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Preventing the Preventable:

Reducing Rehospitalizations Through Coordinated, Patient-Centered Discharge Processes

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Abstract

Objectives—Growing literature suggests that a significant proportion of rehospitalizations could be prevented if systems were put in place aimed at identifying and addressing some of the underlying issues that cause them. This article highlights key risk factors for unplanned rehospitalizations and illustrates a project that has successfully addressed many of the underlying issues that contribute to them.

Primary Practice Setting(s)—The study illustrated herein took place at an inner-city academic teaching hospital.

Findings/Conclusions—Proactively identifying patient-, clinician-, and system-associated barriers to successful discharge transitions is critical for effective transitions of care for patients leaving the hospital setting. This process represents a culture change, requires a multidisciplinary approach to care, and mandates clear delineation of roles and responsibilities in the process, with ultimate and clear process ownership being defined. With such steps in place in a system of care, it is reasonable to expect a reduction in preventable rehospitalizations.

Keywords

care transitions; hospital discharge; patient safety; risk factors

The ability to predict which patients are at high risk for rehospitalizations is an inexact science. The scientific literature has begun to introduce methods of modeling this prediction (Bowles & Cater, 2003; Coleman, Min, Chomiak, & Kramer, 2004; Lagoe, Noetscher, & Murphy, 2001). These models, however, are cumbersome and limited when applied to a general inpatient population. Several, largely retrospective, studies have examined clinical, demographic, and logistical risk factors for rehospitalization and posthospitalization adverse events, some of which may lead to rehospitalization. Caution should be exercised in applying the demographic risks because the studies were often done in small and specific populations.

Some of the major clinical parameters identified include high-risk medication use (antibiotics, gluco-corticoids, anticoagulants, narcotics, antiepileptic medications, antipsychotics, antidepressants, and hypoglycemic agents; Budnitz et al., 2006; Budnitz, Shehab, Kegler, & Richards, 2007; Forster et al., 2004; Forster, Murff, Peterson, Gandhi, & Bates, 2005; van Walraven & Forster, 2007), polypharmacy (five or more medications; Campbell, Seymour, Primrose, & ACMEPLUS Project, 2004), and specific clinical conditions (e.g., advanced chronic obstructive pulmonary disease, diabetes, heart failure, stroke, and depression; Bula, Wietlisbach, Burnand, & Yersin, 2001; Coleman et al., 1998; Gwadry-Sridhar, Flintoft, Lee,

Lee, & Guyatt, 2004; Kartha et al., 2007; Ng et al., 2007; Phillips et al., 2004; Strunin, Stone, & Jack, 2007).

The demographic and logistical factors identified include prior hospitalization (Billings, Dixon, Mijanovich, & Wennberg, 2006; Coleman et al., 1998; Comette et al., 2005; Rodriguez-Artalejo, Guallar-Castillon, & Herrera, 2006; Smith et al., 2000; Soeken, Prescott, Herron, & Creasia, 1991), postdischarge follow-up appointment time provided prior to discharge, low income, low-educational level (Forsythe et al., 2006), low literacy (Baker et al., 2002), reduced social network indicators (Rodriguez-Artalejo et al., 2006), and unmarried/widowed individuals (Forsythe et al., 2006).

Adding to the importance of understanding and improving discharge transitions, the Centers for Medicare & Medicaid Services (CMS, 2008) has indicated that it will incorporate reporting rehospitalization rates as a part of its hospital quality measure reporting program starting in 2009. Of note, the literature does question whether rehospitalization is a valid marker of poor healthcare delivery, given the multifaceted etiologies for its occurrence (Ashton & Wray, 1996).

Nonetheless, it is clear that some rehospitalizations are preventable. Estimates of how many are preventable vary widely depending on patient population and definitions used for preventability (Oddone et al., 1996). In addition, it is important to recognize that hospitalizations can be upsetting, disruptive (Heiskell & Pasneu, 1991), and costly to patients and are quite costly to healthcare systems (HCUPnet, n.d.). Understanding the root causes of unplanned hospitalizations is critical for strategizing about reducing these adverse events.

INTRODUCING PROJECT RED

In an effort to clarify the etiologies for unplanned readmissions to the hospital, we undertook an intensive study of the discharge process using several methods such as process mapping, failure mode–effect analysis, qualitative analysis, root–cause analysis, and quantitative analysis to identify the key processes related to rehospitalization, which were then classified into one of three buckets (Greenwald, Denham, & Jack, 2007):

1. healthcare system–related issues;
2. clinician-related issues, or
3. patient-related issues.

A similar system has been used by prior authors (Oddone et al., 1996). Figure 1 shows the major classifications of reasons deemed contributory to re-hospitalization in this analysis.

These pilot data served as the foundation for Project RED (ReEngineered Discharge, n.d.), which was a randomized controlled trial of usual care for adult medical inpatients being discharged home as compared with a “RED” discharge. The discharge intervention was based on core principles derived from the pilot analyses, including

- clear delineation of roles and responsibilities across the care team spectrum;
- patient education throughout the hospitalization, not simply pre-discharge;
- easy and efficient information flow between members of the care team as well as with the ambulatory providers;
- full-time case management services to ensure access to these services at the actual moments of discharge;
- all discharge information in patients’ language and literacy level; and

- a written discharge plan must accompany patients at discharge and include
- easy-to-understand information about their medications, diet, and lifestyle modifications,
- clear instructions regarding all planned followup care,
- patient education materials regarding their illness or reason for hospitalization,
- clear instructions about what to do if their condition changes,
- postdischarge plan reinforcement is important to help patients and families bridge the transition out of the hospital during the period before seeing their ambulatory principal care providers
- information must be accurately delivered to the aftercare providers in a timely fashion, and
- this process must be measured and benchmarked with opportunities for quality control measures to be put in place.

RED INTERVENTION COMPONENTS

The RED intervention had three components:

1. The discharge advocate (DA) is a nurse whose task is to coordinate the discharge information, plans, patient service and educational needs, and aftercare requirements with the various members of the inpatient care team (nurse, case managers, pharmacists, social workers, therapists, and physicians) and transmit these in a coordinated and faithful manner to the patient/family and aftercare providers.
2. The after-hospital care plan (AHCP) is a patient-centered, low-literacy, highly pictorial document that includes information about the patients illness, medications, follow-up appointments, pending studies and laboratory tests, and contact information for key members of the care team in the hospital (including the DA) and the principal care providers after discharge. The DA creates and presents this document to the patient/ family prior to discharge. Using teach-back methodology (Schillinger et al., 2003), comprehension of the material included is improved. See <http://www.bu.edu/fammed/projectred/toolkit.html> for an example of the AHCP.
3. A clinical pharmacist, employed by the research study for part of her time, telephoned the patients approximately 3 days after discharge. During this scripted call, the pharmacist reviewed the patient's clinical progress, medication access, use, and complications and addressed questions regarding follow-up or other concerns. Relevant information gathered was referred back to the inpatient or principal ambulatory care providers as appropriate.

FINDINGS

Although final analyses of the data from Project RED are still underway, interim analysis data highlight several important aspects:

1. The DA invested about 90 min per enrolled subject. The DA work, completed throughout the course of the hospitalization, included coordinating the discharge information, producing and teaching the AHCP to the patient and the family, and facilitating communications with aftercare providers by ensuring the AHCP reached them in a timely fashion. The DA was also available via pager for patients after discharge. We estimated that about one third of the DA time was spent in research-related activities that would not be required in "real-world" implementations.

2. As described by other authors (Schnipper et al., 2006), despite medication teaching at the time of discharge, the pharmacist intervened for approximately half the patients reached by phone after discharge.
3. The AHCP was well received and patients particularly found the simple medication list very useful. The AHCP color-coded appointment calendar was also highly rated.
4. The RED discharge appeared to have mitigated the problems associated with low literacy when stratified analyses compared high versus low literacy patients and their risk of unplanned hospitalizations or emergency department (ED) visits.
5. Patients knew their discharge diagnoses more frequently in the intervention group and were more likely to have seen an ambulatory aftercare provider than those participants in the control group.
6. Emergency department visits and unplanned hospitalizations were significantly less frequent as a composite endpoint, largely driven by lower ED visit rates, in the intervention group.
7. The RED intervention was especially effective in lowering the rate of rehospitalizations for those patients who were considered high hospital utilizers (as defined by two or more hospital admissions in the 6 months before the index admission).

DISCUSSION

It is clear from these data, and those from others evaluating discharge interventions (Coleman, Parry, Chalmers, & Min, 2006; Dudas, Bookwalter, Kerr, & Pantilat, 2001; Einstadter, Cebul, & Franta, 1996; Naylor et al., 1994; Schnipper et al., 2006; van Walraven, Seth, Austin, & Laupacis, 2002; Weinberger, Oddone, & Henderson, 1996), that no system will completely eliminate rehospitalizations. Nonetheless, if even a small fraction of the more than 39 million discharges in 2006 (for a total cost of more than \$943 billion; HCUPnet, n.d.) could be prevented, the healthcare economic impact would be profound and some patients would be saved from unnecessary rehospitalizations. The RED intervention was determined to be highly cost-effective even after considering the nursing time needed to deliver the program. The RED research team is now developing an automated health information technology system that will significantly reduce the amount of human time required. These results are due out in 2010.

The themes of RED, however, can be applied across all institutions and incorporated into local process improvement efforts around multidisciplinary transitions of care. Indeed, based largely on the work done by Project RED and the core principles it developed, the National Quality Forum (2006) adopted Safe Practice 11 regarding safe discharges. Thus, project teams will have this national imprimatur to motivate their organizations to advance their discharge transition process to meet this new safe practice.

CONCLUSIONS

Inpatient case managers, nurses, physicians, pharmacists, therapists, primary care physicians, emergency physicians, hospital administrators, and importantly, patients and their caregivers have an important opportunity to work together to achieve the goal of preventing unnecessary hospitalizations. Institutions must be knowledgeable about the discharge transitions literature, as well as basic process improvement skills, and be invested in improving their local system. Numerous online resources are now available to help systems begin this multidisciplinary process (Table 1). Healthcare teams invested in improving their institution's discharge transition process must understand that culture change surrounding hospital systems

improvement is often slow, but important. Healthcare dollars and, more important, patient care depends on it.

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REFERENCES

- Ashton CM, Wray NP. A conceptual framework for the study of early readmission as an indicator of quality of care. *Social Science Medicine* 1996;43(11):1533–1541. [PubMed: 8961397]
- Baker DW, Gazmararian JA, Williams MV, Scott T, Parker RM, Green D, Junling R, Peel J. Functional health literacy and the risk of hospital admission among Medicare managed care enrollees. *American Journal of Public Health* 2002;92:1127–1183.
- Billings J, Dixon J, Mijanovich T, Wennberg D. Case finding for patients at risk of readmission to hospital: Development of algorithm to identify high risk patients. *British Medical Journal* 2006;333(7563):327.
- Bowles KH, Cater JR. Screening for risk of rehospitalization from home care: Use of the outcomes assessment information set and the probability of readmission instrument. *Research Nursing Health* 2003;26:118–127.
- Budnitz DS, Shehab N, Kegler SR, Richards CL. Medication use leading to emergency department visits for adverse drug events in older adults. *Annals Internal Medicine* 2007;147(11):755–765.
- Budnitz DS, Pollock DA, Weidenbach KN, Mendelsohn AB, Schroeder TJ, Annett JL. National surveillance of emergency department visits for outpatient adverse drug events. *Journal of American Medical Association* 2006;296(15):1858–1866.
- Bula CJ, Wietlisbach V, Burnand B, Yersin B. Depressive symptoms as a predictor of 6-month outcomes and services utilization in elderly medical inpatients. *Archives Internal Medicine* 2001;161(21):2609–2615.
- Campbell SE, Seymour DG, Primrose WR. ACMEPLUS Project. A systematic literature review of factors affecting outcome in older medical patients admitted to hospital. *Age and Ageing* 2004 March;33(2):110–115. [PubMed: 14960424]
- Centers for Medicare & Medicaid Services. CMS proposes to expand quality program for hospital inpatient services in FY2009. 2008 [Retrieved August 5, 2008]. Released April 14, 2008, from <http://www.cms.hhs.gov/apps/media/press/release.asp?Counter=3041&intNumPerPage=10&checkDate=&checkKey=&srchType=1&numDays=3500&srchOpt=0&srchData=&srchOpt=0&srchData=&keywordType=All&chkNewsType=1%2C+2%2C+3%2C+4%2C+5&intPage=&showAll=&pYear=&year=&desc=&cboOrder=date>
- Coleman EA, Min S, Chomiak A, Kramer AM. Posthospital care transitions: Patterns, complications, and risk identification. *HSR: Health Services Research* 2004;39:5.
- Coleman EA, Parry C, Chalmers S, Min S. The care transitions intervention. Results of a randomized controlled trial. *Archives Internal Medicine* 2006;166:1822–1828.
- Coleman EA, Wagner EH, Grothaus LC, Hecht J, Savarino J, Buchner DM. Predicting hospitalization and functional decline in older health plan enrollees: Are administrative data as accurate as self-report? *Journal of the American Geriatric Society* 1998;46(4):419–425.
- Comette P, D'Hoore W, Malhomme B, Van Pee D, Meert P, Swine C. Differential risk factors for early and later hospital readmission of older patients. *Aging-Clinical Experimental Research* 2005;17(4):322–328.
- Dudas V, Bookwalter T, Kerr KM, Pantilat SZ. The impact of follow-up telephone calls to patients after hospitalization. *The American Journal of Medicine* 2001;111(9B):26S–30S.
- Einstadter D, Cebul RD, Franta PR. Effect of a nurse case manager on postdischarge follow-up. *Journal of General Internal Medicine* 1996;11(11):684–688. [PubMed: 9120655]

- Forster AJ, Clark HD, Menard A, Dupuis N, Chernish R, Chandok N, et al. Adverse events among medical patients after discharge from hospital. *Canadian Medical Association Journal* 2004;170(3):345–349. [PubMed: 14757670]
- Forster AJ, Murff HJ, Peterson JF, Gandhi TK, Bates DW. Adverse drug events occurring following hospital discharge. *Journal of General Internal Medicine* 2005;20(4):317–323. [PubMed: 15857487]
- Forsythe, S.; Chetty, VK.; Anthony, D.; Johnson, A.; Greenwald, J.; Paasche-Orlow, M., et al. Risk score to predict readmission after discharge; Poster presentation at the North American Primary Care Research Group Conference; Tucson, AZ. 2006 Oct 15–18.
- Greenwald JL, Denham CR, Jack BW. The hospital discharge: A review of a high risk care transition with highlights of a reengineered discharge process. *Journal of Patient Safety* 2007;3:97–106.
- Gwadry-Sridhar FH, Flintoft V, Lee DS, Lee H, Guyatt GH. A systematic review and metaanalysis of studies comparing readmission rates and mortality rates in patients with heart failure. *Archives Internal Medicine* 2004;164(21):2315–2320.
- HCUPnet. (n.d.). [Retrieved August 5, 2008]. from <http://hcupnet.ahrq.gov/>
- Heiskell LE, Pasneu RO. Psychological reaction to hospitalization and illness in the emergency department. *Emerging Medicine Clinical Nursing American* 1991;9(1):207–218.
- Kartha A, Anthony D, Manasseh CM, Greenwald JL, Chetty VK, Burgess JF, et al. Depression is a risk factor for rehospitalization in medical inpatients. *Primary Care Companion: Journal of Clinical Psychiatry* 2007;9:1–7.
- Lagoe RJ, Noetscher CM, Murphy MP. Hospital readmission: Predicting the risk. *Journal Nursing Care Quality* 2001;15(4):69–83.
- National Quality Forum. Safe practices for better healthcare 2006 update. 2006 [Retrieved August 5, 2008]. from <http://www.bu.edu/fammed/projectred/NQF SafePractices.pdf>
- Naylor M, Brooten D, Jones R, Lavizzo-Mourey R, Mezey M, Pauly M. Comprehensive discharge planning for the hospitalized elderly-A randomized clinical trial. *Annals of Internal Medicine* 1994;120(12):999–1006. [PubMed: 8185149]
- Ng TP, Niti M, Tan WC, Cao Z, Ong KC, Eng P. Depressive symptoms and chronic obstructive pulmonary disease: Effect on mortality, hospital readmission, symptom burden, functional status, and quality of life. *Archives of Internal Medicine* 2007;167(1):60–67. [PubMed: 17210879]
- Oddone EZ, Weinberger M, Horner M, Mengel C, Goldstein F, Ginier P, et al. Classifying general medicine readmissions. Are they preventable? *Journal of General Internal Medicine* 1996;11:597–607. [PubMed: 8945691]
- Phillips CO, Wright SM, Kern DE, Singa RM, Shepperd S, Rubin HR. Comprehensive discharge planning with postdischarge support for older patients with congestive heart failure: A meta-analysis. *Journal of the American Medicine Association* 2004;291(11):1358–1367.
- Project RED. (n.d.). [Retrieved August 5, 2008]. from <http://www.bu.edu/fammed/projectred/>
- Rodriguez-Artalejo F, Guallar-Castillon P, Herrera MC. Social network as a predictor of hospital readmission and mortality among older patients with heart failure. *Journal of Cardiac Failure* 2006;12(8):621–627. [PubMed: 17045181]
- Schillinger D, Piette J, Grumbach K, Wang F, Wilson C, Daher C, et al. Closing the loop: Physician communication with diabetic patients who have low health literacy. *Archives of Internal Medicine* 2003;163(1):83–90. [PubMed: 12523921]
- Schnipper JL, Kirwin JL, Cotugno MC, Wahlstrom SA, Brown BA, Tarvin E, et al. Role of pharmacist counseling in preventing adverse drug events after hospitalization. *Archives of Internal Medicine* 2006;166:565–571. [PubMed: 16534045]
- Smith DM, Giobbie-Hurder A, Weinberger M, Oddone EZ, Henderson WG, Asch DA, et al. Predicting non-elective hospital readmissions: A multi-site study. Department of Veterans Affairs Cooperative Study Group on Primary Care and Readmissions. *Journal of Clinical Epidemiology* 2000;53(11):1113–1118. [PubMed: 11106884]
- Soeken KL, Prescott PA, Herron DG, Creasia J. Predictors of hospital readmission. A metaanalysis. *Evaluation & the Health Professions* 1991;14(3):262–381.
- Strunin L, Stone M, Jack BW. Understanding rehospitalization risk: Can hospital discharge be modified to reduce recurrent hospitalization? *Journal of Hospital Medicine* 2007;2(5):297–304. [PubMed: 17935257]

- van Walraven C, Forster AJ. Anticoagulation control in the peri-hospitalization period. *Journal of General Internal Medicine* 2007;22(6):727–735. [PubMed: 17401605]
- van Walraven C, Seth R, Austin P, Laupacis A. Effect of discharge summary availability during post-discharge visits on hospital readmission. *Journal of General Internal Medicine* 2002;17:186–192. [PubMed: 11929504]
- Weinberger M, Oddone EZ, Henderson WG. Does increased access to primary care reduce hospital readmissions? *The New England Journal of Medicine* 1996;334:1441–1447. [PubMed: 8618584]

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FIGURE 1.

Qualitative analysis of contributors to discharge. PCP indicates primary care provider.

TABLE 1
Online Resources for Improving Discharges

Society of Hospital Medicine's Project BOOST–BOOSTing Care Transitions Resource Room

This resource offers a step-by-step workbook to the process of improving discharge transitions and has significant support tools for teams beginning or continuing this process. It is appropriate for all levels of users. It is available at: <http://www.hospitalmedicine.org/boost>

Project RED

This Web page includes background on Project RED with links to the National Quality Forum Safe Practice as well as Project RED workbooks and examples of after-hospital care plans. It is available at: <http://www.bu.edu/fammed/projectred/>

The Care Transitions Program

This multipart program offers Web site viewers access to information about discharge checklists, transition coaching, principles of care transitions, and information about patient-centered personal health records. It is available at: <http://www.caretransitions.org/>

National Transitions of Care Coalition

On this site, there are a number of tools that are downloadable aiming to improve the patients' understanding of their medications, their healthcare visits, performing medication reconciliation, and how to implement a transition of care program. It is available at: <http://www.ntocc.org/>. Click on the tab marked "Health Care Professionals."