BENCHMARKING BASICS

Staffing Metrics: A Case Study

Ted Cohen

One of the uses for benchmarking and metrics is to determine if your staffing levels are appropriate compared to your workload and to similar institutions. In these times of budget constraints, and with personnel costs often being the largest percent of the budget, it is very important to have metrics that quantify staffing needs based on workload.

AAMI's Benchmarking Solution (ABS) directly or indirectly provides several quantitative metrics and qualitative survey responses that can assist in establishing staffing metrics. These include acquisition value of equipment, full-time equivalent (FTE) counts, device counts per FTE, derived hourly cost, cost of service ratio (COSR), and others (Table 1).

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The following is an example of a sequence of steps one might take to use *ABS* to establish and apply staffing metrics:

1. Within *ABS,* determine the demographics selection to use (e.g., acute care hospitals, hospital size, location, timeline etc.), or use all ABS respondents for a particular timeline (e.g. ,2010).
2. Measure and report your current and historic COSR. (For more detail, see the article "*AAMI's Benchmarking Solution:* Analysis of Cost of Service Ratio and Other Metrics" in the July/August 2010 issue of BI&T.) A COSR of less than about 6% validates that the overall expenses for current workload are within reason, i.e., average or better compared to all *ABS* respondents.
3. Measure and report current and historic staffing ratios based on the amount of equipment supported. There are several measurements that can be made, including amount of equipment (in acquisition dollars) supported by one FTE; equipment counts supported by one FTE (only useful for low cost equipment); workload estimates by type of equipment based on historical data, manufacturer information and other published workload data (e.g., ECRI Institute data).
4. If the measurements are being used to justify additional staff, measure and report the net increase in workload estimated for the new project's equipment.
5. Split the net increase in workload into "one-time startup workload" (e.g., planning, installation, incoming inspection) and long-term, continuing repair and maintenance workload. Make sure to remove from the long-term workload analysis any replaced equipment that will be leaving.
6. From the long-term workload increase, and the metrics listed above, calculate estimates

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For more information about *AAMI's Benchmarking Solution*, visit www.aami.org/abs.

	Calculation Report Parameter	Average Response*
1	Total number of FTEs on the CE staff.	19.6
2	Percentage of clinical engineers on the CE staff.	7.2%
3	Percentage of BMETs on the CE staff.	75.7%
4	Percentage of FTEs assigned to management or supervision	18.1%
5	Percentage of FTEs assigned to maintenance and repair.	85.0%
6	Percentage of CE staff holding CCE, CBET, CLES, or CRES.	22.1%
7	Percentage of CE staff holding an IT-related certification.	4.8%
8	Number of devices in all categories that are maintained by CE staff	14,082
9	Total acquisition cost of all devices that are managed by CE staff	$87,054,174
10	Average cost per device	$11,379
11	Span of Control: Total number of non-management, non-supervisory FTEs divided by the number of supervisory and management FTEs.	7.8
12	Devices per technician: Number of devices maintained by CE staff divided by the number of FTE in the CE program assigned to medical device maintenance and repair	1,087
13	In-house Maintenance Hours to Paid Hours Ratio: Ratio of total annual maintenance hours to total annual hours paid to CE program personnel assigned to maintenance and repair.	0.65
14	In-house Maintenance Costs: Total annual cost for maintenance and repair services provided by CE.	$1,748,561
15	External Maintenance Costs: Total annual cost for maintenance and repair services provided by entities external to CE.	$2,994,095
16	Hourly Cost of In-house Maintenance: Ratio of total annual maintenance cost to total annual maintenance hours for the CE program.	$89.85
17	Vendor Maintenance Cost to Total Maintenance Cost Ratio: The ratio of maintenance contracts plus vendor time and materials costs to the total cost of maintenance.	0.56
18	Total Maintenance Cost to Acquisition Cost Ratio (COSR): Ratio of the total annual maintenance cost to the total acquisition cost for medical devices managed by the CE program (percentage).	5.46%
19	"Derived: Acquisition cost supported per maintenance FTE (Line 9/(line 1 x Line 5)"	$5,221,831

**Average of all 2010 respondents (135). Not all respondents answered all questions.*

Table 1. Selected *ABS* Metrics From the *ABS* Calculation Report

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of the FTEs required to support the additional equipment.

7. For any "big ticket" items, develop a specific draft support plan in collaboration with the customer department and refine the specifics for these more complex and expensive systems. This may include obtaining quotations for parts agreements or other "shared" support arrangements with the manufacturer or a third-party vendor.
8. Other metrics to consider analyzing include the ratio of external repair and maintenance costs to overall costs (sometimes called "penetration") and your hourly service costs compared to peers in your community.
9. Conduct an internal review and "sanity check" on the preliminary results.
10. Review the analysis results with your administrator and the major impacted customers.

At UC Davis Medical Center, we used a similar process for developing plans for adding staff for a new hospital wing that opened in 2010. We used benchmarking data from 17 peer university hospitals that all maintained at least some imaging equipment in-house (our comparison demographic). This data showed that one FTE technician maintained about $5.5 million of acquisition cost (ABS 2010 average shows this metric to be about $5.2 million per FTE (Table 1, line 19). Table 2 lists a summary of the type of equipment installed in the new wing. Table 3 summarizes the data presented to hospital leadership.

Evaluation of the additional workload details based on the types of equipment involved revealed that two BMET-3s (specialists) would be needed—one for OR integration and other OR equipment support, and one for the automated clinical laboratory, and that a radiology equipment specialist would be needed to support the cardiac catheterization labs and other additional radiology equipment. The other positions requested were designated as BMET-2 (generalists).

A draft report was presented to my administrator. After that presentation, and further discussion with clinical laboratory management and the vendor of the lab automation lines, it was determined that the FTE request for the lab automation line would be dropped since that line was going to be placed on a full-service contract, and the vendor was not

amenable to any workload sharing with consequent cost savings. Subsequently, a "final" report was presented to a group of senior leadership who reviewed all the new building staffing requests, and then a subsequent presentation to the chief operating officer. Ultimately, four FTEs were approved for clinical engineering. Benchmark data analysis definitely helped "sell" this proposal.

Clinical engineering also requested contracted assistance for incoming inspection work as well as one-time funding for additional technical training and test equipment to be obtained during the initial post-installation (warranty) year.

Depending on the project, another *ABS* metric that could be used to further validate and/or adjust staffing levels is device count per tech (1,087 devices per tech, Table 1, line 12). However, with an average device cost of $11,000, one should be very careful using this metric for very expensive or very low-cost products (i.e., one CT scanner does not equal one infusion pump).

Upcoming issues of *BI&T* will continue this column with additional "How to ..." descriptions for other metrics in *ABS*.

If you are an *ABS* subscriber and would like more information on using *ABS* for staffing metrics, please post your questions on the *ABS* list serve or contact me or one of the other *ABS* subject-matter experts at tedcohen@pacbell.net. ■

Automated clinical laboratory	$4 million
24 new ORs with OR Integration	$5 million
4 new cath/EP labs	$10 million
OR 45: Hybrid cath lab/OR	$2 million
New MRI 1.5 T, 1 refurb MRI	$2 million
2 new CT scanners, 1 refurb CT scanner	$3 million
2 DR X-ray rooms	$1 million
New Emergency Rm with ICU-like monitoring	$1 million
Expanded (12 bed) Burn Unit	$500,000
New Neuro Surgical ICU	$500,000
New Surgical ICU	$500,000
Other medical equipment	$7.5 million
Subtotal	$37 million
Other equipment in SESP, not CE supported (e.g. Dietary)	$5 million
Grand Total	$42 million

Table 2. UC Davis Pavilion (SESP) Project, Summary Equipment List

Total Additional Equipment with CE Responsibility	$37 million
Equipment that will be leaving	$9 million
Net CE Workload Growth	$28 million
Proposed FTE Growth	5 FTE
Special "big ticket" systems and their support plans:	
a) OR integration	CE support
b) 5 cardiac cath/EP labs	Shared support agreement
c) 175 Physiological monitors	CE support
d) Automated clinical lab	Full Service contract
FTE approved:	4 FTE

Table 3. Summary of FTE Analysis