

Outcomes of a Quality Improvement Initiative: Multi-Disciplinary Team for Infective Endocarditis Improves the Numbers of Patients Who Undergo Surgery

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Background

Optimal management of IE requires inputs from a number of specialties including infectious disease, cardiology, cardiothoracic surgery, and others. Guidelines from the US and Europe recommend incorporating multidisciplinary teams (MDT) in the management of IE. These recommendations are based on quasi-experimental before and after studies which have consistently demonstrated that MDTs reduce in-hospital and one-year mortality.

In a prior study, we identified leverage points for improving infective endocarditis (IE) outcomes at an academic medical center. We aimed to improve the rate of surgery for those with guideline-based indications for surgery by 50% via implementation of a clinical care pathway for IE care through MDT.

Methods

We recorded outcomes and surgical indications for patients with IE from December 2018 to June 2020 and compared to our prior published data from January to December 2016, using similar criteria. Changes implemented in the interim period included development of an MDT for IE that provided recurring conferences, participated in heart valve team case discussions, and promoted the use of a home-grown algorithmic clinical care pathway within the electronic health record to guide providers on the next steps in management. Primary outcomes were surgery or transfer to a higher center for surgery and in-hospital death. Odds ratios were calculated using a multivariate logistic regression model including age and sex covariates.

Results

We identified 31 IE patients with guideline indications for surgery. Of those patients, 15(48.39%) were female, 15(48.4%) were 18 - 44 years of age, 8(25.8%) were 45 - 64 years, 8(25.8%) were >64 years, 28(90.3%) white, 2(6.4%) black, 1(3.2%) East Asian, 17(54.8%) were intravenous drug users. Prior to the intervention, 6 of 21 (28.6%) patients with indications underwent surgery or were transferred outside for surgery and 6 (28.6%) patients died. Post-intervention, 17 of 31 (54.8%) patients with indications underwent or were transferred for surgery, and 5 (16.1%) died. After adjustment for age and sex, compared to the pre-intervention period, the odds of surgery or transfer for surgery for patients in the post-intervention period was 4.88 (95% CI 1.20, 19.79, $p=.027$). The odds ratio for death among patients in the post-intervention period was 0.40 (95% CI 0.09, 1.69, $p=0.21$).

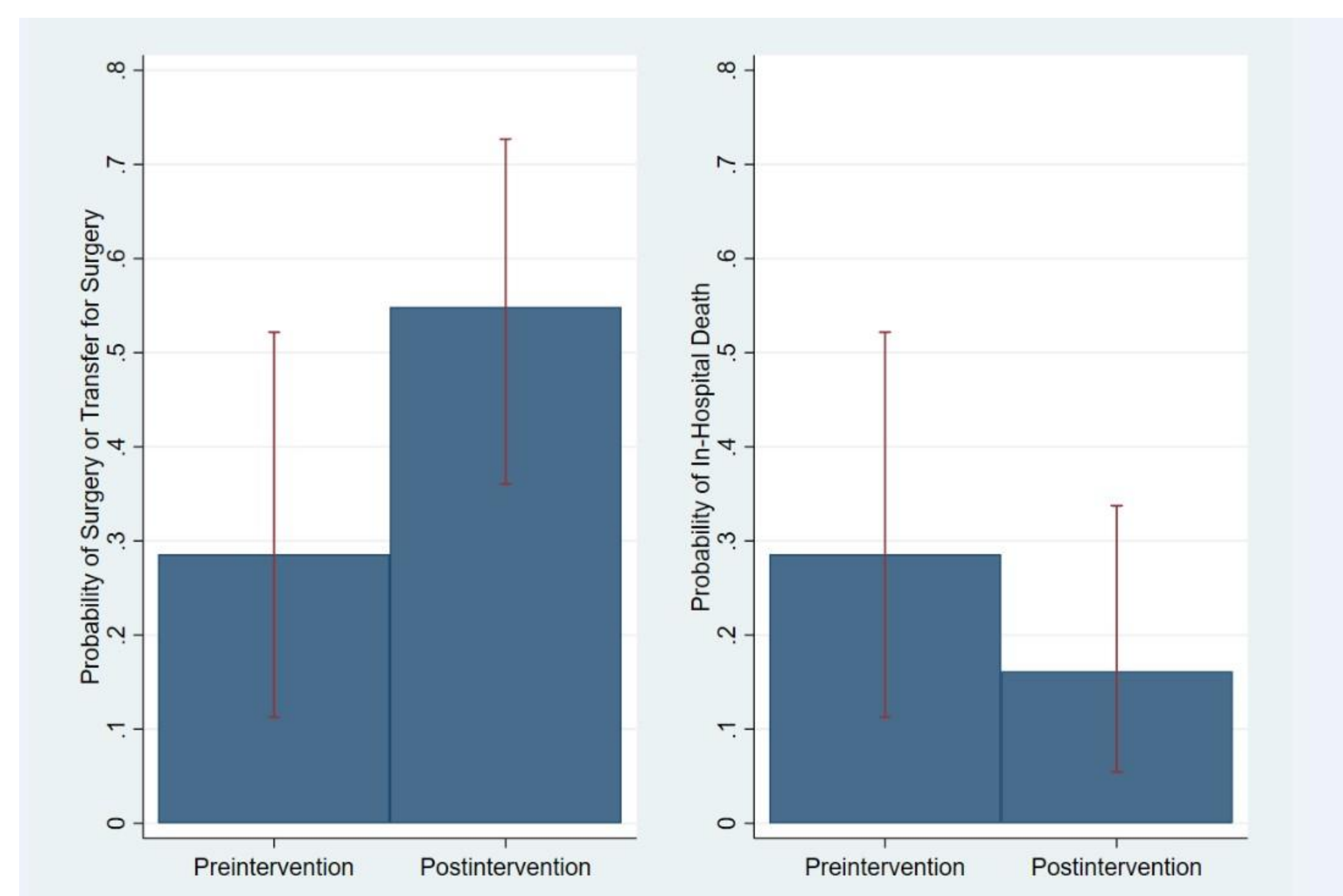


Figure 1: Multivariate logistic regression models comparing outcomes prior to IE MDT clinical care pathway implementation to after. On the left, probability of surgery or transfer for surgery. On the right, probability of in-hospital death.

The "6 Ts" Stepwise Sequential Summary of Clinical Care Pathway

1. Trigger: Clinical suspicion for IE includes the following high-risk markers

Unexplained fever, known structural/valvular/congenital heart disease with shunt lesions, end-stage renal disease on hemodialysis, history of substance or intravenous drug use, *s. aureus* bacteremia, recent invasive dental/endoscopic procedures

2. Task: Apply modified Duke criteria to classify as definite or possible endocarditis

Pathological criteria: Microorganisms demonstrated by culture or histological exam of vegetation/abscess/lesion showing active endocarditis.

Clinical Criteria: Two major criteria, one major criterion and three minor criterion, five minor criterion

3. Triage: Evaluate for presence of, risk for life threatening conditions or complications

Cardiac: Acute heart failure, acute pulmonary edema, perforation, destruction.
Systemic: Severe sepsis or septic shock

4. Track: Determine timeline for interventions

Fast-track: If at risk for or have the above critical conditions, urgent consultations (preferably within 6 h) were placed to infectious diseases and cardiology followed by transfer of care to the cardiac intensive care unit, where cardiothoracic teams are readily available.

Nonurgent track: If minimal or no risk, then routine consultations (within 24 h) were requested to infectious diseases and cardiology, followed by cardiac surgery consultations per guideline recommendations.

5. Testing

Transesophageal echocardiogram, brain imaging studies, repeat blood cultures until negative, dental/other imaging studies

6. Transition: Execute care plan and transition to post-care plan

If surgical risk acceptable between cardiac surgeon and medical teams (using scoring tool or subjective), proceed with surgery and transition to postoperative care as appropriate for the surgical operation performed.

If surgical risk is considered high or conflicting opinions between medical and surgical teams, primary team to decide on further options, e.g., informed decision making with patient/family, transfer to another center or palliative care consultation.

Table 1: Stepwise sequential summary of IE clinical care pathway based on MDT models, instituted at our university for care of IE patients.

Conclusions

Using quality improvement tools, an MDT for IE can be successfully designed and implemented with a clinical pathway in centers where subspecialty services are available. Our approach has resulted in a higher rate of surgery amongst those patients with guideline indications for it. An electronic clinical care pathway embedded in the EHR is feasible and may have a convenient role in MDT implementations.

