

Cost-minimization analysis of jumbo reusable forceps versus disposable forceps in a high-volume ambulatory endoscopy center

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Background: Endoscopists worldwide are faced with the challenge of choosing the most cost-effective and durable equipment. There are limited data comparing the 2 major options for endoscopic forceps: disposable and reusable. Disposable forceps are marketed as the cost-effective alternative to reusable forceps.

Objective: This study was designed to provide a prospective assessment of the survival and cost of reusable versus disposable forceps to allow more educated decisions when purchasing endoscopic equipment.

Design: A 24-month prospective study in a high-volume ambulatory endoscopy center (AEC) with 71 Olympus jumbo reusable forceps (OJRF). A “cost of OJRF per procedure” was generated to compare to the estimated cost of disposable forceps per procedure.

Setting: Gastrointestinal Associates PA of Jackson, Mississippi, which performs approximately 24,000 outpatient procedures per year.

Patients: General patient population of this AEC undergoing colonoscopy.

Main Outcome Measurements: Mean cost of forceps per procedure and survival of reusable forceps. Cost was derived from purchase price, cleaning costs, repair/maintenance costs, and number of uses.

Results: Over the 24-month period, the total cost per procedure was \$3.27. The mean number of uses per OJRF was 166.3. Sixty-eight percent of the forceps required no repair throughout the 2-year study, and only 1 forceps was deemed beyond repair. For comparison, disposable forceps were assigned a cost per procedure of \$10.00 on the basis of conservative market price. Over a 2-year period this cost-per-procedure difference resulted in a cost savings of \$79,482.

Limitations: Failure to determine the average life-span of OJRF because 98% were still functioning properly after 2 years and an average of 166.3 procedures. Evaluation did not include storage and disposal costs, which would add a miniscule additional cost to disposable costs. The study also does not address some of the other arguments for disposables such as performance (quality of specimen) compared with reusables. The estimated average number of uses and durability was only studied for the OJRF. Other forceps may have different average cost per use and durability.

Conclusions: In a large-volume AEC, OJRF are vastly more durable than reusable forceps reported in prior studies and are vastly more cost-effective than disposable forceps. A longer study period would have only revealed more dramatic cost savings and durability. (*Gastrointest Endosc* 2009;69:284-8.)

Endoscopic procedures are well established as essential diagnostic and treatment measures for many GI diseases. Biopsy forceps for tissue sampling are one of the most

Abbreviations: AEC, ambulatory endoscopy center; OJRF, Olympus jumbo reusable forceps.

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commonly used tools for these procedures.¹⁻³ In a time of significant cost constraints, endoscopy centers are now faced with many economic decisions, such as choosing between disposable or reusable forceps. In spite of pressure from manufacturers to switch to disposable instruments, few data are available to compare the durability and cost-effectiveness of the 2 options. Manufacturers of disposable forceps market their product as convenient to use, consistent in performance, and lower in cost. Reusable forceps are designed for multiple uses after sterilization between

uses. However, high initial purchase prices, increased risk of cross-contamination, wear and decline in function, and cleaning/repair costs have been cited as disadvantages of reusable forceps.⁴⁻⁷ There are no large prospective trials to compare these 2 options. This prospective study was designed to better evaluate the durability and costs of the most popular biopsy forceps in our ambulatory endoscopy center (AEC), the Olympus Jumbo Reusable Forceps (OJRF), versus disposable forceps over a 24-month period.

MATERIAL AND METHODS

A total of 71 new OJRFs (Olympus FB-50U-1 large-cup fenestrated biopsy forceps with needle, 3.7-mm channel, 230-cm length; Olympus Inc, Shinjuku-ku, Japan) were prospectively followed for 24 months in the high-volume (more than 24,000 procedures per year) AEC of Gastrointestinal Associates, PA, of Jackson, Mississippi. Data collected for 24 months included purchase price, total number of uses, types of repairs, cost of repairs, and total reprocessing costs for each individual forceps. Forceps were reprocessed according to American Society for Gastrointestinal Endoscopy guidelines. The cost perspective analysis in this study is from the standpoint of the AEC as health care provider rather than from that of third-party government/insurer. Reprocessing costs included labor and cleaning materials. Labor was calculated on the basis of 3 man-hours per day at \$14.50 per hour. Cleaning materials included a half gallon of Steris Klenzyme per week at \$20.92 per gallon, Convertors self-seal packs at \$0.24 per pouch, 4.5 bottles per week of sterile water at \$0.97 per bottle, and \$1.43 per indicator. Total reprocessing costs are outlined in Table 1. The cost of cleaning machinery is outlined in Table 2. Storage and disposal costs, which would slightly increase overall costs of disposable forceps, were not included in the study.

Forceps durability was evaluated by logging forceps failures, need for repairs, failure rate per number of uses, recurrent failure rate post repair, and costs for each repair (Table 3). "Failure of use" was defined as any nonfunctioning forceps, any forceps with less than adequate ease of use, or any forceps producing a poor tissue sample. All forceps deemed suboptimal by a physician or technician were immediately sent for repairs. All individuals were educated on proper handling of OJRF to minimize damage in transport and reprocessing. After 24 months, the data were evaluated and a total cost per procedure for the OJRF was calculated with the following formula:

$$\begin{aligned} &(71 \times \text{Purchase price}) + \text{Total repair costs} \\ &+ \text{Machinery cost} \\ &+ \text{Total reprocessing costs}/ \\ &\text{Total number of procedures} \end{aligned}$$

For comparison, disposable forceps were assigned an estimated cost per procedure of \$10.00 on the basis of a very conservative market price. This price was derived from

Capsule Summary

What is already known on this topic

- Disposable forceps are marketed as convenient, consistent in performance, and lower in cost than reusable forceps.

What this study adds to our knowledge

- In a 24-month prospective assessment of durability and cost of reusable versus disposable forceps in a single high-volume ambulatory endoscopy center, the cost per procedure was \$3.27 and \$10, respectively, leading to significant savings.

suppliers' volume discounted quotes to our center ranging from \$9 to \$17 per forceps. The total cost per procedure for disposable forceps was then estimated on the basis of 1 forceps per procedure. Most AECs would not be able to achieve this low a price without considerable volume discounts.

RESULTS

The final cost per procedure for the OJRF was \$3.27. This was derived from the data collected during the study period. A total of 11,810 biopsy sessions were performed with the 71 OJRF. The initial purchase price for each of the OJRF was \$276.25. One "use" of a forceps in this study basically means 1 forceps used in 1 procedure regardless of the number of actual biopsy bites taken (ie, 1 procedure = 1 use). The mean number of uses per forceps was 166.3 with a range of 16 to 230 uses. Dividing the purchase price by the mean number of uses translates to \$1.66 purchase price for each procedure.

Reprocessing costs, including time and quantities of supplies, were recorded and tabulated weekly on a cost basis. The reprocessing costs totaled \$1.29 per use, as shown in Table 1. The 24-month total cost of purchasing and operating 2 on-site reprocessing machines (Ritter M11 UltraClave Automatic Sterilizer [Midmark, Versailles, Ohio] and the Branson Model 8510MT Ultrasonic Tabletop Cleaner [Branson, Danbury, Conn]) was estimated to be \$0.12 per use as described in Table 2.

The 10-year life expectancy of the sterilization equipment was a reasonable and conservative estimate based on the manufacturer's technicians' quotes. Repairs were necessary for 23 of the 71 OJRFs (32%) with a total repair cost of \$2,396.25, or \$0.20 repair cost per procedure (\$2,396.25 total repair cost/11,810 procedures). Only one forceps out of the 23 (4.3%) was unreparable and terminated during the 2-year study.

The following calculation was then made to derive a total cost per procedure of \$3.27 for the OJRF:

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