Adoption of Laparoscopic Colorectal Surgery in the Elderly Population: The Current State and Value Proposition
Deborah S Keller, Thais Reif de Paula, Daniel P Geisler, James M Kiely, Ravi P Kiran
Division of Colon and Rectal Surgery, Department of Surgery, Columbia University Medical Center, New York, NY

BACKGROUND
Laparoscopic colorectal surgery has patient and financial benefits, with comparable oncologic outcomes in malignant cases. The safety, feasibility have been specifically demonstrated in the elderly population (>65 years old) and benefits may be even more pronounced in this growing population. A paucity of studies to date have evaluated the present use or outcomes of laparoscopy in the elderly population.

AIM & HYPOTHESIS
Our goal was to evaluate the current use, trends in utilization, and outcomes for laparoscopic colorectal surgery in elderly patients. Our hypothesis was that laparoscopy has clear clinical and financial benefits in the elderly, but is underutilized in appropriate cases.

METHODS
The Premier Inpatient Database™ was reviewed for elderly patients undergoing elective colorectal resection from 1/1/2010-9/30/2015. Cases were stratified by open or laparoscopic approach. The main outcome measures were the trends in utilization by approach, total costs for the episode of care, hospital length of stay (LOS), readmission, and complications by approach in the elderly.

Univariate analysis was used to compare outcomes across platforms. Generalized Estimating Equation models were used to evaluate the impact of the surgical approach on cost, Negative Binomial distribution and log link function for LOS, and multivariate logistic regression for complications across approach, adjusting for all patient demographic, comorbidities and hospital characteristics.

RESULTS
70,655 elderly patients were included in the trend analysis. The rates of open surgery were significantly higher than laparoscopic every year (all p<0.01). The utilization rate for laparoscopy increased small but significant amounts between 2010-13, then decreased between 2013-15, with corresponding decreases in open surgery from 2010-13, which increased between 2013 and 2015.

For the comparative analysis between 1/1/2014 through 9/30/2015, there were 19,054 colorectal resections- 54.6% open and 45.4% laparoscopic. Laparoscopic patients were younger, and had less comorbidities. There were significantly more laparoscopic procedures at larger hospitals and urban hospitals.

In adjusted analysis, there were significantly lower total costs, lengths of stay, complication and readmission rates with laparoscopy (all p<0.001). When readmitted, the readmission episodes were less expensive with laparoscopy. In the elderly, use of laparoscopy was associated with a 36% lower risk of complications, a 33% lower risk of readmission, a hospital course 2.6 days shorter, and over $4,012 less total cost than open procedures.

CONCLUSION
Despite being associated with reduced cost and improved clinical outcomes, the adoption of laparoscopic colorectal surgery in the elderly has lagged behind open surgery and even declined in recent years. There is hence a tremendous value proposition for patients and hospitals to increased use of laparoscopic colorectal surgery in the elderly.