

The Real Costs of Surgical Instrument Training in Sterile Processing Revisited

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ABSTRACT

The need for properly trained sterile processing staff members has grown with the increased sophistication of surgical procedures. In 1998, I conducted a survey of hospitals about various aspects of training sterile processing personnel, including the length of time for training employees to process general surgical and specialty surgical instruments. To evaluate trends, I conducted a second survey 10 years later. A majority of the 2008 respondents indicated that training would take three to six months (60%) or six to 12 months (31%) and that most preceptors (52%) spend two to three months working with new employees. A calculation of the cost to train a sterile processing technician to the competent level, including the salary of the preceptor, was \$41,414 for 2008, an increase of more than 100% from the 1998 calculation. These costs must be weighed against the loss of revenue when procedures are delayed because of missing, damaged, or unclean instruments and the patient safety issues that could result if an employee is not well trained. *AORN J* 92 (August 2010) 185-193. © AORN, Inc, 2010. doi: 10.1016/j.aorn.2009.10.025

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Managed health care has influenced every aspect of health care delivery. Budgetary and staff reductions have affected job titles and departments, leaving the remaining staff members to provide quality services to patients using fewer resources. For example, although the OR procedure volume may decrease, the sophistication of the procedures being performed increases, which increases the workload in the sterile processing department; however, the full-time employee hours may still decrease as a result of the lower procedure volume. Despite these cuts, the need for properly trained sterile processing staff members has increased

dramatically with the growth of sophisticated surgical procedures performed in hospitals and ambulatory surgery centers.

The predominant image of the sterile processing department has been the “bedpan and thermometer” department; however, in the past 10 to 15 years, the health care community has increased its awareness that if sterile processing personnel are provided with proper training, competency verification, and ongoing continuing education, they can perform many sophisticated tasks. For example, sterile processing personnel could handle surgical instrument processing for the OR, labor and delivery, emergency department, and

ambulatory surgery room, thereby allowing RNs and surgical technologists to perform more direct patient care tasks.

In 1998, I conducted a survey of randomly selected health care facilities to help determine the cost of training a sterile processing technician with no relevant experience. Ten years later, I conducted the survey again to examine trends in sterile processing and to reevaluate the actual costs of training surgical instrument processing personnel. Sterile processing managers or directors in each of the facilities were asked about various aspects of surgical instrument processing at their facility, including the length of time for training employees on processing general surgical and specialty surgical instruments and the job title of the preceptor.

TRAINING STERILE PROCESSING PERSONNEL

Traditionally, the sterile processing department has not been recognized as one that requires highly skilled workers. According to the Association for the Advancement of Medical Instrumentation (AAMI), which develops standards of practice for decontamination and sterilization in the United States, “personnel engaged in sterile processing should receive both an initial orientation and on-the-job training.”¹(section 4.3.1) The AAMI describes the core knowledge areas as including, but not limited to, microbiology, infection control, decontamination, sterilization, and new instrumentation. “There should be a training manual that documents all aspects of training related to onsite approved protocols . . . the manual should document that training was performed and when competency was achieved.”¹(section 4.3.1) In addition, the AAMI recommends that all sterile processing personnel be certified as a condition of employment¹ and within two years of hire.

Some sterile processing/central service training programs are available that offer vocational training; however, these are in the minority and can be expensive. These courses include clinical time

and are designed for the novice with no experience. Certification is available from two organizations, which are both recognized by the AAMI. The CBSPD is a freestanding, independent, non-profit certification board that is accredited by the National Commission for Certifying Agencies.² The CBSPD offers a five-year certification with six different specialties, including sterile processing technician, supervisor, manager, surgical instrumentation specialist (advanced practice), ambulatory surgery sterile processing technician, and flexible endoscope reprocessor. The International Association of Healthcare Central Service Material Management offers one-year certification on three levels: technician, surgical instrument specialist, and leadership.³

A training program is the foundation for newly hired personnel; the more time a trainer puts into the training, the better the outcome not only for the employee but also the department and, ultimately, the patient. Time, however, is the enemy in most situations. Although most sterile processing managers recognize the importance of thorough training for their employees and know that they are expected to provide continuing education for their employees, their plans could be stalled or discarded as a result of staffing issues. Many sterile processing departments are marginally staffed. When an employee retires, takes a vacation, or takes a leave of absence, staffing in the department becomes the primary concern. Often, managers are left with questions such as the following:

- How can we take the time to train personnel when there are instrument sets waiting to be sterilized and assembled for the next patient?
- We know that the patient must come first but at what cost?
- Is some training better than none?
- Are marginally trained sterile processing technicians a risk to themselves and their patients?

Inadequate training can lead to employee and patient injury. For example, if a new trainee does not understand the need for personal protective

equipment and sharps injury prevention controls, the employee could be inadvertently exposed to blood or body fluids. Additionally, if a device is not cleaned or sterilized according to the device manufacturer's written instructions, it may not be safe to use or may not function as intended, both of which can cause injury to a patient. Inadequate training also can lead to improper use that could damage surgical instruments, patient care equipment, and processing equipment.

Proper orientation and on-the-job training is as necessary for sterile processing personnel as for personnel in any other technical position in the health care facility. Because the position of sterile processing educator

is not common, some managers have resorted to providing videos and magazine articles for employees to self-study in an attempt to compensate for the lack of time or clinical

expertise in developing inservice programs for employees. Sterile processing managers and supervisors should understand the following important aspects of training:

- Training takes time; it cannot be rushed. The sterile processing manager should justify the hours and money required for thorough training of sterile processing personnel to hospital administrators to gain their support.
- Training costs money.
- Training requires knowledgeable preceptors (ie, individuals selected for their skills and extensive knowledge of all sterile processing techniques). It is important to identify and develop preceptors for sterile processing departments.⁴
- Training is more than show and tell. Training requires a formal process in which the theory is presented (ie, why and how something must

be performed), followed by an error-free return demonstration.

COMPETENCY

Successful completion of an educational program does not necessarily ensure competency, which is the ability to take knowledge of basic principles and apply it to performance. The challenge for sterile processing managers is to direct educational efforts toward developing and maintaining competency in the core knowledge and skill areas of practice, for example, identification, care, handling, testing, and processing of surgical instrument sets.⁵ The knowledge and skills needed to

effectively identify, clean, inspect, assemble, and process surgical instruments can directly affect patient safety, surgeon satisfaction, and the surgical instrument repair and replacement budget of the facility.

The surgical instrument inventory of any health care facility is a major capital asset and, as such, must be properly maintained. The amount of time and competency verification for such an important responsibility, however, may be inadequate. I have frequently heard OR personnel complain about a lack of quality in processing surgical instruments, including instruments that are missing, incorrect, improperly cleaned, damaged, mislabeled, or missing parts. The most frequent reason sterile processing personnel give for this lack of quality is a critical lack of time as a result of short staffing, which not only affects the quality of training but also the quality of the end products. When people are rushed, there is an increased risk of errors; this scenario only intensifies as departments are downsized. Furthermore, the increased complexity of surgical procedures and instrumentation (eg, robotic systems) also has

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increased the amount of training and education necessary for sterile processing staff members.

Numerous mechanisms have been developed to prevent these errors (eg, inventory or count sheets, computer-generated count sheets with reference diagrams); however, these mechanisms alone do not guarantee quality. Key indicators for additional training needs include the following:

- shortage of staff (employees cannot be rotated because of skill limitations);
- general employee dissatisfaction (as indicated by excessive turnover, a large number of grievances, and a large number of corrective actions);
- customer complaints about services;
- inability of the department to function within the budget; and
- poor employee morale.⁴

SURVEY OF HEALTH CARE FACILITIES

After I conducted my 1998 survey of randomly selected health care facilities, I calculated that the cost to train a new sterile processing technician with no relevant experience to the competent level was \$20,426 per staff member, not including benefits.⁶ I decided to revisit this topic 10 years later to see what differences have occurred. In January 2009, I conducted a survey of the same randomly selected hospitals as in 1998, as well as additional facilities that responded to the survey request on the CBSPD web site to reevaluate the actual costs of training surgical instrument processing personnel. The total response rate was 33%. There were 42 respondents from 23 states. The following is a breakdown of the survey responses by state:

- Alabama (1),
- California (1),
- Connecticut (1)
- Florida (2),
- Georgia (1),
- Idaho (1),
- Illinois (2),
- Indiana (1),
- Kansas (1),

- Nebraska (1),
- New Jersey (10),
- New York (3),
- North Carolina (1),
- Maine (1),
- Massachusetts (1),
- Ohio (1),
- Oklahoma (1),
- Oregon (1),
- Pennsylvania (2),
- South Carolina (1),
- Tennessee (4),
- Vermont (1),
- West Virginia (1), and
- no state given (2).

Of the responding facilities, 16 were urban, 18 were suburban, and eight were rural.

General Survey Responses

One of the survey questions addressed whether the central supply and sterile processing personnel processed OR surgical instrumentation or whether they just sterilized the sets after assembly and packaging by OR personnel.

Results showed that in the past 10 years, there has been a significant change in the processing of surgical instrumentation for the OR from minimal to full processing (Table 1). Centralized processing has long been recommended because it allows for

- standardized procedures and protocols,
- elimination of duplicate cleaning and processing of equipment,
- increased availability of OR personnel for patient care and other technical duties, and
- a reduced chance of cross-infection in the OR by eliminating a decontamination area.

General Surgical Instrument Training

A series of survey questions addressed the training of personnel with regard to general surgical instruments. For the question, "If your department processes surgical instruments for the OR, including decontamination, assembly, testing, and sterilization, how long does it take for a new employee

TABLE 1. Survey Responses

Size of facility (number of beds)	Facilities responding*		Processes OR instruments		Sterilizes only		Does not process	
	1998	2008	1998	2008	1998	2008	1998	2008
	< 199	8.7%	16.6%	50%	100%	25%	0%	25%
200 to 299	32.6%	16.6%	70%	100%	20%	0%	10%	0%
300 to 399	15.2%	12%	100%	100%	0%	0%	0%	0%
400 to 499	21.7%	9.5%	90%	100%	10%	0%	0%	0%
500 to 599	10.9%	9.5%	100%	100%	0%	0%	0%	0%
600 to 1,200	8.7%	12%	80%	100%	20%	0%	0%	0%

* 2.2% no response in 1998; 24% no response in 2008.

(with no previous experience) to become competent in preparation of general surgical instruments?" a majority of the respondents indicated that training would take three to six months (60%) or six to 12 months (31%). The remaining respondents indicated that more than a year was needed (2%) or abstained from answering the question (7%) (Table 2).

Survey participants also were asked whether a time limit was placed on training the new employees; 26 (62%) said no, and 16 (38%) said yes. The 1998 survey responses indicated that 50% of the responding facilities had time limits for training, so the 2008 responses represent a considerable decrease in facilities that impose a time frame on training (12%). This is an important change because a major factor in training is the realization that different people learn at different rates.

TABLE 2. Length of Time for General Surgical Instrument Training

Length of time	Responses
3-6 months	25 (60%)
6-12 months	13 (31%)
1 year	1 (2%)
No response	3 (7%)

During training, a preceptor is needed to direct and observe the new employee. Survey participants were asked whether a preceptor was used for this purpose, and they responded unanimously that they used a preceptor for all training. In 1998, 97.6% of respondents in participating facilities used a preceptor at all times. The participants were then asked how long the preceptor worked with the new employee who was learning general surgical instrumentation. Results showed that most preceptors (52%) spent two to three months working with new employees (Table 3).

In addition, to help determine overall costs, participating facilities were asked to disclose the job titles of the preceptors involved in training. Results indicated that in 2008, 35 (83%) were a certified technician, lead technician, or technician, which is an increase from 55.5% in 1998. Five

TABLE 3. Length of Time Preceptor Used for General Instrument Training

Length of time	Responses
1-4 weeks	7 (17%)
2-3 months	22 (52%)
6 months	5 (12%)
Until competent	1 (2%)
Varies	3 (7%)
No response	4 (10%)

TABLE 4. Length of Time for Specialty Instrumentation Training

Length of time	Responses	
	1998	2008
1-3 months	4 (10%)	7 (16.5%)
3-6 months	8 (20%)	10 (24%)
6-9 months	2 (5%)	6 (14%)
9-12 months	11 (25%)	8 (19%)
More than 1 year	17 (40%)	4 (10%)
No response		7 (16.5%)

preceptors (12%) were an educator or supervisor in 2008, which is a decline from 45.5% in 1998.

Specialty Surgical Instrument Training

The survey also asked about the length of time for a sterile processing technician to become competent in the processing of specialty surgical instruments, including orthopedic instruments. Results showed that 43% of respondents in 2008, compared with 70% in 1998, thought that training should last anywhere from six months to more than a year (Table 4), so the actual time perceived as needed for training has decreased.

In the 2008 survey responses compared with those from 1998, there was a modest increase in the number of respondents who indicated they used a preceptor for specialty instrument training from one to six months, a dramatic increase in using a preceptor for six to 12 months, and a large decline in using a preceptor until the employee was fully competent in specialty surgical instruments. Instrumentation continues to increase in sophistication; however, from the survey results, it appears that training is still inadequate, with only 14.3% of respondents in 2008 reporting that training should be conducted until the employee is competent (Table 5).

COSTS FOR TRAINING

Only three of the respondents were able to provide data concerning costs to train a new sterile processing employee. One respondent indicated

that cost was determined by multiplying the hire rate by 26 weeks of training, a second facility reported \$12,480 (ie, a half-year salary), and a third reported \$5,500 (ie, \$11/hour for 500 hours). None of the respondents included the preceptor’s time in their calculations. The following are criteria that I used to determine the costs to train personnel processing surgical instruments:

- Training with a preceptor is needed to develop competency.
- Training with a preceptor should be done until the employee is competent.

Unfortunately, only approximately 15% of the respondents indicated they continued training until the employees’ competency in surgical instrument processing was verified, which is a 20% decrease from 1998. Although sterile processing department managers may have a time frame in mind, it is unrealistic to expect all personnel to become competent in a specific amount of time. Using my more than 30 years of experience in sterile processing, I applied a more realistic approach to factor in competency with productivity using a scale method (Table 6).

A new employee is not considered productive during the first month of training because the preceptor’s observations and the employee’s initial learning take place during this time. Productivity, in this case, refers to the ability to completely

TABLE 5. Length of Time Preceptor Used for Specialty Instrument Training

Length of time	Responses	
	1998	2008
2-3 weeks	5.5%	
1 month	8.4%	4.7% (2)
2 months	5.5%	9.5% (4)
3-6 months	27.8%	11.9% (5)
6 months	5.5%	26.1% (11)
7-9 months	5.5%	14.3% (6)
12 months	5.5%	19.0% (8)
Until competent	36.2%	14.3% (6)

TABLE 6. Productivity Scale

Number of months of employment	1	2	3	4	5	6	7	8	9	10	11	12
Productivity (%)	0	5	10	15	20	25	30	35	40	50	70	90

prepare, inspect, assemble, test, wrap, identify, and label surgical instruments without any supervision. As employees learn on the job by explanation, observation, and demonstration, their productivity gradually increases each month.

Packaging of devices and sets should always be performed with a preceptor until the employee becomes competent in performing the tasks autonomously. As the new employee achieves competency in each set, he or she will be able to assemble those items independently as they become available for processing. When these sets appear for processing cannot be controlled, however, so the new employee may be asked to perform other activities such as deliver supplies or clean storage shelves.

Based on the productivity scale, the employee should reach 25% productivity by six months, 40% by nine months, and 90% by one year.

This time frame could be extended based on the sophistication of the facility (eg, robotic instrumentation, spinal surgery, total joint surgery, open heart surgery). Also, training is dependent on tray or instrument availability. It is feasible that certain trays will not appear for processing during training. The employee should not be signed off on any trays until he or she has provided a satisfactory return demonstration. An option is to obtain the tray and open it specifically for training; however, this can affect the OR by potentially causing a delay should the instruments be needed, thereby potentially affecting patient safety.

The actual cost for training should take into account productive salary versus training costs, which are identified in Table 7. The salary is based on the 2008 average sterile processing technician salary of \$29,000 from the CBSPD salary

TABLE 7. Sterile Processing Technician Training Costs

Number of months	Productivity	Salary	Productivity salary	Training Costs
1	0%	\$2,416	0	\$2,416
2	5%	\$2,416	\$121	\$2,294
3	10%	\$2,416	\$242	\$2,174
4	15%	\$2,416	\$362	\$2,054
5	20%	\$2,416	\$483	\$1,933
6	25%	\$2,416	\$604	\$1,812
7	30%	\$2,416	\$725	\$1,691
8	35%	\$2,416	\$846	\$1,570
9	40%	\$2,416	\$966	\$1,450
10	50%	\$2,416	\$1,208	\$1,208
11	70%	\$2,416	\$1,691	\$725
12	90%	\$2,416	\$2,174	\$242
2008 totals for 1 year			\$9,422	\$19,569
1998 Training costs			\$5,704	\$11,846
2008 Change			+\$3,718	+\$7,723

Values are rounded to the nearest dollar.

TABLE 8. Preceptor Labor Cost for Training

Preceptor salary	First 6 months (50% time)	Last 6 months (25% time)	Total
1998: \$11/hour	\$5,720	\$2,860	\$8,580
2008: \$28/hour	\$14,560	\$7,285	\$21,845

survey.⁷ This average is less than the salaries published in the *Healthcare Purchasing News* salary survey in August 2009, which indicated that the salary range is \$34,423 to \$59,520.⁸ Both surveys are limited in validity because salary amounts vary greatly by geographic location (eg, the Northeast versus the South); therefore, to be as conservative as possible, I used the lower salary amount.

To determine the preceptor’s salary, I aggregated the salary data from the sterile processing lead technician, coordinator, and OR educators from the 2008 CBSPD survey and the 2009 *Healthcare Purchasing News* survey, which amounted to \$58,240 per year. The preceptor’s activities would amount to 50% of his or her time for the first six months and 25% of his or her time for the last six months (Table 8).

OVERALL COST

In 2008, the combined training cost (ie, new employee, preceptor) was \$41,414 to provide thorough on-the-job training for one year (Table 9). This is for one employee only and does not include any other benefits such as medical care. Another cost factor to consider, however, is the loss of revenue in the OR when procedures are delayed because of missing, damaged, unclean, or nonfunctioning instruments that could result if an employee is not well trained. When an instrument set is incorrectly assembled (ie, has incorrect or missing items), the delay in time to get another set, if available, or to flash sterilize the set in an emergency can take as long as 15 minutes. Using

a conservative, average cost of \$20 per minute, this amounts to \$300 of OR time. The loss of productivity for a nursing staff member with an average salary of \$40 per hour is \$10 during this delay. The average loss, therefore, is \$310. To put these costs into perspective, if processing errors occurred 20 times a year, the costs to the health care facility would be approximately \$6,200. When the actual number of delays during the day and week as a result of instrument errors is calculated, the total adds up quickly. This amount does not include the reprocessing fee for the tray, which can be determined by calculating the costs for decontamination, preparation, assembly, and sterilization, including labor.

Additional costs may include instrument repair, which can be dramatically affected by proper training of personnel. Incorrect cleaning, disassembly, reassembly, wrapping, and processing can all affect the life of the surgical instrument. Finally, there is no measure for the cost of pain and suffering for an unfavorable patient outcome because of quality issues with instrument processing.

THE IMPORTANCE OF CONTINUING EDUCATION

It is the responsibility of the sterile processing manager to ensure thorough training and continuing education for his or her staff members. The training should be competency based and include all the core competencies required. Effective training of sterile processing personnel is paramount to patient and employee safety and, as

TABLE 9. Comparison of Training Costs From 1998 to 2008

Totals/ 1 year	New employee	Preceptor	Total
1998 Training costs	\$11,846	\$8,580	\$20,426
2008 Training costs	\$19,569	\$21,845	\$41,414
Change	+65%	+154.6%	+102.8%

such, complete training of all aspects of the job requirements must take place. There should not be any rigid time frames for the training to accommodate individuals with special training needs such as language barriers and manual dexterity problems. Additional training may be needed to reinforce a procedure or to teach employees about new equipment. Furthermore, the quality of work performed in the sterile processing department is directly related to the quality of the training and the competency verification of each task. It is the responsibility of the sterile processing manager to develop the orientation plan for the department and to ensure compliance for all employees. Finally, financial savings could be realized because proper training of personnel could decrease turnover rates and reduce damage to instruments. **AORN**

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