1 A Validated Value-Based Model to Improve Hospital-Wide Perioperative Outcomes: Adaptability to Combined Medical/Surgical Inpatient Cohorts

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2 Abstract

Objectives: Authors hypothesized that building safe hospital systems to improve value-based surgical outcomes is predicated on workflow redesign for dynamic risk stratification, coupled with “real-time” mitigation of risk. We developed a comanagement model for hospitalized surgical cohort, and determined whether this iterative process redesign for surgery will be adaptable to disparate hospital systems and will be beneficial for combined medical/surgical adult inpatients.

Context: Concerns about preventable harm in hospitalized patients have generated a plethora of both, process-driven and outcome-based strategies in US Healthcare. Although comparison between hospitals is a common mechanism to drive quality, other innovative approaches are needed for real-time risk mitigation to improve outcomes.

Methods: Prospective implementation of Surgical Continuum of Care (SCoC) model in hospitals initially for surgery patients; subsequently Continuum of Care (CoC) for medical/surgical population. Redesign of hospital care delivery model: patient cohorting, floor-based team building, and intensivist/hospitalist staffing of progressive care unit (PCU). Work flow redesign for clinical effectiveness: multidisciplinary team rounds, acuity stratified care rounding based on dynamic risk assessment into a novel HAWK (high risk)/DOVE (low risk) patient grouping, intensivist/hospitalist comanagement of surgical patients, and targeted response.

Study: Pre- and postintervention with concurrent cohort control design.

Setting: Academic medical centers for SCoC and integrated health system hospital for CoC.

Patient Groups: SCoC Pilot Study–Campus A: Preintervention control group 1998–2000, Intervention Group 2001–2004; Campus B: Comparator Control Group 1998–2004.

SCoC Validation Study–Campus C: Preintervention Group 2001–2005; Intervention Group 2006–2008. CoC Study–Campus D: Hospital-wide Group 2009.

Metrics: Mortality, length of stay (LOS): overall, surgical intensive care unit and PCU, readmission rates, and cost. Case mix index for risk adjustment.

Results: Total >100,000 admissions. There was a significant reduction in overall surgical mortality in both, pilot ($P < 0.002$) and validation ($P < 0.02$) SCoC studies and overall hospital mortality in the medical/surgical CoC study (risk-adjusted mortality index progressively declined in CoC study from 1.16 pre-CoC to 0.77 six months post-CoC implementation; significant at 75% confidence level). Case mix index was unchanged during study period in each campus. Nested study in validation cohort of hospital-wide versus surgery alone (observed/expected mortality index) demonstrated significant benefit to SCoC in intervention group. The mortality benefit was primarily derived from risk-stratified rounding and actively managing risk prone population in the PCU. Surgical intensive care unit, PCU, and total hospital patient-days significantly decreased in SCoC pilot study ($P < 0.05$), reflecting enhanced throughput. LOS reduction benefit persisted in SCoC validation and CoC studies. In addition to decreased LOS, cost savings were in PCU (range, $851,511–2,007,388) and top diagnosis-related groups, for example, $452 K/yr for diagnosis-related group 148.

Conclusions: SCoC is patient-centered, outcomes-driven, value-based approach for hospital-wide surgical patient safety. The principles of this value paradigm are adaptable to other hospitals as demonstrated in our longitudinal study in 3 hospital systems, and the initial experience of CoC suggests that this model will have benefit beyond surgical hospital cohort.