Early readmission among patients with diabetes: A qualitative assessment of contributing factors

Daniel J. Rubin [a,*], Kelly Donnell-Jackson [a], Ram Jhingan [a], Sherita Hill Golden [b,c], Anuradha Paranjape [d]

[a] Temple University School of Medicine, Section of Endocrinology, Diabetes, and Metabolism
[b] Inpatient Diabetes Management Program, Division of Endocrinology, Diabetes, and Metabolism
[c] Welch Center for Prevention, Epidemiology, and Clinical Research, Johns Hopkins University School of Medicine
[d] Temple University School of Medicine, Section of General Internal Medicine

ARTICLE INFO

ABSTRACT

Aims: To explore causes of early readmission, i.e., hospital readmission within 30 days of discharge, among patients with diabetes.
Methods: We performed thematic analysis of semi-structured interviews among 20 adults with diabetes hospitalized with an early readmission at an urban academic medical center.
Results: Five themes emerged as contributors to readmission risk: (1) poor health literacy (lack of knowledge about diabetes and discharge instructions), (2) health system failure (of the discharge process and post-discharge support), (3) failure of expected protective factors, (e.g., following the discharge instructions, being aware of medication changes upon discharge, and having help and social support), (4) social determinants of health impeding care, and (5) loss of control over illness. A majority of patients reported needing assistance with transportation, obtaining and taking medications, and preparing food. Most patients denied an active role in exacerbating their condition prior to readmission, and many believed that being readmitted was out of their control.
Conclusions: Our findings suggest several interventions that may reduce the risk of early readmission for patients with diabetes, including inpatient diabetes education, improving communication of discharge instructions, and involving patients more in medication reconciliation and post-discharge planning.

© 2014 Elsevier Inc. All rights reserved.

1. Introduction

Hospital readmission within 30 days of discharge (early readmission) is a high-priority healthcare quality measure and target for cost reduction (Axon & Williams, 2011; Stone & Hoffman, 2010; Epstein, 2009). In 2012, patients with diabetes incurred approximately $124 billion in annual expenditure for hospital care in the United States (US) (ADA, 2013). Although diabetic patients represent about 8% of the US population (CDC, 2011), they account for 23% of hospitalizations (8.8 million) each year (HCUP Nationwide Inpatient Sample (NIS), 2011). Likewise, while the overall early readmission rate is 8.5–13.5% (Pennsylvania Health Care Cost Containment Council, 2012; Friedman, Jiang, & Elixhauser, 2008), the rate in patients with diabetes is 14.4–21.0% (Robbins & Webb, 2006; Bennett, Probst, Vyavaharkar, & Glover, 2012; Rubin, Handorf, & McDonnell, 2013; Chen, Ma, Chen, & Yermilov, 2012). Because the proportion of hospitalized patients with diabetes has risen steadily over recent decades in tandem with the increasing incidence of diabetes in the general population (CDC, 1988-2009), these rates may continue to climb (MMWR, 2012).

Despite the large costs, the reasons for early readmission of patients with diabetes remain poorly understood. Most studies of readmission risk factors in this population are limited by retrospective design, lack of clinical data and/or restriction to a primary discharge diagnosis of diabetes (Robbins & Webb, 2006; Bennett et al., 2012; Cook, Naylor, Hentz, et al., 2006; Cramer, Chapa, Kotsos, & Jenich, 2010; Kim, Ross, Melkus, Zhao, & Boockvar, 2010; Menzin, Korn, Cohen, et al., 2010). Few studies have successfully used qualitative research methods to better understand readmission risk factors (Strunin, Stone, & Jack, 2007; Long, Genao, & Horwitz, 2013; Kangovi et al., 2013). None of these studies focused on patients with diabetes. A better understanding of the causes of early readmission among such patients may identify aspects of the inpatient to outpatient transition of care that could be improved to reduce readmission rates. We performed thematic analysis of semi-structured interviews to explore causes of early readmission among hospitalized patients with diabetes.

2. Methods

2.1. Sample

We conducted the study at Temple University Hospital, an urban academic medical center in Philadelphia, PA with approval of the Temple University Institutional Review Board. Eligible patients were those readmitted to the hospital within 30 days of discharge, who had diabetes (defined by an ICD-9-CM code of 250.xx, self-report, or outpatient use of a diabetes-specific medication), were at least 18 years old and spoke English. We excluded those admitted to an obstetric service. A list of potential participants who met the eligibility criteria was generated daily using the electronic medical record. Based on the availability of the patients and the interviewers, a convenience sample of 27 patients was approached for consent, of which 6 patients declined to participate and 1 recording was lost. The final sample therefore consisted of 20 participants interviewed between September, 2012 and February, 2013. The primary diagnosis associated with each admission and readmission was obtained by reviewing hospital records.

2.2. Interviews

Every patient provided written informed consent and was interviewed in the hospital room. The interviews were conducted on 1 or 2 days per week during the study period, with no more than 2 interviews completed in a single day. Interviews averaged about 20 minutes in duration. Three investigators (DR, KJ, and RJ) individually conducted the interviews, which were recorded and transcribed by the interviewer into Microsoft Word 2010 documents. We reviewed discharge records to assess the accuracy of patient recall about discharge instructions.

Because, to our knowledge, no prior qualitative study has focused on readmission among patients with diabetes, we developed a new interview guide based on our experience and literature review (Table 1). At the time the protocol was being planned, there was only 1 published qualitative study examining readmissions (Strunin et al., 2007). The description of the interview used in that study informed our own interview guide, as the exact questions were not reported. In our interviews, participants were asked to describe their experiences and perceptions related to their recent and current hospitalizations. Particular attention was paid to transitions of care between the inpatient and outpatient settings. In addition, participants were queried about discharge instructions, home environment, social support, needs after discharge, and the ability to attend follow-up appointments. Participants were also asked to provide feedback on the discharge process. The 28-question interview was open-ended such that participants responded in their own words. Interviewers encouraged participants to explain yes or no answers. We piloted the guide with 3 participants to ensure clarity and comprehensiveness of the questions. Because the content of the guide was not changed after the pilot, these 3 participants were included in the analysis.

2.3. Analysis

Based on the transcriptions (not a priori assumptions), the interviewers coded the 3 pilot interviews together to ensure inter-rater reliability of codes. After the pilot, each interviewer individually coded the interviews. The interviewers collectively reviewed each interview to assure accuracy and consistency of coding. Discrepancies were resolved by consensus. The codes represented themes observed in the data. Initial codes, which were tracked as comments within the transcription documents, were standardized, compiled then organized into themes. Each interview was coded within 1 week of being conducted. As planned before data were collected, we conducted interviews until thematic saturation occurred (i.e., an additional interview would not contribute new information) (Long et al., 2013).

Table 1
Interview guide.

1. Why did you have to come to the hospital?
   a. Did you call a healthcare provider before arriving at the hospital? Did you decide to come to the hospital, or did your healthcare provider send you? How did you get to the hospital?
2. Did you need any help or support after your last discharge? Did you get the help you needed?
3. Do you think you had what you needed to get better after your last discharge?
4. Were the events leading up to this admission similar or different from the last admission?
5. Was there anything you did or did not do that led to this admission?
6. Do you think you did anything that may have made your condition worse?
7. What do you feel might have helped you most to avoid coming back to the hospital?
8. What discharge instructions did you receive during your last hospital admission?
9. Did you have any questions about the discharge instructions? If so, did you feel like all of your questions were completely answered?
10. Did you follow all of the discharge instructions? If not, then why?
11. Were your medications changed during your last discharge? If so, then what were the changes?
12. What medications were you taking just before this admission? What was the reason for taking each one?
13. Did the doctor suggest changes to your behavior or lifestyle upon your last discharge? If so, then explain the changes. Did you follow them?
14. Did you feel you understood the follow-up plan in terms of doctors' visits or home visits after your last discharge?
15. Do you have any suggestions to improve the discharge process?
16. Do you think there were challenges or obstacles you faced with following the discharge plan?
17. Were you given any medical appointments before you left the hospital?
    a. Did you attend any appointments between the last admission and the current admission? If not, then explain. If you did, then with which provider or providers?
18. Does anything make it difficult for you to keep your medical appointments?
19. What do you think causes your diabetes?
20. What do you think makes diabetes worse? What makes your blood sugar high?
21. How well do you think your diabetes is controlled? How are your blood sugars at home?
22. Do you know what the A1c blood test means? What is your A1c?
23. Having diabetes can sometimes be stressful or frustrating. How do you cope with your diabetes?
24. Do you think you will need any kind of help after this hospitalization?
25. Is anyone else, such as friends, neighbors, or family members, involved in your care?
26. Is there anything you think you can do to avoid another hospital admission?
27. Do you feel that you have social support at home?
28. Is there anything else you think I should know to understand why you were readmitted?

3. Results

3.1. Participant characteristics

Table 2 summarizes characteristics of the sample. The median self-reported number of admissions in the prior 12 months was 6 (range, 1 to 30). Eighty percent of the participants reported having at least a high school level of education. The median A1c value was 10.5% (range, 5.4 to 14.4%) among the 19 patients for whom a result was available. Table 3 shows the primary diagnosis associated with each admission and readmission.

3.2. Thematic analysis

Five themes emerged as contributors to readmission risk: 1) poor health literacy, 2) health system failure, 3) failure of expected

Table 2
Sample characteristics (N = 20).

Characteristic	Value
Age, y	45 (22–72)
Males	11 (55%)
Race	
Black	14 (70%)
White	3 (15%)
Hispanic	3 (15%)
Education	
Some college	8 (40%)
Some high school	8 (40%)
No high school	4 (20%)
Diabetes	
Type 1	8 (40%)
Type 2	9 (45%)
Post-transplant	3 (15%)
A1c, %	10.5 (5.4–14.4)
Diabetes duration, y	10 (<1–18)
# of admissions prior 12 months	6 (1–30)

Data are n (%) or median (range).

Fig. 1. Themes of early readmission risk in patients with diabetes.

protective factors, 4) social determinants of health impeding care, and 5) loss of control over illness (Fig. 1).

3.2.1. Poor health literacy

The participants displayed poor health literacy in terms of diabetes knowledge. None had a good understanding of their diabetes. Common responses were that sugary foods or heredity cause diabetes. One patient with post-transplant diabetes said: *"I didn't have this [diabetes] until I got the liver transplant. Maybe the guy who gave me the liver had diabetes."* Another said: *"I blame only myself …. There's a lot of things, it could be my depression, things at home, bad diet and all that."* Several patients were unaware of what causes hyperglycemia; one individual said salt worsens diabetes. A majority of patients lacked awareness that HbA1c reflects average blood sugar over 3 months, and most did not know their most recent HbA1c value. One patient with a history of myocardial infarction was unaware that diabetes is associated with heart disease.

Participants also displayed limited knowledge about the instructions from their recent hospital discharge. Several patients could not remember any of the topics addressed in their discharge instructions, and only a few patients recalled all the topics. Most of the patients

Table 3
Primary diagnosis associated with admission and readmission.

Participant	Admission diagnosis	Readmission diagnosis
1	Diabetic ketoacidosis	Diabetic ketoacidosis
2	Gastroparesis	Gastroparesis
3	Hyperglycemia	Hyperglycemia
4	Foot ulcer infection	Foot ulcer infection
5	Heart transplant	Deep venous thrombosis
6	Hypertensive urgency	Hypertensive urgency
7	Abdominal pain	Abdominal pain
8	Hyperglycemia	Hyperglycemia (HHS)
9	Gastroparesis	Gastroparesis
10	Congestive heart failure	Congestive heart failure
11	Coronary artery disease	Chest pain (incisional)
12	Hyperglycemia	Hyperglycemia
13	Congestive heart failure	Congestive heart failure
14	Chest pain (viral URI)	Cough (tracheobronchitis)
15	Chest pain (hypersensitivity pneumonitis)	Chest pain (heart transplant rejection)
16	Diabetic ketoacidosis	Opioid overdose
17	Congestive heart failure	Chest pain (hypertensive heart disease)
18	Abdominal pain (SBP)	Abdominal pain (SBP)
19	Gastroparesis	Gastroparesis
20	Gastroparesis	Gastroparesis

Abbreviations: HHS, hyperglycemic hyperosmolar syndrome; SBP, spontaneous bacterial peritonitis; URI, upper respiratory infection.
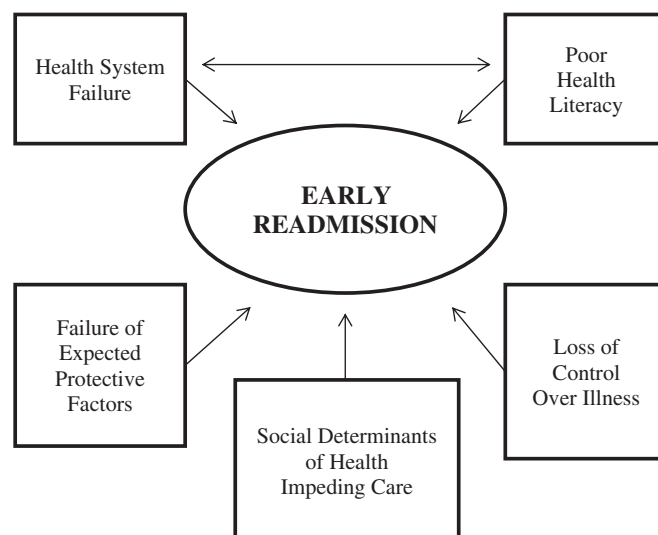
who did recall some of the instructions had vague responses, such as "watch my diet" or "check my sugars." Patients had difficulty recalling their outpatient medications, and a few were unaware that their medications had been changed. Likewise, many patients were either mistaken about or lacked awareness of whether or not a follow-up appointment had been scheduled prior to discharge. Despite the poor recall, almost all participants reported having no questions during the discharge process.

3.2.2. Health system failure

Patients described how the discharge process and post-discharge support were inadequate. Most participants reported understanding and following their discharge instructions, yet all of them were readmitted within 30 days. Furthermore, many admitted that they could not remember the discharge plan later in the interview and reported obstacles to following it. One patient said: *"I live day by day, hoping to make it to the next day, and when I feel weak I just go to the hospital."* Another said she didn't have the strength to follow a diabetic diet. Some participants felt unready to be discharged and that being better prepared might have prevented readmission. A few patients complained of difficulty attending follow-up appointments because they were scheduled too close together or conflicted with other obligations. Although every participant had diabetes, most of the discharge instructions lacked diabetes-specific information. Of the 5 participants with a primary discharge diagnosis of diabetes, only 1 had diabetes-specific instructions.

Aspects of support following discharge appeared insufficient as well. Over half the participants did not contact a healthcare provider before deciding to seek emergency care, and most of these individuals did not describe a situation that required immediate inpatient care. A patient who had incisional chest pain following cardiac bypass surgery suggested how his readmission could have been avoided, saying: *"If somebody woulda come to the house I might have known where the pain was coming from."* Many patients reported lacking the help they needed after discharge, primarily nursing care, medications, and meals. A majority of the patients reported similar circumstances leading to their readmission. Two participants were unable to obtain their insulin after discharge, which resulted in their readmission.

3.2.3. Failure of expected protective factors

Several factors related to the discharge process, post-discharge support, and diabetes that we expected to protect against readmission failed to do so. Many individuals stated they had the resources required to recover after discharge but were readmitted for the same

condition that caused the initial admission. The vast majority of patients reported understanding and following the discharge plans, having what they needed to get better and no obstacles to adherence. Most of the participants were aware of changes to their medications upon discharge. Almost all said they had help and social support from family members. One family member said: *"Since he had the transplant, we look at him close. That's my brother in law and I look out for him."* The same patient's wife was very involved with his care, stating: *"I stay on top of [his] medicines every day. I do everything."* They went on to describe his social support: *"And there's the church. All the members are praying for him. He's like a baby. He's got a lot of support."* Despite the support, this patient who normally took multiple daily insulin injections was readmitted because he was unable to obtain basal insulin after discharge without prior authorization and developed symptomatic hyperglycemia.

Most participants had an accurate understanding of their diabetes control. A renal transplant recipient with an HbA1c of 5.4% observed: *"Before I came in here, [my blood sugar] was under control, but since they gave me steroids, it shoots up."* Similarly, most recognized that dietary indiscretion, medication non-compliance, and stress cause hyperglycemia. A patient remarked: *"For me, lots of things – it can be food, it can be the pain, it can be stress, vomiting, anything like that raises my sugar."* One patient's sister reported good compliance with dietary restrictions: *"He is very strong willed when we are at party or something and the deserts are just sitting there."* This insight into diabetes management, however, failed to prevent readmission and did not yield good glycemic control as 80% of the patients had an HbA1c >8%.

3.2.4. Social determinants of health impeding care

A majority of the participants reported difficulty attending their medical appointments, usually because of limited transportation means. One participant said she often lacked the funds to get to appointments. She explained: *"I don't have any income. I have food stamps; that's the only income I have."* Over half the patients described a need for help after discharge consisting of transportation, obtaining and taking medications, and preparing food. One patient said *"not having someone there to help me out"* limited his ability to follow the discharge plan.

3.2.5. Loss of control over illness

Many patients believed that being readmitted was beyond their control, and several felt that they had no control over their medical problems. One participant said: *"They told me my pancreas is literally done…. So 9 out of 10 times it's going to get worse and I have to come back to the hospital periodically."* Another stated: *"I have been told there is nothing I can do."* Most patients denied an active role in exacerbating their condition prior to readmission. A few patients admitted to being frustrated by their diabetes: *"It frustrates me … sometimes I don't even check my blood sugar … and I get mad. Sometimes I take my insulin, sometimes I don't even take my pills. Or sometimes I take my pills and don't take my insulins…."*

4. Discussion

This prospective qualitative assessment of factors contributing to early readmission of patients with diabetes identified 5 themes: poor health literacy, health system failure, failure of expected protective factors, social determinants of health impeding care, and loss of control over illness. To our knowledge, there is no previously published qualitative study of hospital readmission risk factors among diabetic patients.

The identified factors may contribute to the likelihood of readmission in several ways. Patients with diabetes and poor health literacy may take insulin improperly and require readmission for hyperglycemia or hypoglycemia. For example, one of our participants who normally used both basal and bolus insulin was readmitted for

hyperglycemia because he was unable to obtain his basal insulin and thought the bolus insulin would be sufficient. Unclear discharge instructions may leave patients unable to care for themselves. In our sample, some patients were told to "Follow a diabetic diet." Such vague instructions do not provide adequate information to enable patients to adhere to an appropriate diet. Low-income patients may skip doses of insulin because they cannot afford it, leading to hyperglycemia or its complications. Similarly, our findings suggest that patients who feel powerless to control their diabetes may stop taking their medications or checking their blood glucose levels. We found that poor health literacy, lack of financial resources, and a belief in the loss of control over illness all contributed to medication non-compliance prior to readmission. Poor health literacy and health system failure may be simultaneously mediated by poorly communicated discharge instructions and the impaired ability of patients to comprehend and remember them due to discomfort, distractions or anticipation of discharge. Indeed, we found that few patients accurately remembered the discharge instructions. Poorly communicated discharge instructions are but one example of how patients with low health literacy may be predisposed to failure of the healthcare system to meet their needs and how inadequate support from the healthcare system may exacerbate low health literacy. The extent to which all 5 factors act independently or in combination may vary from case to case. Thus, to reduce readmissions for this population all these factors must be considered.

Our findings suggest several interventions that may reduce the readmission risk for patients with diabetes. Diabetes education prior to discharge may counter poor health literacy and health system failure while promoting a sense of control in patients. Such education should include survival skills (sick day care and recognition, treatment, and prevention of hyperglycemia and hypoglycemia), as well as the logistics of taking diabetes medications (ADA, 2014). Indeed, a recent retrospective study of over 2,000 diabetic patients with an HbA1c >9% found that inpatient diabetes education was associated with a 44% lower odds of ER (Healy, Black, Harris, Lorenz, & Dungan, 2013). Communication of the discharge instructions could be improved by delivering them at a literacy level appropriate for patients and using teach-back to verify comprehension (White, Garbez, Carroll, Brinker, & Howie-Esquivel, 2013; Paasche-Orlow, Schillinger, Greene, & Wagner, 2006). Compliance with discharge plans could be promoted by involving the patient more in medication reconciliation and scheduling of follow-up appointments, as well as assessing obstacles to adherence (Jack, Chetty, Anthony, et al., 2009). Additional interventions that may help reduce readmission risk include better assessment of needs prior to discharge and education on important discharge diagnoses (Jack et al., 2009). Such interventions have been shown to decrease readmission rates in studies not focused on patients with diabetes (Jack et al., 2009; Hansen, Young, Hinami, Leung, & Williams, 2011; Coleman, Parry, Chalmers, & Min, 2006).

4.1. Comparison to prior literature

The contributions of health system failure and social determinants of health on readmission risk have been previously described in a similarly designed qualitative study of low-income patients readmitted at another urban academic medical center (Strunin et al., 2007). In that study by Strunin et al., many patients described how life circumstances and gaps in outpatient care or support made it difficult for them to follow medical advice. As with our study, participants expressed a need for help at home after discharge mostly consisting of transportation and meal preparation. Also similar to our findings, both the Strunin et al. paper and another qualitative assessment of readmission risk by Long et al. reported heavy reliance on informal support from friends and family (Long et al., 2013). In addition, Long et al. found that inadequate access to outpatient care and fragmented

primary care relationships led patients to self-triage to the emergency department, which may apply to our study as more than half of our participants did not contact a healthcare provider before seeking emergency care. Similarly, another group found that social dysfunction, disability, difficulty accessing ambulatory care, and cost may contribute to high utilization of acute care among urban patients with low socioeconomic status (Kangovi et al., 2013). In contrast to our study, Strunin et al. found that lack of medical knowledge did not seem to be an important contributor to readmission risk in their general population of hospitalized patients. Of note, none of these other qualitative assessments of readmission risk focused on patients with diabetes. Knowledge may be more important for readmission risk among diabetic patients because good diabetes management requires a high degree of patient self-efficacy and involvement.

Loss of control over chronic illness is not a concept that has been previously reported to potentially contribute to readmission risk. The feeling of powerlessness over one's illness may be a barrier to effective self-management and adherence to post-discharge plans. These beliefs may require cognitive behavioral therapy to change (Bowins, 2013), and whether such psychotherapies can reduce readmission risk needs to be explored.

4.2. Limitations

We acknowledge some limitations to our study. First, patients were drawn from a single hospital that serves an urban, high-minority, low-income population. Our findings may therefore not apply to other populations. However, this is a high-risk population adversely affected by diabetes. Second, patients with multiple readmissions may have confused the circumstances surrounding their most recent admission with prior admissions. Such errors in recall, however, are unlikely to negatively affect the validity of the results because patient perceptions about prior admissions are still relevant for understanding readmission risk. Third, the study was based on individual interviews rather than focus groups, which may have gathered additional or different information. These in-depth interviews, however, allowed for detailed, personal interactions that may not have been possible in a group setting. Lastly, because we lacked a control group without diabetes, it is not possible to conclude which of our findings are specific to the diabetic population, if any.

4.3. Conclusions and future directions

In summary, we found that poor health literacy, health system failure, social determinants of health, and loss of control over illness may contribute to early readmission risk among patients with diabetes. Furthermore, we found that factors expected to protect against readmission failed to do so. These findings suggest several points of intervention that may help reduce the risk of readmission for patients with diabetes. Future research is needed to confirm the themes we identified as contributing to the risk of early readmission and to determine the extent to which they are unique to diabetes. Furthermore, interventions to reduce readmission risk in this population must be developed and tested.

Acknowledgements

References

American Diabetes Association (2013). Economic costs of diabetes in the U.S. in 2012. *Diabetes Care, 36*, 1033–1046.

American Diabetes Association (2014). Standards of medical care in diabetes. *Diabetes Care, 37*(Suppl 1), S14–S80.

Axon, R. N., & Williams, M. V. (2011). Hospital readmission as an accountability measure. *JAMA, 305*(5), 504–505.

Bennett, K. J., Probst, J. C., Vyavaharkar, M., & Glover, S. H. (2012). Lower rehospitalization rates among rural Medicare beneficiaries with diabetes. *The Journal of Rural Health, 28*(3), 227–234.

Bowins, B. (2013). Cognitive regulatory control therapies. *American Journal of Psychotherapy, 67*(3), 215–236.

CDC (1988–2009). *Number (in thousands) of hospital discharges with diabetes as any-listed diagnosis, United States.* Centers for Disease Control and Prevention (CDC), National Center for Health Statistics (http://www.cdc.gov/diabetes/statistics/dmany/fig.1.htm. Accessed January 7, 2013).

CDC (2011). *National diabetes fact sheet: national estimates and general information on diabetes and prediabetes in the United States, 2011.* Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention.

Chen, J. Y., Ma, Q., Chen, H., & Yermilov, I. (2012). New bundled world: quality of care and readmission in diabetes patients. *Journal of Diabetes Science and Technology, 6*(3), 563–571.

Coleman, E. A., Parry, C., Chalmers, S., & Min, S. (2006). The care transitions intervention: results of a randomized controlled trial. *Archives of Internal Medicine, 166*(17), 1822–1828.

Cook, C. B., Naylor, D. B., Hentz, J. G., Miller, W. J., Tsui, C., Ziemer, D. C., et al. (2006). Disparities in diabetes-related hospitalizations: relationship of age, sex, and race/ethnicity with hospital discharges, lengths of stay, and direct inpatient charges. *Ethnicity & Disease, 16*(1), 126–131.

Cramer, S., Chapa, G., Kotsos, T., & Jenich, H. (2010). Assessing multiple hospitalizations for health-plan-managed Medicaid diabetic members. *Journal for Healthcare Quality, 32*(3), 7–14.

Epstein, A. M. (2009). Revisiting readmissions — changing the incentives for shared accountability. *New England Journal of Medicine, 360*(14), 1457–1459.

Friedman, B., Jiang, H. J., & Elixhauser, A. (2008). Costly hospital readmissions and complex chronic illness. *Inquiry, 45*(4), 408–421.

Hansen, L. O., Young, R. S., Hinami, K., Leung, A., & Williams, M. V. (2011). Interventions to reduce 30-day rehospitalization: a systematic review. *Annals of Internal Medicine, 155*(8), 520–528.

HCUP Nationwide Inpatient Sample (NIS) (2011). *Agency for Healthcare Research and Quality (AHRQ).* (http://hcupnet.ahrq.gov/HCUPnet.jsp. Accessed August 11, 2013).

Healy, S. J., Black, D., Harris, C., Lorenz, A., & Dungan, K. M. (2013). Inpatient diabetes education is associated with less frequent hospital readmission among patients with poor glycemic control. *Diabetes Care, 36*(10), 2960–2967.

Increasing prevalence of diagnosed diabetes (2012). United States and puerto rico, 1995-2010. *MMWR. Morbidity and Mortality Weekly Report, 61*(45), 918–921.

Jack, B. W., Chetty, V. K., Anthony, D., Greenwald, J. L., Sanchez, G. M., et al. (2009). A reengineered hospital discharge program to decrease rehospitalization: a randomized trial. *Annals of Internal Medicine, 150*(3), 178–187.

Kangovi, S., Barg, F. K., Carter, T., Long, J. A., Shannon, R., & Grande, D. (2013). Understanding why patients of low socioeconomic status prefer hospitals over ambulatory care. *Health Aff (Millwood), 32*(7), 1196–1203.

Kim, H., Ross, J. S., Melkus, G. D., Zhao, Z., & Boockvar, K. (2010). Scheduled and unscheduled hospital readmissions among patients with diabetes. *The American Journal of Managed Care, 16*(10), 760–767.

Long, T., Genao, I., & Horwitz, L. I. (2013). Reasons for readmission in an underserved high-risk population: a qualitative analysis of a series of inpatient interviews. *BMJ Open, 3*(9), e003212–003217.

Menzin, J., Korn, J. R., Cohen, J., Lobo, F., Zhang, B., Friedman, M., et al. (2010). Relationship between glycemic control and diabetes-related hospital costs in patients with type 1 or type 2 diabetes mellitus. *Journal of Managed Care Pharmacy, 16*(4), 264–275.

Paasche-Orlow, M., Schillinger, D., Greene, S., & Wagner, E. (2006). How health care systems can begin to address the challenge of limited literacy. *Journal of General Internal Medicine, 21*(8), 884–887.

Pennsylvania Health Care Cost Containment Council (2012). Hospital readmissions in Pennsylvania 2010. http://www.phc4.org/reports/readmissions/10/ (Accessed 12/18/2012)

Robbins, J. M., & Webb, D. A. (2006). Diagnosing diabetes and preventing rehospitalizations: the urban diabetes study. *Medical Care, 44*(3), 292–296.

Rubin, D. J., Handorf, E., & McDonnell, M. (2013). Predicting early readmission risk among hospitalized patients with diabetes (7796). *ENDO 2013: The Endocrine Society's 95th Annual Meeting* (https://endo.confex.com/endo/2013endo/webprogram/Paper7796.html. Accessed September 24, 2013).

Stone, J., & Hoffman, G. (2010). *Medicare Hospital Readmissions: Issues, Policy Options and PPACA, Vol. 7-5700.* (pp. R40972). Congressional Research Service, Penny Hill Press.

Strunin, L., Stone, M., & Jack, B. (2007). Understanding rehospitalization risk: can hospital discharge be modified to reduce recurrent hospitalization? *Journal of Hospital Medicine, 2*(5), 297–304.

White, M., Garbez, R., Carroll, M., Brinker, E., & Howie-Esquivel, J. (2013). Is "teach-back" associated with knowledge retention and hospital readmission in hospitalized heart failure patients? *Journal of Cardiovascular Nursing, 28*(2), 137–146, http://dx.doi.org/10.1097/JCN.1090b1013e31824987bd.