

Early results: 30-day mortality was 3.3%. Limb loss rate was significantly lower in the upper (n = 2; 2.9%) than the lower limb (n = 12; 13.3%;  $P < .05$ ). Primary patency was 93% (upper limb) and 89% (lower limb): early graft occlusions occurred both in the upper (n = 5; 7%) and the lower limb (n = 10; 11%;  $P = .59$ ). Occlusions were followed by amputation in 8 cases (upper limb, 1 of 5; lower limb, 7 of 10) despite successful revision of the occluded grafts. Long-term results after a median follow-up period of 6.0 years (range, 0.3-23.4): upper limb (68% of patients were followed): no late limb loss, no vascular reintervention, patency: 97%; lower limb (66% of patients were followed): one late limb loss, one redo bypass for vein graft dilation, patency: 98%.

**Conclusions:** Repair of arterial injuries in the limbs using vein grafts is hampered by a considerable risk of early occlusion, probably caused by insufficient anticoagulation and due to associated injuries. Early graft occlusion is frequently followed by limb loss, especially in the lower limb. However, during long-term follow-up, occlusions of interposed vein grafts, and vascular reinterventions as well as late amputations are uncommon.

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**RR20.**

**Optimal Medical Management Reduces Mortality Following Vascular Surgery in New England**

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**Objectives:** This study examined variation and impact of antiplatelet (AP) and statin therapy on early and late mortality in patients undergoing vascular surgery in our region.

**Methods:** We studied all patients (n = 14,490) undergoing primary elective CEA/CAS (n = 7503), supra/infringuinal bypass (n = 3816), and open/endo AAA repair with known coronary risk factors (n = 3171) from 2005-2012 in the Vascular Study Group of New England. We defined "optimal medical management" as treatment with both AP and statin agents, preoperatively and at discharge. We used multivariable analysis to determine the independent impact of AP and statin therapy on 30-day mortality and 5-year survival, and analyzed center variation in medication use.

**Results:** Preoperative AP and statin use was associated with reduced 30-day mortality (0.97 vs 1.58%, RR 0.61;  $P < .01$ ). AP and statin prescription at discharge was additive in survival benefit (Fig). Preoperative and discharge AP and statin was associated with improved 5-year survival (HR, 0.68; CI, 0.62-0.77;  $P < .01$ ) and consistent across procedure types. The use of optimal medical management increased during the study interval (55% in 2005 to 68% in 2012;  $P < .01$ ). However, the proportion of patients on optimal medical therapy varied significantly among the 29 centers, from 40 to 86%;  $P < .01$ .

**Conclusions:** Optimal medical management was associated with reduced short and long term mortality. However, one-third of patients are sub-optimally managed in real world practice. This is an opportunity for quality improvement that can substantially improve survival after vascular surgery.

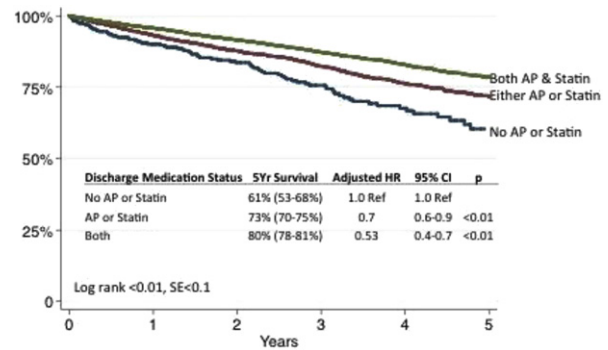


Fig. Five-year survival based on discharge medication status

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**RR21.**

**Factors Associated With HCAHPS Performance in Vascular Surgery Patients**

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**Objectives:** Under the Affordable Care Act, patient satisfaction and the quality of care delivered as measured by the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) will assume an increasingly important role. While HCAHPS is a standardized patient satisfaction survey, there is minimal published data describing factors associated with high scores. This study evaluates factors associated with HCAHPS satisfaction in vascular surgery patients.

**Methods:** This study is a retrospective review of vascular surgery HCAHPS surveys at a single academic center from 2011-2012. Global satisfaction, evaluated by hospital satisfaction and willingness to recommend the hospital, was the primary endpoint. Other survey domains, demographics and clinical variables including complications, procedure and ICU stay were also evaluated. Only top answers were considered positive ("always"; 10/10 satisfaction; definite recommendation).

**Results:** There were 92 vascular surgery HCAHPS responses. 87 (94.6%) were white and 64 (69.6%) were male. Important factors associated with satisfaction included nurse/doctor listening, respect and explanations (all  $P < .01$ ). Pain control ( $P < .05$ ), prompt assistance ( $P < .02$ ) and a quiet atmosphere ( $P < .05$ ) also correlated with satisfaction. Complications, LOS, emergent admission and insurance were not associated with overall satisfaction. Patient's self-health assessment and procedure type (endovascular, open, or both) were the only clinical variables associated with satisfaction ( $P < .05$ ).

**Conclusions:** Among vascular surgery patients, patient-provider interactions, pain control, quiet environment, self-assessment of health and procedure type are associated with patient satisfaction. The latter clinical variables warrant further investigation. This study reinforces the importance of patient-provider interactions and identifies factors that may increase patient satisfaction and the successful delivery of quality care under the Affordable Care Act.

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**RR22.**

**Implementing Toyota Production System Practices Improves Efficiency of Patient Care in an Academic Vascular Practice**

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**Objectives:** Toyota Production System (TPS) methods have been advocated for use in medical settings. We sought to improve operational efficiency in the vascular clinic and vascular laboratory by instituting these lean management principles.

**Methods:** To operationalize rapid change, the TPS principles were introduced and implemented with our management and entire clinic and lab staff. These principles included value stream mapping, 5-S, standard work, and continuous improvement processes. The desired changes were evaluated after 6 months using appointment availability, clinic and lab volumes, patient satisfaction and employee engagement metrics as the outcomes variables.

**Results:** Over the study period, clinic visits increased by 7% (383 to 410 visits per month), while new patient visits increased by 15% without increasing staff support. Improved efficiency resulted in an increase in available vascular lab appointments by 29% without extending work hours. Coordination with the clinic appointments also improved: total lead time for those with dual appointments decreased by 56% (126 minutes to 55 minutes), proportion of lab visit starting late decreased by 72%, and lab visits ending after scheduled start of clinic appointment decreased from 50% to 18%. Even with increased clinic volumes, employee job engagement improved (score 93 vs 55;  $P < .0001$ ) and patient satisfaction was maintained (score 91.3 vs 93.1;  $P = .14$ ).

**Conclusions:** Adoption of TPS management strategies can rapidly improve patient care processes. Implementing

programs that increase efficiency in delivering healthcare without increasing costs will become more paramount as health care dollars become more scarce.

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**RR23.**

**Functional Status of Elderly Adults Before and After Interventions for Critical Limb Ischemia**

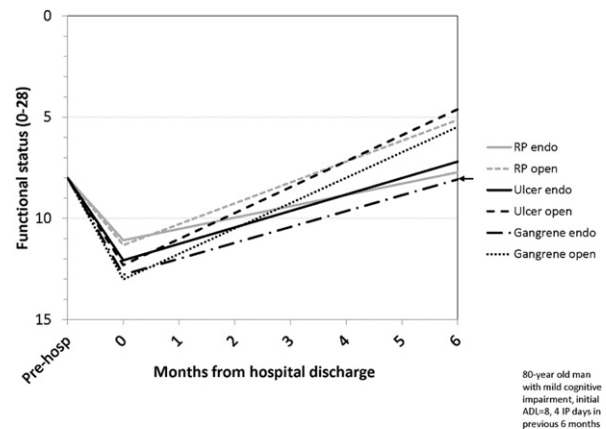
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**Objectives:** The impact of interventions for Critical Limb Ischemia (CLI) on functional status in the elderly remains unclear. Open (OPEN) and endovascular (ENDO) procedures were evaluated.

**Methods:** Medicare inpatient claims were linked with nursing home assessment data to identify elective admissions for lower extremity procedures for CLI. A functional score (0-28; higher indicating greater impairment) based on activities of daily living, walking, and locomotion was calculated before and after interventions. Hierarchical modeling determined the effect of the surgery on residents' function controlling for comorbidity, cognition, and pre-hospital function.

**Results:** 452 and 450 patients underwent OPEN and ENDO, respectively (rest pain (RP): 86; ulceration: 373; and gangrene: 443). Hospitalization was associated with a significant decline in function in both groups. Disease severity was associated with initial decline but not with the rate of recovery ( $P > .35$ ). OPEN had higher rates of recovery ( $P = .011$ ).

**Conclusions:** Open and endovascular procedures for CLI were associated with a similar initial decline in functional status suggesting less invasive endovascular procedures did not preserve baseline function. Endovascular procedures for CLI did not significantly improve functional status over time. Traditional open bypass significantly increased functional status for all CLI diagnoses with the greatest functional improvement being for ulceration. Further analysis is



Function Over Time

Fig. Function over time.