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A Stepwise Approach to Robotic Surgery and Effective Set-Up

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Abstract

Background- Purchasing, implementing, and maintaining robots present a number of significant obstacles that must be addressed.

Objective- In managing and setting up a Robotic surgical unit a potentially difficult assignment and summarize the essential procedures and solutions for safe implementation and purchasing in the current financial environment.

Methods- Best practices was developed, implemented, and are still in use today as of 2009. These actions have resulted in a process that effectively monitors the members of the leadership team, attending, resident, fellow, and staff training, credentialing, safety measures, efficiency, and case volume recommendations has been developed using programmatic means.

Results- Examples of management of all robotic surgical services are provided, along with guidelines for hospitals and robotic directors that can be used by one's own robotic surgical services features of a program for multispecialty robotic surgery.

Conclusion- By implementing these best practices, robotic surgical programs will be effective and well-positioned to provide current patients with a secure and productive environment a clinical setting.

Keywords: Robotic assistance, Robotic surgery, Cost, Best Practices, Leadership team, surgical resident training, Certification.

Introduction:-

The benefits of minimally invasive surgery are well known and include shorter hospital stays, significantly less postoperative discomfort, quick return to preoperative levels of activity, less postoperative ileus, and immune system preservation [1]. Specifically, laparoscopic Robot-assisted laparoscopic surgery has replaced urology [2]. The primary considerations affecting surgeons, such as a shorter learning curve and reduced surgeon fatigue, are the key drivers of this significant shift from pure laparoscopic urology to

robot-assisted laparoscopy [2]. The patient factors mentioned above are comparable in our perspective.

Significantly, robotic assistance enables sophisticated laparoscopic surgery to be performed by both open and minimally invasive surgeons. A 3D surgical field with an adjustable magnification is provided by dual video cameras. [3]

Robotic tools have six degrees of freedom of motion, the same as a human hand. There are four degrees of mobility possible with laparoscopic

equipment. By motion scaling, the robot eliminates surgeon tremor, allowing extraordinary dexterity and accuracy during the procedure. The use of robotic technology in operating rooms can have many benefits. For instance, during the actual surgery, the robot can precisely translate the surgeon's hand movements using robotic equipment. Crucially, the robot enables doctors with limited or no experience in laparoscopic procedures to perform difficult surgery. The variety of procedures performed has also risen because to robotic technology. The capacity of the surgeon to perform microdissection is improved by the use of endo-wristed instruments with motion scaling (which prevents tremor) and 3D magnified operative areas. The fast development of robotic technologies has made it possible to execute increasingly sophisticated reconstructive procedures on children [4]. Children's robotic surgery has been aided by tools like 3-5 mm trocars. A crucial development is that single-port and multi-arm (non-central) platforms are accessible on the open market.

As this technology develops, planning is necessary to address the clinical and Financial concerns related to using a robotic system in a hospital. This planning process begins with determining the finances (business planning) and extends through purchase. It also identifies important team members who will train the team as a whole and supervise the clinical and financial governance of the system. Exchanging good practices will aid other institutions in expanding their robotic surgery programs and introducing new robotic surgical tools and techniques. The examination and training pathways for robotic surgery have benefits and drawbacks, but we can keep changing them. But, it's crucial to have a foundation for institutional training, competency, and quality measures. [5,6]

Materials and Methods:-

It was a prospective set up in Department of Surgery for the setting of Robotic unit. Goals and a vision for the robotics program are critical first components and are essential for sustainability. As an academic institution, the aim is to advance with new and innovative approaches using minimally invasive robotic surgery while having the professionals teach others. There are offered sample strategic goals and objectives that can be customized for each organization.

Methodology:-

Clinical to Hospital Administration Collaboration and Financial Implications [6,7]

High levels of team competence and effective teamwork determine surgical results. As a result, surgeons depend on the group. Robotic surgery is no exception, in part because the surgeon is seated at a console and must rely on a group that comprises the person at the patient's bedside who assists with vital chores. For a successful patient outcome, it is essential to educate the robotic (or other) operating room team of nurses, anesthetic personnel, and bedside assistants. The team and team leader must communicate with other employees and mentors in order to offer the assistance and direction required during the training phase. While creating a robotic program, administrators and surgeons must collaborate to establish the needs of the hospital.

In a teaching hospital, teams typically function well together, allowing for intellectual discussion, especially on cutting-edge technologies like robots. Often, they receive support from sizable benefactors or through academic routes. This is crucial for educating the following generation of surgeons and expanding our knowledge of the potential applications of robotic surgery. These programs can be implemented in more remote centers as robotics advances in this manner through research and resident training. [8]

The financial burden becomes more tolerable because the robotic platform has a reduced learning curve. Another argument is that as robotic surgeons gain experience, their operating times decrease significantly and in many institutions, they may even be quicker than human surgeons similar procedure carried out laparoscopically. So, rather than being constant or static, the economic arguments are a dynamic field. Crucially, the early adopters of the robotic technology need to be selected and provided with a curriculum-based training program after the hospital has decided that a budget is available and a prudent financial plan is in place. [9]

Leadership team- [11]

The success of a robotics program depends on the formation of a leadership team. Ideally, a Director of Robotics should be part of this team. According to patient volume, surgical services may also employ an assistant robotics director. The Director and Deputy Director are responsible for maintaining their support for the program's

objectives and mission. They collaborate closely with a Robotics Head Clinical Nurse, a role specifically created for the robotics program. The position of Robotics Manager should also be filled

by a member of the perioperative staff. Last but not least, a robotics coordinator is a crucial part of a robotics program.

Table 1- Robotic Leadership team and Role

Leadership Team Member	Role
Robotic Director	Provide leadership, vision, implementation of programmatic components, justification of equipment purchase, and monitoring of credentialing
Assistant Robotic Director	Provide leadership, assist Robotics Director with high-volume programs
Robotics Clinical Head Nurse	Monitor and assist with team training, supervise operating room staff, certify staff, and communicate with Robotic Director regarding any problem with robotic technology or robotics staff
Robotics Coordinator	Monitor equipment, instrumentation, staff training; preference card, inventory, and troubleshooting; maximize utilization,
Robotics Manager	Schedule and monitor utilization, collect metrics data, actively manage operating room coordination of robotic cases
Robotics Advisory Board	Holders of all positions described above, all robotic surgeons (anesthesia staff added when indicated)

It is advantageous to establish an internal robotics advisory board, which should be comprised of all currently practicing robotic surgeons, robotics directors, robotics nurses, and a robotics coordinator the perioperative personnel, anesthesia staff, and chosen robotics staff. This group can be divided into different groups to accomplish different objectives (such as starting the first robotic buy versus making later equipment purchases) and has a flexible meeting schedule. Robot user meetings, which can include all members of the Internal Advisory Board, can be scheduled as needed (e.g., monthly, quarterly, or annually).

In order to communicate with the Anesthesia Department regarding robotics surgical cases, collaboration with the Anesthesia Department was established to build a Robotics Advice form. Based on the amount of cases and surgeons who wanted to employ the robotics system, robotics systems were expanded.

Robotic Surgical Training-

Without the necessary training, robotic surgery cannot be started [7]. The most popular robotic operation being performed today is the radical prostatectomy using a robot. There is growing evidence that using a robot to assist the surgeon has important advantages for both the patient and

the surgeon, particularly in terms of reducing operating time and operator fatigue [2]. In comparison to an experienced open surgeon, a fellowship-trained laparoscopic surgeon has a similar, quick learning curve for robotic prostatectomy. Animal model training in robotics, prior to human application, is effective. Most of all robotic surgeries were initially tested in an animal model.

The surgeons who are committed to robotic surgery are the first group to join. It's important to note that robotic surgery programs progress deliberately and frequently slowly. Each phase needs audit cycles that critically evaluate the performance of the robotic team as a whole, not just the surgeon team to ensure safe and successful outcomes, operating room leaders should have the authority to provide performance comments at each stage of the procedure. This process is the most satisfying after the team starts using it.

An important and early step is team training. The best outcomes can be achieved by using a common learning instrument, such as an objective-based curriculum that is visible and interactive. This should enable gradual foundation construction based on experiences (modular). To learn more a more specialized skill set is required for the specialist team member who has to

comprehend certain operational details [12]. The general robotic crew needs to be familiar with the setup, drape, and both electrical and mechanical troubleshooting before moving on to the next step. Cross-specialty training programs are now offered [13], along with didactic sessions, video-based modular training, dry laboratories, and access to cadaveric instruction [14]. The team training program must prioritize the development of non-technical abilities. These human elements are essential for a smooth patient experience during a robotic-assisted operation [15].

Resident Training:-

While surgical educators in resident training facilities using robotic surgery are still responsible for instructing residents in surgical management,

they now have a new barrier to overcome to participate in and carry out a procedure while not physically seated at patient side

Three steps are involved in attempting to train with emerging technologies, according to Sachdeva et al. [10]. (i) perceptual awareness, which includes mental imagery and cognitive comprehension of the procedure; (ii) guided, modular learning with an immediate mentor feedback to ensure proper learning; and (iii) autonomous learning refinement to increase accuracy and productivity. The curriculum for the ERUS host robotic training center, which is based on modular training, includes these procedures, which are obvious to any expert teacher [12].



Requirements for resident training:

- Eight hours of documented training on the robot, to include work on inanimate models, docking practice, time with the Intuitive representative, proctoring by upper level residents, and individual practice of techniques.
- Online training.
- Bedside assisting in at least 10 cases.

Once the first 3 requirements are completed, the resident or fellow can submit the above information to the residency and fellowship

Monthly and Quarterly data Metrics-

The robotic program's thorough oversight enables tracking of patient results and application of

director and then sit at the robotic console at the discretion of the attending surgeon.

metrics to daily practice, specific providers, and overall evaluation for program expansion planning.

Table 2- Metric data

Monthly metrics	Quarterly Metrics
Case volume summary	Overall number of cases
Utilization	Length of robotic surgery
Robotic procedures	Major and Minor complications
Procedure summary- patient in to out Operative time Estimated blood loss	Case listing
Cases by date	Total %of readmissions
	Financial charts
	Mortality list

A robot orientation session and hands-on system training lasting 1-2 hours with an Intuitive Surgical representative, a treating physician, are included who is robotically qualified, a fellow, or a chief resident. This workshop covers the elements and appropriate usage of the da Vinci Surgical System and EndoWrist Instruments through didactic and hands-on skill exercises. Key da Vinci System functions, system setup, and management are covered in-person training. [14,15]

Case volume requirements-

In our experience, selecting a qualified surgeon at the outset is crucial for doctors interested in robotic surgery who will continue to be competent, etc. If this case volume threshold is not attained, internal advisory board members will assess each case and provide a recommendation to the department chair regarding whether privileges should be discontinued or continued with a proper monitoring plan.

Future Prospects-

Leadership, communication, task overlap, and standardization are the main points of emphasis. Further efficiency and cost savings can be attained by reviewing the process and examining every area of the robotics program (such as the sterile processing unit, par levels, and tray component evaluation). Robotics is also being used into physician Assistant (PA) Program which will help to increase the educational initiatives regarding exposure to robotic surgery of the PA Program. With the introduction of robotics into more surgical specialties, new practices could develop. The idea of a "committee for innovation" that would oversee the introduction of new robotic platforms for patient usage. By planning for further equipment that would enable robot-assisted surgical operations, reviewing surgeon credentials, and doing so. [15]

Conclusion:-

Robotic surgery programs are a great representation of a surgical practice in which different standards for training, certification, and monitoring are being developed ideal. By properly allocating roles and holding people accountable within healthcare systems, best practices can be implemented without adding unnecessary load to the system. Changes to the strategies mentioned are encouraged, and procedures will evolve over time. The ultimate aim is to provide safe and efficient patient care.

Conflict of Interest- None declared

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