Surgical Instrument Inventories: Efficiency and Effectiveness Measurement—Part Two

By Douglas Sanders

Executive Summary

Part one of this article examined a widespread problem that many hospitals have in managing their surgical instrument inventories. Bad business decisions and fraud, caused by the lack of accountability and controls, are driving unneeded spending. The first article examined just one example, general instrument preventive maintenance, plagued by unscrupulous vendors who deceive hospital managers into using their unproven and expensive services. The remedy for this unnecessary practice, and others, is to employ cost accounting methods to benchmark and measure changes in the total cost and performance of instrument inventories.

Part two of this article introduces the tools you need to objectively measure the efficiencies and effectiveness of the surgical inventory both as a whole, and in individual segments, as defined by type (e.g. general instruments, specialty instruments, power equipment, rigid and flexible scopes). The applications for applying these tools will also be examined.

Evaluation by quality and cost

Managers of surgical instrument inventories rely heavily on subjective opinions and perceptions which lack verifiable data, especially on instrument performance. These managers may report that the surgeons are happy; instrument performance has improved; and/or "We need to spend more in order for the instrument to work better." The truth, however, may be the contrary; spending more does not improve instrument performance and in many cases, worsens functionality.

Typically, managers rely exclusively on vendors for reporting on the number and the cost of instruments repaired and replaced. However, all information must originate from your own internal accounting sources to eliminate the possibility of any data omission, whether it is accidental or intentional. Keep in mind that vendors have an incentive to manipulate numbers to their own advantage.

When an instrument fails (i.e. cannot function to the surgeon's satisfaction), there are only two remedies: 1) repair it, or 2) replace it. Repairing is almost always the most cost effective solution. So one must consider the following for a comprehensive evaluation of the instrument inventory:

- The number of failures.
- The cost of repairs.
- The cost of replacements, whether new or used.

Evaluations also need to include a comparative procedure analysis to compensate for fluctuations in the number of procedures.

How to calculate failure frequency

Although costs are paramount in evaluating value, you must first look at instrument performance. Quality cannot be compromised at the expense of cutting costs. All repair vendors claim to reduce the number of repairs through their quality of repairs and preventive maintenance programs. In addition, they claim to reduce the number of instruments in the operating room (OR) that do not function (OR failures). To measure the effectiveness of their claims, there is an easy method to evaluate OR failure rate. Instrument OR failure rates are measured by the following formula:

Number of OR failures (ORF) divided by procedures (P) (excluding any leased instruments) = instrument failure rate (IFR).

ORF÷P = IFR

Example: If a hospital group has 50,000 procedures (inpatient and outpatient) per year and experiences 7,000 instruments identified in the OR per year as not working then:

7,000÷50,000 = .14 failures per procedure, or a 14% IFR

By measuring IFR's, decision makers can evaluate the effectiveness of repair vendors with regard to the effect on performance (or quality) in the operating room.

Hospitals with a higher IFR produce lower inventory effectiveness and hospitals with a lower IFR generate higher inventory effectiveness.

How to calculate repair cost

Similarly, all repair vendors also claim to reduce repair costs for the same reasons listed above. You can use the same evaluation method to measure cost per procedure to find the lowest cost by:

Total cost of repairs (repairs (R), repair exchanges (RE), and preventive maintenance (PM) costs) divided by number of procedures (P) (excluding any leased instruments) = repair cost per procedure (RCPP)

(R + RE + PM)÷P = RCPP

Example: A hospital has 50,000 procedures per year and spends $500K on repairs, $250K on repair exchanges, and $500K on preventive maintenance. The repair cost per procedure is:

($500,000 R + $250,000 RE + $500,000 PM) ÷50,000 procedures = $25 RCPP

By measuring the RCPP, decision makers can evaluate the cost effectiveness of their repair vendor. They can also compare cost effectiveness to other hospitals to illustrate the best vendor selection. In addition, the RCPP can measure any changes made with respect to repair vendors, preventive maintenance services, and repair exchange programs.

Hospital groups that minimize their RCPP have only partially achieved their goal of maximizing surgical inventory efficiencies.

How to calculate replacement costs

The cost of purchasing new replacement instruments is largely ignored when considering repair vendors. However, the best repair vendors will significantly reduce new instrument costs by as much as 80%. There is the potential for hundreds of thousands of dollars in savings, depending on the size of the hospital.

Evaluating new replacement instrument costs (NIC) can benchmark and measure the impact when making changes with repair vendors and/or preventive maintenance vendors. You can use an equation similar to the RCPP to achieve new replacement instrument cost per procedure (NICPP).

NIC÷P = NICPP

Example: A hospital purchases $5M of replacement instruments and provides 50,000 procedures over the course of one year. The NICPP then is calculated:

$5,000,000÷50,000 = $100 NICPP

Hospital groups that reduce the NICPP, demonstrate superior efficiencies when compared to other hospital groups with higher NICPP.

How to calculate total cost of ownership

Moreover, new replacement instrument costs (NIC) represent a critical component in the Total Cost of Ownership (TCO) equation. TCO is the cost of repairing and replacing the current surgical instrument inventory. Overlooking replacement costs creates a miscalculation of ownership costs. Here is the TCO equation:

R + RE + PM + NIC = TCO

Example: A hospital spends $1.25M from the repair budget as described in the previous example, and an additional $5M on replacement instruments from the minor equipment budget. The TCO then is:

$500,000 R + $250,000 RE + $500,000 PM + $5,000,000 NIC = $6,250,000 TCO

You can now use procedure equations to calculate TCO per procedure (TCOPP) by:

RCPP + NICPP = TCOPP

Where RCPP=repair cost per procedure and NICPP =new replacement instrument cost per procedure.

Example: Using the previous examples you have:

$25 RCPP + $100 NICPP = $125 TCOPP

Repairs, repair exchanges, preventive maintenance programs, and the cost of new instruments, must all be taken into consideration when evaluating the effectiveness of the surgical instrument inventory.

> The primary application for TCO analysis is to identify and minimize waste and fraud through change analysis.

If cost calculation does not include replacement costs, then a repair vendor can shift part of the TCO to the replacement budget by suggesting replacement rather than repair, thereby giving the false impression of lowering costs. Repair vendors who also sell the instruments will frequently use this is ploy. In addition, repairs and replacements are controlled by two different budgets (i.e. repair and minor equipment) making evaluations more difficult.

Why you should segment inventory

Because multiple repair vendors are used, it is helpful to analyze different types of instruments by segmenting them into five groups:

- general instruments
- specialty instruments
- power equipment
- rigid scopes
- flexible scopes

Managers tend to use these categories when deciding which repair vendors to use and how best to use the various vendors. Evaluation of each type instrument inventory will reveal which one operates more efficiently and effectively. You can use the same evaluation methods detailed earlier for comparison.

How to apply total cost of ownership

The primary application for TCO analysis is to identify and minimize waste and fraud through change analysis. Taking this approach, you systematically uncover the root cause of the problem(s). You can

measure the impact of changing a repair vendor and/or management practice.

To measure change, you first must benchmark all of the variables in the equations explained above. Then, the impact of change must be tested with only one change at a time. For instance, you could measure the impact of a vendor providing preventive maintenance service for general surgical instruments.

Example: Your hospital group has a van service that provides preventive maintenance every day of the work week. The annual cost of the service is $500,000 and the instrument failure rate (IFR) is 28%. You can measure a change in service by reducing the service by half, to two and one-half days per week. If the IFR decreases, let's say to 21%, then you would have an improvement of instrument efficiencies. Moreover, repair costs and the TCO would be reduced by $250,000 per year. The next step would be to eliminate the service while monitoring the IFR to determine the wastefulness and the fraudulent nature of this service.

Only TCO analysis can measure the change of any of the important variables and how they affect overall quality and cost.

You can apply this to all segments pertaining to repairs, repair exchange programs, preventive maintenance programs, and replacement of instrument groups. The potential findings include not only costly preventive maintenance programs that do not provide value, but also identifies unnecessary replacements and repair exchange programs.

Summary

Current surgical instrument inventory evaluations typically only look at one component of repair or replacement costs. TCO analysis includes all variables of the equation: repair, repair exchange, preventive maintenance, and replacement costs.

Only TCO analysis can measure the change of any of the important variables and how they affect overall quality and cost. Many vendors offer repair service/replacement cost savings with the intent of increasing TCO. Now financial managers have the tools needed to evaluate quality and cost effectiveness of current and future hand-held surgical instrument inventories. **NP**

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