy, high readmission rates, and suboptimal patient satisfaction reflected an improvement owing to hospital-initiated efforts (MedPAC, 2018). The case management services provided in this study employed highly trained case managers and attempted to align with the established hospital protocol in accordance with federal regulations. Although the evidence indicates that case management is effective, because the readmission rate for HF at the facility where the study was conducted is approximately 22.5%, there is an opportunity to improve the process, as the national rate for the target population is 22.0% (Medicare, 2017).

Policy and Procedure

Patients diagnosed with HF and diabetes require case management services within 24–48 hr of admission (Supplementary Digital Content Appendix B available at http://links.lww.com/PCM/A11). The omission of the HbA1c in the medical charts that were reviewed for this study contradicts current evidenced-based practices, as there is a 16% risk of hospitalization for HF for every 1% increase in HbA1c (Adler et al., 2000; Engoren, Schwann, & Habib, 2014). A logical conclusion for the staff's omission of HbA1c would likely be that patients are either relying on their outpatient care to provide the treatment for uncontrolled diabetes or hyperglycemia was considered the patient's baseline. In addition, 10 of the patients in the readmitted group should have received case management services but did not due to a system failure. Rationale for case management services not performed despite empirical evidence supporting its effectiveness includes, but is not limited to, weekend/holiday admissions—patient admitted over the weekend and a consult for ICM services not ordered; problematic staffing—case management department was understaffed the day of the admission; therefore, the workload became voluminous precluding the case management staff from consulting on each case, noncompliance, or patient refused services. Furthermore, glycemic control is linked to improved outcomes for every 1% that the HbA1c is reduced. Although glycemic thresholds are higher for older patients, maintaining a record of the A1c during the patient's admission would allow providers to improve patient-centered care at an individual level in order to favorably impact the risk of microvascular complications related to uncontrolled metabolic control (Engoren et al., 2014).

For a single-focused disease management approach, research has shown that case management services such as telemonitoring was not effective in reducing readmissions compared with usual care (Chaudhry et al., 2010). On the contrary, this study indicated a significant association between case management and readmission. This study conflicts with the aforementioned study's findings because of the disparate interventions. The current study's intervention addresses high-risk patients. The assessment of ICM services focuses on the interaction of four domains: biological (medical), psychological (behavioral/mental), social, and health system (see Figure 2).

Rationale for case management services not performed despite empirical evidence supporting its effectiveness includes, but is not limited to, weekend/holiday admissions—patient admitted over the weekend and a consult for integrated case management services not ordered; problematic staffing—case management department was understaffed the day of the admission; therefore, the workload became voluminous precluding the case management staff from consulting on each case, noncompliance, or patient refused services.

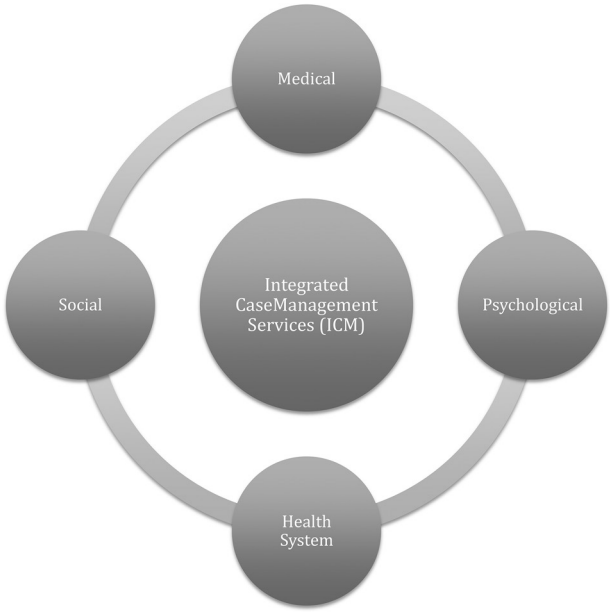

FIGURE 2
Integrated case management services for 59 out of the 68 subjects diagnosed with diabetes and heart failure for the intervention and control treatment groups, Case Management Impact, Washington, DC, 2015–2017.

Polypharmacy

Also, in this study, descriptive statistics indicated that in this sample population, subjects were prescribed an average of approximately 14 medications overall. Raval et al. (2015) found that 30-day readmissions among elderly Medicare recipients diagnosed with diabetes were at risk due to polypharmacy, multiple comorbidities, and access to care for minorities. Polypharmacy was noted prior to the index admission as increasing the risk for 30-day readmission compared with subjects without polypharmacy (Raval et al., 2015). The author also highlights that 30-day readmission risk was increased for older patients diagnosed with comorbidities including diabetes compared with subjects without comorbidities. This is consistent with the findings of this study where descriptive statistics reflected an average of six comorbidities on readmission in the ICM group and five comorbidities in the TAU group (see Table 4). Furthermore, the results of this study found significantly higher rates of 30-day readmission among subjects who were carriers of Medicare (see Table 5).

On the contrary, the sample in this study was inconsistent with the current literature for predictors of readmission. Raval et al. (2015) found that polypharmacy, comorbidities, function status, and chief complaint indicated on the index admission were predictors of readmission. This study did not reflect statistical significance as a predictor for readmission for any of the aforementioned variables.

In addition, this study reflected statistical significance for the LOS as a predictor for readmission, however. This finding was inconsistent with a 2015 study examining the relationship between LOS and readmissions in bariatric surgery patients, where the authors found that a longer postoperative hospital visit was associated with increased readmission rates (Lois et al., 2015). However, Carey and Lin (2014) conducted a retrospective review of patients' index admissions and possible readmissions at 7 days and 30 days postdischarge of the initial admission. The findings are consistent with the current study that there was a favorable association between a longer LOS and reduced readmissions.

Hyperglycemia

The association of readmission and hyperglycemia is well supported (Iribarren et al., 2001). In this study, the intervention group reflected an average of 191 for glucose and 138 in the TAU group (see Table 4). Poor glycemic control is a risk factor for hospitalized patients diagnosed with HF and diabetes because the condition encourages atherosclerosis and coronary artery disease. In addition, poor glycemic control is associated with medication noncompliance and passive care provided by the physician. In a longitudinal analysis, the authors used Medicare data to determine the effects of case management and telehealth on recipients diagnosed with HF or diabetes mellitus. In the retrospective matched cohort study, there were 1,767 subjects enrolled from two CMS groups. The case management and telehealth intervention deployed resulted in lower mortality (hazard ratio = 0.85, 95% confidence interval = 0.74–0.98; $p = .03$) and reduced inpatient admissions in the intervention group. Therefore, robust case management services coupled with telehealth programs ameliorate health outcomes (Baker et al., 2013).

Gender and Race

This study found that among the patients who were readmitted, 77.7% of the patients who received the intervention were Caucasian and 22.2% were African American compared with the control group where 20% were Caucasian and 60% were African American (see Table 6). However, Joynt, Orav, and Jha (2011) found that race was associated with an increased readmission rate at a systems level among hospitals that admit a higher proportion of African Americans. The current study finding is consistent with the demographics of the city in which the hospital is located. Also, according to the U.S. Census Bureau (2010), 44.6% of the population in the District of Columbia indicated Caucasian. In addition to race, Joynt et al. (2011) found that patients who readmitted at 30 days with HF were younger and the majority of the patients were female. This is a

TABLE 6
Selected Characteristics of 19 Readmitted Subjects Diagnosed With Diabetes and Heart Failure Categorized by Readmissions, Case Management Impact, Washington, DC, 2015–2017

Characteristics	ICM 30-Days End Point *n*[a]	(%)	TAU *n*[a]	(%)	*p*
Race					1.0[b]
Caucasian	7	(77.7)	2	(20.0)	
African American	2	(22.2)	6	(60.0)	
Asian	0	(0.0)	1	(10.0)	
Other	0	(0.0)	1	(10.0)	
Gender					.28[b]
Male	3	(33.3)	4	(40.0)	
Female	6	(66.7)	6	(60.0)	
Chief complaint					.84[b]
Skeletal	0	(0.0)	0	(0.0)	
Muscular	1	(5.2)	0	(0.0)	
Cardiovascular	4	(44.4)	7	(70.0)	
Digestive	1	(5.2)	0	(0.0)	
Endocrine	0	(0.0)	0	(0.0)	
Nervous	0	(0.0)	0	(0.0)	
Respiratory	1	(5.2)	2	(20.0)	
Lymphatic	0	(0.0)	0	(0.0)	
Urinary	1	(5.2)	0	(0.0)	
Reproductive	0	(0.0)	1	(10.0)	
Integumentary	1	(5.2)	0	(0.0)	

Note. ICM = integrated case management services; TAU = treatment as usual.
[a]*n* (%) represents frequency (percentages of the sample).
[b]Chi-square test.

consistent result with the current study for readmitted subjects where 67% in the intervention group and 60% in the TAU group were female (see Table 6).

Length of Stay

Length of stay is controversial. Although Jencks et al. (2009) found that readmissions were associated with increases in length of stay, gaps in care, fragmented follow-up care, and poor patient outcomes, a more recent study found that the readmissions for patients diagnosed with HF were reduced by 1%–8%, when the LOS of the prior index admission was extended by 1 day (Carey & Lin, 2014). Similarly, Eapen et al. (2013) found that patients diagnosed with HF reflected decreased 30-day readmission rates with longer LOS at the index admission. The latter studies are more consistent with the results of the present study. Overall, patients in the TAU group experienced an average LOS of 2.1 days compared with 6.0 days for the intervention group in the target population. For the patients who were readmitted, the average LOS was 2.5 days compared with 5 days for the patients who did not readmit (see Table 8).

Root-Cause Analysis

An RCA was conducted on the 19 readmitted patients using *5 whys* as the method for determining the root cause of the problem. According to American Society for Quality, Lean Six Sigma (2018) states that the general methodology for performing RCA is to (1) record the issue, (2) ascertain the depth of the issue, (3) gather and deconstruct the facts, (4) determine the issue at the center, (5) develop a corrective action plan, (6) execute the corrective action plan, and (7) examine the effects after execution. Because of administrative barriers, Steps 6 and 7 were not realized by the time this study closed (see Tables 9–11).

Protection of Human Subjects

The data were deidentified and stored in a Health Insurance Portability and Accountability Act–compliant database. The retrieved data were destroyed upon completion of the data collection and analysis as well as scrubbed and cleaned.

Strengths and Weaknesses of the Design

The strength of the design was that the data required for the analysis were captured in their entirety within the electronic medical record. The job requirements

TABLE 7
Index Admission Case Management (*N* = 68), Case Management Impact, Washington, DC, 2015–2017

Length of Stay Patient Outcome	*M* (*SD*)	95% CI LL	UL
Received the intervention	6.0 (5.0)	4.5	7.4
TAU	2.1 (2.2)	1.0	3.1

Note. CI = confidence interval; LL = lower limit; TAU = treatment as usual; UL = upper limit.

TABLE 8
Thirty-Day Readmission Case Management (*N* = 19), Case Management Impact, Washington, DC, 2015–2017

Patient Outcome	*M* (*SD*)	95% CI LL	UL
30-day readmission	2.5 (2.6)	1.2	3.8
Did not readmit in 30 days	5.0 (5.0)	4.3	7.2

Note. CI = confidence interval; LL = lower limit; UL = upper limit.

TABLE 9
Root-Cause Analysis for Readmissions for Case Management and Treatment as Usual Groups

Subjects	DOA	CC	LOS	DOR	CC	LOS	ICM	F/u Appointment	Comments
Subject 3	12/31/2016	Cardiovascular	5 hr	1/10/2017	Cardiovascular	3 days	No	Yes	Weekend admission
Subject 9	2/08/2017	Cardiovascular	3 hr	2/16/2017	Cardiovascular	3 days	No	Yes	Discharged with glucose 460 baseline 200 per patient and BP 156/99
Subject 13	1/18/2016	Cardiovascular	2 days	1/30/2016	Urinary	2 days	Yes	Yes	Hospital course, CHF, acute pulmonary edema, hypoxia, hypercapnia, respiratory acidosis. Premature discharge or inappropriate level of care
Subject 20	11/21/2015	Musculoskeletal	24 hr	12/1/2015	Cardiovascular	7 days	Yes	Yes	Weekend admission, discharge assessment performed to discharge to home with existing 24/7 care. Inappropriate level of care
Subject 21	1/12/2016	Respiratory	3 hr	1/13/2016	Cardiovascular	5 days	No	Yes	History coronary artery bypass graft (CABG) (+) cough, shortness of breath (SOB), uses continuous positive airway pressure (CPAP) at night, unable to sleep, crackles LLL bases. Premature discharge or inappropriate level of care
Subject 24	11/27/2015	Cardiovascular	11 days	12/11/2015	Cardiovascular	4 days	Yes	Yes	Discharged to SNF ejection fraction 40%–45% (+) abnormal bacterial culture of pleural fluid *Staphylococcus epidermis*[a] Glucose 152
Subject 25	4/6/2017	Cardiovascular	4 days	4/17/2017	Respiratory	6 hr	Yes	Yes	Discharged home with home health. Premature discharge. Inappropriate level of care
Subject 26	1/10/2017	Cardiovascular	3 days	1/26/2017	Cardiovascular	5 hr	Yes	Yes	(+) discoloration pain suffered ischemic stroke during hospital course. Discharged to LTC. Inappropriate level of care.

Note. BP = blood pressure; CC = chief complaint; CHF = congestive heart failure; DOA = date of admission; DOR = date of readmission; F/U = follow-up appointments; ICM = integrated case management services; LLL = left lower lung; LOS = length of stay; LTC = long term care; SNF = skilled nursing facility.
[a]Results of culture.

for the position included both academic and work experience. The descriptive statistics is an additional strength of the study, as it manipulated the data to be viewed from multiple perspectives and favorably impacted the internal validity. A regression analysis determined whether there was a combination of factors that contributed to the readmission for those who received a case management assessment via the ICM services and those who received TAU. Generalizability was achieved because of the feasibility to replicate the study as it was based on the Donabedian theory.

The weakness of the design included diversity in the sample. The sample should reflect the limitations in the number of patients who met the inclusion criteria. Case managers assessed the majority of the patients who were admitted, which limited the number of patients found in the group who received standard care. The sample was conveniently selected on the basis of those patients' diagnosis codes used to determine which patients match the inclusion and exclusion criteria. Also, the hospital had a low volume of high-risk patients; thus, the time frame of the retrospective analysis was extended to account for this occurrence. Oversampling was a solution in response to the weakness of a small sample. Furthermore, this study did not examine all-cause admissions, rather it focused only on a specific subgroup. This specification will impact the results of the study and threaten the external validity.

TABLE 10
Root-Cause Analysis for Readmissions for ICM and Treatment as Usual Groups

Subjects	DOA	CC	LOS	DOR	CC	LOS	ICM	F/u Appointment	Comments
Subject 27	10/15/2016	Cardiovascular	2 days	11/13/2016	Cardiovas-cular	2 days	No	Yes	Discharged home self-care. Glucose 171. Home self-care. Premature discharge. Inappropriate level of care.
Subject 29	5/6/2016	Cardiovascular	3 days	5/23/2016	Urinary	2 hr	Yes	Yes	Discharged home self-care.
Subject 34	3/3/2016	Respiratory	3 days	3/14/2016	Respiratory	6 hr	No	Yes	Discharged home self-care. NYHA Class IV. Glucose 156. Home self-care. Premature discharge. Inappropriate level of care.
Subject 36	10/7/2015	Respiratory	23 hr	10/4/2017	Respiratory	6 days	Yes	Yes	Discharged home self-care. Glucose 156. Home self-care. Premature discharge. Inappropriate level of care.
Subject 39	9/13/2016	Digestive	3 hr	10/7/2016	Respiratory	2 hr	No	No	No PCP only nephrologist BP 167/108. Home self-care. Premature discharge. Inappropriate level of care.
Subject 40	12/10/2015	Integumentary	2 days	1/9/2016	Integu-mentary	3 days	Yes	Yes	WBC 13.52 (+) Prednisone Na 133. Abbreviated discharge assessment. Discharge to SNF
Subject 44	10/7/2016	Cardiovascular	28 hr	10/16/2016	Cardiovas-cular	21 hr	Yes	No	Left against medical advice (AMA)

Note. BP; DOA = date of admission; DOR = date of readmission; CC = chief complaint; F/U = follow-up appointments; ICM = integrated case management services; LOS = length of stay; NYHA = New York Heart Association; PCP = primary care physician; SNF = skilled nursing facility; WBC = white blood cell.

Another limitation was the small sample size. Because of the hospital policy that every patient in this sample receives a case management assessment, this reduced the TAU sample size considerably. Finally, as a retrospective analysis, forming conclusions requires consideration of factors not explicitly listed in the medical chart that could be captured from a prospective analysis. For example, there is limited documentation available of the additional interventions deployed for patients or social determinants that contributed to the patient readmitting in 30 days (see Table 12).

Nursing Practice Implication

The underpinning of the implication to nursing practice through this retrospective analysis lies within the American Association of Colleges of Nursing (AACN) standards of scholarship discovery based on the American Association of Colleges of Nursing's (AACN, 2006) *The Essentials of Doctoral Education for Advanced Nursing Practice*, as this study is associated with all of the core competencies (AACN, 2006; Edwards et al., 2017).

TABLE 11
Root-Cause Analysis for Readmissions for ICM and Treatment as Usual Groups

Subjects	DOA	CC	LOS	DOR	CC	LOS	ICM	F/u Appointment	Comments
Subject 45	1/20/2016	Respiratory	5 hr	1/29/2016	Respiratory	6 days	No	Yes	Patient febrile 99.9 low grade but declined further treatment.
Subject 48	3/15/2017	Urinary	3 days	3/22/2017	Lymphatic	3 days	Yes	Yes	Discharge plan resumed 24/7 home care. Inappropriate level of care of premature discharge.
Subject 63	5/26/2016	Cardiovas-cular	7 hr	5/30/2016	Cardiovas-cular	4 days	No	Yes	(+)SOB, back pain, weakness. Home self-care.
Subject 67	8/8/2016	Cardiovas-cular	3 hr	9/6/2016	Cardiovas-cular	2 hr	No	No	Discharge to HR 233. O_2 88% .

Note. CC = chief complaint; DOA = date of admission, DOR = date of readmission; F/U = follow-up appointments; HR = heart rate; ICM = integrated case management services; LOS = length of stay; SOB = shortness of breath.

TABLE 12
Inclusion and Exclusion Criteria, Case Management Impact, Washington, DC, 2015–2017

Inclusion Criteria

1. Medical charts of patients admitted with diabetes and comorbid heart failure on and between September 1, 2015, and July 31, 2017.
2. Inpatient and emergency department index admissions and Medicare stipulated 30-day readmissions.

Exclusion Criteria

1. Patients admitted to the skilled nursing facility.
2. Patients within the target population who readmitted to a different hospital.

Although case management services are effective in reducing readmissions, a future objective should be to further reduce readmissions for the target population by incorporating an improved communication strategy. Factors that decrease readmission rates are inclusive of measures that target communication enhancement (Terra, 2007). As a result of this quality improvement project, such an objective should be considered, monitored, and evaluated for future nursing practice improvement. Gordan, Deland, and Kelly (2015) found that by incorporating a strategy called a *just culture*, the health care team benefited from improved communication because, on average, a surgery patient interacts with 27 different physicians in the hospital, which introduces system failures if there are no safeguards to maintain the continuum of care. As such, the just culture creates an environment where anyone can voice his or her concerns about an issue that may negatively impact the patient, without fear of reproach.

Case managers should be abreast of current policies and procedures and ways in which they can improve the quality of care. Case managers should examine the costs associated with extending a medically unstable patient's LOS versus the costs of a readmission. According to Medicare (2016), the average cost of an index admission where this study was conducted was approximately $1,270 versus a readmission that costs approximately $7,200.

Recommendations

Therefore, by 2020, the facility will experience a 10% decline in the readmission for the target population after implementing the communication strategy described previously and the following recommendations, using the numerator as the number of patients diagnosed with HF and DM:

1. The hospital policy states that patients admitted with core measure diagnoses should receive ICM services. The readmitted patients who received TAU should have received case management services. The root cause of the patients not receiving case management services is that the staff members were not familiar with the policy.
2. Reeducating the staff about hospital policy 03-32-03 will reduce the number of missed opportunities to provide case management services and reduce potentially avoidable readmissions by 10% for the target population over 24 months.
3. The hospital policy requires that patients 80 years of age and older receive case management services. However, the average age of the patients who were readmitted in the TAU grou p was 78 years and they did not receive case management services.
4. Based on descriptive statistics, the hospital policy should be lowered to the average age of 78 years instead of 80 years for the target population to reflect the evidence and be added criteria to close gaps by 10% over 24 months.
5. As a result of the root cause and statistical analyses, the patients in the TAU group may have been discharged too soon. In a California study of calendar year 2008 inpatient index admissions, readmissions for patients diagnosed with HF was reduced by 1%–8%, when the LOS was extended by 1 day (Carey & Lin, 2014). In the present study, for this target population, a system-wide policy change should be implemented to extend the LOS by 1 day to reduce readmissions by 10% over 24 months.
6. For the target population, additional laboratory test results such as HbA1c should be incorporated into the inpatient battery of tests. Glycemic control is linked to improved outcomes for every 1% that the HbA1c is reduced (UpToDate, 2017). There is a 16% risk of hospitalization for HF for every 1% increase in HbA1c (Adler et al., 2000; Engoren et al., 2014).

The goal should be increasing access to quality care and managing costs by using an approach that centers on patients and the collaboration of health care providers (Rangel, 2009). Implementing the aforementioned recommendation, as well as monitoring and evaluating the amendments, will result in an improvement in quality of care.

Conclusion

Aligned with Healthy People 2020, an essential tool for the success of PPACA, providing effective case management services reduces readmissions and is directly related to improved quality of care (Medicare, 2017; National Institute for Health Research, 2017; Office of Disease Prevention and Health Promotion, 2016). Nurse case managers address the ailments of society, deliver unencumbered care

to individuals, and evaluate the outcomes of care for continuous improvement (American Nurses Association, 2017). Case management in health care systems reduces costs and improves the quality of care (Bisiani & Jurgens, 2015). Research has also shown that providing high-quality care is associated with reduced readmissions and shorter length of stays for those admitted (Medicare, 2017). Improving health outcomes of patients is a primary responsibility of the health care team, with the nurse and the patient as the focal point. Furthermore, managing chronic diseases to include hypertension, hyperglycemia, and hyperlipidemia can be improved with the use of a nurse case manager (Fraser et al., 2018). Research is needed to examine a broader sample size and specific medications as well as examine the effectiveness of ICM services from a qualitative perspective.

The current study provides evidence to substantiate a specific case management approach to reduce 30-day readmissions for the target population. Effectively reducing costs and improving outcomes through an ICM program involve the health care team, including the patient (Terra, 2007). The evaluation of the specific case management approach utilizes research skills, which are a component of the scholarship of practice (AACN, 2016). Future studies are needed to examine transitional care as a contributing factor that impacts readmission; discharge planning that occurs when the LOS is extended; and additional factors not examined in this study that may predict readmissions. The hospital department and parent institution approved this study, IRB ID: IRB00145676. The University of Virginia, tracking number 20115, provided final institutional review board approval.

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