

Dale Hockel  
Michael Kintner

# total cost of ownership the role of clinical engineering

A hospital can avoid many hidden and excessive costs associated with equipment service contracts by having the organization's in-house clinical engineering department assume greater responsibility for this function.

### AT A GLANCE

- > Hospitals often incur substantial hidden costs associated with service agreements that they enter into with original equipment manufacturers at the time of equipment purchase.
- > Hospitals should perform an analysis of the *total cost of ownership* (TCO) of their organizations' medical equipment to identify opportunities for performance improvement and savings.
- > The findings of the TCO analysis can point to areas where clinical engineering service management can be improved through investments in technology, training, and teamwork.

As hospitals continue to look for opportunities to reduce costs beyond low-hanging fruit, there are subtle areas that should be considered—including clinical engineering spend and its impact on total ownership costs for capital equipment. Hospital leaders should take the time to understand their organization's total clinical engineering spend to avoid the risks of escalating expenses in hidden areas and missing out on significant and sustainable opportunities for savings.

The costs that constitute a healthcare organization's total clinical engineering spend may include purchase price, installation, financing (including leasing or renting), utilities, upgrades, training, and disposal. To gain a clear picture of clinical engineering spend, hospital leaders should perform a *total cost of ownership (TCO) analysis*, calculating all costs incurred over the life of each asset.

### Understanding Clinical Engineering Spend

Performing an effective TCO analysis to assess clinical engineering spend requires, first and foremost, a clear understanding of the definition of *clinical engineering*: its function, who is responsible for managing this department, and how much is spent in this area.

A well-functioning clinical engineering department does much more than just purchase and manage medical equipment; it also is responsible for comprehensive medical equipment management. For this reason, the clinical engineering department should drive the TCO analysis, with a charge to deliver high utilization of equipment and meet the department's financial goals. The analysis should be data-driven, with a focus on producing valuable information regarding inventory, downtime, productivity needs, and regulatory issues—all of which can help department managers make

For an analysis of the potential cost impact of transferring service management for sterilizer equipment to a centralized, in-house clinical engineering department, go to [hfma.org/ceserviceanalysis](http://hfma.org/ceserviceanalysis).

informed decisions and accurately forecast equipment needs.

The team of clinical engineers and technicians who are charged with the analysis also should be “best-in-class,” with a strategic focus and the ability to illustrate the “bigger picture” regarding the current state of hospital equipment and what to expect for the future.

Having a clear picture of a hospital’s clinical engineering operations, expenses, and effectiveness is as important as understanding how clinical engineering functions. An effective clinical engineering department should be one area in which a hospital is consistently *saving* money. The challenge is that many clinical engineering departments are full of hidden costs, making it difficult to find ways to save. Some costs are obvious—repairs and preventive maintenance, for instance. But many clinical engineering costs may be reflected within other departments’ budgets, confounding efforts to track expenses and identify opportunities for savings short of auditing each department’s expenses line by line. Further complications come when the clinical engineering budget is not clearly visible to hospital management because it is lumped together with other departments, such as IT and facilities.

### Identifying Hidden Costs

Hospitals can assume undue financial risk when medical equipment service costs are not centralized in clinical engineering and are instead fragmented across hospital departments. Such fragmentation increases the potential for costs to stay just out of view of managers—and stymies efforts to calculate total spend. A primary objective in performing a TCO analysis should be to consolidate these hidden costs within clinical engineering so that they can be easily identified, thereby enabling the hospital to more readily identify opportunities for significant cost savings.

**Service contracts.** Hospitals that do not invest clinical engineering with responsibility for managing all equipment service costs face the pitfall of having no systematic cost controls for

these expenses. All too often, hospital managers will establish a service contract with an original equipment manufacturer (OEM) at the time of purchase without realizing that the additional expense is unnecessary because the hospital’s clinical engineering staff already possess the internal talent and resources to perform the necessary services. In such situations, hospital staff are prone to becoming dependent on the service contract, immediately calling the OEM for repairs and preventive maintenance rather than relying on the in-house clinical engineering team.

This behavior can lead to unmonitored costs, as the OEM is likely to render services outside of the contract, called “bill-aboves,” that include labor or parts excluded from the contract. For instance, let’s consider that a computed tomography (CT) tube fails at 5:15 p.m. on Monday. If glassware coverage is not included in the contract, the hospital will pay more for the replacement than it would have prior to its investment in the contract because the replacement must be made outside of business hours. A hospital can better manage and mitigate these expenses by aligning the OEM service offerings with the skill sets of its in-house clinical engineering team and the support needs of the equipment in question. In-house staff can acquire the part and perform the replacement, obviating the expense of calling an OEM technician after hours. If the skill set is not available on staff, it is more beneficial to place the equipment on a full-service contract, in which case the hospital also should encourage specific team members to review OEM contracts carefully prior to making a service call to avoid unnecessary expenses, such as after-hours service fees.

Department managers and other hospital leaders also should review service contracts for auto-renewal clauses. If the hospital does not notify the OEM within a few months prior to the end of the agreement of its desire not to renew the contract, it will automatically be engaged for another long-term contract—with a potential cost increase over the previous term. The Medical Consumer Price Index industry standard for

inflation is about 3 percent annually; however, costs of some contracts can increase up to 6 percent annually. Consider, for example, an OEM agreement for \$100,000 per year. If the agreement were to renew automatically, with a 5 percent increase annually over five years, the renewals would add \$52,563 in additional costs over the life of the agreement—and worse, these may be non-value-added costs. These types of contract provisions therefore require careful monitoring.

Moreover, OEM service contracts can pose a bigger problem if each department is allowed to independently renew with OEMs without considering the costs of the contracts, the bill-aboves, coverage levels, exclusions, auto-renewals, and the skill set of the in-house clinical engineering team. When management of service contract expenses is fragmented, the organization cannot develop a plan to right-size service contracts or bring the services in-house.

*Miscoded expenses in the general ledger.* Although many financial professionals live by the general ledger for budgeting and forecasting, they all too often have a misplaced reliance on this tool when accounting for clinical engineering expenses, which can result in incorrect coding of expenses. For instance, such expenses might be listed as radiology or surgery department expenses and misclassified as “Other Med Care Materials.” A recent audit we performed of 14 U.S. hospitals disclosed that a significant percentage of medical equipment service expenses are miscoded and land within Radiology (23 percent) and the surgery/operating room area (21 percent), with no reference to repair in the description.

In short, it is possible that no more than 50 percent of the total expenses for service contracts will be visible in the general ledger because of the likelihood that costs have been miscoded or coded as prepaid or that payments have been missed in the year being reviewed.

*Underdeveloped clinical engineering.* Centralization of medical equipment service costs in clinical engineering is a critical step in reducing TCO for

a hospital’s capital assets, but this act alone is not enough. Centralization will be effective only if the hospital’s clinical engineering program is well-run, appropriately staffed, and properly equipped with technology and training. Indeed, an underdeveloped clinical engineering program can itself become a source of missed savings opportunities. A common symptom of an underdeveloped clinical engineering program is the ineffective use, or complete lack, of a computerized maintenance management system (CMMS) to track, manage, and report on capital assets. A CMMS can help a hospital avoid the risks of having too much or too little inventory and excessive service costs and can provide an essential basis for developing strategic plans for capital acquisition and cost management.

Determining the right staffing model for a hospital’s clinical engineering department is difficult, but is crucial for maintaining the integrity of a hospital’s biomedical, radiology, laboratory, and IT equipment. It also could save the organization thousands of dollars.

### Current-State Assessment

With a clear understanding of where hidden costs can lie, the TCO analysis team can begin identifying the organization’s medical equipment service costs. The next step, aimed at developing a complete clinical engineering budget for the organization, should be to conduct a current-state assessment that examines all areas of expenses listed both in clinical engineering and in each department throughout the hospital’s general ledger. The assessment should include a review of current costs for areas such as run rate of service contracts for all modalities, current annualized labor rates and benefit for technicians/managers, overtime, callbacks, parts and vendor service expenses, and training. The assessment also should examine all clinical engineering expenses over several years to identify trends.

### Solutions for Sustainable Savings

The findings of a TCO analysis often will point to a need to reduce the amount and length of costly

service contracts and shore up the organization's clinical engineering function. In such circumstances, this effort will require an investment in technology, training, and teamwork.

**Technology.** To reduce reliance on service contracts across all modalities and improve the uptime of critical medical equipment, a hospital's clinical engineering operations will require an investment in technology. Best-in-class clinical engineering programs require pertinent and vetted technology to manage, monitor, and track medical devices systemwide 24 hours a day.

Using a CMMS to manage medical equipment will help track several key factors needed to make informed decisions that will ultimately influence TCO. To ensure appropriate maintenance is performed, equipment is accounted for, and devices are safe for use in patient care according to regulatory and accreditation standards, the CMMS tracking and management system should provide instant access to comprehensive data on medical equipment, including service history data, device alerts/recalls, operations benchmark metrics, and documentation of all service costs during the life of each asset.

An effective CMMS will also capture common criteria such as:

- > Service response time
- > Equipment downtime
- > Preventive maintenance completion rates
- > Repair turnaround time
- > Clinical engineering productivity
- > Equipment acquisition costs
- > Medical equipment alerts, hazards, and recalls and documented actions

These evidence-based data can help hospital managers discern which technology will enhance patient care and plug any holes that may exist in healthcare delivery.

In addition to effectively managing your current equipment, these data are critical when evaluating new technology and developing a multiyear capital plan. When purchasing new technology,

beyond looking at the sticker price, it is important to consider the maintenance over the technology's entire life cycle. How often will the equipment break down? How long will the organization have to wait for parts? How much do the parts cost? How much will it cost for a technician to replace the part? For how long will patients have to wait, or be rescheduled or diverted?

**Training.** There is a common misconception that a reduction in workforce can save money and increase revenue. In fact, investing in its workforce can help a hospital reduce expenses by eliminating service contracts and increase revenue by maximizing uptime. If there is a constant flow of repair work (which there typically is on a high-volume piece of equipment), it makes the most financial sense to invest in training in-house staff to provide support rather than rely on the OEM.

Investing in staff development and training can significantly improve response time, reduce downtime, and eliminate exorbitant costs by leveraging on-site expertise of individuals who are more familiar with the hospital's operations and needs. When transitioning to a centralized service management approach, if a department has already committed to a long-term service contract, it may make sense for clinical engineering to weigh the financial impact of breaking that contract (possibly through an out-clause) and paying any associated penalty fees to save money in the long run using in-house engineers for the service. When a service contracts are deemed necessary, the hospital should limit those contracts to less than two years, thereby leaving open the option of a quick transition to in-house service.

Of course, the biggest hurdle for a hospital in training its own staff is finding the time to dedicate and money to invest. The reality is the money saved on expensive service contracts and long repair times can more than justify the investment in training on-site staff. The clinical engineering staff likely is more than qualified and capable of carrying out the job. It's unlikely,

however, that the staff members have received training specific to the devices covered under the service contracts. The key consideration is that by increasing the skill level of staff on-site, a hospital can significantly reduce the overall cost of service contracts, bill-aboves, and downtime, potentially saving thousands of dollars each year.

This point is reinforced by the experience of St. Vincent Hospital in Indianapolis, which recently invested in training its clinical engineering staff, in part to reduce its dependency on service contracts for many of its high-end systems, including its CT, positron emission tomography (PET)/CT, and computed radiography (CR) readers. An investment of \$60,000 for training an on-site engineer garnered a \$300,000 ROI for the CT and PET/CT devices, and an investment of \$4,000 in training on the CR reader earned a savings of \$100,000 for the year in preventive maintenance. As a result of this continued focus on training and an overall investment of \$180,000 for the year, the hospital's in-house clinical engineering program was able to increase its responsibility for service management from 40 percent to 58 percent of the hospital's medical equipment. The initiative also enabled the hospital to develop internal talent, hire more skilled professionals, and instill trust with end-users.

A hospital's training strategy should go beyond service training and consider how data and metrics from the clinical engineering program might be used to develop systemwide training initiatives. Training for clinical engineering is essential and should occur frequently, but hospitals also should promote greater efficiency among other facility staff by encouraging employees to participate in a culture of knowledge sharing and creating opportunities for them to take ownership of their roles and responsibilities—and that requires not only training, but also teamwork.

**Teamwork.** Establishing clinical engineering as a comprehensive medical equipment management function rather than just the team that fixes “broken equipment” can provide a basis to

promote knowledge sharing across departments, support strategic planning of asset acquisitions, and encourage effective partnerships throughout the entire system. Remember, the clinical engineering department is data-driven and can provide valuable information about inventory, equipment downtime, service costs, and regulatory issues—all of which help the management team make informed decisions. Elevating the role of clinical engineering can help hospital leaders see the bigger picture of the state of their organization and provide a glimpse of what's coming. For example, by assessing medical equipment performance data from the CMMS across the hospital system, it is possible to identify and retire all devices that are at the end of their life cycles. By retiring these devices, the system would significantly reduce unnecessary costs, mitigate the risk of delaying a procedure or using broken equipment, and provide operational efficiencies to reinvest resources in higher-impact areas.

Optimizing clinical engineering operations can help an organization achieve its financial goals by ensuring high utilization of equipment and through the avoidance of potentially high costs of service contracts. The primary ingredient is a best-in-class clinical engineering department built through an appropriate investment in technology, training, and teamwork. ●

### TOTAL COST OF OWNERSHIP CALCULATOR

If you want to assess your clinical engineering operation's influence on total cost of ownership, use this quick (approximately two-minute) online calculator: [www.trimedx.com/7-stages-of-tco-for-ce](http://www.trimedx.com/7-stages-of-tco-for-ce). The calculator provides you the opportunity to gain a better understanding of your clinical engineering cost-saving initiatives and offers solutions to enhance your revenue stream.

### About the authors



**Dale Hockel, FACHE, MBA,** is senior vice president, operations, TriMedx, Indianapolis, and a member of HFMA's Indiana Pressler Memorial Chapter (Dale.Hockel@trimedx.com).



**Michael Kintner** is capital equipment strategist, TriMedx, Indianapolis (Michael.Kintner@trimedx.com).

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