Introduction

Despite advances in hemostatic techniques, blood loss remains an ongoing concern in spinal fusion surgery, and is associated with long operating times and extended post-surgery complications. In addition to severe blood loss (≥1.5 L), a common and high complication of spinal fusion is surgical site infection (SSI), seen in 5.6% of procedures. This study aimed to evaluate key drivers of the economic burden of spinal fusion surgery.

Methods

A comprehensive literature review was conducted to search for costs and frequencies of blood loss, transfusion (autologous, allogeneic, or cell salvage) anesthesia, operating time, and hospital stay, with the final objective to determine the overall per-patient budget impact of spinal surgery. Due to lack of robust support in the literature, costs of pre-surgery care, surgical device costs, and other consumables excluded from the analysis. All costs were inflated to 2013 US dollars using the medical care component of the consumer price index. Separate searches were conducted for available data on adolescent scoliosis (AS) and adult deformity (AD).

Results

Results of the analysis are presented in Table 2.

Adult deformity surgery: Mean per-patient costs ranged from $17,700 to $17,318, with uncertainty around rates of perioperative blood loss transference as the main driver of variability.

Adolescent scoliosis surgery: Mean per-patient costs ranged from $17,312 to $20,580, with uncertainty around length of operating room time being the main driver of this variability.

Discussion

The bulk of the calculated economic burden of spinal fusion was due to utilization of hospital resources including operating room time, post-operation length of stay, and management of surgical side infection, with transfusion and anesthesia costs contributing smaller amounts. With a mean cost of $23,860 per case and an incidence of 5.6%, SSI was noted as an uncommon but high-cost risk of spinal fusion.

The majority of the economic data evaluated was from single-center cost studies, and the variation across these studies can be seen in the data employed in the analysis. The higher variation in total cost of adolescent scoliosis procedures was due to the higher variability in the procedure duration as reported in the literature.

No study directly reported the duration of anesthesia time during spinal surgeries, and although it is understood that patients remain under anesthesia for a duration longer than that of the operation, the lack of a verified figure led to the assumption of anesthesia time being equal to operating time.

Only two studies of spinal surgery reported blood transfusion needs, with others only reporting volume of blood lost during operations. Blood loss is poorly correlated with transfusion needs, and with the relatively small economic impact of transfusion costs, this is not a major component of the analysis.

Conclusions

The economic burden of spinal surgery is dominated by costs relating to the time spent on the operation and post-operative recovery. Further research is needed to clarify the range and variability of costs of the spinal fusion, as well as to shed light on additional drivers of economic burden.

References

7. Table 1: Unit costs and frequencies of spinal surgery in adult and adolescent populations
8. Assuming anesthesia time = OR time
9. Table 2: Calculations of major cost components of spinal surgery in adult and adolescent populations