

Cardiac Output Monitoring Technologies During Major Surgery: A Nationwide Economic Evaluation

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Background: The cost of cardiac output (CO) monitoring technologies is often perceived as a significant barrier to their adoption. A fair economic evaluation should take into account savings related to the decrease in postoperative morbidity usually associated with CO-guided therapy. A recent meta-analysis (1) showed a 17-29% decrease in postoperative morbidity with CO-guided therapy. Our objective was to predict the economic impact of CO-guided therapy by comparing potential savings and costs.

Methods: We studied 204,680 adult patients from 541 US hospitals who had a major non-cardiac surgical procedure between January 2011 and June 2013. Hospital costs (including 30-day readmission costs) in patients with and without complications were extracted from the Premier Inc. research database. Potential cost-savings associated with a 17-29% decrease in postoperative morbidity were estimated. Average cost of CO monitoring technologies was estimated at \$300 per patient (\$250 per disposable sensor + \$48 for the amortization of a \$15,000 monitor used two times a week over 3 years).

Results: A total of 76,807 patients developed one or more post-surgical complications (morbidity rate 37.5%). In patients with and without complications, hospital costs were \$27,607 ± 32,788 and \$15,783 ± 12,282 (p<0.0001), respectively. According to Pearse et al. (1) morbidity rate was anticipated to decrease to 26.6-31.1% with CO-guided therapy, yielding potential gross costs savings of \$153-263M for the study period, \$61-105M per year, or \$754-1,286 per patient. Potential savings per patient were highly variable from one surgical procedure to the other, ranging from \$354-604 for femur and hip fracture repair to \$3,515-5,996 for esophagectomies (Table 1). Therefore, our findings suggest that for each \$ spent to implement CO-guided therapy, hospitals could save in return between \$1-2 for femur and hip fracture and up to \$12-20 for esophagectomies.

Conclusion: Postsurgical complications occurred in more than one third of our study population and had a dramatic impact on hospital costs (+75%). With CO-guided therapy, potential cost savings per patient were \$754-1,286, i.e. 2.5 to 4 times higher than the average cost of CO monitoring techniques. These projections must be confirmed by large prospective studies. But in the meantime, they should help hospitals estimate the potential return on investment when considering the purchase of CO monitoring technologies.

References:

1. Pearse et al. Effect of perioperative cardiac output-guided hemodynamic therapy algorithm on outcomes following major gastrointestinal surgery. JAMA 2014