

HOSPITAL READMISSION
AND THE TIMING OF POSTDISCHARGE OUTPATIENT FOLLOW-UP

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CHAPTER I: THE PROBLEM

Introduction

The period after discharge from the hospital has been characterized as a vulnerable time for patients.¹⁻³ During this time period, a patient transitions from an acute care setting to a lower-level care setting, such as their home, a rehabilitation hospital, or a nursing home.^{4,5} Although moving to a setting of lower acuity, patients may still have significant ongoing care needs and medication reactions,⁶ complications of hospitalization,^{7,8} or adverse events from failure to follow-up critical tests or lab results may occur resulting in readmission to an acute care hospital.^{2,9,10}

Recently, increased attention has been directed toward hospital readmissions as the Medicare Payment Advisory Commission (MedPac) has recommended to Congress that the Centers for Medicare and Medicaid Services (CMS) reimburse hospitals with high risk-adjusted rehospitalizations less per case than hospitals with lower rates of readmission.¹¹ Jencks et al¹² defined the scope of readmissions by examining Medicare claims data from 2003-2004. They found that 19.6% of Medicare beneficiaries discharged from a hospital were readmitted within 30 days and estimated the expense to Medicare of unplanned readmissions was \$17.4 billion.

Readmissions reflect the quality of inpatient care and of care transition between the inpatient and outpatient settings.^{4,5,13-17} The heightened interest in readmissions has in turn focused more attention on the postdischarge period. Recognizing the risks inherent to care transitions, Coleman¹ published basic principles for effective transitions of care. These principles include: communication between discharging and receiving clinicians, education of patients and their caregivers regarding warning signs and symptoms and what to expect at their next care facility, medication reconciliation, and a follow-up plan for tests and appointments. Recent efforts have been made to operationalize these principles, improve the safety of care transitions and, ideally, decrease rehospitalizations.

Background of Problem

Several patient-related, provider-related and system-based factors contribute to the vulnerability of the postdischarge period.¹⁸ With more than 125 million people in the United States living with chronic diseases,¹⁹ patients being discharged from the hospital today have more complex care needs owing to increased acuity of illness and disease severity.²⁰ Despite increased severity and the resultant complexities of treatment, hospital admissions have been shortened for many disease processes.^{21,22} That is, patients are being discharged “quicker and sicker” from the hospital.²³ Their plans of care may have already been very detailed at admission and changes to these plans during hospitalization may further increase patients’ self-care responsibilities or the complexity of their medication regimens. In this setting, patients make mistakes in medication administration or may not recognize when their symptoms are worsening culminating in a return to the emergency room or readmission to a hospital.^{2,7,9,10}

Compounding these patient-centered factors are changes in the care delivery model that have fragmented patient care across settings. Patients admitted to a hospital are often cared for during their stay by hospitalists, physicians who practice inpatient medicine, with care returned to their outpatient primary care physician upon discharge.^{24,25} Hospitalists order tests that can be pending at the time of discharge, recommend tests to be completed after discharge, and can make considerable changes in patients’ medication regimens or plans of care.² Primary care providers (PCPs) may have little or no knowledge of their patients’ hospital care, pending results, or recommended follow-up plans as the discharge communication process is often not standardized.¹⁸ The transfer of patient care back to a primary care physician is further weakened by lack of direct communication between discharging and receiving practitioners.¹

The main communication mode still employed by inpatient practitioners is the hospital discharge summary and yet this document is often unavailable to outpatient practitioners seeing their patients following a hospitalization.^{26,27} Providers themselves have not reliably shown to bridge this gap as PCPs report they are not often notified that their patient has been admitted to the hospital²⁸ and are infrequently involved in discharge planning discussions.² The handoff of care, then, between inpatient and

outpatient providers is informal, inconsistent, and dependent on a written document that frequently is unavailable to the receiving outpatient provider at the time of follow-up.

As patients are being discharged with more care needs and after shorter hospital stays than in times past, they may need to transition through several settings that accommodate their changing care needs. They may, for example, transition from an acute care hospital to a long-term acute care facility, to a rehabilitation hospital and then home within a matter of weeks with different care providers in each setting.^{4,5} In such instances, the dangers of hand-offs are multiplied and the deficits in provider communication are amplified.¹

With their care fragmented across settings and amongst multiple providers, patients report a sense of abandonment during the postdischarge period.²⁹ Patients themselves, and their caretakers, have become the agents of continuity and yet care processes have not changed quickly to support this new paradigm. Efforts to improve care focus on empowering patients to assume responsibility for their care,³⁰ ensuring better handoffs between providers,³¹ and improving follow-up with outpatient providers soon after their discharge.^{32,33}

Statement of Problem

Several solutions have emerged incorporating Coleman's principles of care transitions that focus on strengthening this process, making the postdischarge period safer and decreasing hospital readmissions. Studies of single interventions, like timely delivery of discharge summaries to outpatient providers, have been shown to decrease readmissions.²⁶ Improved readmission rates have also been observed with interventions tailored to specific patient populations, such as postdischarge nursing visits and comprehensive discharge planning in patients admitted with heart failure exacerbations.^{34,35} Recently, approaches that group multiple actions into a single intervention have been published to assist patients in the postdischarge period.^{36,37}

An intervention that is frequently included in these comprehensive approaches is ensuring that prior to discharge, each patient has an appointment scheduled with an outpatient physician. It is a widely held assumption that closer outpatient follow-up decreases adverse events that lead to emergency room visits or readmissions.^{2,31}

Outpatient providers may be able to “tie up loose ends” by following up on labs or other tests pending at the time of discharge, recognizing worsened signs and symptoms of disease, or detecting patient errors in medication administration.³ Earlier detection of such problems can decrease emergency room visits and readmissions. There is no guidance from the literature however, regarding how soon after discharge these appointments should be made for medical patients.

Hypothesis

The postdischarge outpatient appointment is an opportunity for outpatient primary care providers to detect problems or failures of postdischarge care. Ideally this occurs soon after discharge and before patients become ill enough to return to the emergency room or to need readmission to an acute care hospital.

The hypothesis of this study is that patients with an outpatient follow-up appointment scheduled with their primary care provider within five days of discharge have fewer 30-day readmissions than those patients who have appointments scheduled six days or longer from discharge.

Purpose and Significance of Study

As discussed, scheduling patients for a postdischarge appointment is common to interventions attempting to make the transition period safer, thereby decreasing readmissions to the hospital. Defining the best time period in which patients should be seen by their PCP is important to help inpatient clinicians as they plan for patients’ postdischarge care. In examining the practice habits of outpatient physicians, DeSalvo et al³⁸ found that the interval set to the next appointment varied widely among physicians, ranging from 2.2 to 20.5 weeks, despite similar practice settings and level of physician training. Given the absence of specific guidelines, the same variability likely exists among inpatient physicians, and evidence-based recommendations for a specific follow-up interval would help standardize this component of transitional care.

Scheduling patients for outpatient appointments after discharge is not only an added task for inpatient providers, but also significantly impacts the workload of outpatient providers. PCPs have seen their workloads increase, with the number of

clinical items addressed in a visit rising from 5.4 to 7.1 between 1997 and 2005 ($p < 0.001$) and time for patients' clinical issues decreasing from 4.4 to 3.8 minutes ($p=0.04$) per clinical issue.³⁹ Postdischarge appointments can be labor intensive for PCPs, particularly if a discharge summary is not available to inform their visit with the patient regarding hospitalization. Working towards evidence-based standards for scheduling postdischarge follow-up recognizes that available outpatient appointment times are a valuable resource. Defining the best timing for postdischarge follow-up would help use this resource judiciously.

Definition of Terms

The need for patients to reestablish care with their primary care providers after hospital discharge has come about due to the fragmentation of healthcare across settings. *Hospitalists* are “physicians whose practice emphasizes providing care for hospitalized patients.”²⁴ Hospitalists care for patients during their hospital stay and return care to patients' *primary care providers* (PCPs) at discharge. PCPs “devote the majority of their practice to providing primary care services to a defined population of patients...and serve as the entry point for substantially all of the patients' medical and health care needs.”⁴⁰ Although traditionally PCPs have cared for their patients across settings, with the development of the hospitalist model, they are now primarily outpatient providers.

Transitional care refers to measures taken to “ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location.”¹ Effective transitional care requires collaboration amongst providers and care facilities as a patient changes care settings. Part of transitional care includes arranging a *follow-up appointment* with a primary care provider, with scheduling done before they leave the hospital. The follow-up appointment refers to the first postdischarge, outpatient appointment a patient has with their primary care physician. This appointment allows reestablishment of care with the primary care provider.

A measure of the quality of transitional care is *readmission*, or rehospitalization to an acute care hospital. When used to measure the quality of inpatient or transitional care, the typical marker is the *30-day readmission*, or readmission to an acute care hospital

within 30 days of discharge.^{5,13,14,41} The initial admission is referred to as the *index admission*. Readmissions are further characterized as planned or unplanned. *Planned readmissions* refer to those readmissions to the hospital for a scheduled procedure or surgery and are not used as a quality marker of inpatient or transitional care. *Unplanned readmissions* are those that were not expected to occur at the time of discharge and result due to adverse events, defined as “adverse outcomes caused by medical care.”⁸ Unplanned readmissions are also *related* to the index admission, when the patient is readmitted for the same problem or *unrelated*, when a patient is readmitted for a new or different problem than the index admission.

Scope of Study

The study population included patients admitted to teams staffed by hospitalists in the Division of Hospital Medicine at Mayo Clinic. At the time of this study, the Division of Hospital Internal Medicine (HIM) of the study institution consisted of 22 hospitalists. During the study period March 20, 2009 to September 30, 2009, a total of 1697 patients ranging in age from 18 years to 101 years were cared for by the division’s providers. The hospitalists have primary admitting responsibilities for patients on four general medicine teams at Saint Marys Hospital, a 1,265-bed tertiary care facility, in Rochester, Minnesota. There are several specialty teams such as cardiology, pulmonary, and gastroenterology within the hospital that admit patients with specific, single-organ system problems and are staffed by specialist attending physicians. Additionally, intensive care physicians care for patients who require cardiac monitoring or intensive care unit admissions.

The division has maintained a database of all patients admitted to its teams since March 20, 2009. Recorded in this database is each patient’s demographic information, index admission date and discharge date, discharge destination and any 30-day readmissions. The database captures admissions to Saint Marys Hospital and readmissions to one of the two hospitals of Mayo Clinic in Minnesota: Saint Marys Hospital and Rochester Methodist Hospital, a 794-bed facility where patients are admitted primarily for obstetric, gynecologic, and elective surgeries. Readmissions are labeled as such only if a hospital medicine team cared for the patient during their index admission. There are occasions when patients are cared for by a medical specialty or

surgery team during their index admission and readmitted to a hospital medicine team. In these cases, only the readmission is recorded in the division's database. All readmissions, whether planned or unplanned, are recorded in the database. A separate database, generated from billing information and maintained by the institution, records primary and secondary diagnosis related groups (DRGs) as well as a severity of illness index.

The hospital system utilizes an electronic medical record which includes all clinical documentation generated during a patient's hospital stay, including admission and discharge notes, consult notes, procedure reports, laboratory and radiology results, and the discharge summary. For patients who receive their primary care within the hospital system, outpatient notes from visits with primary care providers are also recorded in the electronic medical record. The information composing the Division of Hospital Medicine's readmission database is extracted from the hospital system's electronic medical record. The study included patients discharged to home by hospitalists from Saint Marys Hospital with follow-up appointments made. Readmissions of patients to Saint Marys Hospital or Rochester Methodist Hospital were examined.

Summary

Sicker patients, shorter lengths of stay, and changes in care delivery that introduce discontinuity of providers across settings has rendered the postdischarge period a vulnerable time for patients discharged from an acute care hospital. Events including worsening of medical conditions and adverse medication reactions may occur causing patients to return to the hospital for evaluation or readmission. Work is underway to improve care transitions making this time period safer for patients.^{36,37} Several authors and organizations recommend that patients be seen shortly after discharge by their primary care provider.^{12,33,42} There is no guidance from the literature, however, as to when exactly patients should be seen. The goal of this study is to determine how the timing of the postdischarge follow-up appointment is related to readmission in order to guide clinicians in their discharge planning, improve the safety of the postdischarge period for patients, and decrease unplanned patient readmissions.

CHAPTER II: REVIEW OF THE LITERATURE

Theoretical Framework

The current healthcare system that discharges patients with multiple chronic illnesses after shorter hospital stays and with more complex care needs poses many hazards to patients. Fragmentation of care is a problem inherent to this system as patients' healthcare providers typically change when moving from the inpatient to outpatient setting. It was estimated in one study that 49% of patients experience at least one medical error that is related to discontinuity of care between inpatient and outpatient providers.⁹ Medication continuity errors comprised 42% of these errors, work-up errors accounted for 12%, and test follow-up errors made up 8% of these errors. Although there was no statistically significant association between these errors and rehospitalization, a similar study design was applied to a different patient population, and found 76 of 328 patients experienced at least one adverse event (therapeutic errors, nosocomial infections, diagnostic errors, procedure-related complications, pressure ulcers and falls).⁸ Twenty-one percent resulted in additional physician visits, 12% required evaluation in the emergency room, and 17% were readmitted.

Forster et al⁷ reviewed the postdischarge course of 400 hospitalized patients for adverse events due to the medical care received during admission including drug events, procedure-related complications, nosocomial infections, and falls. Seventy-six (19%) reported symptoms were attributable to medical care. Twenty-three reported events were deemed preventable and 20 adverse events led to significant morbidity. Further assessment of this data, focusing specifically on adverse drug events, revealed 11 per 100 discharges were affected, of which 27% were deemed preventable.⁶

In addition to adverse events resulting from hospitalization, test results frequently have not been returned prior to dismissal posing another risk to patient safety. Roy et al¹⁰ determined that of 1095 patients who had 2033 test results return after their discharge, 191 test results were potentially actionable. When surveyed, physicians were unaware of 61.6% of these results. Upon further review, 37.1% of these results were deemed actionable and 12.6% were felt to require urgent action. Such results suggest patients are at risk for harm unless a system is in place for follow-up of pending test results.

Failed follow-up of pending studies highlights the problem of poor communication between hospital and outpatient physicians. This poses another risk to patients during the postdischarge period as inpatient physicians may make recommendations for follow-up procedures or further evaluation by a specialist to occur once the patient is discharged. However, poor communication between discharging and receiving physicians may be a barrier to completing these recommendations. In a study by Moore,³ 36% of recommended workups in 182 patients were not completed. These workups included subspecialty referrals, outpatient diagnostic procedures, and laboratory tests. Diagnostic studies were carried out less than laboratory tests. The hospital physician had documented their recommendation in the discharge summary only 45.6% of the time.

Such studies illustrate the risks that patients are exposed to in the postdischarge period. It has also been demonstrated that patients themselves are poor at detecting the ill effects of these risks. Specifically, the finding by Epstein et al⁴³ that patients with worsening symptoms postdischarge were only minimally more likely to have made a follow-up appointment for themselves compared to asymptomatic patients (61% vs. 58.4%, $p < 0.05$) is concerning. Weismann⁴⁴ found that patients delayed access to health care because they thought the problem was not serious or would ‘go away’. These findings support the idea of a primary care follow-up appointment as a measure to detect postdischarge complications and readmissions to the hospital. A visit with a primary care physician may serve as a time to “tie up loose ends”: assess patients for adverse events of hospitalization, follow up on labs, arrange for recommended work-ups or referrals to specialists, and perform medication reconciliation.³

Although outpatient follow-up postdischarge seems like a reasonable intervention, there is a paucity of evidence in medical patients regarding whether outpatient follow-up affects readmissions to the hospital. Emergency medicine providers, however, have evaluated the effect of this intervention more extensively. Attendance of follow-up appointments ranged in the United States from 24-46% when patients were responsible for making their own appointment and from 65-70% if the appointment was made for them.⁴⁵ In a retrospective review of patients discharged from a Canadian emergency room, Murray et al⁴⁵ observed 81.7% of orthopedic surgery, urology, plastic surgery and

gynecology appointments were attended by patients who were referred from the emergency room. The investigators attributed this high compliance rate in part to the fact that the appointments were made for patients before they left the emergency room and patients were given computer printouts with the date, time and location of their appointment.

Further prospective evaluation of postdischarge appointment adherence in ER patients with appointments scheduled for them was undertaken by Kyriacou et al.⁴⁶ They performed a randomized trial of patients dismissed with and without primary care appointments made for them from the Northwestern University emergency room. The follow-up rate at one month for the intervention group was 59% compared to 37% for the standard care group ($p < 0.001$). The timing of the follow-up appointments was based on the recommendations of attending ER physicians and the patients' schedules, but the time to scheduled follow-up appointments was not specified by the authors.

Although adherence to scheduled postdischarge appointments is better studied in ER patients than medical patients, the timing of the follow-up appointment has not been well-studied in either population. In an older study evaluating an intervention that increased primary care access for veterans after discharge from the hospital, Weinberger et al⁴⁷ demonstrated a shorter time to follow-up was actually associated with more ER visits and higher readmission rates. Patients in the intervention group were visited while still in the hospital by a primary care physician to review the plan of care and an appointment was made for the patient with the primary care clinic within one week of discharge. Although only 62.5% of patients in the intervention group actually had an appointment made for them, 82% of these patients attended the appointment. The patients in the control group received the usual discharge care and the authors did not specify what percentage of patients had an appointment scheduled for them. Patients in the intervention group had a higher monthly readmission rate observed (0.19 vs. 0.14 readmissions, $p = 0.005$) as well as trends towards higher proportions of patients being readmitted compared to the control group (49% vs. 44%, $p = 0.06$).

Despite Weinberger's findings, it is widely accepted that follow-up is beneficial to avoid pitfalls of the early postdischarge period. In one of the few studies of medical patients, Ashton¹³ examined adequacy of inpatient medical care, including whether a

follow-up appointment was made for the patient, and its influence on 90-day readmissions of patients with chronic illness. Thirty-nine percent of patients who were readmitted had a follow-up appointment made compared to 81% of patients who were not readmitted ($p<0.05$). Twenty-eight percent of the readmitted patients saw a physician after discharge from the index admission compared to 66.7% of the patients who were not readmitted ($p<0.05$).

From a cost perspective, Jack et al³⁷ looked at total patient care cost in a group of 370 patients working with a discharge advocate who helped arrange follow-up appointments, perform medication reconciliation, and provide patient education. Comparing this group to a group of 368 patients who received the institution's usual discharge care, they found that the combined hospital utilization and outpatient follow-up cost was higher in the usual care group by \$149,995. More patients in the intervention group received outpatient follow-up care which was estimated to cost \$3711 more in the intervention group. The authors did not feel the slightly increased cost for outpatient follow-up of the intervention group detracted from the impressive difference in total cost between the usual care and intervention groups. They felt that hospital utilization (ER visits and readmissions) accounted for the higher cost in the usual care group.

The reviewed studies demonstrate the potential dangers to patients after hospital discharge. Financial data shows outpatient care is a cost-effective measure to decrease postdischarge hospital utilization. Available ER literature regarding postdischarge follow-up supports making appointments for patients to help decrease hospital utilization. Determining the timing of these appointments can further refine recommendations and optimize the cost savings realized by decreasing hospital utilization.

Historical Background

Follow-up appointments represent a single component of transitional care. The need for transitional care processes has arisen due to the confluence of increased patients with multiple, chronic diseases and changing care delivery expectations and models of care. The increased prevalence of chronic diseases requires complex care, yet decreased lengths of stay have been expected and realized in recent years.^{21,22} Previously, primary care physicians would care for these patients across the continuum of settings, but with

sicker hospitalized patients making it difficult for primary care physicians to see patients in the hospital and in the office, the field of hospital medicine, with its practitioners called “hospitalists,” arose.²⁴

In addition to time pressures on primary care physicians, other drivers of the growth of hospital medicine include the increased acuity of hospitalized patients and increased emphasis on efficiency and safety of inpatient care.^{25,48,49} Five years after the field was first described, a review of available outcomes by Wachter and Goldman⁴⁸ found 15 of 19 studies of care by hospitalists showed significant decreases in hospital cost, by an average of 13.4%, and an average decrease in length of stay of 16.6%. Reflecting the success of the field, hospital medicine is growing by 10-20% each year.²⁵

Despite the growing number of institutions employing hospitalists, systems have not evolved to support effective transfer of care between providers and between care settings.⁵⁰ There is a risk of treating hospitalization as a discrete event rather than a period of time along a continuum of care. This is reflected in a 2005 survey of patients who either had a chronic illness or a recent acute illness which showed that one third of those hospitalized in a 2-year time period had no follow-up arrangements made for them at the time of discharge.⁵¹

Discontinuity of care is an acknowledged vulnerability of the hospitalist model, and as the field has grown, this has become an area of interest to researchers in hospital medicine.^{1,25,52} Patients, who have had to adapt to a new model of care, indicated soon after the hospitalist model arose that they themselves recognized the importance of communication between their primary care physician and hospitalist. Eighty-eight percent of 74 inpatients interviewed in one study thought that their primary care physician had medical information about them that should be imparted to the hospitalist and 82% felt their hospitalist had medical information that should be imparted to their primary care physician.⁵³

Even with the recognition that effective communication between providers is important as patients transfer from the hospital to the outpatient setting, communication between inpatient and outpatient physicians remains poor. Kripilani et al,²⁷ in a review of observational studies examining communication at discharge, found that only 3% of primary care physicians reported being involved in discussions about discharge.

Additionally, availability of discharge summaries was reported at 12-34% at the first postdischarge visit which was felt to affect the quality of 25% of these outpatient visits. Pantilat²⁸ surveyed 1030 family physicians in California to determine their opinions regarding communication with hospitalists. Just 56% of respondents who had used hospitalist services were satisfied with the communication with hospitalists and 89% agreed that they were not notified often enough when their patient was admitted to the hospital by a hospitalist. Sixty-three percent of primary care physicians reported being notified by a discharge summary but only 33% reported the discharge summaries always or usually arrived before their first follow-up appointment with the patient after discharge.

The potential risks of poor care transitions to patient safety are evident but there are currently no formal, comprehensive metrics to measure the quality of transitional care. Efforts are underway to correct this deficiency. In 2006, the National Quality Forum endorsed the care transition measure, a measure of the quality of preparation for care transitions.⁵⁴ One of the 2010 national patient safety goals of the Joint Commission on Accreditation of Hospital Organizations (JCAHO) is improving communication among caregivers regarding critical results of tests and diagnostic procedures.⁵⁵

A recent collaboration of several inpatient, outpatient, and emergency medicine professional organizations reviewed the available transitional care literature, developed consensus standards addressing quality of care transitions, and called for the development of outcome measures for these standards to drive improvement.⁵⁶ Without formal outcome measures for care transitions, readmissions are being used to reflect inpatient care quality as well as the quality of transitional or postdischarge care.^{1,5,15}

No direct penalties are yet realized for failure of care transitions but with proposed reimbursement of readmissions based on a hospital's rate of readmission, there is a possibility of indirect penalty for poor care transitions. Studies that have used readmissions as an outcome measure to assess transitional care do show a relationship between the two which supports using readmissions to measure transitional care quality. Van Walraven²⁶ found a trend toward lower readmission risks in patients who were seen in follow-up by a physician who had received a dismissal summary (RR 0.74, 95% confidence interval 0.050 to 1.11). Moore⁹ performed a multivariate analysis showing

that patients with at least one outpatient test or procedure suggested or scheduled by their inpatient physician that was not followed up by their outpatient provider were at least 6.2 times (95% CI, 1.3 to 30.3) more likely to be readmitted than patients with no errors in work-up. The timeframe of readmission in this review was within 3 months after their first postdischarge primary care appointment.

As studies show, deficits in care transition are problematic and although standards of transitional care have been proposed in the literature, they have been neither fully enacted nor well-measured. Currently, readmissions are used as an indicator of poor care transitions. Increased attention to readmissions has prompted interest in operationalizing these principles, quickly spawning several discharge interventions.^{36,37} There has also been a paradigm shift in care delivery away from primary care physicians providing care across all care settings and towards rotating providers based on care site. Patients and their caretakers are now the agents of continuity and yet processes have not kept up in terms of preparing patients and their caretakers for postdischarge care. A frequently proposed solution to strengthening care during this period is scheduling a follow-up appointment with the patient's primary care, outpatient provider. This study's purpose is to define the time period in which that appointment should be made after discharge from the hospital to avoid readmission.

Review of Studies

Despite several published recommendations to include a scheduled primary care appointment in the postdischarge plan for patients,^{12,33,42} there are few that specify actual timing of these appointments. A review of the current literature was undertaken to review studies that relate the timing of postdischarge appointments and hospital readmissions.

Two recent interventions, the Care Transitions Intervention (CTI)³⁰ and a re-engineered discharge process (RED),³⁷ looked prospectively at the effect on readmissions of multiple activities bundled into one intervention. The Care Transitions Intervention is the work of Dr. Eric Coleman that operationalizes his principles of transitional care. Transition coaches educate patients regarding: (1) medication self-management, (2) maintaining a record to facilitate information transfer, (3) completing timely follow-up

with primary or specialty care, and 4) awareness of a list of signs and symptoms indicative of a worsening condition and what to do in response. A goal of CTI transition coaches is to have patients schedule and complete follow-up visits, but no timeframe for follow-up is specified. In a randomized controlled trial, patients in the Care Transitions Intervention group had lower readmission rates at 30 days compared to the control group ($p=0.048$). Similarly, RED uses nurse discharge advocates to implement a discharge intervention including patient education, discharge planning, and follow-up by phone after discharge. Discharge advocates also arrange for follow-up appointments while the patient is still in the hospital, soliciting patient input regarding the timing of follow-up. No timeframe for follow-up is specified. The rate of outpatient follow-up within 30 days of discharge was a secondary study outcome. Ninety-four percent of patients in the intervention group were discharged with a PCP appointment and had a higher rate of PCP follow-up than the usual care group (62% versus 44%, $p < 0.001$). The intervention patients had a lower rate of hospital utilization, by about 30%, within 30 days of discharge compared to controls.

Similar to the bundled interventions of RED and the CTI, Balaban³² implemented an intervention that standardized the discharge process and arbitrarily chose the ideal timeframe for follow-up as 21 days. Registered nurses used a standardized discharge form and made postdischarge phone calls to patients to improve transitional care in the intervention group. The intervention did not include scheduling an appointment for patients but an outcome measure was whether follow-up with a primary care provider occurred within 21 days of discharge. The authors, recognizing there were no studies determining the best timing of follow-up, explained that they chose a 21-day period “to accommodate both the seriously ill patients who need rapid follow-up and those patients who can reasonably wait longer.” They found that fewer patients (14.9%) in their intervention group failed to follow-up within 21 days compared to the concurrent group (40.8%, $p=0.005$) and historical control group (35%, $p=0.01$). Additionally, fewer patients in the intervention group were readmitted within 31 days compared to the concurrent and historical controls, but the differences did not reach statistical significance.

An earlier study by Einstadter⁵⁷ used nurse case managers with general medical patients to address discharge plans, discuss postdischarge follow-up appointments with the dismissing physician, and educate patients on the importance of attending appointments. Sixty-three percent of the intervention group had a scheduled appointment at the time of discharge, but only 29.6% of these patients kept their appointment. The median time to first appointment in the intervention group was 15.1 days and in the control group 17.2 days. There was no difference in 30-day readmission or ER visits between the intervention and control groups (20% versus 14%, $p=0.12$).

In the few studies that specify a time to follow-up then assess outcomes, Preen et al⁵⁸ and Weinberger et al⁴⁷ tested discharge interventions that arranged for follow-up appointments within a week of discharge. Preen et al randomized patients with cardiopulmonary diagnoses to an intervention where care plans were sent to their primary care provider while they were still hospitalized. The PCPs then made changes in the plan based on their knowledge of the patient and returned the corrected plan to the hospital physician. Intervention patients were scheduled to see their PCP within 7 days of discharge, and patients and caregivers were educated on the discharge plan. Patients and PCPs were surveyed before and after discharge with outcomes including satisfaction with discharge, quality of life and length of stay. Length of stay showed no difference between intervention and control groups and postdischarge hospital utilization (ER visits and readmissions) was not measured. Weinberger et al randomized VA patients to an intervention that arranged for an in-hospital visit by a primary care provider, a postdischarge phone call two days after release, and primary care follow-up within a week of discharge. Over the six-month study period, intervention group patients had higher rates of readmission per month (0.19 vs. 0.14, $p=0.005$). The authors attributed this, in part, to the fact that the patients studied were very ill with half of the congestive heart failure patients classified as New York Heart Association class III or IV, 30% of the diabetic patients with end-organ damage, and 25% of patient with COPD being home-oxygen dependent.

The above are the available studies addressing postdischarge follow up and its relationship to readmissions. Coleman's CTI demonstrates that when patients are encouraged to make primary care follow-up appointments as one component of a bundle

of discharge activities, readmissions decrease. Jack et al's re-engineered discharge demonstrated that when patients are discharged with an appointment made for them, there is a higher compliance rate in attending the appointment and a lower rate of hospital utilization. CTI and RED acknowledge the importance of postdischarge follow-up but do not specify a time period. Balaban's group was one of the first to choose a timeframe for optimal follow-up. Using an arbitrarily chosen 21-day window, they found more intervention group patients had followed up and had fewer 31-day readmissions, although readmissions did not reach statistical significance. Einstadter's study showed no difference between the hospital utilization in the discharge intervention group, whose median follow-up of 15.1 days was two days shorter than the control group. Although Balaban set a time period during which to measure attendance of postdischarge appointments and Einstadter measured the median time to follow-up, neither actually scheduled patients for postdischarge follow-up within a set time period. Preen set a 7-day timeframe for scheduled follow-up but outcome measures did not include readmissions. Weinberger's study, in which patients with a 7-day follow-up also had higher readmissions, may have limited external validity as the patient population was quite ill.

Although there are no studies to delineate the ideal postdischarge follow-up period for avoiding readmissions, there are some published recommendations based on expert opinion that specify a timeframe. Bisognano and Boutwell⁴¹ described 'appropriate intensity' of postacute care follow-up as one component of the Institute for Healthcare Improvement's Ideal Transition Home Model. Although based on heart failure literature, the authors felt that the basic principles of this model are widely applicable and suggest scheduling a face-to-face appointment within 48 hours after discharge for high-risk patients and within 5 days for moderate risk patients. The IHI publication How-to Guide: Creating an Ideal Transition Home⁴² elaborates that high-risk patients have been admitted two or more times in the last year, are unable to teach back (repeat in their own words the education they have received during hospitalization), or have caregivers with low confidence in providing care at home. Moderate-risk patients have been admitted once in the last year and their caregivers have moderate comfort in carrying out self-care at home.

The national hospitalist professional organization, the Society of Hospital Medicine, formed a committee to develop a discharge checklist of the most important information and activities needed for patient care handoff upon discharge.³³ The discharge checklist includes postdischarge care with a follow-up appointment made for the patient within 2 weeks, or sooner if patient has a “fragile medical condition.” The authors specify that this recommendation is based on expert consensus and peer review of the recommendations, but not on published studies. Based on expert opinion, then, the range of optimal postdischarge follow-up with a primary care physician to decrease readmissions is 2 days to 2 weeks.

Establishment of Need and Delineation of Study

This study’s goal is to examine the relationship between the timing of postdischarge follow-up appointments and 30-day unplanned readmissions. The existing recommendations for the timing of the follow-up appointment are general as that of Jencks et al¹² who found that 56% of patients with 30-day readmissions had not seen a primary care provider and recommended that discharging providers “ensure a follow-up with a MD is scheduled for every patient before he/she leaves the hospital” and feel that this “is probably more efficient than trying to identify high-risk patients and arranging follow-up care just for them.” Current expert opinion is that follow-up should occur 2 days to 2 weeks after discharge, but there are no studies that support this time frame.

Although scheduling an outpatient appointment for all patients prior to their discharge from the hospital seems like a sensible intervention to improve transitional care and decrease readmissions, outpatient appointments are a limited resource. It is necessary, then, to determine the optimal timing of these appointments to avoid overburdening an over-stressed primary care system. A survey by Schoen et al⁵¹ revealed that patients in the United States do not have rapid access to primary care and are more likely to wait 6 days or longer than patients in other countries. Inpatient providers should be aware of such barriers to completing follow-up appointments in their local community. Even if patients have access to primary care, Bodenheimer²⁰ points out the “impossible schedule” maintained by primary care physicians citing the estimate that 7.4 hours per work day would be required to perform all recommended preventive

services and 10.6 hours per day to provide high-quality long-term care for a typical panel of patients.^{59,60}

Such limitations in outpatient providers' schedules encourages collaboration between inpatient and outpatient providers.⁶¹ A culture of shared accountability for postdischarge follow up may be needed to provide optimal patient care. Wachter and Pantilat⁶² proposed "continuity visits" to describe patient care encounters that occur between a hospitalized patient and their primary care physician, who visits them in the hospital. Such a visit would allow PCPs to provide clinical and social insight to the inpatient provider and learn more about the patient's hospitalization, perhaps facilitating a smoother transition back to outpatient care. An alternate approach to care in the immediate postdischarge period was put forth by van Walraven et al.⁶³ These investigators undertook a population-based cohort study in Canada and found that the relative risk of death or 30-day readmission decreased by 5% (95% CI, 2% to 4%) when patients were seen in follow-up by physicians who took care of them during hospitalization. Such studies raise the idea of a hospitalist-staffed follow-up clinic. Collaboration between inpatient and outpatient providers could continue to give rise to innovative solutions to bridge the gap between the time of discharge and the time of first postdischarge follow-up.

Summary

Based on expert opinion, the current timeframe in which patients should be seen by their primary care physician after hospitalization is 2 days to 2 weeks. There is no literature that supports these recommendations, however. The intent of this study is that by retrospective review of recent admissions to a general medical ward at an academic medical center a relationship between the timing of postdischarge follow-up and readmissions is determined to help clarify the optimal time to follow-up.

CHAPTER III: METHODOLOGY

Introduction

During the time of this study, the Division of Hospital Medicine was comprised of 22 hospitalists, 11 nurse practitioners and 9 physician assistants. Hospitalist admitting teams are comprised of a hospitalist and nurse practitioner or physician assistant. Hospitalists also serve as attending physicians on teams supervising medical students, interns, and residents and on medical consult teams evaluating surgery patients. Hospital admitting teams care for patients who are directly admitted from the emergency room or from primary care offices, transferred from outside facilities for admission, or transferred from the intensive care unit once they become stable enough for a general medical ward.

The hospital's electronic medical record contains discharge summaries of all patients dismissed from the hospital. A section of the discharge summary specifically addresses follow-up recommendations. This section is used by inpatient providers to document postdischarge appointments and recommendations for postdischarge care.

Research Design

A retrospective study of general medical patients cared for by physicians (hospitalists) in the Division of Hospital Medicine at Mayo Clinic was performed. The data sources were the hospital system's electronic medical record, the hospital system's billing database, and the database kept by the division beginning April 1, 2009, which includes all general medical patients cared for on a hospitalist service since March 20, 2009.

Hypothesis

The hypothesis of this study was that patients with an outpatient follow-up appointment scheduled with their primary care provider within five calendar days of discharge have fewer 30-day readmissions than those patients who have appointments scheduled six days or longer from discharge.

Sample/Population of Interest

The population of interest was patients with general medical conditions cared for by hospitalists on medical wards at an academic medical center.

Selection of Subjects

Patients who were admitted March 20, 2009 through September 30, 2009 and discharged to home or assisted living, settings where primary care providers would not be expected to visit patients, were included. Patients discharged to nursing homes, skilled nursing facilities, or another acute care hospital were excluded. Patients who transferred to another service, died during their hospitalization, or left against medical advice were also excluded.

Only patients cared for by the hospitalists' non-teaching admitting teams were evaluated. Patients cared for by hospitalists serving as attending physicians on teaching teams and consultative medicine teams are not included in the division's database.

Instrumentation/Procedures

Estimate of sample size and power statement: A two group continuity Pearson corrected c^2 test with a 0.05 two-sided significance level will have 80% power to detect the difference of unplanned 30-day readmissions between the proportion of patients with follow-up appointments scheduled ≤ 5 days (p_1) of 0.05 and the proportion with follow up scheduled ≥ 6 days from discharge (p_2), of 0.125 (odds ratio of 2.714) when the sample sizes are 200 and 400 respectively (total sample size of 600).

Methodology

Submission of the protocol to the Mayo Clinic and Indiana University Institutional Review Boards was completed and the study deemed exempt by both boards.

Data Sources

Two separate databases were accessed for patient information. The readmit database maintained by the Division of Hospital Medicine captures patients admitted to

and cared for by hospitalists at Saint Marys Hospital. Readmissions to one of the two hospitals of Mayo Clinic in Minnesota: Saint Marys Hospital and Rochester Methodist Hospital, a 794-bed facility where patients are admitted primarily for obstetric, gynecologic, and elective surgeries are also recorded in the database. Readmissions were labeled as such only if a hospital medicine team cared for the patient during their index admission. There were occasions where patients were cared for by a medical specialty or surgery team during their index admission and readmitted to a hospital medicine team. In these cases, only the readmission was recorded in the division's database. All readmissions, whether planned or unplanned, were recorded in the database. Another database, generated from billing information and maintained by the institution, records primary and secondary diagnosis related groups (DRGs) as well as a severity of illness index.

The hospital system utilizes an electronic medical record which holds all clinical documentation generated during a patient's hospital stay, including admission and discharge notes, consult notes, procedure reports, laboratory and radiology results, and the discharge summary. For patients who receive their primary care within the hospital system, outpatient notes from visits with primary care providers are also recorded in the electronic medical record. The information composing the Division of Hospital Medicine's readmission database is extracted from the hospital system's electronic medical record. All follow-up plans, including postdischarge appointments made for the patient are recorded in the discharge summary of the electronic medical record.

Chart Review

Patients in the database were de-identified and assigned a study number. The electronic medical record was accessed to review discharge summaries as well as clinical notes of the patients' index admissions and readmissions, if they were rehospitalized. The date of scheduled follow-up appointments with primary care providers were recorded and the timing from discharge calculated from the discharge summaries for all patients cared for by hospitalists during the study period. The database used records all 30-day readmissions. The charts of patients with 30-day readmissions were reviewed to determine whether the admission was planned or unplanned. Readmissions were

considered planned if patients returned for a scheduled procedure or surgery. Only unplanned readmissions were addressed. If multiple readmissions occurred for a single patient during the 30 days after the index admission, only the first readmission was examined. For patients who were cared for by a surgical or medical subspecialty group within the 30 days prior to their admission to a hospitalist group, the admission to the hospitalist group was considered their index admission. For patients dismissed by the hospitalist group and readmitted within 30 days by another specialty, the readmission was included.

Demographic data was recorded in the database and DRG information was collected from the Mayo medical index and billing data. The aims of the study were as follows:

Specific Aims

Specific Aim 1: The study will compare the frequency of first unplanned readmissions between those patients who were discharged to home with follow-up appointments made within 5 calendar days of discharge and those who had follow-up appointments made 6 calendar days or longer from discharge.

Specific Aim 2: Patients discharged to home with unplanned readmissions within 30 days of discharge and those discharged to home without 30-day, unplanned readmissions will be characterized by:

- Age, gender, race
- Length of stay of index admission
- Discharge APR-DRG
- Severity-of-illness measure
- Presence of the following comorbidities:
 - Heart failure
 - Pneumonia
 - Chronic obstructive pulmonary disease
 - Psychoses
 - Gastrointestinal problems

Specific Aim 3: For patients discharged home with and without 30-day unplanned readmissions the range and average time to scheduled follow-up appointment will be determined.

Specific Aim 4: For patients discharged home who were readmitted within 30 days, the average time (days) between discharge and readmission will be determined.

Statistical Method

Frequency and percentage were used to summarize the data. The unplanned readmission rate within 30 days between the group of patients with a follow-up appointment scheduled within 5 days of discharge and the group with an appointment scheduled 6 days or longer after discharge were compared by Fisher's exact test. The basic demographics (age, gender, race), discharge APR-DRG and associated comorbidities (secondary diagnoses) of each patient discharged by providers in the Division of Hospital Medicine during the study period were collected from Mayo billing data. They were tabulated and compared by Fisher's exact test or two-sample t-test.

CHAPTER IV: RESULTS

There were 1697 patient admissions for the period March 20, 2009 through September 30, 2009. One thousand one-hundred-forty-five patients were discharged to home, which included patients living in group homes, assisted living communities, and those going home with home health care services. Excluding 55 duplicate entries for the same admission and 42 patients (with 46 admissions) who did not sign the institution's research consent form, there were 1044 eligible patient admissions. The baseline characteristics of these patients are summarized in Table I.

Patients who were discharged from the hospital to home settings are characterized in Table II, grouped by whether they

Table I: General characteristics of patients discharged home	
Variable	Total (N=1044)
Age (years)	62.95 ± 18.18
LOS (days)	3.27 ± 4.44
Male, No. (%)	502 (48%)
White race, No. (%)	965 (92%)
APR-DRG Severity, No. (%)	
0	643 (62%)
1	53 (5%)
2	148 (14%)
3	165 (16%)
4	35 (3%)
30-day readmission, No. (%)	
Unplanned	112 (11%)
Planned	29 (3%)
None	903 (86%)

had appointments scheduled within 5 calendar days of discharge, appointments 6 days or longer from discharge, or no appointment scheduled. Of the 1044 patient discharges home, 178 (17%) had follow-up appointments made within 5 days of discharge and 394 patient discharges home (38%) had follow-up arranged 6 days or longer from discharge. Of those patients with follow-up made within 5 days of discharge, 21 (12%) had unplanned 30-day readmissions compared to 44 (11%) unplanned 30-day readmissions in those patients with follow-up made 6 days or longer from discharge ($p=0.89$). Four hundred seventy-two patients (45 %) discharged home had no follow-up appointment made and 47 (10%) of this group had an unplanned 30-day readmission ($p= 0.57$ compared to follow-up made within 5 days).

Variable	No PCP follow-up (n=472)	PCP follow-up ≤ 5 days (n=178)	PCP follow-up ≥ 6 days (n=394)	P-value (≤ 5d vs. ≥ 6d)
Age (years)	60.5 ± 17.60	63.3 ± 19.04	65.8 ± 18.10	0.14
LOS (days)	2.6 ± 3.22	4.04 ± 2.86	3.92 ± 6.23	0.87
Male, No. (%)	239 (51%)	82 (46%)	181 (46%)	0.98
White race, No. (%)	430 (91%)	167 (94%)	368 (93%)	0.85
APR-DRG Severity, No. (%)				0.66
0	304 (64%)	100 (56%)	239 (61%)	
1	27 (6%)	7 (4%)	19 (5%)	
2	61 (13%)	27 (15%)	60 (15%)	
3	63 (13%)	37 (21%)	65 (16%)	
4	17 (4%)	7 (4%)	11 (3%)	
Diagnoses, No. (%)				
Renal failure	13 (3%)	6 (3%)	11(3%)	0.72
Cellulitis	9 (5%)	7 (4 %)	11(3%)	0.48
Pneumonia	6 (1%)	4 (2%)	8 (2%)	0.88
Sepsis	2 (0%)	1(1%)	6 (2%)	0.33
Electrolyte disorder	6 (4%)	6 (3%)	5 (1%)	0.09
Syncope	7 (4%)	4 (2%)	4 (1%)	0.25
Peripheral Vascular Disease	5 (3%)	2 (1%)	8 (2%)	0.44
Nonbacterial gastroenteritis, gastrointestinal symptoms	3 (1%)	3 (2%)	5 (1%)	0.70
Infectious gastroenteritis/ GI bleed	3 (1%)	3 (2%)	4 (1%)	0.51
Kidney, Urine Infect	4 (2%)	1 (1%)	4 (1%)	0.58
Alcohol Dependence	7 (1%)	0 (0%)	1 (0%)	0.50
Heart failure	3 (1%)	2 (1%)	1 (0%)	0.19
COPD	3 (1%)	2 (1%)	6 (2%)	0.70
Malignancy	5 (3%)	1 (1%)	4 (1%)	0.58
Depression	0 (0%)	0 (0%)	3 (1%)	0.24
30-day readmission, No. (%)				
Unplanned	47 (10%)	21 (12%)	44 (11%)	0.89
None	403 (85%)	155 (87%)	345 (88%)	
Planned	22 (5%)	2 (1%)	5 (1%)	

The demographic characteristics of patients dismissed home are detailed in Table II. Patients with follow-up scheduled within 5 days of discharge were an average age of 63.3 (± 19.04) years compared to 65.8 (± 18.10) years in those patients scheduled for follow-up 6 days or longer from discharge (p=0.14). Patients scheduled for follow-up within 5 days of discharge had an average LOS of 4.04 (± 2.86) days compared to an average LOS of 3.92 (± 6.23) days with follow-up scheduled 6 days or longer (p=0.87). Patients with no follow-up appointment made for them were an average age of 60.5 (±17.60) years, with an average length of stay of 2.6 (± 3.22) days. The distribution of patients by APR-DRG severity class is also documented in Table II. The most common

diagnoses cared for by the hospitalists as well as common diagnoses known to have high readmission rates are compared between groups in Table II with no differences in occurrence for any diagnosis.

Table III: Patient characteristics by readmission status			
Variable	30-day Unplanned		P-value (Unplanned Readmit vs. No Readmit)
	Readmission (n=112)	No Readmission (n=903)	
Age (years)	64.31 ± 16.47	62.86 ± 18.53	0.43
LOS (days)	3.27 ± 2.45	3.25 ± 4.68	0.97
Male, No. (%)	59 (53%)	428 (47%)	0.29
White race, No. (%)	105 (94%)	834 (92%)	0.60
APR-DRG Severity, No. (%)			0.11
0	62 (55%)	568 (63%)	
1	6 (5%)	43 (5%)	
2	15 (13%)	127 (14%)	
3	21 (19%)	140 (16%)	
Diagnoses, No. (%)			
Renal failure	4 (4%)	25 (3%)	0.63
Cellulitis	2 (2%)	2 (2%)	0.54
Pneumonia	3 (3%)	15 (2%)	0.44
Sepsis	0 (0%)	8 (1%)	0.32
Electrolyte disorder	1 (1%)	15 (2%)	0.54
Syncope	0 (0%)	15 (2%)	0.17
Peripheral Vascular Disease	4 (4%)	11 (1%)	0.05
Nonbacterial gastroenteritis, gastrointestinal symptoms	1 (1%)	10 (1%)	0.84
Infectious gastroenteritis/ GI bleed	2 (2%)	7 (1%)	0.28
Kidney, Urine Infect	1 (1%)	8 (1%)	0.99
Alcohol Dependence	0 (0%)	7 (1%)	0.35
Heart failure	0 (0%)	6 (1%)	0.39
COPD	3 (3%)	8 (1%)	0.08
Malignancy	2 (2%)	8 (1%)	0.36
Depression	1 (1%)	2 (0%)	0.22
Follow-up, No. (%)			0.89
≤ 5 days	21 (19%)	155 (17%)	
≥6 days	44 (39%)	345 (38%)	
None	47 (42%)	403 (45%)	
Discharge to follow-up (days)	9.42 ± 10.57	8.39 ± 7.18	0.75
Range: (min, max)	(1,74)	(0,81)	
Discharge to readmission (days)	11.06 ± 9.48		
Range: (min,max)	(0,60)		

Of the 112 patients who were dismissed home with 30-day unplanned readmissions, 21 (19%) had follow-up appointments made within 5 days of discharge compared to 44 (39%) with follow-up made 6 days or longer from discharge and

47 (42%) had no follow-up appointment made (Table III). Of the 903 patients who were dismissed home without 30-day readmissions, 403 (45%) had no follow-up appointment made, 155 (17%) had follow-up appointments made within 5 days of discharge and 345 (38%) had follow-up 6 days or longer from discharge.

The average age of patients with unplanned 30-day readmissions was 64.31(\pm 16.47) years compared to 62.86 (\pm 18.53) years in those patients who were not readmitted ($p=0.43$) (Table III). The average LOS in readmitted patients was 3.27 (\pm 2.45) days and 3.25 days (\pm 4.68) in those patients who were not readmitted ($p=0.97$). Twenty-six percent of readmitted patients and 19% of non-readmitted patients had either APR-DRG severity class 3 or 4. In patients with unplanned 30-day readmissions the average time between discharge and follow-up appointment was 9.42 (\pm 10.57) days and the average time between discharge and readmission was 11.06 (\pm 9.48) days. For patients who were not readmitted, the average time between discharge and scheduled follow-up appointment was 8.39 (\pm 7.18) days.

CHAPTER V: DISCUSSION AND CONCLUSIONS

Discussion of Results Relative to Hypothesis

The original study hypothesis was that those patients seen by their primary care provider within 5 calendar days of discharge from a general medical inpatient stay would have fewer readmissions than those patients seen longer than 6 days from discharge. The results of this study, however, did not support the hypothesis as 12% of the patients seen within 5 days were readmitted compared to 11% of patients seen 6 days or longer from discharge ($p=0.89$)

Patients were characterized by age, length of stay and APR-DRG (all patient refined diagnosis related group) disease severity classes with no difference in those characteristics between the group of patients who had follow-up arranged within 5 days of discharge and those with follow-up appointments made 6 days or longer from discharge (Table II). This suggests that when determining the timing of follow-up for patients, clinicians do not necessarily consider patient age or gender. Given the homogeneous population of this study, it cannot be determined whether race is a consideration in timing of follow-up appointments.

Part of the rationale for this study's hypothesis was that those patients with complex care needs are at risk for failure of postdischarge care and require follow-up closer to the time of discharge. It might be expected that if any diagnoses were considered by the dismissing hospitalist to represent sicker patients, then those diagnoses would be more heavily represented in the group with follow-up within five days of discharge. No difference between the groups existed in the occurrence of any of the top ten APR-DRGs cared for by the hospital medicine group, nor in several diagnoses identified as the most commonly readmitted (heart failure, COPD, gastrointestinal problems, and pneumonia) in a recent review of Medicare patients¹² (Table II). Diagnosis alone may not be the primary determinant of follow-up timing.

If not diagnosis, then severity of illness would seem a logical consideration when determining follow-up timing. Length of hospital stay (LOS) is often used to reflect patients' illness severity and in this study there was no difference in LOS between patients with follow-up made within 5 days of discharge (4.04 days \pm 2.86) and those

with follow-up made after 6 days (3.92 days \pm 6.23, $p=0.87$). This suggests that degree of illness, as reflected by length of stay, was not the only determinant of follow-up timing either. An alternate explanation for the similar lengths of stay between groups with follow-up within 5 days and those with follow-up longer than 6 days is that patients who were sicker may have been kept in the hospital longer. Patients with more comorbidities, for instance, may have been kept in the hospital until all of their acute issues were resolved, and clinicians may have been comfortable with a longer time period before follow-up. Patients with fewer comorbidities may have been released with ongoing acute issues that were showing improvement but not completely resolved, prompting arrangement of closer follow-up in these otherwise “less sick” patients. Testing of this theory requires evaluation of length of stay in relation to severity of illness measurement, which was not performed in this study.

Table III characterizes patients based on their readmission status. For patients who were readmitted, readmissions occurred at 11.06 days (\pm 9.48, range 0-60 days) whereas the time to scheduled follow-up appointment was 9.42 days (\pm 10.57, range 1-74 days). In those patients who were not readmitted, the time to scheduled follow-up appointment was 8.39 (\pm 7.18) days. This suggests that the optimal time to follow-up may actually be closer to 8 days, which seems counterintuitive to the rationale of the hypothesis. It may be that 5 days is actually too soon after hospitalization for problems, such as progression of disease or failures of transitional care, to manifest themselves; the benefits of hospitalization may still be realized, a “honeymoon” effect. By 8 days this effect may have faded, yet problems that arise may still be correctable in the outpatient setting. Nine to ten days after discharge may be too late for problems to be corrected in the outpatient setting, necessitating readmission. This rationale addresses only the timing of the appointment; it considers neither encounter content nor appointment attendance. Both of these factors clearly influence the effectiveness of the postdischarge follow-up visit.

It is notable that patients without readmission tended to be younger compared to those patients who were readmitted (62.86 years vs. 64.31 years, $p=0.43$), but this did not reach statistical significance. Lengths of stay were nearly the same between readmitted and non-readmitted patients (3.27 days vs. 3.25 days, $p=0.97$). The distribution of

severity scores is shown and does not differ between patients with and without readmission ($p=0.11$). By demographic data, diagnoses present, and crude indicators of illness severity, there were no clear differences between the group of patients who were readmitted and those who were not. This suggests clinicians are using different factors than those traditionally recorded to characterize patients when determining timing of follow-up appointments.

Discussion of Results Relative to Other Studies

There are few other studies that specifically evaluate the timing of postdischarge follow-up and readmissions. Guidelines based on expert opinion suggest between 2 days and 2 weeks as the optimal time to follow-up.^{33,42,56} This study used a follow-up period of 5 days because the most recent of these guidelines, from the Institute of Healthcare Improvement, recommends this period of follow-up for moderate risk patients.

This study evaluated only whether appointments were made for patients prior to discharge and if so, in what time period. Of all studies to date that examine follow-up timing, this study's 5-day follow-up period is the shortest interval tested. The current study found 55% of patients who were not readmitted had appointments made and 58% of patients who were readmitted had appointments made. This was unlike Ashton's¹³ study of patients with chronic illness where 81% of patients who were not readmitted had follow-up appointments made compared with only 39% of patients who were readmitted ($p < 0.05$). Ashton's data suggests that patients with appointments made for them have fewer readmissions. Our data does not support this idea. Ashton, however, was able to determine that 66.7% of those patients who were not readmitted saw a physician whereas we were not able to determine the actual rate of follow-up in this study. Although more patients who were readmitted in our study had appointments scheduled compared to those who were not readmitted, we do not know how many patients in each group actually attended those appointments. It may be that although more of the readmitted patients had appointments made, fewer actually attended those appointments compared to non-readmitted patients. This emphasizes the importance of determining appointment attendance when drawing conclusions about the effects of follow-up appointments.

Other studies evaluating the relationship between postdischarge follow-up and readmission have had discrepant results. Weinberger's⁴⁷ study of veterans with chronic illnesses in which 62.5% of patients in the intervention group had an appointment made within one week of discharge, and of whom 82% kept that appointment, found an increase in ER visits and readmissions. Weinberger's patients were sicker, including patients with New York Heart Association class III or IV heart failure, oxygen-dependent chronic obstructive pulmonary disease (COPD), and diabetes with end-organ damage, and not comparable to this study's population set in an institution where specialists care for patients with heart failure and COPD. Patients enrolled in Jack's³⁷ re-engineered discharge (RED) process also had appointments made for them, although no time frame for follow-up was specified. Ninety-four percent had appointments made with 62% in the intervention group seen by a primary care provider within 30 days of dismissal. The intervention group demonstrated lower hospital utilization. In a study with much lower adherence to follow-up than the RED intervention, Einstadter⁵⁷ found that 62.6% of patients had appointments scheduled at discharge, but only 29.6% kept their appointment. Even with poor attendance of PCP appointments there were no differences between control and intervention groups in 30-day readmissions, similar to the results of the current study. Median time to first appointment in the intervention group was 15.1 days, and 17.2 days in the control group, both longer than the follow-up period of our study. Einstadter's study population, like the current study, was comprised of general medical patients suggesting that follow-up in this patient population 15 to 17 days after discharge may not affect readmission.

In another study that examined a longer follow-up period than our investigation, Balaban³² conducted a study in general medical patients and determined whether the patients saw their primary care provider within 21 days of discharge; appointments were not made for the patients. This study used the "one-size-fits-all" 21-day follow-up period to account for ill patients who would need rapid follow-up and less ill patients who could wait longer. Fewer patients were readmitted who saw their PCP, although this did not reach statistical significance. In the absence of a way to risk stratify patients based on diagnosis or severity of illness, this approach of using the same follow-up period for all patients may actually be well-suited for general medical patients in whom multiple

diagnoses are represented. Einstadter's and Balaban's work suggests that postdischarge follow-up sooner than 15-21 days after discharge may not affect readmission in general medical patients.

The variability in study design including whether appointments were made for patients, whether the timing of appointments was specified or left to the discretion of the dismissing provider and whether appointment attendance was determined makes it difficult to compare the studies currently in the literature relating follow-up and readmissions. It is also difficult to make suggestions for clinical care based on current literature.

Significance of the Findings

Based on recent emergency medicine literature, we know that attendance of PCP appointments is better (59%) when appointments are made for patients than when they do not have appointments made (37%).⁴⁶ Several organizations and authors^{12,33,42} recommend making follow-up appointments for all patients dismissed from acute hospital stays. PCP appointment times are a limited resource and currently there is not enough evidence to support a practice standard for the timing of follow-up appointments. This study is an early step in refining these expert recommendations to find the best timeframe of follow-up, specifically focusing on the impact on readmissions.

This study may prompt evaluation of other factors that clinicians use to determine follow-up times for their patients as the traditionally reported demographic and disease-related factors were no different between groups who were seen within 5 days of discharge and those seen 6 days or later and between groups who were readmitted and not readmitted.

Limitations of the Study

This study is not without limitations. There are those limitations related to a retrospective study including reliance on chart documentation and inability to control for confounding variables, like concurrent nursing efforts to decrease readmissions. Additionally, this study was performed with data from a single academic medical center with an ethnically homogeneous patient population, which limits the external validity of

its results. Sampling bias is also a concern in a study performed at an academic tertiary care center with a number of referred patients.

There are other limitations of the study design. We chose to record patients as being discharged “home” if they lived in a group home or assisted living community, as these are care settings in which routine medical evaluation is not received. Evaluating patients who are discharged home minimizes the number of handoffs that need to be accounted for compared to patients going to skilled facilities or nursing homes, but also excludes sicker patients. Given that routine medical care is not provided for patients in these settings designated as “home,” our group’s practice is to make follow-up appointments for patients transitioning to these settings. There is an argument that can be made that patients in these settings do have some medical oversight, such as facility personnel who help dispense medications or home health care. These services vary by setting and were not controlled for in this study.

Also related to study design, although readmissions are frequently used to assess postdischarge or transitional care, they are not perfectly reflective of poor care. Not all unplanned readmissions are preventable and not all deficiencies can be corrected with a postdischarge appointment. The study does not address the quality or content of the appointment. Human factors, such as patient non-adherence to a treatment plan, or rapid progression of a chronic disease may necessitate rehospitalization despite all efforts towards successful postdischarge care.

Perhaps unique to practice in a large, academic referral center, many of our patients who did not have primary care follow-up did have appointments scheduled with specialists prior to their discharge. We prioritized primary care follow-up given that primary care physicians might more consistently sense general failures in care than specialists who may be focused on a singular problem or issue. For patients who were discharged with a scheduled primary care follow-up appointment, there was no accounting for whether they actually attended the appointment. Jencks¹² recently found that 56% of Medicare patients readmitted within 30 days had not seen a primary care physician prior to readmission, but that study did not determine how many patients had appointments scheduled prior to discharge from the index admission.

There were limitations of the data including that patients with diseases known to have high readmission rates, like heart failure and COPD, are typically cared for by specialists at the study institution. Consequently, there were relatively few patients with these diagnoses in the database. Additionally, 30-day postdischarge mortality was not recorded. This could affect readmission results as those patients who were discharged home and died out of the hospital were not eligible for readmission. Further, readmissions were only recorded if patients returned to the two hospitals of Mayo Clinic in Rochester. It is possible that patients were readmitted within 30 days to a different hospital. These readmissions were not accounted for in this study.

Estimates of illness severity were limited by use of APR-DRG severity of illness subclasses. The subclass' numerical values are categories, not scores, so subclass 4 in a patient with heart failure does not necessarily represent the same illness severity as subclass 4 in a patient with a hip fracture. Averaging the subclass scores, then, does not give an accurate representation of the illness severity of the group. Rather than averaging numerical values for the group, the distribution of patients by subclass is detailed in both Tables II and III in an attempt to more accurately represent the group's illness severity.

Lastly, this study may be slightly underpowered as the follow-up group sizes were just below those needed to achieve 80% power as predicted by pre-study statistical analysis.

Suggestions for Further Research

The ideal study to determine the relationship of follow-up and readmissions would prospectively examine readmissions in patients randomized to an intervention where follow-up appointments are made within a scheduled period of time, patients' adherence to this appointment recorded, and content of the appointment standardized. Additionally, different follow-up periods should be evaluated to determine the best timing of follow-up. As shown in earlier work, especially that of Balaban,³² longer follow-up periods in general medical patients may be more impactful in terms of readmissions than shorter follow-up periods.

This study did not find differences in patients with and without readmissions in terms of age, gender, diagnoses, and length of stay. It is likely that clinicians are risk

stratifying based on other characteristics and it would be worth determining what these factors are as they are perhaps beyond the scope of traditionally measured variables. A more refined study, for instance, would evaluate timing of follow-up and readmissions considering patient characteristics, like health literacy and social support systems, and high-risk situations like initiating new medications in the hospital. Physician characteristics may also be an area of possible study as de Salvo found wide variability amongst outpatient providers in terms of when they scheduled return appointments.³⁸ Their investigation found that gender of provider influenced timing of follow-up appointments. It is likely that other provider variables that influence this decision exist and yet remain unstudied.

Summary and Conclusion

The study of transitional care is relatively new. Its importance is increasing as new models of care have precipitated multiple providers caring for patients as they transition through multiple care settings. The new care models often make patients responsible for care continuity and some investigators in the field propose patient-centered approaches to transitional care.¹ Recent published anecdotes and studies indicate that although providers recognize the hazards of the new care models, they have failed in developing systems that help patients transition through care settings safely.^{3,6,7,10,65}

This study attempted to refine the general recommendations put forth by IHI, the Society of Hospital Medicine, and several investigators studying readmissions that all patients dismissed from the hospital have a follow-up appointment with a primary care physician. As patients are frequently cared for by hospitalists while inpatients, this component of transitional care helps patients reestablish care with their primary care providers. There is relevance to defining a time period given that PCP appointments are a limited resource.

No difference in readmissions between patients who were discharged with PCP appointments scheduled within 5 calendar days of dismissal and those with appointments made 6 days and longer from dismissal were found in this study. It may be that the chosen time period was too short to realize an impact on readmission as patients may still

be experiencing the benefits of hospitalization, a “honeymoon effect.” It may also be that readmissions are not the appropriate outcome to measure the effects of PCP follow-up. The results also raise the question of whether traditionally reported patient characteristics, like diagnoses and length of stay, are actually what clinicians use to decide the timing of postdischarge follow-up. This study is an early step in refining transitional care practices. The decisions made by inpatient clinicians result in utilization of a limited resource, primary care physicians’ time. It is therefore important to define the variables involved in determining postdischarge, primary care follow-up and the best metrics to assess the impact of this follow-up.

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EDUCATION

University of California-Davis 1988-1993
Bachelor of Science
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Loyola University Chicago 1993-1997
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Indiana University-Purdue University Indianapolis 2007
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POSITIONS HELD

Attending Hospitalist 2001-2005
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Senior Associate Consultant
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BOARD CERTIFICATION

Internal Medicine (2001)
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MEDICAL LICENSURE

State of Indiana, Physician
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EDUCATIONAL ACTIVITIES

Curriculum Development

Developed inpatient medicine curriculum and reading syllabus for internal medicine and transitional residents rotating at Methodist Hospital on general medicine ward service and hospitalist medicine consult service.

Developed orientation to hospitalist group's admit and consult services. Conduct orientation monthly for internal medicine and transitional year residents rotating with hospitalist group.

Organized noon didactic lecture series for hospital group.

Organized monthly journal club for hospitalists and internal medicine and transitional year residents.

Monitored hospitalist group's CME activities.

Educational Honors and Awards

Assistant Resident Teaching Award (1998)

Department of Pediatrics
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Outstanding Teaching Faculty (2002-2003)

Methodist Hospital Transitional Year Residency
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Presentations

Great Lakes Pharmacy Resident Conference (2006)
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American College of Surgeons-Indiana Chapter Annual Meeting (2008)
“Perioperative Beta-blockers”
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Methodist Hospital Grand Rounds (2008)
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INSTITUTIONAL RESPONSIBILITIES/COMMITTEE MEMBERSHIP

Leadership

Physician Leadership Academy (2005)
Clarian Inpatient Medicine Hospitalists Leadership Committee (2007-2009)
Mayo Clinic Division of Hospital Medicine Unit Liaison (2010)
Mayo Clinic Division of Hospital Medicine Quality Chair (2010)

Committee Membership

Methodist Quality Council

Member

Clarian Diversity Council

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Clarian North Medication Reconciliation Task Force

Member

Residency Curriculum Subcommittee

Member

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Clarian North Medical Center Quality Council

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Clarian North Medical Center Professional Assessment and Improvement

Member

Clarian North Head and Neck Center of Excellence Task Force

Member

Clarian North Joint Replacement Task Force

Member

Clarian North CPOE Committee

Member

Methodist Internal Medicine Education Committee

Member

Mayo Clinic Division of Hospital Medicine Education Committee

Member

Mayo Clinic Division of Hospital Medicine Executive Committee

Member

Mayo Clinic Division of Hospital Medicine Readmission Committee

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MEDICAL AND COMMUNITY SERVICE

AFRICA: Moi University School of Medicine-Kenya

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BOLIVIA: Consejo de Salud Rural Andino-Montero, Bolivia

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GUATEMALA: The Timmy Foundation

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US: Hispanic Latino Health Summit Planning Committee

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PUBLICATIONS

Peer-reviewed Articles

Kutzbach BR, Kashiwagi DT, Couch SM, Burton MC. Diagnosis: The Eyes Have It. American Journal of Medicine 2010 Aug; 123(8):e1-2.

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Book Chapters

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