Financing a Simulation Center

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KEYWORDS

• Surgery • Simulation center • Skills laboratory • Education • Training • Finance • Costs • Funding

KEY POINTS

- Many avenues exist to attain funding for establishing surgical skills laboratories, with industry, hospital, and departmental funding being the most common.
- Industry funding or grants can provide substantial initial funding to start the operation; internal support, however, from the surgery department and hospital administration are essential for sustaining the laboratory.
- Collaboration with other medical departments and specialties, such as gynecology, urology, gastroenterology, nursing, and other allied health professions, is key for optimizing the utility of and amount of revenue generated by the laboratory.
- Budgeting factors for financing a laboratory should include both initial and maintenance costs, and acquisition of equipment is generally the most expensive capital investment. Costs for personnel, use of facility or laboratory space, supplies and consumables, and equipment maintenance are ongoing costs for maintaining the laboratory.

INTRODUCTION

The operating room and the patients' bedside historically have been the foundation for surgical skills training. Although these environments continue to be important, concerns with learning efficiency and patient safety have shifted the training process to include simulation-based training in a structured environment. Teaching residents in a live patient setting increases operative time and costs.[1] As the importance of simulation-based training has been established across various medical and health professional disciplines, skills training laboratories have become a standard in surgery training programs. In 2008, the American College of Surgeons and Association of

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Program Directors in Surgery developed a simulation-based surgical skills curriculum; this curriculum was followed by the Residency Review Committee for Surgery of the Accreditation Council for Graduate Medical Education mandating resident access to a skills laboratory.

Although laparoscopic skills training laboratories existed at the time of the reform, institutions without laboratories were forced to modify their program in order to remain compliant. Funding was reported as a major obstacle; establishing a surgical skills laboratory and adapting the training curriculum requires a significant amount of resources, including a physical location, equipment, and manpower.[2,3] A systematic approach, therefore, is necessary to secure the needed funds, optimize, and budget appropriately in order to build a first-rate training facility.

OBTAINING FUNDING

After establishing a plan for a surgical skills training center, the next step is identifying appropriate funding sources. Finding funding is a critical, yet challenging step in developing a simulation center. Because most laboratories do not initially generate revenue, funding must be acquired from other sources. Numerous avenues for sourcing funds exist, including industry; the surgery department/health sciences center; hospitals; government at the federal, state, or local level; and philanthropic organizations (**Box 1**).

Industry sponsors are one of the most common sources of funding through educational partnerships or grants. According to a survey of training centers, 68% of laboratories have received funding from industry.[2] Funding opportunities are available from various companies, such as medical device, pharmaceutical, and medical education vendors. Successful funding from a granting agency, however, requires the skills laboratory to meet industry objectives. For example, the center may be asked to conduct specific training activities or use recommended equipment. Commitment to industry stipulations may lead to increased activities and may provide continued funding. Most industry funding, however, is provided for start-up or for a limited duration. In addition to cash grants, medical device companies are also able to donate equipment. These donations are valued similarly to cash, which would otherwise be used for equipment purchases. Equipment donations are more readily available and can result in considerable reductions in start-up costs.

Box 1
Funding sources

- Surgery department
- Medicine specialties
- Allied health disciplines
- Hospital
- Industry
- Medical school/health sciences center
- Alumni
- Community fundraising
- Government
- Research grants

Although industry sponsorship can provide a substantial amount of funding, support from the surgery department/health sciences center (ie, leadership at the home academic institution) is essential for the success of the operation. Faculty and administration buy-in are necessities. Beyond initial funding, the surgery department must remain committed for ongoing sustainability. After all, surgeons and surgery residents are generally the primary users of the laboratory. The simulation center provides a controlled environment where individuals can hone skills to attain competency or mastery without compromising patient safety. The skills laboratory is a training environment for residents as well as a place for continuing education and professional development for practicing surgeons (**Fig. 1**).

Other medical or allied health departments with concurrent interests are potential sources for support. Medical specialties, such as gastroenterology, gynecology, or urology, as well as allied health professionals, such as operating room technicians, nurses, and respective trainees, perform patient procedures or require simulation-based training that benefits from a simulation training center. A shared learning environment facilitates development of a diversified and comprehensive skills laboratory, enhancing the experience for all users. The more specialties and professions that get involved in the training center, the greater the revenue generated. In addition to cost sharing for the initial start-up and establishment of the center, collaboration also provides a strong foundation for ongoing contributions. Multi-departmental collaboration forges bonds and leads to the sharing of space, equipment, students (or users), or educational support. Surveys suggest that shared laboratory training programs are associated with larger space and increased variety and number of simulators, including video box trainers and virtual reality trainers.[2] Other benefits from a pooled commitment from different departments include maximization of faculty members and efforts to manage and oversee the laboratory.

When multiple departments or schools are involved in supporting the cost of such an endeavor, a memorandum of understanding (MOU) should be established. An MOU is a mutual agreement between multiple parties and outlines the utilization and payment strategies of the shared environment. A strong partnership with multiple

Fig. 1. In addition to the benefits to novices and surgeons in training, a skills training center allows practicing surgeons to rehearse skills and stay abreast of current techniques.

programs also increases the laboratory's competitive advantage when seeking grants from external sources.

Endorsement from local hospitals can provide supplementary funding. With a vested interest in improving patient safety, hospitals can save costs from shorter operations and fewer patient complications. These benefits outweigh the steep investment involved with establishing a training laboratory. Like partnerships with other medical departments and allied health disciplines, support from and collaboration with local hospitals will provide a stronger foundation for sustaining the laboratory.

Medical school tuition in the form of laboratory fees is another mode of funding. In addition to residents and practicing providers, medical students also benefit from access to a simulation-based skills laboratory. The growing belief in early education of basic surgical skills, including laparoscopy, has led to increased utilization of simulation-based training centers by medical students. Recently, the American College of Surgeons and the Association of Surgical Education established a Simulation-Based Surgical Skills Curriculum that is increasingly being adopted by medical schools. A recent survey of surgery programs indicated that 69% of laboratories are concurrently used by medical students.[3] In addition, the commitment to educational excellence increases the competitiveness and attractiveness of the medical school, serving as a recruiting tool to incoming medical students.

External support beyond laboratory users can be acquired from federal, state, or local government support or philanthropic donations from alumni, local community organizations, or private entities. Because the aim of charities is to benefit the public good, fundraising activities should emphasize how the community's reputation and overall health is enhanced by the presence of a simulation center within it. For example, the skills laboratory enhances education for current and future health care providers, thus improving the health care for the community. Government funding can also be secured for the laboratory; the election season for local government officials who share support of the laboratory is a strategic time to request funding.

Incremental funding can be acquired from continuing education course fees or research grants. For example, programs that offer certification can charge credentialing fees. For research, funds can be requested in the form of overhead and fringe costs when the laboratory space is used. Use or purchase of supplies for research activities also warrants budget line items. Simulation laboratories can charge fees for activities that use the space, equipment, and personnel for purposes aside from the intended surgical skills training and education. The fees will vary based on factors such as what facilities are available, the capacity for live-animal surgery, the geographic location, and the viable alternatives for a given desired activity.

BUDGETING

Establishing a surgical skills laboratory requires a start-up and maintenance budget. The start-up budget is the initial financial plan for starting the skills laboratory through operation in its initial years. Included in this budget are personnel, physical space, materials, supplies, and training equipment, assuming facility space is already constructed (**Table 1**). Costs are derived from the curriculum and are estimated from the size of residency. Several programs have reported start-up costs as low as $100,000, whereas other laboratories cost up to several million dollars to establish. The average cost of a laboratory start-up is approximately $450,000.[4]

Beyond the start-up, a plan for ongoing support to sustain the laboratory should also be established. Compared with start-up, when most expenditure occurs, maintenance is generally less expensive, ranging from $12,000 to $300,000 annually.

Table 1
Sample budget configuration for principal costs

Budget Items	Estimated Costs ($)
Simulation Equipment	
Fundamental of Laparoscopic Surgery Trainer Box	4715
GI-Mentor Endoscopy Simulator (Simbionix, Cleveland, OH)	64,500
MIST (Mentice, Gothenburg, Sweden)	16,000–25,000
LapSim Basic (Surgical Science, Minneapolis, MN)	39,000
Lap Mentor (Simbionix, Cleveland, OH)	90,000
Extended warranty	Varies per equipment
Operating Equipment and Materials	
Varies per curriculum	
Training laboratory computer	400
Television monitors	200
Portable video recording devices	200
Stapler reloads	3000
Suture	3000
Endoloops (Ethicon, Somerville, NJ)	1000
Task trainer disposables	3000
Animal part resections	800
FLS disposables	800
Building materials	400
Personnel Costs	Varies from part-time to 1.00 full-time equivalent
Facilities Expense	
Lease or rent	Varies per institution
Total	—

Abbreviation: FLS, Fundamentals of Laparoscopic Surgery.

Recurring and maintenance costs include laboratory consumables, personnel, facility fee, and warranty support or upkeep for equipment.[4]

Equipment and Supplies

The initial investment is substantial as most of the capital expenditures occur during start-up. Capital expenses include major equipment, which is defined as property that has an acquisition cost greater than $5000 and has a service or utility life of 1 year or greater. Simulators and operating room equipment, such as laparoscopy towers, are examples of capital expenses. Simulators vary in price depending on the sophistication of technology. Almost all laboratories have box trainers, such as the Fundamentals of Laparoscopic Surgery (FLS) Box Trainer (Limbs & Things LTD, Savannah, GA) or Simulab Lap Trainer (Simulab Corporation, Seattle, WA). Although the number of trainers does not necessarily correlate with the size of the program, most laboratories have an average of 3 trainers.[2] Investment in box trainers is less costly initially; but it can require significant personnel commitment in the long-term, as optimal use of box

trainers requires expert read-time feedback. Self-practice training methods, such as video tutorials, can offset manpower needs and its cost for training.

Virtual reality simulators are extremely expensive. Many training laboratories possess at least one virtual reality simulator. Examples of virtual reality simulators include MIST (Mentice, Gothenburg, Sweden), LapSim (Surgical Science, Minneapolis, MN), or Lap VR Mentor (Simbionix, Cleveland, OH). The advanced technology allows for self-directed training and self-assessment, saving both time and effort for training center personnel. In order to balance the costs of equipment and manpower, relying more on inexpensive low technology trainers in addition to a few virtual reality simulators may be cost-effective. Regardless of laparoscopic training methods, simulation laboratories that serve resident trainees should have the trainers and equipment to allow residents to practice for the FLS certification examination. Additionally, the ability to practice for Fundamentals of Endoscopic Surgery (FES) is recommended, because certification in FES is soon to become a requirement for graduating chiefs wanting to sit for the Qualifying Examination of the American Board of Surgery. With the steep capital investment in equipment, its maintenance should also be considered. Although limited warranties are typically available with the purchase of new apparatuses, the purchase of an extended warranty is recommended, given that replacement or repair of simulators is inevitable and can be expensive. These warranties can cost tens of thousands of dollars per annum, an expense that needs to be budgeted at the time of purchase.

The inventory of the training center also includes consumable materials and supplies necessary for conducting skills simulation training. These costs must also be included in the start-up budget. These items include sutures, absorbable clips, and stapler reloads. Other initial purchases that are necessary for administering skills modules include television monitors, portable video carts, camera lens, and laboratory manuals.

When constructing a budget for equipment or supplies, price quotes from different vendors should be obtained and negotiated accordingly. Although many of these products are available in bulk or prepackaged assortments, items should be purchased according to the needs of the curriculum, required tasks for training, and available resources. Unused items are wasteful over time. Establishing a relationship or rapport with hospitals and industry is also helpful and may also allow savings in costs and donations.

Salaries and Wages

At a minimum, skills laboratories generally require one individual to run and manage activities (**Fig. 2**). Administrative duties include scheduling coordination of learners and inventory management. In addition, personnel must help with the set up/breakdown of training equipment, teaching courses, and evaluating trainees. Having an employed staff can help reduce the time commitment needed from faculty members, but faculty participation can never be eliminated. Although the initial stages may require little support from personnel, increased utilization over time requires at least one full-time employee. As demand increases, other full-time equivalents may need to be added to the staff. The budget must account for salaries and wages of all such personnel involved with the training center.

Determining who is best suited to staff a training center is an important and challenging task. The credentials needed depend on the curricula being taught and the learner groups being targeted. For example, a surgical technician knowledgeable with operating room (OR) instruments and equipment might be sufficient for a training center focusing mainly on teaching residents technical skills. A nurse educator may be required for a training center training multiple professions in both technical and

Fig. 2. Coordinators are necessary for the operation of the skills laboratory. Coordinators manage the laboratory and provide teaching assistance to reduce time commitments from faculty.

nontechnical skills. Larger centers may need to add a PhD educator to help with curriculum development and assessment, or a human factors expert may be recruited to help with research in teamwork or evaluation tool development. As different learner groups are added, more individuals may be hired to focus on a particular component of the training curriculum or type of learner.

Facilities

Physical space dedicated for simulation-based training is necessary for establishing a simulation center. Assurance of space is more feasible and cost-effective by converting available space rather than constructing a new facility. Using space within or nearby hospitals is most convenient; converting unused operating rooms or an existing clinical classroom environment can potentially save costs. Conversely, institutions can elect to renovate or construct a new facility to leverage additional funding. At a minimum, 800 sq ft of space should be allocated for simulators, workstations, monitors, other patient care equipment, and supplies (**Fig. 3**). For budget preparation, the cost of the occupied space is listed as an ongoing cost. In a shared laboratory, facility fees can be divided among each collaborator. For example, the percentage of use by each department or specialty is used to determine the amount of funds that each contributes toward the use of facility, equipment, and materials.

REPRESENTATIVE AND INNOVATIVE FUNDING AND REVENUE EXAMPLES

Funding Examples

Core laboratory model

One funding solution used to address financing of a simulation-based skills training center is to treat it much like a core laboratory used to conduct bench research. Core laboratories are typically common resources housed within a health sciences center or school housing laboratory equipment and materials requiring large capital expenses that are essential to conduct key aspects of research. The cost to obtain the equipment is assumed by the larger health sciences center or school, and multiple

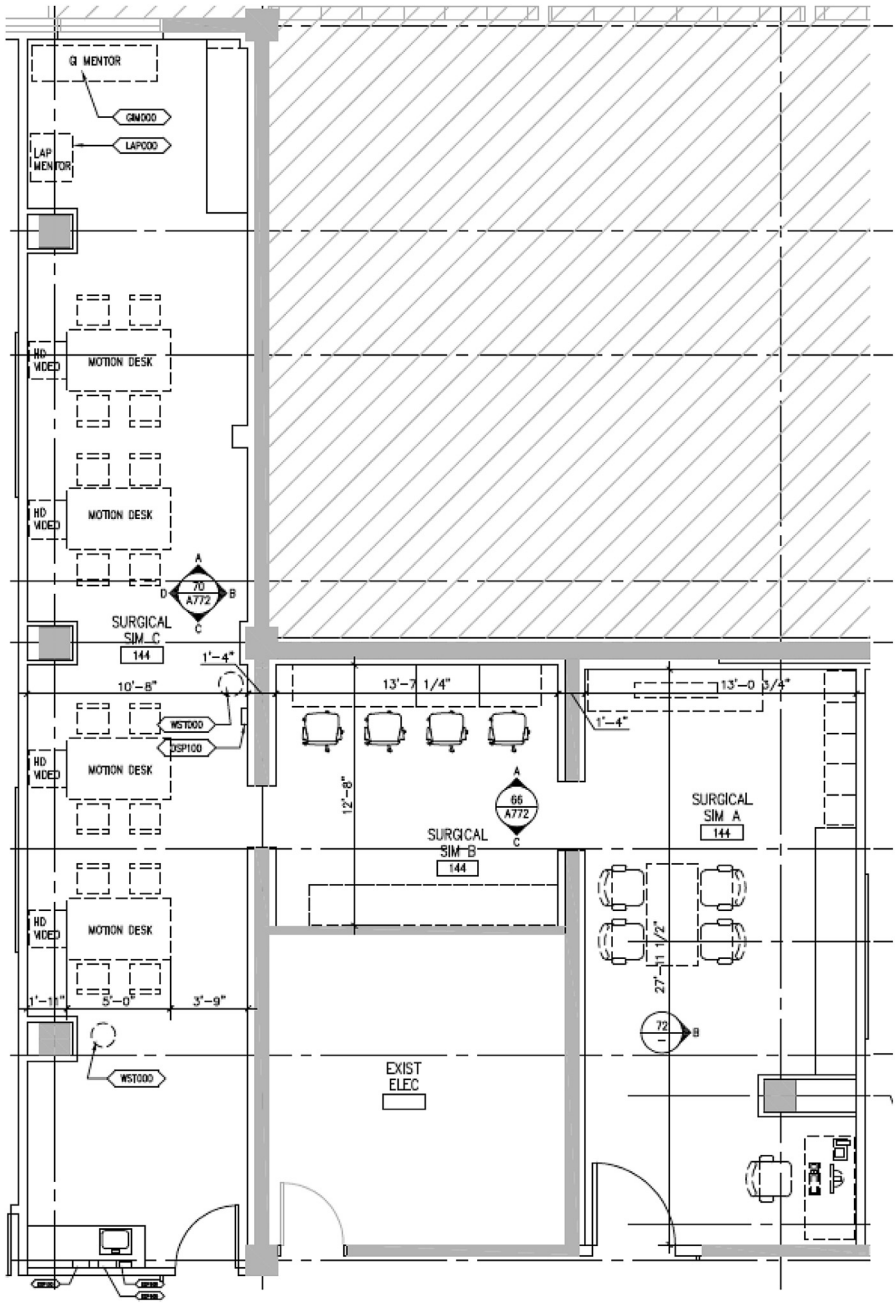

Fig. 3. An example of a surgical skills laboratory floor plan.

research groups share its use. In addition, the core laboratory becomes an in-kind institutional resource that allows groups to apply for larger federal and/or private grants. Thus, although the institution absorbs the initial cost, the core laboratory is a potential multiplier in terms of research grants.

A simulation center can serve much the same function. The space, simulation rooms, high-cost simulators, and other equipment can be housed within a school or health sciences center in lieu of a smaller department, allowing for its use across multiple specialties and professions. Use of the facility could be on a per-use basis or based on mission priorities for the institution. For example, a school of medicine might assume the cost for student-based training and education because it is considered part of the mission of the entity. Continuing professional development activities, on the other hand, may be permitted at a fixed or variable rate. With such a model, capital purchases tend to involve equipment and/or simulators with multi-specialty/profession applications, allowing for optimal utilization of resources.

Pay-to-play model

Another solution to funding a simulation-based skills training center is a pay-to-play model in which user groups assume part of the cost of running the center. Major participant specialties and/or professions may be assessed an annual tuition or fee. This amount might be evenly distributed among the specialties or prorated based on the number of residents/learners in each group. Alternatively, an additional charge based on learners per group might be assessed in order to cover disposables or the like. Major purchases of large-scale capital equipment would be supported through one or all of the user groups based on consensus building. This model ensures that all key user groups have so-called skin in the game, ensuring engagement in center-based decision making and purchases.

Innovative Revenue Examples

Partnering with malpractice insurance companies

One potential revenue source for a skills training center is with malpractice insurance companies. These entities are continually looking for ways to reduce costs and payout amounts and, thus, could be willing to pay for training in certain high-risk procedures or in teamwork in order to lower risk. Such partnerships are particularly likely to occur in situations in which institutions or groups are self-insured, because the incentives benefit both the insurer and the institution. An example of such a revenue partnership is the Harvard CRICO funding of an OR team training project to determine its effectiveness in reducing occurrences.[5]

Training at outside hospitals

Another source of revenue for a training center is from training at outside hospitals. Thus, training is taken on the road in which center personnel travel to designated hospitals to perform technical, nontechnical, or combined technical/nontechnical skills training with hospital staff and physicians based on the needs of the institution. For this in situ training, the hospitals can pay the training center, providing revenue to offset costs of activities at the center itself. Central line placement instruction is an example of a skill-based training activity. Team-based training for low-frequency, high-risk events, such as emergency department delivery, is an example of combined technical/nontechnical training.

Maintenance of certification programs

MOC simulation-based training is already an established component of the American Board of Anesthesiology recertification program. The American Board of Surgery and other surgical specialty boards will no doubt follow suit within the short to midterm. These programs will likely be administered through regional or state-based training centers. Thus, surgeons will be continually searching for MOC courses for which the center can charge tuition to provide revenue.

SUMMARY

Careful financial planning is imperative for establishing a skills laboratory. Support from the surgery department and hospital and collaborations with medical departments are essential for the initial foundation and sustenance of the laboratory. Endorsement can also be attained from external sources, such as industry sponsorship, donations, and miscellaneous activities. When budgeting, all expenses should be justifiable and attuned appropriately, and services should be charged appropriately to all laboratory users. Although initial costs can be substantial, prudent management of finances and proper use of resources will demonstrate how the benefits of a laboratory will outweigh the operational costs over time.

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