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## Reducing Hospital Readmission: Current Strategies and Future Directions

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### Abstract

New financial penalties for institutions with high readmission rates have intensified efforts to reduce rehospitalization. Several interventions that involve multiple components (e.g., patient needs assessment, medication reconciliation, patient education, arranging timely outpatient appointments, and providing telephone follow-up), have successfully reduced readmission rates for patients discharged to home. The effect of interventions on readmission rates is related to the number of components implemented, whereas single-component interventions are unlikely to reduce readmissions significantly. For patients discharged to post-acute care facilities, multicomponent interventions have reduced readmissions through enhanced communication, medication safety, advanced care planning, and enhanced training to manage common medical conditions that commonly precipitate readmission. To help hospitals direct resources and services to patients with greater likelihood of readmission, a number of risk stratification methods are available. Future work should better define the role of home-based services, information technology, mental health care, caregiver support, community partnerships, and new transitional care personnel.

### Keywords

Transitions of care; Hospital discharge; Readmission risk; Post-acute care

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In recent years, widespread and intense efforts to reduce excess hospital readmissions have been spurred by heightened awareness of both the prevalence of readmission as well as new financial penalties linked to readmission rates. In this review, we will summarize the prevalence of hospital readmission, approaches to reduce readmission for patients discharged to home or to post-acute care (PAC) facilities, and methods to identify patients at high-risk of readmission. We will also note several areas where additional work is needed.

## Prevalence of Hospital Readmission

Though readmission rates in the United States have been high for many years, Jencks and colleagues brought this issue to the forefront with their landmark 2009 article.<sup>(1)</sup> Analyzing 2003–2004 claims data, they demonstrated that 19.6% of Medicare beneficiaries were readmitted to the hospital within 30 days of discharge, and 34.0% were readmitted within 90 days. Medical and surgical patients were both affected, though medical patients had a higher readmission rate (21.1% vs. 15.6% among surgical patients at 30 days) and accounted for 77.1% of the rehospitalizations. The highest 30-day readmission rates were observed for patients with heart failure (26.9%), psychoses (24.6%), recent vascular surgery (23.9%), chronic obstructive pulmonary disease (22.6%), and pneumonia (20.1%). During the last decade, risk-adjusted 30-day readmission rates among Medicare beneficiaries have remained relatively constant.<sup>(2)</sup>

Readmission rates have been documented in other populations as well. For example, in Veterans Affairs hospitals, the 30-day all-cause readmission rate was 15.2% in 2009–2010.<sup>(3)</sup> In 2007, the 30-day readmission rate among non-elderly adults (age 21–64, excluding obstetric admissions) was approximately 10.7% for patients with Medicaid and 6.3% for patients with private insurance.<sup>(4)</sup>

## Public Reporting and Penalties

In an effort to drive down rates of hospital readmissions, the Centers for Medicare and Medicaid Services (CMS) has publicly reported risk-standardized readmission rates for acute heart failure, pneumonia, and myocardial infarction since 2009.<sup>(5)</sup> Beginning in 2013, readmission rates following total hip and/or total knee replacement as well as hospital-wide unplanned readmission rates will be added. Each measure has a rigorous risk-adjustment methodology that controls for differences in hospitals' patient population.<sup>(6–8)</sup> These models, however, rely primarily on the presence of comorbid conditions, as determined from claims data, and do not account for other factors associated with a successful transition to home, such as patient race, health literacy, socioeconomic status, social support, community resources, or practice patterns.<sup>(9–11)</sup> Thus, their ability to level the playing field for comparing hospital performance is somewhat limited.<sup>(9; 10)</sup>

The cost of readmissions to the health care system is substantial, accounting for an estimated \$17.4 billion in spending annually by Medicare alone.<sup>(1)</sup> The Hospital Readmissions Reduction Program (HRRP), established in the Affordable Care Act,<sup>(12)</sup> authorizes Medicare to reduce payment to hospitals with excess readmission rates. The penalties are based on a calculation of the risk-standardized 30-day readmission rate for the previous three years for Medicare beneficiaries hospitalized with heart failure, pneumonia, or acute

myocardial infarction, though it is expected that other conditions will soon be added. Hospitals with higher than expected readmission rates are penalized a percentage of their total CMS reimbursement, beginning at 1% in year 1 of the program, up to 3% in year 3. These financial penalties have produced the intended outcome of intensifying hospital efforts to reduce excess readmissions.

These initiatives are based on the notion that readmissions reflect the quality of care. Many disagree, however, with the adoption of 30-day all-cause readmissions as a quality metric for diverse reasons.(10; 13; 14) First, although it may be reasonable to hold hospitals accountable for problems that patients experience during the first week after discharge, readmissions occurring after that may increasingly reflect patient self-management, outpatient care, community resources, or the development of new problems that go beyond the control of the discharging hospital.(10) Second, it is unclear what proportion of readmissions are truly preventable, as estimates range from 5% to 79%, with a median of 27%.(15) Third, hospital readmission rates are not meaningfully related to other performance measures that are accepted to be valid reflections of hospital quality.(16) Fourth, academic institutions and hospitals in socioeconomically disadvantaged areas are disproportionately affected by the new readmission penalties.(17) This has raised concern that institution of these penalties may exacerbate existing health disparities. Finally, because CMS penalties are based on 3-year performance, if hospitals do successfully reduce their readmission rates, the financial benefit will not be seen immediately, and will be realized only if improvements are sustained.

## Interventions for Patients Discharged from Hospital to Home

These concerns notwithstanding, given current policies, hospitals are seeking a path forward to reduce readmissions. A review of common issues that arise during transitions of care is available,(18) as are recent reviews that summarize interventions to reduce hospital readmission,(19) improve patient safety at hospital discharge,(20) enhance medication reconciliation,(21) and improve handovers from the hospital to the outpatient setting.(22) Publications have also highlighted the role of ambulatory care practices in fostering more effective transitions in care.(23; 24) Here we will focus on interventions to reduce readmission, most of which are hospital-initiated.

Hansen and colleagues performed a systematic review of 43 interventions to reduce 30-day hospital readmission.(19) Overall, the quality of studies was low, with only 16 being randomized controlled trials (RCTs). Most studies (56%) tested the effect of single-component interventions, while the remainder tested bundles. The authors described a taxonomy of intervention components including broad categories of pre-discharge interventions (e.g., patient education, discharge planning, medication reconciliation, appointment scheduled before discharge); post-discharge interventions (e.g., timely follow-up, timely PCP communication, follow-up telephone call, patient hotline, home visit); and bridging interventions (e.g., transition coach, patient-centered discharge instructions, provider continuity). The most common categories of interventions were patient education, discharge planning, follow-up telephone call, patient-centered discharge instructions, and discharge coaches or nurses who interacted with the patient before and after discharge. Of

interest (and concern), the authors found no consistent evidence from RCTs that any one intervention by itself significantly reduced hospital readmission. Of the 16 RCTs, only 5 yielded significant reductions in hospital readmission. One of these provided early discharge planning (a single-component intervention) to high-risk patients.(25) One small pilot study(26) and three larger investigations(27–29) implemented multicomponent intervention bundles, which resulted in absolute reductions in 30-day readmission of 3.6 to 28 percentage points. The latter three interventions merit additional description, as they are often given as examples of how health care systems can successfully reduce readmission (Table).

Naylor’s model utilizes an advanced practice nurse who meets with the patient and caregiver in the hospital, performs a structured needs assessment, and provides comprehensive discharge planning including education and coordination of post-discharge services.(27) Post-discharge telephone follow-up includes reinforcement of education, monitoring of symptoms and progress, and adjustment of the care plan as needed. The intervention reduced readmissions during the first 6 weeks after discharge among medical patients.(27) A more intensive form of the intervention that included home visits was also effective in reducing rehospitalization among high-risk elderly patients.(30)

The Care Transitions Intervention (CTI), developed by Coleman,(31) utilizes a nurse transition coach who educates and empowers patients to better navigate their own care. The CTI emphasizes four “pillars” – medication self-management, a patient-owned health record, follow-up with a primary care provider or specialist, and awareness of red flags. The intervention lowered 30- and 90-day readmission rates in an RCT,(28) and also reduced readmissions in a real-world effectiveness study.(32)

Project Reengineering Discharge (RED), developed by Jack and colleagues,(33) addresses both the system and patients’ navigation of the discharge process through 11 mutually reinforcing components (Table). When implemented in an urban university hospital by nurse discharge advocates, participants randomized to the intervention group had a lower rate of 30-day hospital utilization (emergency department visits and rehospitalizations).(29)

Overall, this literature demonstrates that singular interventions (e.g., providing patient education or scheduling follow-up) are unlikely to significantly reduce hospital readmission. (19) Multifaceted intervention bundles are likely necessary for substantial improvement in readmission rates. Although the above multicomponent initiatives differ substantially in their approach, they all bridge the hospital and post-discharge periods with dedicated transitional care personnel, patient-centered discharge instructions, and telephone follow-up. To our knowledge, no studies have been published regarding the comparative effectiveness of these different approaches. Thus, it has been challenging for health systems to know what combination of interventions to deploy.

We recently described a framework – the Ideal Transition in Care – that assimilates the key components of transitional care interventions into a single model.(14) The Ideal Transition framework posits that multiple interventions across the continuum of care from hospital to home are needed to support the hospital discharge transition, and that the strength of the transition depends on the number of intervention components that span this continuum.

There are 10 key components to an Ideal Transition including discharge planning, medication safety, advance care planning, coordination among team members, and follow-up (Figure).

Burke and colleagues recently performed an updated systematic review, mapping transitional care interventions to the 10-component Ideal Transition in Care framework.(34) They included 61 interventions, 42 of which have been studied in RCTs. The number of components included in prior interventions ranged from 1 to 8, with an average of 3.5. The most common components included were patient education (with an emphasis on promoting self-management), medication safety, and coordination of care. Just under half (47.5%) of interventions demonstrated a statistically significant reduction in readmissions. Consistent with prior reviews, no singular intervention component significantly reduced readmissions, though a trend was present for patient education and engaging social and community supports ( $p=0.06$  for each). The only significant predictor of success in reducing readmissions was the number of domains included in the intervention ( $p=0.002$ ). Others have also recently shown that the number of strategies employed by hospitals is significantly associated with 30-day risk-standardized readmission rates in heart failure.(35)

## Interventions for Patients Discharged to Post-Acute Care Facilities

A substantial proportion of patients cared for in the hospital require subsequent treatment in a post-acute care (PAC) facility, which may include either a skilled nursing or rehabilitation facility. Among patients > 65 years of age, discharges to PAC facilities account for roughly 28% of all hospital discharges.(36) Although this represents the minority of all hospital discharges, this population accounts for a substantial proportion of overall and disease specific hospital readmissions. Among Medicare beneficiaries discharged to a PAC facility in 2006, nearly 25% of patients were readmitted within 30 days at a cost of \$4.34 billion.(37) The rate of readmissions from PAC has increased by as much as 30% since 2000,(37) and is especially high in some conditions, such as congestive heart failure.(38; 39)

Many factors affect the readmission rate among patients in PAC facilities. The decision to rehospitalize a post-acute care patient is influenced by a) patients' condition and preferences, b) PAC preferences and characteristics, and c) the influence of local, state, and national policies.(40) Patients discharged to PAC facilities tend to be older, have increased number of comorbidities, increased medication burden, higher severity of illness, and more deficits in cognition and/or function when compared to patients discharged to home. It is not surprising that these factors are associated with increased risk of admission or readmission from PAC.(41–46) In addition to severity of illness and comorbidities, patient and caregiver goals of care (including do-not-resuscitate orders) are highly predictive of hospital readmission from a PAC setting.(44; 47) For example, O'Malley found that the presence of advanced directives increased the time between hospitalization among nursing home patients.(44) Factors specific to PAC settings also influence the risk of hospitalization. These include communication barriers between the hospital and PAC facility,(48; 49) communication barriers within individual PAC facilities,(49) limited resources and training,(50) quality of care,(44; 47) and staffing patterns (e.g., nurse retention and level of physician engagement).(51) Finally, financial incentives and broader health policies further increase

readmission risk. The historical lack of accountability for hospital readmissions has previously allowed hospitals to benefit financially from rehospitalization and impeded motivation to better coordinate care between the acute and post-acute care settings.

Reducing readmissions from PAC facilities will require approaches that address patient, PAC facility, and policy factors that influence rehospitalization. Fewer controlled studies in this context are available to guide practice, but the published literature does allow recommendations to be made. As with discharges to home, multicomponent interventions are more likely to have sustainable success.(19; 52) Importantly, preventive steps should be initiated early in the acute hospital stay for patients at high risk for discharge to PAC. This group includes patients admitted from PAC facilities as well as patients identified on the basis of symptom burden or a validated prediction tool.(53; 54) Once identified, special attention must be paid to preparing the patient for the next phase of their care in the PAC setting. This includes attention to medication reconciliation, polypharmacy, and discontinuation of high-risk geriatric medications when not indicated.(43; 55) For example, antipsychotic medications initiated in the acute care setting for agitated delirium are often continued without indication and potentially increase the risk for rehospitalization.(43; 46; 56) In addition, care should be made to minimize the use of urinary catheters, peripherally inserted central catheters (PICC lines), and other indwelling devices at the time of discharge, as these present potential safety hazards and increased risk of rehospitalization.(55; 57; 58) Finally, patients transitioning to PAC facilities should be included in routine advanced care planning discussions. These should provide adequate information about short- and long-term prognosis, expectations about the PAC setting, and discussion of goals of care to ensure that future healthcare decisions align with patient preferences. Each of these steps (i.e., medication safety, elimination of safety hazards, advanced care planning) should be continued and reinforced in the post-acute setting.(59; 60)

Multicomponent interventions such as Interventions to Reduce Acute Care Transfers (INTERACT) and Project RED include each of these components.(52; 61–63) In addition, these programs employ additional tools to enhance inter- and intra-facility communication, care pathways and training to manage common medical conditions that may precipitate rehospitalization, and enhanced follow-up procedures (e.g., early follow-up appointments, patient phone calls) to ensure continuity of care following PAC discharge. INTERACT is the most rigorously studied of the multicomponent PAC interventions, all of which are laid out in a comprehensive fashion on their web site available at <http://interact2.net/>. INTERACT has been studied in as many as 25 community skilled nursing facilities.(52) Following six months of biweekly training by an experienced nurse practitioner, participating facilities experienced a 17% reduction in self-reported hospital admissions compared to the same 6 month period from the year prior. Among the most engaged facilities reductions were as high as 24%.(52)

## Identification of High-Risk Patients

Applying high-intensity, multifaceted efforts to all inpatients may not be possible for many institutions, so there has been much interest in predicting patients at highest risk of rehospitalization to allow for targeted intervention. Three studies have specifically applied



transitional interventions only to high-risk patients, reporting absolute risk reduction of 30-day readmissions by 11 to 28 percentage points.(25; 26; 30) These studies used simple checklists of various risk criteria to enroll patients, most frequently including increased age, presence of multiple medical comorbidities, functional impairment, poor social support, and prior healthcare utilization.

High-risk patients may also be identified through readmission risk prediction models, a number of which have been developed and validated during the last 30 years.(9) When considering the value of these models, several aspects must be taken into consideration, including model complexity, data availability, and model performance. The simplest approaches are ideal for busy clinicians and frequently only contain four or five variables. (64) In contrast, other models include more than 90 separate variables and take advantage of the breadth of administrative data available.(65) In general, there is some trade-off between ease of use and discriminative ability of the model. It is important for individuals and institutions to carefully consider the goal of their risk prediction when selecting a model for use.

Another important consideration in model selection is the timing of data availability. In order for a readmission risk score to be most clinically useful, it must be calculable early enough during the index hospitalization to allow time for intervention.(9) Many of the prediction models developed using large administrative databases include variables that are not readily available early in a hospitalization, such as total length of stay and whether the patient is discharged to a skilled nursing facility.(65; 66) While these models may have utility for purposes of risk adjustment and hospital comparison, they are less practical for real-time clinical prediction.

Model performance or discriminative ability has been a topic of much debate. Predictive ability is most commonly measured by comparing the C-statistic. A C-statistic of 0.8 or greater indicates excellent discriminative capability, while a value of 0.7 to 0.8 is considered adequate, and less than 0.7 is suboptimal.(67) A recent systematic review found that the majority of existing readmission models had only a modest ability for accurate prediction, with only six studies to date reporting a C-statistic of greater than 0.7.(9) This may be due in part to the fact that most existing models rely heavily on comorbidities, prior hospitalizations, and basic demographic information. Few have evaluated other factors linked to readmission such as health literacy, functional impairment, language barriers, and level of social support.(9; 14) A small number of studies have begun to evaluate the effect of including these factors, and have generally found that the combination of administrative data, comorbidities, and self-reported variables performs better than any one category alone. (68–70)

Prediction models also may perform better when they are tailored to the specific patient population. Factors affecting readmission rates vary based on discharge destination (home vs. PAC facility) as well as by socioeconomic condition and primary diagnosis. CMS has sponsored the development of several methodologically sound models specific to discharge diagnosis,(6–8) though they only utilize administrative data and perform modestly, with C-statistics ranging from 0.60 to 0.66.(9) Disease-specific risk prediction models have been

reported elsewhere in the literature for acute myocardial infarction and heart failure,(71; 72) as well as stroke and chronic obstructive pulmonary disease.(73; 74)

Although most models have limited ability to accurately predict the probability of readmission for any one patient, most are at least able to stratify patients into low and high risk groups.(68; 70) Some programs have correspondingly adopted more a qualitative approach to both risk assessment and intervention. Project BOOST (Better Outcomes for Older adults through Safe Transitions), led by the Society of Hospital Medicine, employs a simple risk tool assessing eight patient factors that contribute to readmission risk.(75) Each identified risk factor is then paired with suggestions for specific interventions to mitigate risk and reduce readmissions. A related strategy that we are using in our own work is to perform a structured assessment of patients' transitional care needs and provide tailored support delivered by a dedicated transition care coordinator. This needs assessment focuses on intervenable risk factors, such as understanding of medications, functional status limitations, and the need for timely follow-up. This strategy also directs the greatest assistance to patients who have the greatest needs.

## **New Frontiers and Areas Where Additional Work Is Needed**

As the number of transitional care interventions grows, we will see an increase in reports of both positive and negative studies. Authors should carefully describe their patient selection and intervention components, as well as details of how the intervention was implemented (e.g., for telephone calls – who called, when, how often, and what was discussed), so that the most effective approaches can be determined and replicated.(76) In addition, a number of specific areas warrant further investigation and consideration in the next generation of care transition interventions. These include home-based services, telemonitoring and other information technology, mental health care, caregiver engagement and support, partnerships with the community and other healthcare facilities, and role definition for new transitional care personnel.

In the home setting, further work is needed to understand what type and intensity of services should be offered after discharge to reduce unplanned readmissions. Some successful readmission reduction programs have included home visits.(28; 30) However, there is no consistent evidence that home visits reduce readmission rates in the absence of larger coordinated efforts.(77) If linkages between the hospital and outpatient setting improve, home health may provide a natural bridge, warranting further study as the standard of care changes.

Information technology (IT) provides an appealing prospect both for monitoring and as a means of intervention. Telehealth monitoring provides both of these opportunities, but has not been widely incorporated into current care transition interventions. Early studies showed potential benefit of telemonitoring for disease management, though a large trial showed no reduction in readmission rates.(78) Nevertheless, this and other technologies must be considered anew within the context of larger multifaceted interventions. As the number of care transition-related IT products increases, further work will be necessary to clarify which of these products are most clinically effective, cost-effective, and for which populations.



Comorbid psychiatric disease and substance abuse increase the risk of readmission.(9; 79) Among adults admitted with mental health conditions, small studies have tested approaches to reduce psychiatric rehospitalization.(80) However, among medical inpatients, addressing psychiatric disease and substance abuse has not been a focus of most transitional care interventions. Efficient and effective strategies are needed to treat patients with depression, anxiety, schizophrenia, and substance abuse in this setting. Incorporating behavioral therapy in the hospital, during home health visits, and in the ambulatory care setting may be beneficial and warrants further study.

Enhancing the discharge process may be best achieved with robust engagement of caregiver and family support when available. Successful interventions have included caregivers longitudinally throughout the discharge process,(28–30) particularly as it relates to education, medication counseling, and planning outpatient follow-up. Yet an area that needs additional exploration is support to caregivers themselves. Caregivers are at higher risk of depression and heart disease,(81; 82) and even experience higher mortality rates.(83) Teaching patients and their families strategies for self-care, empowerment and advocacy are proving to be useful tactics, but new models to adequately support caregivers and provide necessary respite are needed.

Community partnerships are emerging as one meaningful way for hospitals to successfully reduce readmissions. The CMS Community-based Care Transitions Program (CCTP) represents a large, formal network of organized partnerships between acute-care hospitals and community-based organizations.(84) The community organizations provide timely care transition services for patients after hospital discharge, monitor performance, and provide feedback to CMS. Initiatives involving congregations are another way to engage the community and leverage local support structures to better meet patients' needs. For example, the Memphis Congregational Health Network is a hospital-community partnership involving more than 500 area churches. It has reported significant reductions in readmission and mortality, as well as higher patient satisfaction scores.(85) Other partnerships involve hospitals establishing post-discharge follow-up clinics or collaborating with post-acute care facilities.(86; 87) Such partnerships will require commitment from multiple area institutions, but may be necessary in order to achieve substantial and sustainable reductions in readmissions. The formation of accountable care organizations and the advent of bundled payments may help foster the necessary collaboration across these settings.(12)

The period of time of transitioning from the hospital to home or the post-acute care setting is now fully recognized as a critical period of a patient's illness, and one that requires unique and specific skills to achieve optimal outcomes. New members and roles on the health care team are emerging with this new recognition. New transition care personnel may include transition coaches, discharge advocates, and transition care coordinators, as well as expanded roles for home health providers, advanced practice nurses, case managers, mental health providers, and social workers. These valuable personnel can help arrange services, coordinate care, and help ensure that patient and family preferences are respected. One important area related to hospital utilization is performing advanced care planning to establish goals of care and circumstances under which patients prefer additional hospital care, particularly for patients with poor functional status or limited life expectancy. These

new team members will need to be integrated into health care teams so that their skills can be optimally used, and new compensation structures developed to appropriately reimburse their involvement in patient care.

## Conclusions

Reducing readmissions has become a mandate for hospitals across the United States, hastened by implementation of public reporting and financial penalties for excess readmissions. However, despite an immediate need to improve the quality of discharge planning and transitional care, there is limited high-quality evidence outlining how to best accomplish this. The scientific literature shows that individual interventions are unlikely to significantly reduce readmission rates.<sup>(19)</sup> In contrast, some multifaceted interventions have been successful in this regard.<sup>(27–30)</sup> Effective interventions share certain features: having multiple components that span both inpatient and outpatient settings and delivery by dedicated transitional care personnel. New evidence suggests that the number of components in a care transitions intervention is significantly related to its effectiveness,<sup>(34; 35)</sup> which strengthens the argument for more robust interventions.

Multifaceted interventions require substantial resources for planning, implementation, and monitoring. Though transitional care interventions may be cost-effective in certain settings, <sup>(28–30)</sup> hospitals will each need to determine their current level of performance, the amount of financial penalty that can potentially be recouped, what resources they already have in place, and what new resources they can allocate to readmission reduction efforts in light of other quality and safety initiatives. In making this assessment, it is useful to also consider other improvements that may result from a greater focus on transitions, such as more efficient processes of care, better teamwork, improved patient satisfaction, and improved performance in other areas of quality and safety.<sup>(20)</sup>

Given the resources required, it is reasonable for hospitals to focus efforts on patients at higher risk of readmission. These patients may be identified either on the presence of certain characteristics (advanced age, polypharmacy, decreased functional status, etc.)<sup>25,26,30</sup> or by using predictive models that quantify the risk of readmission.<sup>(9)</sup> At present, it is uncertain which of these approaches is superior, but either can provide some stratification for the allocation of resources and attention. Using a structured needs assessment to identify areas of concern and provide focused resources to patients may prove to be an effective way to tailor assistance to patients' needs.

As efforts unfold to reduce readmissions, it will be critical to rigorously assess their effectiveness and sustainability. To the extent that some readmissions are preventable, and that being readmitted is undesirable for most patients, reducing avoidable readmissions presents a potentially large opportunity to reduce cost, improve quality, and improve the patient experience simultaneously.

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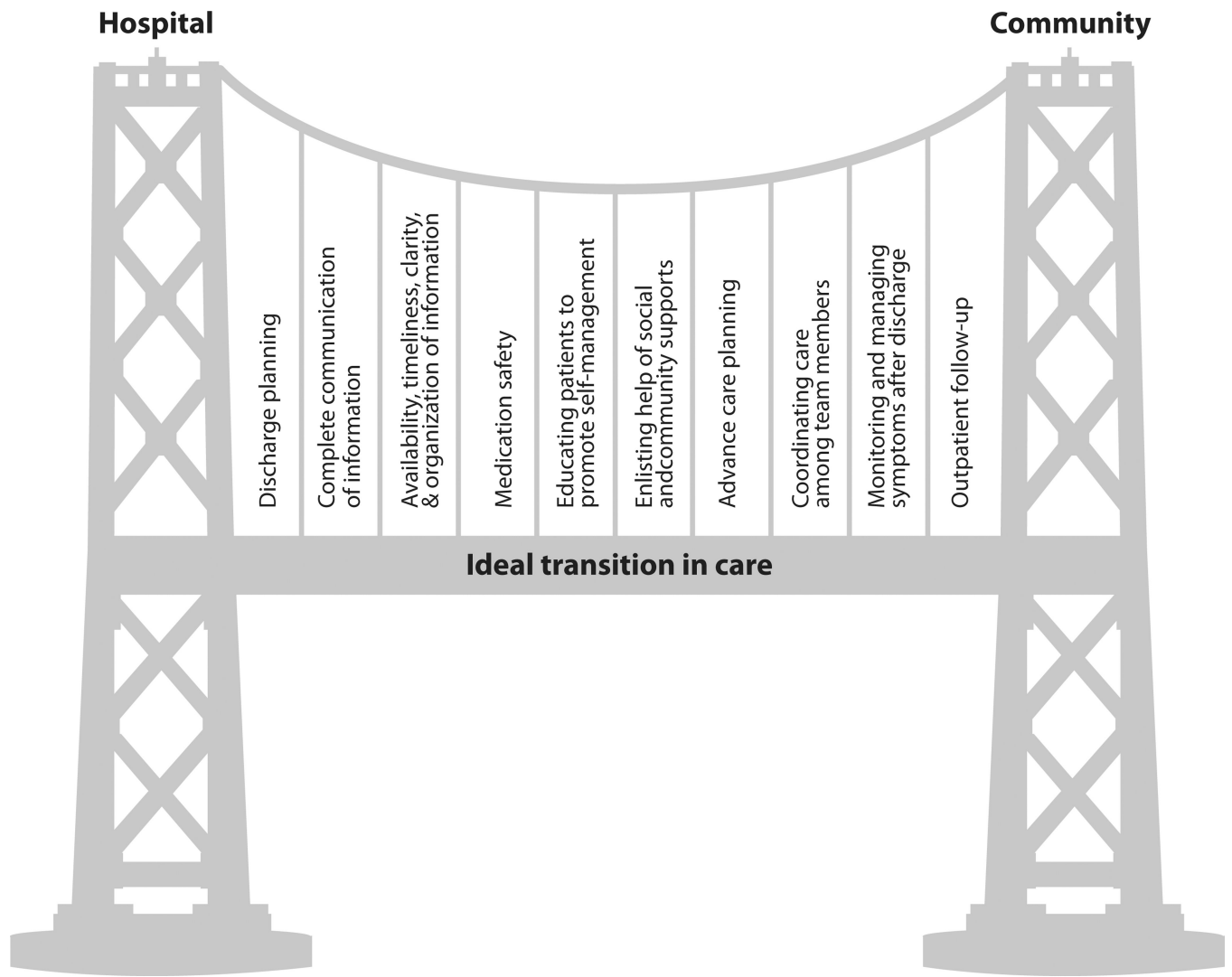
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**Figure.** The Ideal Transition in Care framework. (Reprinted with permission)

**Table**

Selected multi-component transitional care interventions tested in randomized controlled trials.

Author, year	Intervention	Setting; study sample	Key elements	Outcomes
Naylor, 1994(27)	Comprehensive discharge planning	Academic hospital in Philadelphia; Community-dwelling elders with selected medical and surgical conditions, <sup>a</sup> and their caregivers	<p>Advanced practice nurse:</p> <ul style="list-style-type: none"> <li>- Meets with patient and caregiver in hospital</li> <li>- Follows every 48 hours and as needed</li> <li>- At least two follow-up telephone calls after discharge</li> <li>- Available as needed for questions</li> </ul> <p>Intervention components:</p> <ul style="list-style-type: none"> <li>- Structured assessment of patient and caregiver needs</li> <li>- Comprehensive discharge planning</li> <li>- Patient and caregiver education</li> <li>- Ongoing assessment and adjustment of plan if needed</li> <li>- Care coordination for up to two weeks after discharge</li> <li>- Interdisciplinary communication</li> </ul>	Reduced readmission rate for medical patients at 6 weeks (10% vs. 23%, p<0.05)
Coleman, 2004(28)	Care Transitions Intervention	Not-for-profit health system in Colorado; Community-dwelling elders with selected medical and surgical conditions <sup>b</sup>	<p>Nurse transition coach:</p> <ul style="list-style-type: none"> <li>- Meets with patient in the hospital</li> <li>- Home visit 48–72 hours after discharge</li> <li>- Three follow-up telephone calls</li> </ul> <p>Four “pillars”:</p> <ul style="list-style-type: none"> <li>- Medication self-management</li> <li>- Patient-owned health record</li> <li>- Timely outpatient follow-up</li> <li>- Awareness of red flags and</li> </ul>	Reduced readmission rate at 30 days (8.3% vs. 11.9%, p<0.05) and 90 days (16.7% vs. 22.5%, p<0.05) in adjusted analysis

Author, year	Intervention	Setting; study sample	Key elements	Outcomes
			appropriate actions to take	
Jack, 2009(29)	Project Reengineering Discharge (RED)	Safety-net hospital in Boston; Adults admitted to medical teaching services	<p>Nurse discharge advocate:</p> <ul style="list-style-type: none"> <li>- Meets with patient throughout the hospital stay</li> <li>- Coordinates in-hospital discharge Planning</li> <li>- Prepares after-hospital care plan</li> </ul> <p>Pharmacist:</p> <ul style="list-style-type: none"> <li>- Performs telephone follow-up</li> </ul> <p>Intervention components:</p> <ul style="list-style-type: none"> <li>- Patient education</li> <li>- Schedule follow-up appointments</li> <li>- Review test results and outstanding tests</li> <li>- Organize post-discharge services</li> <li>- Medication reconciliation</li> <li>- Reconcile discharge plan with care pathways and guidelines</li> <li>- Discuss action plan in case of Problems</li> <li>- Transmit discharge summary to following provider</li> <li>- Assess patient understanding</li> <li>- After-hospital care plan (written patient education and instructions in plain language)</li> <li>- Telephone reinforcement</li> </ul>	Reduced hospital utilization (combined endpoint of emergency department visits and rehospitalization) at 30 days, incidence rate ratio = 0.695 (95% CI, 0.515 to 0.937)

<sup>a</sup> Congestive heart failure, angina/myocardial infarction, coronary artery bypass grafting, cardiac valve replacement.

<sup>b</sup> Stroke, congestive heart failure, coronary artery disease, cardiac arrhythmias, chronic obstructive pulmonary disease, diabetes, spinal stenosis, hip fracture, peripheral vascular disease, deep venous thrombosis, pulmonary embolism.