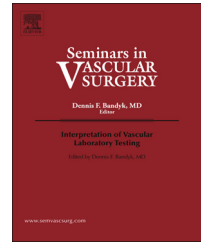


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# Transitions of care and long-term surveillance after vascular surgery



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## ARTICLE INFO

## ABSTRACT

Quality care of vascular surgery patients extends to the postoperative coordination of care and long-term surveillance, including the medical management of vascular disease. This is particularly highlighted in contemporary modern vascular surgery practice, as tremendous focus is being placed on postoperative adverse events and hospital readmissions. The purpose of this review is to provide a contemporary perspective of transitions of care at discharge and long-term surveillance recommendations after vascular surgery interventions.

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## 1. Introduction

Effective coordination of medical care is a hallmark of quality and is thought to have significant influence on patient outcomes. It is expected that high-quality coordination of care transitions will contribute to improved patient care and reduce cost. In this way, care coordination is an important contributor to achieving the “triple aim” of better care, better health, and reduced cost outlined by Berwick et al in 2008 [1]. The Patient Protection and Affordable Care Act is built upon these principals and contains multiple elements that facilitate communication and coordination of medical care [2]. This includes broad adoption of electronic medical records and, among other elements, aligning incentives through shared savings models and delivery integration. It is widely accepted that care coordination is complex, multifaceted, and is extremely important throughout the care continuum. In particular, coordination of the care transition from inpatient to outpatient is critical, and likely has significant bearing on patient medication adherence, patient satisfaction, and unplanned readmission [3].

Hospital readmission has garnered particular attention in clinical care, health policy, and in research. Unplanned readmission is a significant burden to patients, their families, and their health care providers. It is also a high associated monetary cost, with an estimated \$15 billion in excess health care spending per year [4]. The Centers for Medicare and Medicaid Services use readmission as a hospital quality metric. As an incentive for quality improvement, Centers for Medicare and Medicaid Services has initiated penalties for unplanned readmissions in a series of disease-specific states, including pneumonia, heart failure, and myocardial infarction [4–6]. It is expected that, in the coming years, these penalties will expand to include postoperative unplanned readmissions for a broad spectrum of procedures, starting with orthopedic hip and knee replacement and moving to include coronary bypass surgery [2,6]. It is anticipated that vascular surgery procedures will be included in the penalty program as early as 2017 [2]. It is important to acknowledge, however, that controversy exists regarding the suitability of readmission as a target for financial penalties in surgical care.

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There is a demonstrated correlation between postoperative complications and mortality, metrics with an accepted relationship to quality of care [7,8]. However, separating quality care in surgery from nonmodifiable patient and environmental factors may be difficult [9,10].

The connection between readmission and Medicare reimbursement is particularly relevant in vascular surgery, given the high proportion of vascular surgery patients that are Medicare beneficiaries and in light of higher rates of readmission for vascular surgery patients compared with other specialties. A 2009 study demonstrated that vascular surgery patients had the third highest readmission rate among all Medicare beneficiaries (24%) [4]. Another contemporary study that evaluated postsurgical readmission rates, found that in 2012, the overall 30-day readmission rate after surgery was 5.7%, however, patients undergoing lower extremity bypass had the highest readmission rate of 15% [11]. Outside of vascular surgery, a growing body of literature focused on this issue has identified discharge planning and coordinating transitions of care as fundamental areas to reduce unplanned readmissions and improve outpatient continuity of care [12]. Taken together, effective management of care transitions and their potential effect on readmission is an important opportunity in vascular surgery.

In this review, we will focus on the following critical care transitions in the care of vascular surgery patients: the early postoperative transition from inpatient to outpatient care and the long-term continuity and surveillance for vascular surgery patients. We will discuss the existing literature surrounding these intervals, ongoing broad-based initiatives that emphasize these care transitions and outline futures steps that can be taken to better understand care transitions in the vascular surgery population.

## 2. Postoperative care transitions

There are very limited data related to care transitions specific to patients undergoing vascular surgery. Existing studies on postoperative hospital discharge focus largely on predictors of readmission and determining patients at high risk for readmission [11,13]. Based on the National Surgical Quality Improvement Program, a nomogram for high readmission risk was created with 10 variables composed of patient comorbidities (American Society of Anesthesiologists class, steroid use, dialysis dependence, diabetes, and cancer) and procedure-related variables (wound class, operative time, urgent surgery, inpatient procedure, and discharge destination). This nomogram was effective at predicting unplanned readmission with a c-statistic of 0.70 [13]. These factors were likely a function of disease comorbidity, as multiple studies have shown that early readmission is strongly associated with postoperative complications [8,11,14].

Conceptually, identification of patients at high risk for readmission could trigger additional attention to discharge care coordination that could prevent unplanned readmission, including closer clinical follow-up, post-hospitalization telephone contact, and other interventions aimed at increasing patient contact with clinicians. The potential benefit of earlier postoperative follow-up for patients at high risk for

readmission is supported by a retrospective review by Saunders et al, who noted that, in many cases, outpatient follow-up did not occur early enough in the postoperative period to detect complications [15]. Beyond surgery, a prospective evaluation of early follow-up and comprehensive discharge planning resulted in lower readmission rates compared with patients that did not receive intervention (10.6% v 21.1%;  $P < .001$ ) [16]. However, other work has demonstrated that post-discharge telephone calls alone after medical admission demonstrated variable results with efficacy potentially limited by lack of access to the highest-risk patients [17,18]. Importantly, in a systematic review that evaluated multiple domains of a care transition framework, the monitoring and management of symptoms, had the strongest association with readmission reduction in a variety of disease states [19]. In this respect, early follow-up, which is a specific opportunity to manage postoperative symptoms, may be an effective opportunity for reduction of unplanned readmissions.

It is a multipronged approach to postoperative care transitions that will likely be most effective at reducing readmission rates [20]. This includes a multidisciplinary approach that depends on clinicians to identify outpatient needs, define therapeutic goals of care, gaps in the patient's support network, and collaboration between primary care and subspecialty providers [21]. The engagement of multiple providers in postoperative care transitions is supported by a retrospective study demonstrating that early primary care provider follow-up in patients undergoing major vascular surgery (thoracic aortic aneurysm repair) had lower rates of readmission than those that did not have early follow-up with their primary care provider [22].

The impact of a care coordination protocol has been well studied in chronic medical conditions outside of vascular surgery, most notably in heart failure. Heart failure is associated with high-rates of readmission (estimated 25%) and challenges with outpatient medical management [23,24]. A 2004 systematic review of strategies to improve outcomes in heart failure found that in-person multidisciplinary follow-up interventions were the most effective strategy to reduce all cause readmission [relative risk (RR)=0.81], heart failure-related readmissions (RR = 0.74), and mortality (RR = 0.75) in recently hospitalized patients [23]. These follow-up interventions included early follow-up in multidisciplinary heart failure clinic, nurse-led patient education, self-management guidelines for patients, protocol-driven medication changes, dietary consultation services, psychosocial support, telephone follow-up, and in-home visits. Importantly, as similarly demonstrated in surgical patients, these interventions are supported by the ability to determine characteristics of heart failure patients at high risk for readmission [25].

Multiple resources and programs have been developed to specifically address inpatient to outpatient care transitions. Some of these are direct results of the Patient Protection and Affordable Care Act, including the Community-Based Care Transition Program, Independence At Home Program, Hospital Readmission Reduction Program, National Pilot Program on Payment Bundling, Medicare Shared Savings Program, and the Pioneer ACO Program. In general, these programs were initiated to integrate the health care infrastructure to improve communication between providers and align

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