

ORIGINAL ARTICLES

A Study of Time-Dependent Operating Room Fees and How to Save \$100 000 by Using Time-Saving Products

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Problem/Issue: Product costs are a portion of the annually increasing costs of medical care. With diligent analysis of product costs, including the cost of time to use the product, the surgeon can reduce these spiraling costs. The purpose of this study was to provide the surgeon with the necessary information to make informed decisions about time- and cost-efficient products.

Materials and Methods: This study involved phoning, faxing, or e-mailing hospitals and anesthesia groups across the United States to obtain time-dependent costs in the hospital operating room. Operating room fees charged by the hospital and anesthesiologist professional fees are included. Various products were then relatively compared with the time needed to prepare, use, or apply the product. Time and cost factors were then compared in order to ascertain the most time- and cost-effective products.

Findings: The findings revealed an average of \$62 per minute (rounded to the closest dollar) for the hospital operating room fee (range \$21.80–\$133.12) and \$4 per minute for the anesthesiologist professional fee (range \$2.20–\$6.10), with a total of \$66 per minute. This figure represents a marked increase from the 1991 rate of \$20 per minute. Generalizations from this study indicate that time-cost efficiency is seen more so in kits (trays) than in nonkits and more so in disposables than in durables. Products that require fewer people are more time-cost efficient than those that require more people, and products that require fewer steps are more time-cost efficient than those that require more steps. Specific findings included time and cost dominance for the following products: staples over sutures, direct-current cautery over alternating-current cautery, syringes over Dermajet or Madajet, MagneSplint over suturing the nasal septum, aluminum-Velcro or aluminum-foam Denver Splint and Xomed Bridgemaster over any of the

polypropylene heat-sensitive splints, Rhino Rocket and Merocel over Vaseline gauze, Brennan RhinoCath over manual blood removal, 1-piece Biplane liposuction cannulas over any 2-piece type, Doyle ear-dressing kit over component parts, Dale nasal dressing over component parts, preformed implants over manual forming, and Denver Splint kits over component parts.

Conclusions: Each hospital or private suite will have different charges, and the range of product choices for each surgeon will be different. However, the principle is the same: If you save time, you will save money. In addition to the monetary benefit, the patient will be safer and receive less anesthesia, and the surgeon will have more time for his or her own social or professional life. Each surgeon should analyze the product choices and choose those products that will deliver quality care in less time. To save more than \$100 000, the surgeon has to save only approximately 7 minutes per case on 250 cases.

There are many reasons besides saving money why surgeons should be interested in saving time in the operating room. First of all is the patient safety issue, for lessened anesthesia means more safety for the patient. The other reasons include those involving having a more meaningful life with less fatigue, stress, disorganization, irritability, depression, and physical illness. The value of spending more time with family and friends is obvious.

All these benefits await the surgeon who is willing to take a pen to his or her product costs and make changes toward time-saving products. The material for this study was researched because the author was curious as to the amount of savings that occurred when one could use a product that saved a few minutes in the operating room. The savings was much greater than anticipated, currently up to an average of \$66 per minute in US hospitals.

With the rising cost of medical care in the United States, part of the responsibility to reduce costs rests

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with the medical providers because they affect the purchasing decisions. Quality must be maintained, but time must be saved as well. Because using the operating room is now an extremely costly endeavor, time-saving products have taken on a new meaning. The surgeon is in a unique position to either raise or lower the operating room fees by choosing products that offer the same comfort and quality but take less time to use.

Previous Studies on Operating Room Fees

Hamel¹ analyzed operating room fees, including the effects of departmental infighting, materials management, and scheduling inefficiencies. Epstein and Dexter² stress the need for hospital material management systems and just-in-time inventory. Traverso and Hargrave³ suggest that hospitals and surgeons can improve the surgical value package by using disposable equipment and efficient "in room" time. Andrews⁴ indicates that the sterile tray growth rate continues to gain market share over reusables and to grow at a continuous 5% per year. Wasek⁵ stresses the money saved in labor and storage when kits and trays are used, indicating that a multiproduct tray purchase has only 1 invoice, 1 check, 1 purchase order, and 1 product to receive and store. However, a literature search by the author revealed no studies describing individual products and how they can affect the cost of the surgery.

Time-Related Charges in the Hospital Operating Room

Hospitals charge for the operating room by time or by the procedure (flat rate). Other items such as dressings, anesthesia gasses, and medications are charged out individually. Most hospitals charge for a procedure in the operating room by the minute or by 15- or 60-minute segments. Many round up to the next 15 minutes. A few hospitals charge a flat rate for a given number of minutes and then charge per minute if the surgeon takes longer than the average projected time. Keep in mind that when flat rates are used they are calculated on the basis of average historical "times," so even flat rates are time dependent.

This study attempts to relatively compare commonly used products with their time-saving capacities in the hospital operating room. It does not describe the costs in the private operating suite, but the principal is the same: If you save time, you will save money; only the amounts may differ. But each situation is different; even if you are using your private operating suite, you are not necessarily saving money.

The initial stimulus for this study was the response that the author received when commenting to a physician friend that he should switch to a more time-economical product because it would save him 3 minutes, thus decreasing the costs. The colleague commented, "So what? Three minutes is nothing in my 18-hour day and what I would be saving is miniscule." The author had done a previous study on operating room costs in 1991, when the cost for time-dependent services in the operating room was approximately \$20 per minute. Although the author knew that the present-day costs had increased, the up-to-date figures could be determined only by an updated study.

Materials and Methods

Several preliminary models were needed to determine how much money was saved by eliminating 1 minute in the hospital operating room.

First, model surgical procedures were chosen so that the numbers could relate to common insurance procedures. The models chosen were a Reconstructive Septorhinoplasty CPT # 30420, Mastopexy CPT # 19316, and Reduction Mammoplasty CPT # 19418.

Second, a study was done to determine which operating room charges were being charged out by time. Two basic areas of time-dependent charges were discovered: the operating room fee and the anesthesiologist professional fees. The operating room fee includes the usual basic equipment for the procedure, such as an operating room table, anesthesia machine, basic surgical set, disposables for the average case, 1 scrub nurse, and 1 circulator. What was included in this per-minute fee varied considerably from hospital to hospital. The second time-dependent charge was the cost of the anesthesiologist professional fees. The surgeon fees, though usually a considerable amount, were not included in this study because they are not time dependent. Nearly all surgeons will charge and be reimbursed by insurance on a "per procedure" basis. This works in the surgeon's favor only if he or she can shorten the time in surgery and complete the same-quality surgery.

The third model was the hospital model. The model for the hospital study was both the nonprofit and the for-profit hospitals, all with at least 100 beds and all with surgical departments. An attempt was made to obtain information from 2 hospitals from each state in the United States in order to receive a cross section. The employee at the hospitals to contact for the needed information was to be the person in charge of explaining hospital charges to the patients. This person had a

variety of titles, but the most common title was "patient insurance representative" or "patient representative."

Findings of the Anesthesiologist Professional and Operating Room Fee Studies

Anesthesiologist Professional Fee Results

This study was performed by calling multiple groups for their fee structure. Although a simple straightforward question was asked, few anesthesia groups would divulge their rates, most likely because they did not want to divulge their fees to an unknown entity. An attempt was made to gather data from 1 group in each of 50 states; the response rate was 10%. The result of this study was an average of \$4.05 (rounded to \$4) per minute with a range of \$2.20–\$6.10 per minute.

Operating Room Fee Results

Phone calls were made to patient representatives at 100 US private for-profit and nonprofit hospitals with more than 100 beds and a surgical department. A request was made for operating room fee for the surgical procedures (see "Materials and Methods"). The average operating room fee was \$62.19 (rounded to \$62) per minute, and the range was quite varied at \$21.80–\$133.12 per minute. There was a 12 % response rate by e-mail, fax, or phone.

Combined Operating Room and Anesthesiologist Professional Fee Averages Results

The combination of the operating room fee and the anesthesiologist professional fee averages was \$66 per minute. In general, the fees were higher in the East Coast states (eg, New York), Florida, and parts of California.

Changes Since 1991

The average cost of 1 minute in a hospital operating room for time-dependent services has risen from \$20 per minute in 1991 to \$62 per minute in 2004. Time-dependent services included only the cost of the operating room and the cost of the anesthesiologist professional fees. Several other minor additional charges (such as anesthesia gasses) were not included because of the complexity of calculation. Very few other costs are time dependent.

Product Comparison

The following section outlines several specific products comparing the time and cost efficiency and estimating the resultant savings.

Staples Versus Suturing

Most surgeons accept that skin closure with sutures should be used in certain anatomical areas and that staples can be used in certain anatomical areas (Figure 1). Without question, suturing takes longer in the operating room than do staples and is more expensive for the up-front cost of the product. Removal time in the clinic is also longer when sutures are used. The surgeon should use staples—the more economical product—whenever it is possible to give the same-quality results. Examples where staples would save time are in the hair-bearing areas and with extremely long incision lines such as seen with an abdominoplasty. Savings varies considerably with each case.

Light-Bleeding Cauterization by Battery-Powered Disposable Cauteries Versus Grounded Alternating-Current Units

For light bleeding, disposable battery-powered (direct current) cauteries are the product of choice because they are inexpensive, are easy to use, and take almost no time to set up (Figure 2). For heavier bleeding, the more durable electrocauteries are needed. Whereas the concern regarding disposable battery-powered units is merely the up-front costs, the concern regarding durable units includes the considerably higher dollar amount invested up front as well as the set-up time in the operating room. Therefore, a disposable battery-powered unit will be more cost efficient. The time savings in this area vary considerably.

Injection With the Syringe and Needle Versus a Dermajet or Madajet

In the author's experience, even when specific doses are to be administered to a given area, a disposable syringe and needle can be loaded and the injections can be performed quicker than in the same process with a Dermajet or a Madajet (Figure 3). Using preloaded disposable syringes is even quicker. Although the actual injection time is about the same, the Dermajet and Madajet must be cleaned and sterilized after each use. Because of these differences, the time-honored disposable syringe and needles are the most cost efficient. The time savings vary considerably.

The Goode MagneSplint Versus Approximation of Nasal Septal Flaps With Sutures

The approximation of the septal flaps after nasal septal surgery is very time consuming if the surgeon uses a suture technique (Figure 4). This usually takes 2–5 minutes, even for the experienced surgeon; more

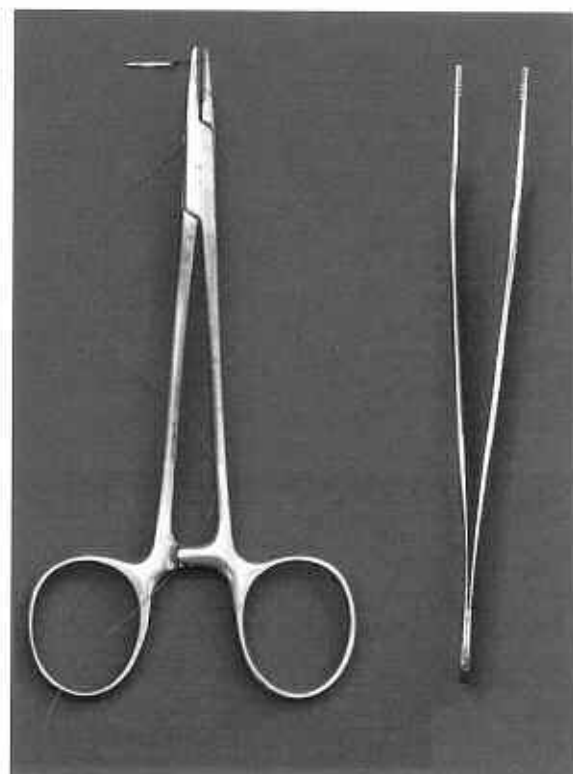


Figure 1. When staples can be used, they will be more time-cost efficient than will suturing.

time may be needed if an internal splint is sutured. Dr Richard Goode has designed a magnetic internal splint that can be applied in less than 30 seconds and keeps the septal flaps together without sutures. Dr Goode's MagneSplint saves is a time-saving product, enabling the surgeon to save 1.5–4.5 minutes (\$99–\$297) on each case.

*Nasal Splinting: Aluminum-Velcro Versus
Aluminum-Foam Versus Thermoplastic
Polypropylene Versus Plaster*

Splints are applied with the patient still under anesthesia; thus, both operating room fees and anesthesiologist professional fees are in effect during application (Figure 5). Surgeons will agree that the goal of splinting after rhinoplasty is to reduce edema, protect the surgical area, and maintain the position of the surgically repositioned bones and cartilages. However, considerable differences in opinion exist among surgeons as to which material to use to splint. Four main types of splints are available to the surgeon today: plaster, thermoplastic polypropylene (Jiffy and Aquaplast), aluminum-foam, (Denver Splint and Xomed Bridgemaster), and aluminum-Velcro (Denver Splint). Because of the time needed to process and apply these

different materials, there is a tremendous difference in the cost of each of these splints.

- Aquaplast polypropylene and Denver Splint polypropylene take 3–5 minutes at \$66 per minute (\$198–\$330) plus \$11–\$25 for the splint and kit.
- Jiffy polypropylene with a special heater is slightly faster at 2–3 minutes. This results in time costs of \$132–\$198 plus \$16–\$30 for the splint and kit.
- Denver Splint aluminum-foam and the Xomed Bridgemaster can be applied in 1 minute for a time cost of \$66 plus \$21–\$43 for the splint and kit.
- Denver Splint aluminum-Velcro splint can be applied in 1 minute at \$66 plus \$21–\$43 for the splint and kit.

All the polypropylene splints, which are made by 3 different companies, took much longer to prepare, apply, and dry (3–5 minutes) than did the aluminum-foam or the aluminum-Velcro splints (1 minute). Although the retail cost of the aluminum splints was more than the polypropylene splints, the 1-minute application time and the lack of need to dry the splint made the aluminum products superior to the polypropylene products in time and cost efficiency. Using aluminum-Velcro or aluminum-foam rather than polypropylene splints saves approximately \$150 per case.

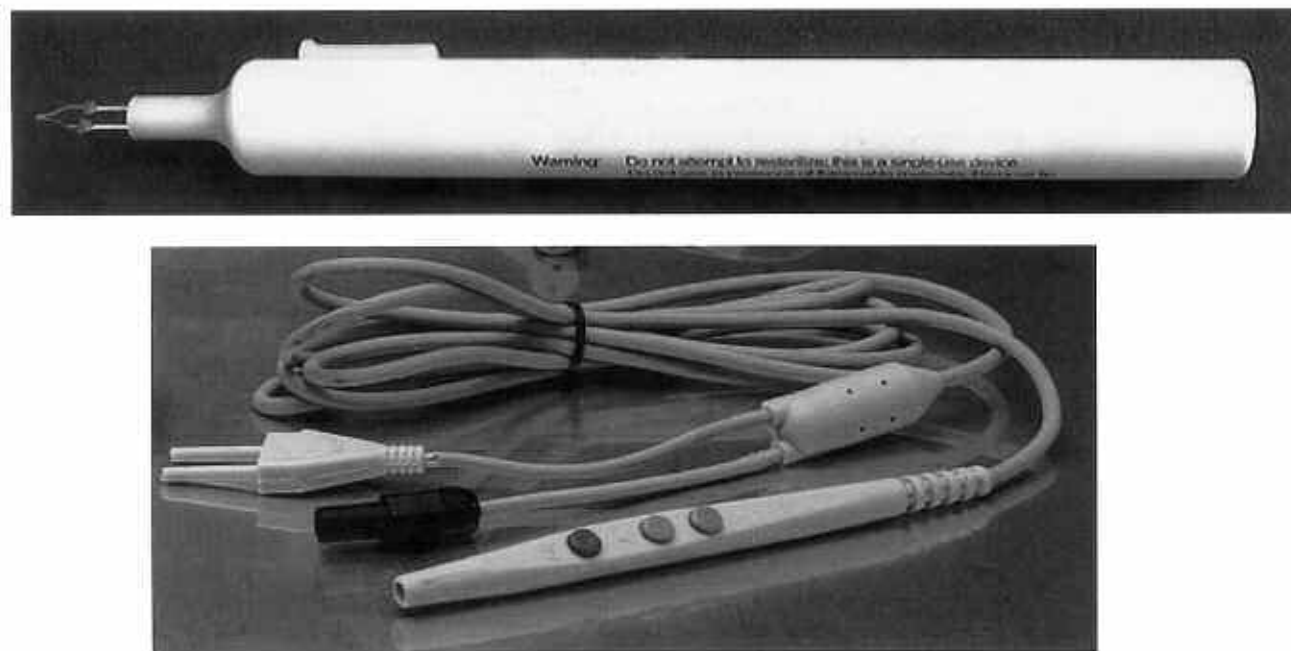


Figure 2. For light bleeding, the battery-powered disposable cautery units (such as Hotsy or Aaron) are more time-cost efficient than are the durable grounded units.

Nasal Packing: Rhino Rocket Expandacell (or Merocel) Versus Vaseline Gauze

For years, the bleeding nose has been packed in layers of Vaseline gauze (1.9 m × 12 mm) (Figure 6). Most surgeons have abandoned this old procedure because it takes about 3–10 minutes to place the gauze in the nose, depending on the surgeon's experience and the level of patient anesthesia. Polyvinyl alcohol foam of any brand is much quicker, is more comfortable, and can be inserted quickly without anesthesia. The surgeon saves a great deal of time when using polyvinyl alcohol foam packs compared with Vaseline gauze. For instance, whereas Vaseline gauze takes 3–10 minutes, the Rhino Rocket (or other polyvinyl alcohol foam packs) takes only 30 seconds. The savings is thus 2.5–9.5 minutes. At the average operating room fee of \$66 per minute, this is a marked savings (\$165–\$627).

Brennan RhinoCath Nasopharyngeal Pack Versus Stopping the Case for Spitting Out Blood During Nose Surgery

Any surgeon who has performed rhinoplasty with twilight anesthesia has experienced the patient having slow dripping of blood into the nasopharynx (Figure 7). This leads to halting the procedure while the patient

coughs or spits up the blood onto his or her tongue, whereby the nurse wipes the bloody mucus off the tongue. If this happens repeatedly, much valuable time is lost. Dr George Brennan of California developed a product called the RhinoCath, which is placed into the nasopharynx and connected to the wall suction before the procedure is started. With the Brennan RhinoCath, any blood appearing in the nasopharynx is suctioned free from the area. Because this product works so well, there is no need to interrupt the procedure for spitting and wiping. The time saved with this product alone could easily be as high as 5 or 10 minutes. At the average operating room and anesthesiologist professional fees of \$66 per minute, this is a time-cost savings of \$330–\$660.

One-Piece Liposuction Handle Cannulas Versus 2-Piece-Handle Cannulas

Changing a Luer Lock cannula on a liposuction handle takes only about 20–30 seconds (Figure 8). If the surgeon is holding the handle and wants it changed, the nurse is given the handle with the existing cannula on it. The nurse then removes the cannula, finds the appropriate new cannula, places the new-size cannula on the handle, and then hands it back to the surgeon. Although this is only a 20- to 30-second transfer, it occurs

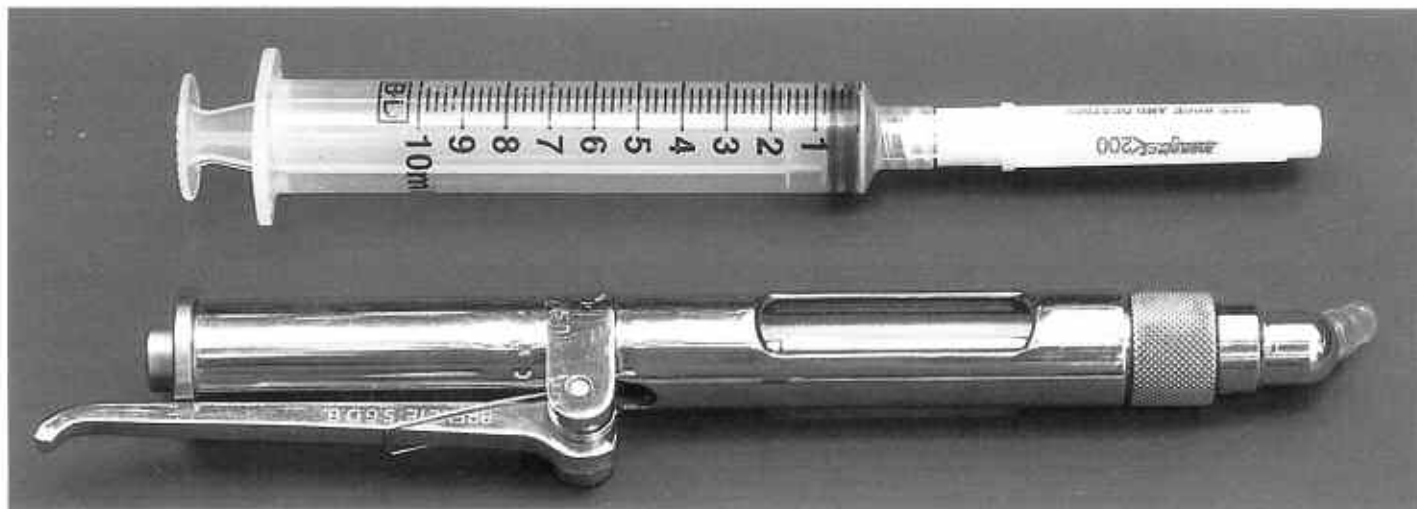


Figure 3. Using plastic disposable syringes and needles is more time-cost efficient than using a Madajet or Dermajet.

multiple times during a surgical case. How much time is saved is dependent on the efficiency of the nurse, but the time problem could be circumvented completely by using 1-piece-handle cannulas. An experienced nurse will then have to only anticipate when the surgeon will need the next cannula and will have it ready to go. The time-cost savings for 2-piece-handle cannulas is dependent on the number of changes

needed, and at \$66 per minute it could be a drastic savings.

Ear Dressings: Doyle Dressing Versus Finding and Applying Components

After ear surgery of cosmetic or reconstructive type, a dressing is usually applied that pads and protects the area but does not apply excessive pressure on the pinna

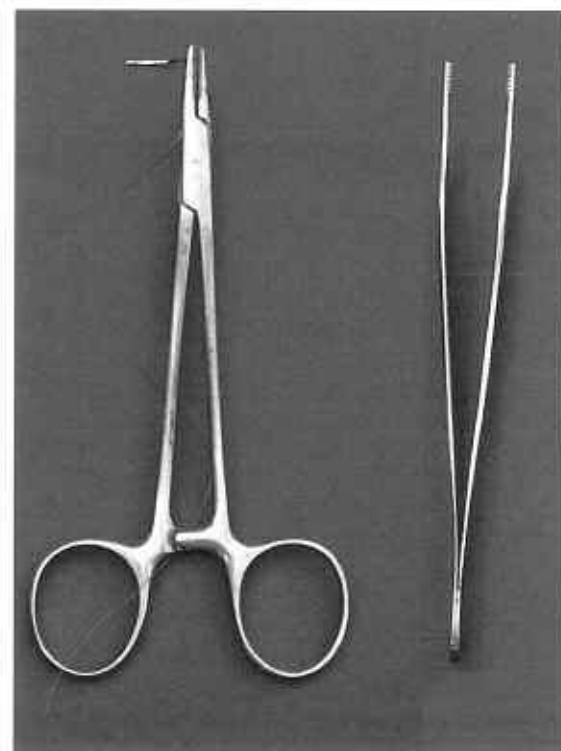


Figure 4. The Goode MagneSplint (internal splint) is more time-cost efficient than is conventional suturing with or without other internal splints.

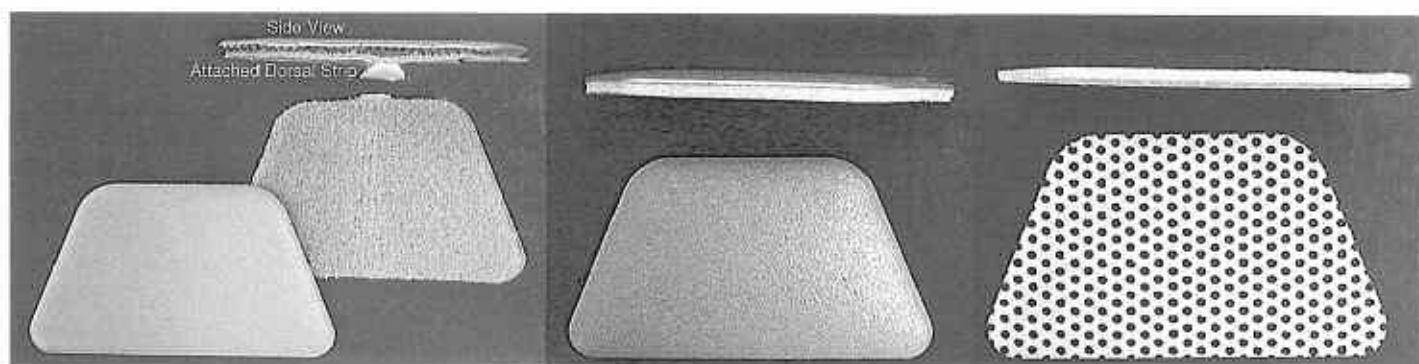


Figure 5. The aluminum-Velcro and aluminum-foam Denver Splints are more time-cost efficient than are Polypropylene Aquaplast or Jiffy splints.

(Figure 9). Taking the time to find and apply all the components could take 2–5 minutes. Dr D.E. Doyle has produced a special protective cup and wrap that can be applied in about 30 seconds. The time-cost savings is 2.5–4.5 minutes (\$165–\$297).

Nasal Drinker Dressings: Dale Nasal Dressing Versus Finding Components and Application

Although applying the first gauze and piece of tape to the cheek in surgery takes little time, the time adds up when the dressing is changed on multiple occasions after surgery (Figure 10). When using this type of dressing, one must consider the time spent with each change. Although these repeated dressings do not use surgical time, costly time is still wasted. The Dale dressing is designed to save time and eliminate skin irritation (from repeated tape exposures), and it takes almost no time to change the dressing. No tape is used

because the dressing loops around the patient's head. The gauze is slipped under the anterior lip of the elastic dressing. The time-cost savings are variable.

Suturing Kits Versus Finding and Using Conventional Instruments to Close a Wound

Kits and trays increase sales and save labor costs considerably (Figure 11).^{4,5} With the exception of specialized areas necessitating special instruments, suturing can be accomplished with the many suturing kits that are offered by Busse, DeRoyal, and many other companies. Most companies also will customize kits for the individual surgeon. The cost of customizing the kit is far less than the potential cost of time to assemble one; however, outlining the exact savings for the kits is difficult. The savings from kits and trays comes not only from not having to wait for a specific instrument but also from not having to clean and sterilize the

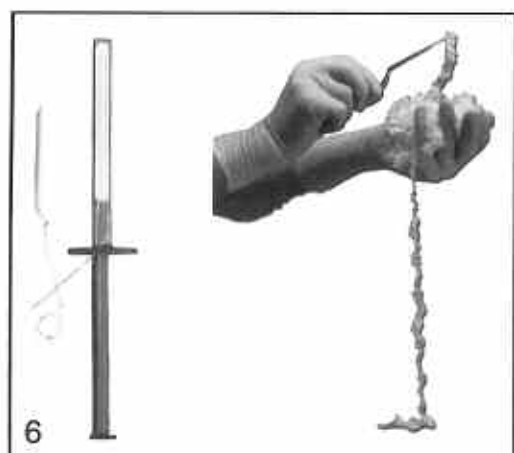


Figure 6. Polyvinyl alcohol foam packing such as the Rhino Rocket with Expandacell or Merocel is more time-cost efficient than are other materials.

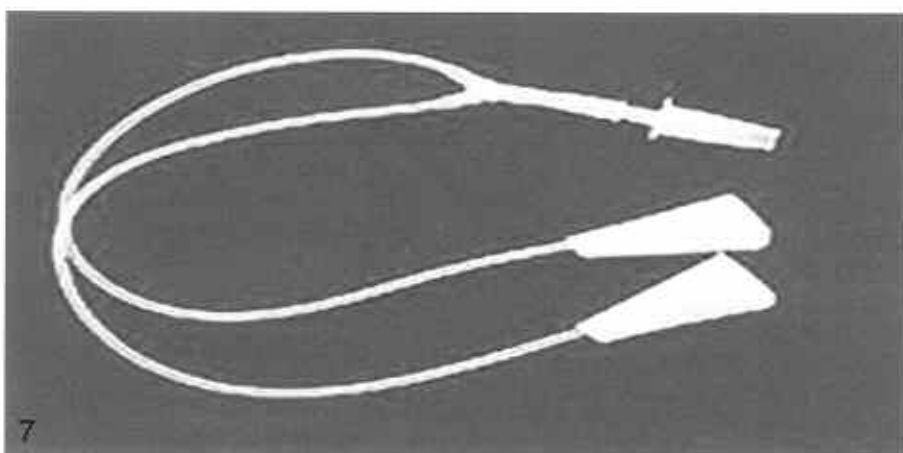


Figure 7. Using the Brennan RhinoCath is much more time-cost efficient than stopping the procedure to allow the patient to spit out blood. The savings in time and cost by using the Brennan RhinoCath can be quite considerable.

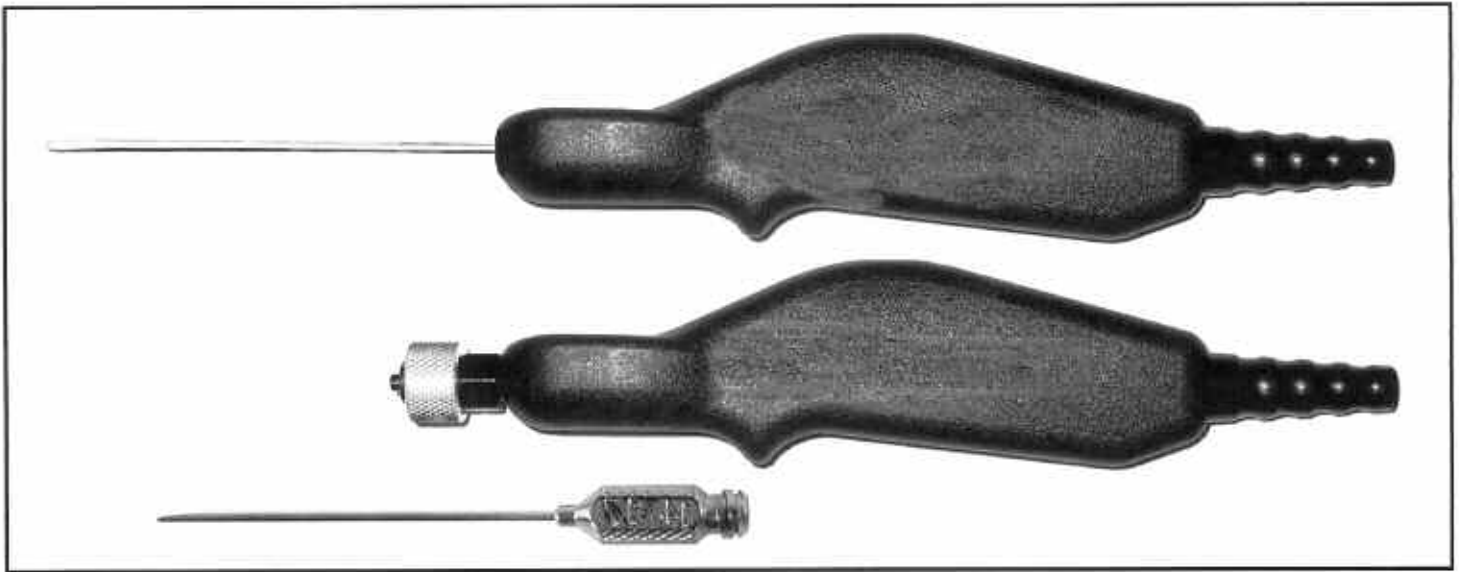


Figure 8. *One-piece Biplane liposuction handle cannulas are more time-cost efficient than are the 2-piece handles.*

components. Kits save time in surgery, and at \$66 per minute it is hard to imagine a kit or tray not saving 3–4 minutes unless they do not contain specific needs. The key, therefore, is for a surgeon to have the kits and trays individualized for his or her needs. The time-cost savings are high and quite variable.

Rhinoplasty Splint Kits Versus Finding and Applying Components

In addition to being convenient, kits will save the surgeon several minutes in surgery^{4,5} because all the components are present (Figure 12). The kits supplied with the Denver Splint have an alcohol sponge for degreasing, a skin-prep packet for skin protection, a dorsum pressure pad, and precut tape for overlap taping.

If the surgeon has to wait to obtain all these components, much time is lost. It is not unusual for 3–4 minutes to be wasted in searching and waiting for components when a kit is not used. At \$66 per minute, this could represent a savings of \$330.

Calculation of the Savings When Comparing 2 or More Equal-Results Products

If you wish to calculate the time-dependent costs of the operating room and the anesthesiologist professional fees for your given hospital, use the following instructions:

- Step 1: Determine the operating room fee. If you do not know what your hospital charges for operating

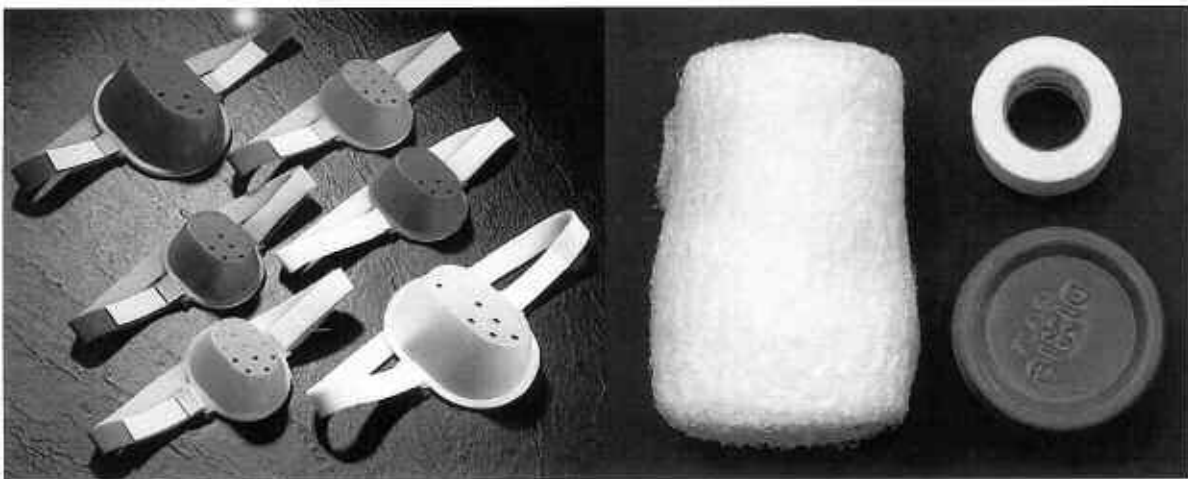


Figure 9. *Using Doyle ear dressings is more time-cost efficient than searching for and applying the components.*

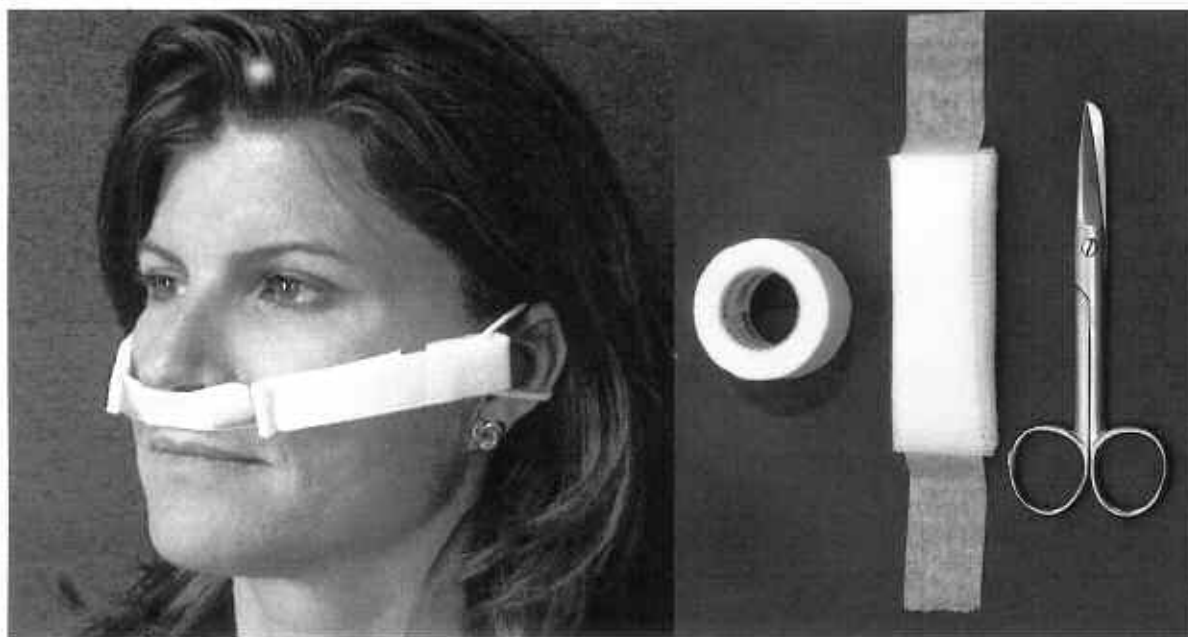


Figure 10. *Using Dale dressing is more time-cost efficient than searching for and applying the components.*

room fees, ask one of your patients for a copy of the hospital bill. From that bill you can obtain the exact number of minutes that the hospital charged the patient and the exact amount of dollars charged for that time. Incidentally, the author was surprised to find that the numbers routinely extracted from an actual bill always exceeded the numbers quoted by the hospital as a projected amount. Armed with the charges, you can determine the cost per minute by dividing the number of minutes into the operating room fee. Using the actual bill is the most accurate method because it reflects the actual and not the

planned charge. The average operating room fee from this study is \$62 per minute.

- **Step 2:** Determine the anesthesiologist professional fee. For the most accurate numbers, you should obtain an actual copy of the anesthesiologist's bill and divide the number of minutes (from the hospital bill) into the anesthesiologist's bill. The average fee from this study is \$4 per minute.
- **Step 3:** Determine the total time-dependent cost. Add the operating room fee per minute to the anesthesiologist professional fee. The national average from this study is \$66 per minute.

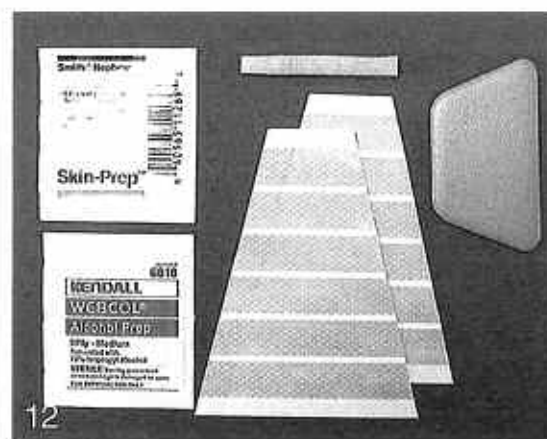


Figure 11. *Using suture kits and suture removal kits is more time-cost efficient than searching for the components.*

Figure 12. Using rhinoplasty splint kits (Denver Splint and Xomed Bridgmaster) is more time-cost efficient than searching for and applying the components.

- Step 4: Compare the time required to use each product in question. For this part of the study, you need to use both products and keep track of the time required to use each product.
- Step 5: Determine what it costs to use each product in question. Multiply the time in minutes saved by the cost of 1 minute from step 3. The average cost from this study is \$6 per minute.
- Step 6: Determine the real total cost of each product in question. Add the up-front retail cost of each product to the time cost of each product.
- Step 7: Determine the final difference and choice of the product. Note the difference in real total cost of each product and choose the less expensive one. (This assumes that both products have the capacity of producing the same-quality results.)

Conclusion and Discussion

There are many reasons, including the obvious patient-safety reasons, why the surgeon should strive to reduce the time under anesthesia in the operating room. Since 1991, the cost of the hospital operating room and the anesthesiologist has increased from an average of \$20 per minute to a present rate of approximately \$66 per minute for time-related services in the hospitals surveyed. This change has brought with it a need to pay attention to time-saving measures. Not only should idle talk with the operating room personnel be lessened, but every effort to keep the cases proceeding in a timely manner should be made. Gone are the days when a surgeon can use his or her favorite product simply because he or she likes it and is accustomed to using it. Now the surgeon must study products and choose the one that can still deliver quality results but take less time and personnel to prepare and use.

Many surgeons use the initial cost of the product as the deciding factor for its purchase and ignore the time needed to use it. The initial cost of many products is insignificant compared with the cost of using them at \$66 per minute. The overall value can be determined by calculating the time-cost efficiency.

Time-cost efficiency for operating room products is the cost savings that occurs with one product compared with another. For disposables, one has to calculate only the cost of the product and the cost of the time to use the product. For durables, one also has to consider the costs of cleaning and sterilization. Disposables obviously have an advantage, as they require neither cleaning nor re-sterilization. All products will have a different cost-

time efficiency, and each will need to be compared with the others on the market. Surgeons are the most logical choice to make this comparison because they use the instruments to be evaluated.

Although each product should be evaluated by the time-cost efficiency, some general statements about classes of products can help the surgeon make choices. Disposables are more time-cost efficient than are durables. Using kits and trays is more time-cost efficient than trying to put together the component parts piecemeal. Disposable kits and trays have the dual advantage. Products that require fewer people to use them are more time-cost efficient than products that require more people to use them, and products that have fewer steps in the instructions to use are more time-cost efficient than products that have many steps. Although these are general guidelines, exceptions do exist, so each product should be evaluated against its similar products.

If we save a mere 7 minutes and perform 250 cases, we will save the medical system more than \$100 000 ($\$66 \times 250 \times 7 = \$115\,500$). This is a "direct" savings in operating room fees that will not be charged to the patient or the insurance; therefore, it is a dramatic savings. If you multiply the minutes saved by the number of cases done by the number of surgeons performing surgery, the savings becomes a very high number. This monetary savings does not take into consideration any of the many other advantages such as for the patient, safety, and for the surgeon, less fatigue, less stress, going home early, or efficiently moving on to the next case.

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