COST OF CANALICULAR LACERATION REPAIR IN DIFFERENT HOSPITAL SETTINGS: A DECISION ANALYSIS

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Introduction

- Canalicular lacerations (CL) occur in 16% of all eyelid lacerations and are frequently seen by ophthalmologists.1
- The two most common settings for CL repair are the operating room (OR) and a hospital-based minor procedure room (MPR) at the discretion of the surgeon, based on variables including patient age, depth of laceration, and presence of other injuries.
- Best practices for CL consist of surgical repair with either bicanalicular or monocanalicular stenting to minimize the risk of posttraumatic epiphora.1, 11-13
- The majority of studies show a high success rate of over 80% in avoiding posttraumatic epiphora.

Objective

- To calculate the cost-effectiveness (CE) of CL repair at a tertiary academic eye center based on setting and surgeon type, from a healthcare system perspective.

Overview of Parent Study

- Effectiveness data for the CE study were obtained from an Institutional Review Board-approved parent study examining the success rate of CL repair based on setting (OR vs. MPR) and surgeon type over 10 years at a single tertiary eye institution.21
- Functional success of surgery was defined as a patient having no epiphora, even with environmental stressors, at 3 months after stent removal.11
- Key findings:
  1. Physician’s level of surgical training affected the success of the CL repair.
  2. The majority of repairs occurred in the OR (72.3%), with 27.7% in the MPR. Each arm is further branched to account for level of training of surgeon conducting repair: fellowship-trained oculoplastic surgeon (OS), comprehensive ophthalmologist, oculoplastic surgery fellow, or ophthalmology resident.

Methods

- A CE study was performed using a decision analytic model constructed in TreeAge Pro 2014 (TreeAge Pro Software, Inc., Williamstown, MA, USA). Figure 1.
- The first branches of the tree illustrated the two-remises of repair: OR and MPR. Each arm is further branched to account for level of training of surgeon conducting repair: fellowship-trained oculoplastic surgeon, comprehensive ophthalmologist, oculoplastic surgery fellow, or ophthalmology resident. The terminal branches account for type of stent used in surgical repair, with only one branch using a monocanalicular stent.
- Model output is the total cost per successful repair measured as average cost-effectiveness ratios for each surgeon type and setting, and the overall incremental cost-effectiveness ratio (ICER) of performing CL in the OR vs. MPR calculated as:

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\text{ICER} = \frac{\text{Total cost OR} - \text{Total cost MPR}}{\text{Success Rate OR} - \text{Success Rate MPR}}
\]

- Clinical and economic inputs are shown in Table 1:
  - Clinical inputs included repair setting (MPR, OR vs. OR, OR vs. MPR, surgery type, ophthalmologist, fellow, or resident), stent type (Mini-Monoka vs. Crawford), and functional success rate.
  - Economic inputs included supplies ( procurement price for drugs and disposable equipment) and personnel (institution wages—30% fringe benefits for surgeon, nurse, nurse anesthetist, anesthesiologist, and scheduler).

- Model sample was defined as all participants included in the prior analysis (n=167 total), of whom 89 were repaired in OR and 78 were repaired in MPR.

Results

- The estimated cost per procedure was $US1523 in the MPR and $US1939 in the OR.
  - The overall success rate in the MPR was 37%, vs. 88% in the OR (p<0.0001).
  - The CBR revealed the incremental cost-effectiveness of performing CL repair in the OR vs. MPR to be $321.56.
  - Within each setting, cost effectiveness of oculoplastic surgeons dominated vs. other surgeon types.
  - Sensitivity analyses revealed OR costs to be most sensitive to nurse anesthetist and nurse time, whereas MPR costs were most sensitive to ophthalmologist and nurse time.

Conclusions

- While it was more costly to perform CL repair in the OR, success rates were much higher in the OR than the MPR. Therefore the additional costs of doing the procedure in the OR are worthwhile when the priority is to maximize the likelihood of success.
- Findings are limited to a single institution, but call to question whether this procedure should be performed in an MPR without the supervision of a fellowship-trained OS.

References