

# Toward Safer Transitions: How Can We Reduce Post-Discharge Adverse Events?

Irfan A. Dhalla, Tara O'Brien, Francoise Ko and Andreas Laupacis

**R**anjit Kaur is an 83-year-old woman who is brought to the hospital by her son because of worsening shortness of breath over the previous week. The emergency room physician correctly diagnoses a heart failure exacerbation (Wang et al. 2005), initiates appropriate treatment (Felker et al. 2011) and consults the hospitalist physician for admission and ongoing care (Wachter 2004). The hospitalist learns that the patient has been prescribed the various medications recommended by clinical practice guidelines and that her adherence to this medication regimen is excellent. No specific trigger for the heart failure exacerbation is found, and the hospitalist concludes that the most likely explanation is a gradual decline in cardiovascular function, perhaps combined with excessive sodium intake. The day after admission, a dietitian meets with the patient and her daughter-in-law to discuss how her diet could be modified to reduce her sodium intake. Three days after admission, Ms. Kaur is “back to baseline” and ready for discharge. The hospitalist discharges her on a slightly higher dose of her diuretic and instructs Ms. Kaur to see her family physician within a week of discharge. She is sent home with a discharge summary in hand that clearly explains the care provided in hospital and the follow-up plan. In other words, the emergency department and in-patient care are “textbook.” The admission is brief and efficient, there are no complications and Ms. Kaur’s symptoms are substantially improved. Nevertheless, three weeks after discharge, Ms. Kaur is brought back to the emergency department because of confusion. Her blood work in the emergency department

shows a dangerously low sodium level. This adverse event may occur after a change in diuretic dose, and can be prevented or managed with careful follow-up after discharge.

This all-too-common patient vignette raises three important questions. Why are patients especially vulnerable to adverse events during transitions in care? Are these adverse events preventable? And, if so, how can we prevent them?

## **Vulnerability to Adverse Events during Transitions in Care**

In countries such as Canada that have largely completed the epidemiological transition (Omran 2005), most deaths and hospitalizations now occur in individuals who suffer from one or more chronic diseases. During the past 50 years, we have also witnessed a profound shift in the way healthcare is provided. The rise of the hospitalist physician has been widely discussed in the United States (Wachter 2004), but in Canada too, most family physicians no longer care for hospital in-patients (Chan 2002). Finally, the changing nature of our society has resulted in smaller families with fewer individuals available to support an aging relative. Together, these changes have combined to produce a situation that leaves patients vulnerable to adverse events that occur soon after a care transition (Coleman and Berenson 2004).

Many post-discharge adverse events result in an unplanned readmission to hospital. Depending on the patient population, readmissions occur after 10–30% of medical admissions

(Gruneir et al. 2011; Jencks 2009). Readmissions after surgical or psychiatric admissions are also common. For example, Lin and colleagues (2011) recently demonstrated that 25% of patients discharged after a hospitalization for depression in Ontario in 2005 were readmitted to hospital or visited an emergency department within 30 days of discharge.

The reasons for adverse events after hospitalization can be considered as being related to patient characteristics or health-care system characteristics. Although many patient characteristics are not readily modifiable, understanding why certain patients are particularly likely to experience a post-discharge

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adverse event provides context for understanding the relevant health-care system factors and can help inform the development of post-discharge interventions.

### **Patient Characteristics Associated with Adverse Events after Care Transitions**

The risk of readmission or death after hospital discharge can be predicted with reasonable but not excellent accuracy (van Walraven et al. 2010a). Many physicians tend to consider medical co-morbidities, such as heart failure and chronic obstructive pulmonary disease, that increase the risk of post-discharge complications. However, “non-medical” patient-related characteristics, such as a substance use disorder, low educational attainment, health illiteracy, poverty, limited fluency in the language in which health-care is being provided and the lack of a robust social support network may be more important. These characteristics, however, are less easily ascertained than health service utilization measures and comorbidity scores.

That poorly defined and difficult-to-measure patient characteristics are risk factors for post-discharge adverse events is neatly – if inadvertently – demonstrated in a recent study (Voss et al. 2011). In this study, 1,888 patients were offered an evidence-based post-discharge intervention. Only slightly more than half the patients accepted. Of these patients, only one quarter permitted a home visit. Therefore, only 13.6% of the eligible population received the intervention. Perhaps unsurprisingly, patients who declined the intervention or did not follow up were nearly 50% more likely to be readmitted to hospital within 30 days of discharge, even after adjusting for differences in measurable baseline characteristics. Although it is possible that the intervention was the reason for the lower rate of readmission, it is more likely that patients who decided not to participate were at higher risk of readmission to begin with.

### **Healthcare System Characteristics Associated with Adverse Events after Care Transitions**

Although all Canadians benefit from publicly funded physician care and hospital services and many also from publicly funded prescription drugs and home care, health-care delivery in Canada is the responsibility of a myriad of quasi-independent institutions and individuals. This situation has led to both horizontal and vertical fragmentation. The lack of system integration largely explains the lack of care integration as experienced by individual patients. For example, in a large observational study of Ontarians discharged to the community after an emergent or elective hospitalization, van Walraven and colleagues (2010b) found that both provider continuity and information continuity were poor. Information from the previous visit was available to physicians only 22% of the time (van Walraven et al. 2008). Patients who saw one of their regular physicians after being discharged were considerably less likely to be readmitted to hospital (van Walraven et al. 2010c).

Another health-care system factor that may be related to the incidence of post-discharge adverse events is the decline of physician house calls in North America (Meyer and Gibbons 1997). This shift has resulted in a situation where many individuals who are at high risk of readmission receive their care at home, mostly from personal support workers, sometimes from nurses and only rarely from physicians. Paradoxically, healthy young adults are able to see family physicians even though lower-cost care providers with less training might be able to provide care of equivalent quality (Laurant et al. 2005).

### **Preventability of Readmissions and Other Post-Discharge Adverse Events**

The proportion of readmissions that is preventable is a subject of considerable controversy. In part because there is no “gold standard” for post-discharge care, the proportion of readmissions judged to be preventable in peer-reviewed studies varies from as low as 9% to as high as 55% (Benbassat and Taragin 2000). Some research suggests that only a small proportion of readmissions are preventable. For example, van Walraven and colleagues (2011) recently conducted a study in which physicians were asked to review standardized case summaries of patients who had experienced an urgent readmission. The physician reviewers were asked to determine whether a readmission was the result of an adverse event and, if so, whether that adverse event was avoidable. The authors concluded that only 16% of readmissions were likely to be avoidable. On the other hand, the Medicare Payment Advisory Commission, an influential governmental agency in the United States, has estimated that up to 76% of readmissions within 30 days of discharge can be prevented (Medicare Payment Advisory Commission 2007). While this number is generally viewed as unrealistic by those who care for in-patients, physicians questioned in the 1960s

may also have been skeptical if told that coronary heart disease mortality after myocardial infarction would decrease by 50% in the next two decades (Guidry et al. 1999).

At least three definitive conclusions can be made about the preventability of readmissions. First, physicians are not very good at predicting which patients will be readmitted (Allaudeen et al. 2011). Although risk prediction models appear to be superior to clinical judgment, more research is needed to better identify those patients who are at especially high risk of a post-discharge event (Kansagara et al. 2011).

Second, when reviewing an individual readmission, there is poor agreement among physicians as to whether the readmis-

### The Toronto Virtual Ward

We have been involved in the development and ongoing evaluation of a post-discharge intervention called the Toronto Virtual Ward. Virtual wards use a team-based approach to care for complex patients in their homes. They are considered “wards” because of their hospital-like elements (e.g., an interdisciplinary team, a shared chart and a single point of contact for the patient) but are “virtual” because the patient is at home.

The Toronto Virtual Ward was developed as a multi-organizational collaboration, with the agency responsible for home care – the Toronto Central Community Care Access Centre – as a key partner. The virtual ward team, which includes a physician, two care coordinators, a part-time pharmacist and nursing and clerical support, provides support to patients and their family doctors for a few weeks after hospital discharge. A randomized controlled trial comparing the virtual ward with usual care is under way, with results expected in 2013.

sion was preventable or not. In one study, the sensitivity of reviewers for identifying avoidable readmissions (with the “gold standard” being assigned by a statistical model incorporating input from multiple reviewers) ranged from 4.5 to 90.5% (van Walraven et al. 2011).

Third, at least some readmissions are preventable. Two lines of evidence support this argument. First, although the research on post-discharge interventions to reduce readmissions remains underdeveloped (Hansen et al. 2011), at least three post-discharge interventions have been shown to be effective in clinical trial settings, with absolute reductions in readmissions or post-discharge emergency department use in the 5–10% range (Coleman et al. 2006; Jack et al. 2009; Naylor et al. 1999). Second, the variability in risk-adjusted readmission rates between institutions and regions strongly suggests that some readmissions are preventable (Goldfield 2011, Epstein et al. 2011).

### How Should We Prevent Post-Discharge Adverse Events and Improve the Quality of Care during Transitions?

A useful way to consider how the quality of care during transitions can be improved is to think about pre-discharge interventions, post-discharge interventions and interventions that cross the transition (Hansen et al. 2011). Pre-discharge interventions include discharge planning, medication reconciliation at the time of discharge, patient education during the in-patient stay, preparation of a standardized discharge summary for the patient, communication with the primary care physician and the scheduling of post-discharge appointments. Post-discharge interventions include additional communication with the primary care physician and home care providers, follow-up telephone calls, home visits and the provision of e-mail or telephone access to the in-patient team for the patient and his or her care providers. Interventions that bridge the transition include those that improve provider continuity (e.g., if the same healthcare provider cares for the patient during and after the hospitalization) and information continuity (van Walraven et al. 2010c).

A single-component intervention is unlikely to have a substantial effect on improving the patient experience or reducing post-discharge adverse events (Hansen et al. 2011). Multi-component interventions are more promising and have been proven to work in randomized trial settings (Coleman et al. 2006; Jack et al. 2009; Naylor et al. 1999). One such intervention, the Care Transitions Intervention, reduced 90-day readmission from 22.5 to 16.7% in a well-conducted randomized controlled trial (Coleman et al. 2006). This intervention was delivered primarily by a “transition coach” and facilitated by the development of a personal health record that was maintained by the patient. The coach – an advanced practice nurse – met with each patient in hospital and then again at home. The coach helped to teach each patient how to communicate his or her needs more effectively, to identify a list of “red flags” that would warrant an intervention and to ensure that the patient’s needs were being met. The coach typically also phoned three times in the month following discharge. Although multi-component interventions such as the Care Transitions Intervention have been shown to be effective in randomized controlled trials, their effectiveness in real-world settings has not yet been conclusively demonstrated.

### Potential System Responses to the Care Transitions Challenge

One possible response to the care transitions challenge is to develop a plethora of disease-focused models of care. We believe this would be a mistake, primarily for two reasons. First, just as there are insufficient resources to admit all hospitalized patients to disease-specific wards, it is unlikely that there will ever be sufficient resources available to implement different

post-discharge models of care for each disease associated with a high risk of readmission. Even more importantly, most patients who are at high risk of readmission suffer from multiple chronic diseases and have non-medical characteristics that increase their risk of readmission. Therefore, family physicians or teams that can provide holistic care are likely to be more effective than specialty clinics working independently of one another.

Another possible response to the care transitions challenge is to use financial incentives to reduce readmissions. We believe that this would be premature, not only because the evidence

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base is immature but also because in a fragmented healthcare system it would be unfair to hold individual physicians or organizations responsible. Rather than penalizing or rewarding hospitals or primary care providers, healthcare payers could provide support for rigorous quality improvement and research. Relatively inexpensive interventions, such as same-day discharge summaries, post-discharge telephone calls and booking an appointment with the family doctor prior to discharge may be suitable targets for quality improvement initiatives and could be evaluated within individual institutions using relatively inexpensive non-randomized study designs (Fan et al. 2010). More expensive interventions should be evaluated using traditional methods such as randomized controlled trials that are less prone to bias. High-quality evaluations will help ensure that resources are deployed in a cost-effective manner.

There is also value in carefully studying high-performing healthcare systems (Baker et al. 2008) and adopting those characteristics that are most likely to improve care for patients with complex problems. Some of these characteristics are likely to be structural (e.g., better integration of acute, community and primary care). As Don Berwick has noted, real improvement often comes from change “of a system” rather than change “within a system” (Berwick 1996).

## Conclusion

Transitions in care are increasingly being recognized as a time when patients are especially prone to adverse events. These adverse events can be serious, and at least some of them are preventable. Adverse events associated with transitions may be less common in integrated health systems that use shared records and where healthcare providers can easily communicate with each other. In fragmented systems, such as those that prevail in most of Canada, superimposed interventions are worth evaluating as a way to improve health outcomes and poten-

tially reduce costs. A better understanding of the characteristics of high-performing healthcare systems would also inform a strategy to improve care transitions. **HQ**

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#### About the Authors

**Irfan A. Dhalla**, MD, MSc, FRCPC, is a member of the Department of Medicine, University of Toronto; the Li Ka Shing Knowledge Institute of St. Michael's Hospital; the Toronto Central Community Care Access Centre; and the Institute for Clinical Evaluative Sciences, in Toronto, Ontario.

**Tara O'Brien**, MD, MSc, FRCPC, is a member of the Department of Medicine, University of Toronto; and Department of Medicine, Women's College Hospital, in Toronto, Ontario.

**Francoise Ko**, PhD, is a member of the Li Ka Shing Knowledge Institute of St. Michael's Hospital.

**Andreas Laupacis**, MD, MSc, FRCPC, is a member of the Department of Medicine, University of Toronto; the Li Ka Shing Knowledge Institute of St. Michael's Hospital; and the Institute for Clinical Evaluative Sciences.