Right Procedure, Right Device

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The combination of surgical techniques and medical devices used in surgical procedures are key factors that affect access to care, patient outcomes, and costs to the healthcare system.

Advancements in surgical technology have led to improved surgical access in procedures as well as lower acuity settings such as outpatient departments. Procedures such as endoscopic examination, biopsy, ablation, and certain laparoscopic procedures are increasingly performed outside of the inpatient setting. Innovation in medical devices has significantly contributed to this shift in acuity of care.

Minimally Invasive Surgery (MIS) has been established as safe, efficacious and cost-effective across a range of procedures.[1] Devices used in advanced surgical approaches such as MIS may result in an upfront increase in surgery/supply costs; however, they are crucial to reduce the post-operative, post-discharge clinical and economic burden. Across 19 surgical procedures analyzed by Agarwal et al.,[2]it was found that laparoscopy reduced post-operative length of stay (1.7 for laparoscopy vs. 3.2 days for open) and ultimately the overall costs of hospitalization by $845 ($12,176 vs. $13,021, Figure 1) while requiring $422 more in supply spend on the day of surgery compared to open procedures ($1,733 vs. $1,311). Post-discharge costs related to complications, readmissions, time-off work, and productivity would further demonstrate the value of MIS.

The use of specific medical devices can also be associated with improved outcomes and reduced costs. One particular electrothermal bipolar vessel sealing system (EBVSS) has been shown to reduce operating time and blood loss compared to conventional ligation methods like clips and sutures.[3]In an analysis of the Premier hospital database, use of EBVSS in inpatient hysterectomy procedures was associated with $611 of reduced costs compared to ultrasonic energy devices[4] and $2,071 of reduced costs compared to use of robotic surgical approach.[5]Automated suturing devices have been shown to reduce intracorporeal suturing time when compared to hand devices.[6]In another analysis of the Premier hospital database the use of automated suturing devices was associated with lower OR time and total hospitalization costs compared to robotically assisted Total Laparoscopic Hysterectomy.[7]Surgical stapler cartridges with graduated staple heights result in improved staple line strength, leak resistance, and hemostasis when compared to those without these features.[8]These products and others can contribute to significantly improved patient outcomes and potentially reduced costs of care.

The investment in advanced medical devices may present a barrier to adoption; however, improved clinical outcomes and reduced costs help justify the value of innovation. In a dynamic healthcare environment that is innovating care models and

demanding more value, surgical approaches and medical devices that improve outcomes and promote provider efficiency can help lead the way.[9]

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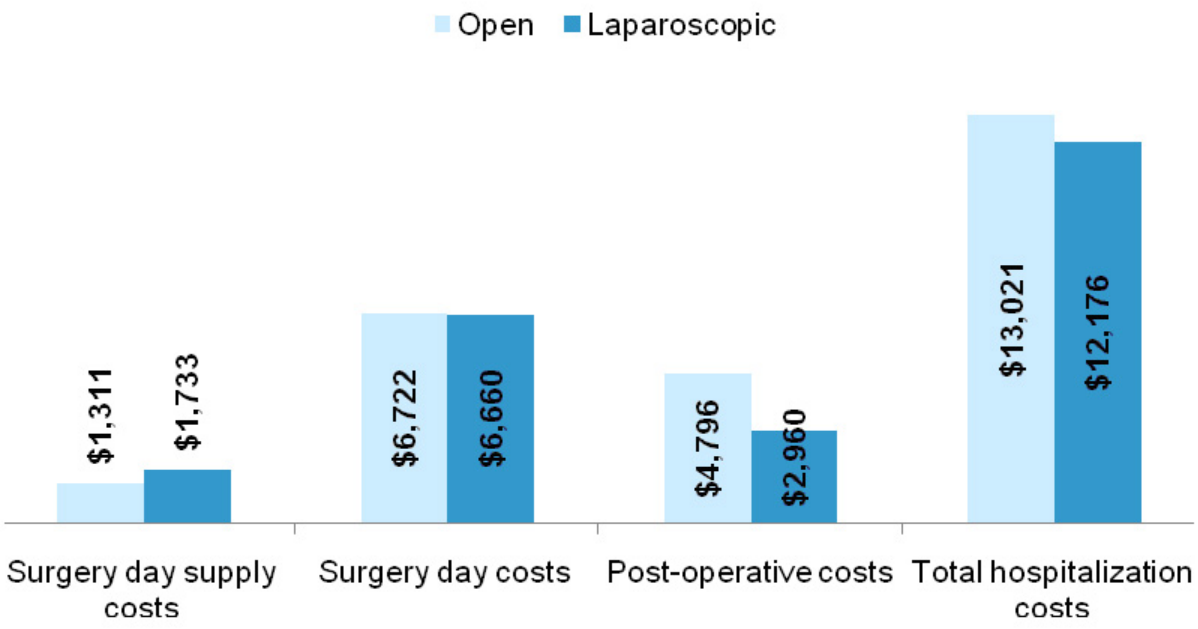

Figure 1: Comparison of surgery day supply, surgery day, post-operative, and total hospitalization costs for an aggregate of nineteen surgical procedures.

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[1]Tiwari et al. Safety, Efficacy, and Cost-Effectiveness of Common Laparoscopic Procedures. Surg Endosc 2011;25(4):1127-1135.

[2] Agarwal et al. Analysis of the 2009 – 2011 Premier hospital database for open and laparoscopic procedures.

[3] Macario et al. Operating Time and Other Outcomes of the Electrothermal Bipolar Vessel Sealing System (LigaSure™) versus Other Methods for Surgical Hemostasis: A Meta-Analysis. Surgical Innovation 2008;15(4): 284-291.

[4]Total hospitalization costs comparison of hysterectomy discharges with use of LigaSure™ and Harmonic Scalpel™. Data source – Premier hospital database 2007 – 2009. (R0023314)

[5]Total hospitalization costs comparison of hysterectomy discharges with use of LigaSure™ and robotic surgery. Data source – Premier hospital database 2007 – 2009. (R0023314)

[6]Pattaras JG, Smith GS, Landman J, Moore RG. Comparison and analysis of laparoscopic intracorporeal suturing devices: preliminary results. J Endourol. 2001 Mar;15(2):187-92.

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- Nguyen NT, Mayer KL, Bold RJ, *et al*. "Laparoscopic suturing evaluation among surgical residents." *J Surgl Res*. 93(1):133-136 (2000).

[7] Hart et al. Economic Outcomes Associated with the Use of an Automated Suturing Device in Total Laparoscopic Hysterectomy. Presented at American Association of Gynecologic Laparoscopists Global Congress in 2011.(SC110079)

[8]Covidien Bench Top Testing. Tyvek Pull Apart Testing, In-Vitro Leak Comparison and In-Vivo Leak Comparison Test.

[9]http://medcitynews.com/2013/01/a-new-model-of-surgery-for-2030-deskilled-decentralized-and-device-driven/ [2]

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