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Reducing cost and improving operating room efficiency: examination of surgical instrument processing

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ABSTRACT

Background: Operating room efficiency can be compromised because of surgical instrument processing delays. We observed that many instruments in a standardized tray were not routinely used during thyroid and parathyroid surgery at our institution. Our objective was to create a streamlined instrument tray to optimize operative efficiency and cost.

Materials and methods: Head and neck surgical instrument trays were evaluated by operating room team leaders. Instruments were identified as either necessary or unnecessary based on use during thyroidectomies and parathyroidectomies. The operating room preparation time, tray weights, number of trays, and number of instruments were recorded for the original and new surgical trays. Cost savings were calculated using estimated reprocessing cost of $0.51 per instrument.

Results: Three of 13 head and neck trays were converted to thyroidectomy and parathyroidectomy trays. The starting head and neck surgical set was reduced from two trays with 98 total instruments to one tray with 36 instruments. Tray weight decreased from 27 pounds to 10 pounds. Tray preparation time decreased from 8 min to 3 min. The new tray saved $31.62 ($49.98 to $18.36) per operation in reprocessing costs. Projected annual savings with hospitalwide implementation is over $28,000.00 for instrument processing alone. Unmeasured hospital savings include decreased instrument wear and replacement frequency, quicker operating room setup, and decreased decontamination costs.

Conclusions: Optimizing surgical trays can reduce cost, physical strain, preparation time, decontamination time, and processing times, and streamlining trays is an effective strategy for hospitals to reduce costs and increase operating room efficiency.

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Introduction

Health care costs have risen dramatically over the last 2 decades and are expected to continue to increase at an alarming pace over the next decade.[1] Hospital spending accounts for over $1 trillion annually and continues to rise.[1] Although revenue from procedures performed in operating rooms is among the highest earnings within a hospital, their costs are similarly high and account for roughly one-third of total hospital expenditures.[2] Thus, reductions in operating room costs could contribute significantly to decreases in overall hospital and health care spending. Given their intimate knowledge of the processes necessary for optimal patient care, surgeons and other members of operating room teams should take the lead in identifying areas within the operating room environment for potential cost reduction and process improvement.

Multiple studies have identified abundant inefficiencies found in the operating room, including process delays, inappropriately prepared patients, and other nonoperative disorganization.[3-5] In addition, turnover time and surgical preparation time have been noted to cause major operating room delays.[6] Improvements centered on streamlining operating room processes could potentially reduce waste, lower cost, improve profit margins, and improve patient satisfaction.

At the authors' institution, more than 900 thyroidectomies and parathyroidectomies are performed annually, with one endocrine surgeon projected to perform over 160 thyroidectomies and parathyroidectomies in 2017. The surgical instruments used during these operations have traditionally been derived from a large head and neck tray built for a wide variety of otolaryngology procedures. The operating room staff observed that the majority of the surgical instruments in these trays were never used during routine thyroidectomies and parathyroidectomies. It was noted that this potentially served as a significant source of operative room waste, inefficiency, and resource loss. Our objective was to reduce the surgical tray size by removing unused instruments, thereby streamlining the tray and optimizing the instrument utilization.

Materials and methods

Surgical instrument trays used by endocrine surgeons for thyroidectomies and parathyroidectomies at our institution were identified by a multidisciplinary surgery improvement team consisting of operating room team leaders, operating room nursing staff, and the endocrine surgeons. Each instrument on the head and neck surgical trays frequently used during these procedures was evaluated by the multidisciplinary team as either necessary or unnecessary based on intraoperative use during thyroid or parathyroid procedures. Surgical instruments routinely used by the endocrine surgeons during typical operations or deemed necessary in complex cases, such as those with poor anatomic identification or difficult parathyroid location, were assembled into a new thyroidectomy and parathyroidectomy instrument tray. Instruments unused during typical procedures were identified as unnecessary and added back to surgical stock at no additional hospital cost. Final approval of necessary and unnecessary surgical instruments was made by the endocrine surgeon using the thyroidectomy and parathyroidectomy tray.

The operating room preparation time, tray weights, number of trays, and number of instruments were recorded for both the head and neck tray and the thyroidectomy and parathyroidectomy tray. Cost savings were calculated using reprocessing cost of $0.51 per instrument. Total instrument reprocessing savings were calculated by multiplying the reprocessing cost per instrument by the difference in number of instruments between the prior head and neck tray and new thyroidectomy and parathyroidectomy tray, as well as by the volume of thyroidectomy and parathyroidectomy procedures by endocrine surgeons. Turnover time savings were calculated by multiplying the number of thyroidectomy and parathyroidectomy procedures by the reduced time from tray opening to setup of the thyroidectomy and parathyroidectomy tray and average operating room costs of $20 to $62 per minute from previously published literature.[7-9] Theoretical hospitalwide savings were calculated using our institution's annual case total for thyroidectomies and parathyroidectomies.

Results

Three of 13 existing head and neck trays were converted to thyroidectomy and parathyroidectomy trays for use by the endocrine surgeons. Figure 1 shows the original head and neck set, which included two complete trays with 98 total instruments (instrument list can be found in Appendix 1). This set weighed 27 pounds in total and took 8-min mean operating room setup time. Sixty-two instruments in the head and neck tray were identified as unnecessary for thyroid and parathyroid surgery and were added back to stock for use on other surgical trays. The thyroidectomy and parathyroidectomy tray (Fig. 2) reduced the head and neck tray by 63% to 36 instruments. The full instrument list for the thyroidectomy and parathyroidectomy tray can be found in Table 1. The total tray weight was 10 pounds, a reduction of 17 pounds (63%) from the head and neck tray. In addition, operating room setup time was reduced by 63% to 3 min.

Each operation using the new tray saved $31.62 ($49.98 to $18.36) in reprocessing costs and $100 to $310 in turnover time reduction. Projected hospital savings by three endocrine surgeons projected to perform at least 300 thyroidectomies and parathyroidectomies using the streamlined tray in 2018 is at least $9486.00 for instrument reprocessing and $30,000.00 to $93,000.00 in turnover time reduction. At our institution, which averages at least 900 thyroidectomies and parathyroidectomies annually, hospitalwide implementation would save at least $28,458.00 in instrument reprocessing and $90,000.00 to $279,000.00 in turnover time reduction each year. In addition, unmeasured hospital savings include decreased instrument wear, maintenance, replacement frequency, and decontamination costs. Although no clinical outcomes were recorded for the purpose of this study, no significant adverse effects to patient care have been noted by surgeons using the