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Educational note: teaching and training in robotic surgery. An opinion of the Minimally Invasive and Robotic Surgery Committee of the Brazilian College of Surgeons

Nota educacional: ensino e treinamento em cirurgia robótica. Um parecer da Comissão de Cirurgia Minimamente Invasiva e Robótica do Colégio Brasileiro de Cirurgiões

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A B S T R A C T

With the expansion of robotic surgical procedures, the acquisition of specific knowledge and skills for surgeons to reach proficiency seems essential before performing surgical procedures on humans. In this sense, the authors present a proposal to establish a certification based on objective and validated criteria for carrying out robotic procedures. A study was carried out by the Committee on Minimally Invasive and Robotic Surgery of the Brazilian College of Surgeons based on a reviewing strategy of the scientific literature. The study serves as a reference for the creation of a standard for the qualification and certification in robotic surgery according to a statement of the Brazilian Medical Association (AMB) announced on December 17, 2019. The standard proposes a minimum curriculum, integrating training and performance evaluation. The initial (pre-clinical) stage aims at knowledge and adaptation to a specific robotic platform and the development of psychomotor skills based on surgical simulation. Afterwards, the surgeon must accompany in person at least five surgeries in the specialty, participate as a bedside assistant in at least 10 cases and perform 10 surgeries under the supervision of a preceptor surgeon. The surgeon who completes all the steps will be considered qualified in robotic surgery in his specialty. The final certification must be issued by the specialty societies affiliated to AMB. The authors conclude that the creation of a norm for habilitation in robotic surgery should encourage Brazilian hospitals to apply objective qualification criteria for this type of procedure to qualify assistance.

Keywords: Simulation Training. Education, Medical. Robotic Surgical Procedures. Curriculum. Preceptorship. Robotic Surgical Procedures. Curriculum. Preceptorship.

INTRODUCTION

The increasing application of technological advances in medicine has raised concerns among patients, surgeons, and hospitals about how to introduce and use them safely and effectively in clinical practice. There is a lack of evidence-based strategies for the acquisition of new surgical skills in practice, especially when it involves the use of new technologies[3]. Hospitals do not have objective practical guidelines on how to authorize doctors to use new technologically dependent procedures for patient care[4,5]. The challenges involved in accreditation and granting privileges to perform these types of procedures are compounded by expectations and pressure from patients, health administrators, device manufacturers and surgeons themselves[4,5].

The best way to allow surgeons to incorporate the robotic tool efficiently into clinical practice, while

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ensuring safety and quality, remains a significant challenge especially when they need to do it outside a Medical Residency or Fellowship program, which offer longitudinal learning of knowledge and development of surgical skills[1,3].

A minimum training curriculum for performing robotic surgical procedures aims to acquire specific knowledge and skills so that the surgeon reaches a certain level of proficiency before performing surgical procedures on humans ("pre-clinical" training).

The qualification process must ensure that those surgeons who receive credentials overcome the technical learning curve so that they can provide safe and effective care to their patients.

In this sense, the authors, designated members of the Minimally Invasive and Robotic Surgery Committee of the Brazilian College of Surgeons (CBC), present a proposal for establishing certification based on objective and validated criteria for performing robotic procedures.

METHOD

Bearing in mind the peculiarities of each country and health system in relation to the qualification process of surgeons in robotic surgery and the absence of legal regulations in Brazil, was carried out by the national directory of the Brazilian College of Surgeons (CBC) review on the topic. This was carried out by the CBC's Committee on Minimally Invasive and Robotic Surgery and included a review of the scientific literature in the databases of PubMed, Lilacs and SciElo, including articles in English or Portuguese, published between 2005 and 2020. Content published in books, non-indexed publications, and government decrees available on the internet and considered relevant by the authors were also used. This review serves as a reference for the creation of regulations for the qualification and certification in robotic surgery, in response to the determination of training in robotic surgery in Brazil, according to a statement from the Brazilian Medical Association (AMB), announced on December 17, 2019[6].

Fundamental concepts

In this process, some concepts must be well specified[6-9].

Privilege: process in which specific scope and content related to patient care services (clinical privileges) are authorized to a healthcare professional by a healthcare organization (in this case, the hospital) based on the assessment of the individual's credentials and performance. Privilege is determined by qualification.

Qualification: set of theoretical knowledge and specific practical skills developed by a specialist physician, derived from, and related to one or more areas of expertise or medical specialty.

Provisional qualification: period of provisional privileges after demonstration of competence through the determined criteria for qualification. The term or number of cases during this period should be determined by the head of service or by the appropriate institutional committee or council.

Competence: determination of an individual's ability to perform the proposed activity with defined performance expectations.

Credentials: documented evidence of licensing, education, training, experience, or other qualifications. Conceptually expresses the certification.

The granting of privilege to perform robotic surgery should be under the responsibility of the institution where the surgeon works, specifically under the responsibility of the hospital's technical director. The institution can base decisions through an institutional committee ("accreditation commission") or a management board[4]. This committee should use objective criteria based on the recommendations from the Associations representing the surgical specialty[6,9].

Surgical proficiency should be assessed for each surgeon and privileges should not be granted or denied based solely on the number of procedures performed. Surgical proficiency should be assessed for each surgeon and privileges should not be granted or denied based solely on the number of procedures performed. The reason is that although there is a minimum universal number of cases that most surgeons need to perform to demonstrate proficiency, the total number of cases for proficiency can be influenced by several factors. Among these are the surgeon's innate skill level, previous laparoscopic experience, the density of cases during the initial learning curve and the presence or absence of collaborative learning between peers[10].

OBJECTIVE

Creation of, uniform, universal, clinically strong objective criteria based on experimental and clinical training for the granting of a certificate of qualification for performing robotic surgeries. This certification will be granted by the Brazilian Medical Association (AMB) through the Brazilian College of Surgeons (CBC), with or without other Surgical Societies or activities areas[6,9].

PREREQUISITE

The professional with a previous qualification and specialty record (QR) in the surgical area will be able to qualify in robotic surgery.

Training Proposal For Enabling Purposes

I - INTRODUCTION TO THE ROBOTIC SYSTEM[6-14]

1. Introduction to the robotic platform.
2. Product training (web-based with specific certification).

Goals

a) Identify the different components, configurations, and general resources of the robotic platform.
b) Demonstrate the appropriate configuration procedures, troubleshooting and system emergence, necessary to safely operate the robotic surgical platform.

II - THEORETICAL-PRACTICAL TRAINING IN THE ROBOTIC PLATFORM (“IN-SERVICE”)[6-14]

1. Preparation in the operating room of the robotic platform.
2. System set-up.
3. Docking.
4. Troubleshooting.
5. It involves theoretical-practical classroom situations by the platform inside a surgical room (or simulation center).

Goals

a) Know how to organize and configure the robotic platform and respective systems (set-up), including the placement of sterile plastic on the robotic arms.
b Demonstrate how to correctly position the robotic surgical platform for different surgical procedures.
c) Analyze possible problems that may affect the proper configuration and fit of the robotic surgical platform.
d) Demonstrate safe disengagement and removal of the robotic surgical platform from the surgical field in an emergency.

Method

a) Preoperative stage:
- Organization of systems.
- Ergonomic position.
- Docking.
- Robotic trocar.
- Operating room organization.
- Resolution of situations.
- Response to system errors.

b) Intraoperative stage:
- Exchange of instruments.
- Operational field safety.
- How to respond if the system makes potentially unsafe movements for the patient.

c) Postoperative stage:
- Transition to the surgical field.
- Offshoot.

d) Staff training and communication skills:
- Checklist 1: Preoperative.
- Checklist 2: Docking of the robotic tool.
- Checklist 3: Intraoperative.
- Team communication regarding the use and transfer of instruments.
- Accounting and removal of foreign objects.
- Periodic checks to discuss the progression of the case, the continuity of the team members and other problems.

- Regular communication with anesthetist.
- Checklist 4: Deployment.
- Checklist 5: Debriefing.

Didactic knowledge to be demonstrated

a) Placement of trocars.
b) Location and spacing of the portals.
c) Access injuries.
d) Incorrect positioning of the portals.
e) Incorrect depth of positioning and introduction.
f) Portal in previous scar area.
g) Non-conference of post-introduction injuries.
h) Failure to view the tip of the trocar.
i) Demonstration through videos.
j) Correct use of the closed, open, or optical trocar technique.
k) Puncture accidents.
l) Collisions of arms at the bedside due to improper positioning.
m) Correct and incorrect portal positions (external and internal view).

Evaluation

A fundamental step in the training process, the assessment must be done objectively. Petz et al.[15] suggest a scale of competence for this phase of training (Table 1).

Table 1. *Scale of competence for robotic procedures[15].*

SPECIFIC SKILL	RATE
Robot Docking	
- Positions robot with an incorrect angle with respect to the operating table, at an inadequate distance, needs assistance to complete the docking; docking procedure takes more than 10 minutes	1
- Correctly positions the robot, needs some help in docking robotic arms; docking procedure takes between 5 and 10 minutes	2
- Docks the robot in the correct position without the need for help, in less than 5 minutes	3
Trocar Positioning for the Chosen Surgical Procedure	
- Wrongly chooses trocar position, needs to reposition robotic arms during the surgical procedure owing to external conflict	1
- Needs supervision to correctly choose trocar position	2
- Correctly chooses trocar position without supervision, no need to reposition robotic arms during the surgical procedure owing to external conflict	3
Coordination of Masters and Pedals	
- Frequently uses clutch as instruments are often in internal conflict or outside the field of view; is forced to frequently move the camera to check the correct positioning of surgical instruments	1
- Takes time to avoid internal conflict and frequent clutch using	2
- Uses clutch only when moving from one task to the following task, appropriately moves camera in the surgical field	3
Use of Robotic Third Arm	
- Tends not to use third arm and to perform scheduled tasks with the aid of only two instruments	1
- Uses the third robotic arm to perform scheduled tasks but occasionally creates conflict between arms	2
- Uses third arm to correctly expose surgical field as an aid to successfully performing scheduled tasks	3
Bimanual Coordination	
- Tends to perform tasks only with the dominant hand, without correct use of non-dominant hand for exposure	1
- Uses two hands with suboptimal coordination	2
- Correctly uses and coordinates two hands for exposure and task performance	3
Autonomy	
- Unable to perform the scheduled task, even with verbal help	1
- Able to perform the scheduled task only with verbal help	2
- Able to perform the scheduled task without help	3
Total	6 - 18

III - POST SYSTEM TRAINING (PRE-CLINICAL): CURRICULUM FOR THE DEVELOPMENT OF PSYCHOMOTORAL SKILLS[6-13,15-17]

Goals

a) Train, using simulation in inorganic, organic or virtual models, the main robotic psychomotor skills that include:
- Manipulation of the endowrist.
- Camera navigation.
- Clutching of instruments.
- 4th arm application.
- Energy application.
- Thin dissection.
- Direction and positioning of the needle.
- Performing knots, sutures, and anastomoses

b) Demonstrate when executing essential psychomotor skills on the robotic platform in inorganic, organic or virtual models:
- Depth perception.
- Manual dexterity.
- Efficient movements.
- Sensitivity to appropriate force.
- Autonomy.
- Competent use of robotic controls.

c) Translate the main robotic psychomotor skills to perform these skills on the surgeon's console of the robotic surgical platform, using surgical simulation.

Methods

1. Virtual Reality Simulation[11,16-18]

There are several virtual reality simulation systems that reproduce with greater or lesser quality and similarity the activities of the surgeon on the console. All simulators have exercises of varying complexity that reproduce movements and situations of robotic surgery. The exercises are evaluated objectively and have proficiency criteria. Once registered, the surgeon has the possibility to evaluate his performance throughout the training. A curriculum of specific exercises for each type of simulator will be suggested, as well as the minimum number of hours of training and the requirement for proficiency in selected exercises.

2. "Real" simulation

Simulation performed on a robotic platform with inanimate objects. Group led by Richard Satava[12] developed a sequence of exercises, defined as the Fundamental of Robotic Surgery (FRS), performed in a structure called Dome that involves movements that reproduce situations existing in robotic surgical procedures. Exercises used historically in laparoscopic simulators can be used if they are organized with objective evaluation criteria. The problem with this step is the availability of a platform and robotic instruments for this type of activity.

Evaluation

Unlike the virtual reality simulation in which the system itself objectively evaluates the student's performance, the real simulation needs to define objective evaluation criteria. Thus, one or more trained observers, in person or by video recording of the exercise (ideal = internal and external image), will evaluate the student. Criteria based on time and specific errors can be used for each exercise or standard assessment model like Global Rate Scale (GRS) or variations such as GOALS[19] (developed for laparoscopy) or GEARS[20,21] (developed for urological robotic surgery) that emphasize the perception of depth, precision of movements, strength in handling tissues, dexterity and efficiency in performance tasks.

3. Simulation in organic models[10,13]

Simulation on the robotic platform with organic material (animal carcass, human corpse, or live animal). Although not considered mandatory[6], this model is desirable since it is the closest to robotic surgery in patients, not only in relation to surgical technique, but also in human relationships and in the organization of systems. It is a pedagogical activity of great complexity and organizational cost, since it uses platforms totally dedicated to simulation and requires a large physical space.

Tasks

- Performing surgical procedures - complete procedures or specific movements with specific objectives.
- System preparation training, docking, and positioning of portals.
- Training on the surgeon's console
  - Camera navigation and control.
  - Use of the energy system.
  - Clutching.
  - Exchange of instruments.
  - Foreign body management.
  - Control of robotic arms.
  - Eye-hand-instrument coordination.
  - Management of the endo-wrist.
  - Atraumatic tissue management.
  - Fine and coarse dissection.
  - Cutting.
  - Targeting needle.
  - Knot, suture, and anastomosis.

Evaluation

As in the "real simulation", criteria based on specific time and errors can be used for each exercise or Global Rate Scale (GRS) assessment model such as GOALS[19] or GEARS[20, 21].

IV - CLINICAL TRAINING UNDER TUTORING

Introduction

The surgeon's time in surgical activity on the robotic platform console represents the final component of any robotic surgery training and habilitation process[10]. Regardless of the amount of training in the preclinical stage, a marked learning curve will be found when the surgeon operates in a live clinical environment[10]. As such, it is crucial that this training stage is well structured and includes an interactive process of objective performance evaluation. Ideally, this would involve gradual progression of defined tasks and steps for each of the surgical procedures, based on the degree of difficulty and under the direct face-to-face supervision of a specialist robotic surgeon, alongside the surgeon (surgeon preceptor - "proctor")[7,10,11,22].

The preceptor surgeon plays an important role in the gradual initiation of the new robotic surgeon. In structuring and developing curricula, the surgeon-preceptor becomes necessary to achieve a high level of results in adapting the beginner to robotic procedures, providing an evaluative feedback throughout the training process[10,22,33].

The specific surgical procedure must be clearly defined by the steps necessary to complete the operation, from the initial positioning of the patient to the final removal of the portals and the patient's recovery, as in the model demonstrated for colorectal surgery, for example[15,23]. When the surgeon obtains proficiency at a specific stage, through a formal assessment, based on the judgment of a specialist surgeon, he will be transferred to the next stage of the procedure, which is sequentially more complex[22]. Eventually, the surgeon will be able to integrate the skills learned and practiced during each stage and complete the entire procedure. The learning process can be further enhanced with video recording and review of operational performance with a mentor or specialist surgeon, as it provides valuable training feedback to the trainee[13]. Recent advances in telemedicine technology, with the use of a conventional Wi-Fi connection, favor the growing use of this route. Considering the complexity of organizing an educational project that involves repeated face-to-face tutoring, the use of remote surgical guidance by teleconference by synchronous video-transmission (tele-mentoring) can be an interesting and cost-effective educational tool[24-27]. The use of telemedicine for distance tutoring of the surgeon in training can be useful, especially for subsequent or more complex cases, provided that proper tutor/surgeon integration is established, in addition to a safe and effective technological structure of communication.

Prerequisites

- Carrying out the previous training steps.
- Observation of robotic surgical procedures.
- Participation as an assistant in the surgical field of a specific number of surgical procedures (bedside-assistant). The ability to effectively

assist these robotic procedures demonstrates that the surgeon has acquired knowledge of the steps of the procedure, the ability to work in the robotic environment, knowledge of the robot's functionality and limitations, as well as the strategies and techniques used by the main ("console") surgeon to complete the specific procedure. The number of cases recommended in this function remains without consensus, although most reports suggest a minimum of 10 cases during training in robotic surgery[28,29].

- How robotic surgical skills degrade substantially after weeks of inactivity in newly trained surgeons the first supervised case must be performed no more than two months after the end of the initial training. Otherwise, the training must be repeated[11].
- Surgical procedures must be performed under the tutorship of a surgeon qualified in robotic surgery and with documented experience in the surgical procedure to be performed[6,9,11].
- After completing a minimum of 10 supervised procedures, the surgeon's next robotic procedures may not be supervised, but should be subject to review by the institution.
- As robotic surgery has long learning curves (between 25 to 90 procedures, even for experienced laparoscopic surgeons[30-32]), new robotic surgeons should be limited, in the first cases, to only basic procedures[11]. In general, it is expected that the surgeon will become proficient in less complex cases before receiving privileges to advance to those with the greatest degree of technical difficulty. However, Syner et al.[31] demonstrated an attenuation of the learning curve when the surgeon is trained in a well-structured robotics service with a large volume of cases. This is expressed in a bimodal presentation curve for colorectal robotic procedures with 15 initial cases, followed by about 25 to 30 cases for complete proficiency. Thus, it is likely that in situations of isolated training, the performance of a greater number of tutored cases is necessary to ensure patient safety. In situations where training is carried out in more structured robotic surgery services, with a training center, a high volume of patients and a team of fixed tutors, fewer tutored procedures will be requested. Rice et al.[33], specifically discussing the learning curve in robotic gastroduodenal pancreatectomies, argue that proficiency-based curriculum associated with tutoring allows safe introduction to these complex procedures even for less experienced surgeons (in the study, resident doctors). Shaw et al.[32], in a case-control study in colorectal and laparoscopic robotic surgery, concluded that complex robotic surgical procedures can be safely performed by laparoscopic surgeons even at the beginning of their experience, although complications are reduced after 15 cumulative robotic cases. This study shows that the decrease in operative time and improvement in surgical results can occur while the complexity of the cases increases. These results support the use of objective criteria to select easier cases for the first 15 colorectal robotic procedures of the learning curve.
- Surgeons who complete the recommended training path are eligible to grant surgical privileges for robotic surgical procedures by the institution from certification granted by the Brazilian Medical Association (AMB) in partnership with the Brazilian College of Surgeons (CBC) and other specialty societies or areas of expertise[6].
- Surgeons should not be allowed to schedule or perform clinical cases completely autonomously until they receive provisional qualification from the institution, based on the CBC / AMB certification[6].

Phases

1. Observation of Cases in the Operating Room

Goals

- Define the roles and responsibilities of each

member of the robotic surgical team.
- Define the appropriate configuration and application of the robotic surgical platform.
- Recognize the application of communication skills related to the performance of the robotic surgical team.
- Examine the appropriate clinical application of the robotic surgical platform during the surgical procedure.

2. Surgical Aid (Bedside Assistant)

Goals

- At least 10 cases[11].
- Understand the flow of the robotic surgical procedure, the functions of the operating room and surgical team.
- Understand and perform the appropriate configuration of the robotic surgical platform.
- Translate the basic first assistant skills needed in robotic surgery, which include:
  - Camera navigation.
  - Insertion and removal of instruments and other materials such as wires, gauze, parts, secretion aspiration, etc.
  - Transfers of movements between internal robotic part and auxiliary actions (laparoscopic) such as cutting, retraction, suction, irrigation, energy use and application of Hemoclips.
  - Undocking.
  - Removal of surgical parts.
  - Conversion to laparoscopic or open surgery.
  - Withdrawal of the trocars.

3. Performing Robotic Surgical Procedures under Mentoring

Goals

- Translate the skills needed for robotic surgery as a primary surgeon on the robotic platform console under the tutelage of a qualified surgeon. They include:
  - Manipulation of the instruments endowrist resource.
  - Camera navigation.
  - Clutching of instruments.
  - Application of the 4th arm.
  - Energy use.
  - Needle manipulation and positioning.
  - Performing knots, sutures, and anastomoses.

Evaluation

OIdeally, the qualification should be based on demonstrated proficiency and not just on the specific number of completed cases or on the evaluation of static times spent on the robotic platform. As in simulation, an objective assessment model can be used, such as the Global Evaluative Assessment of Robotic Skills (GEARS), proposed by Goh and collaborators and directed to Urology[21]. This performance assessment tool can be effectively applied to any surgical specialty. In this study, the variable "depth perception" proved not to be an element capable of differentiating individuals with different levels of experience. This is because the ideal three-dimensional view provided by the Da Vinci system allows untrained surgeons to have excellent scores on this item. It seems reasonable to omit the "depth perception" parameter, making it a five-item scale with a maximum score of 25 points ("GEARS" modified). Hospitals must determine expected results for surgeons experienced in using robotic surgical systems (50 or more procedures) in their institution, using criteria such as: total operating time, estimated blood loss, complications, etc. All of this should be recorded[11].

V - POST-TRAINING - CONTINUING EDUCATION

"Advanced" procedures

Some authors[11] suggest criteria for granting privileges for advanced procedures. To be eligible for the change from basic to advanced privileges, the robotic surgeon must have completed a minimum number of successful basic procedures without complications or other problems. It is prudent that if a surgeon wishes to perform a new procedure, he or she must complete the appropriate specific training to perform this procedure. For the first new robotic procedure, the guidance, preferably face-to-face, of a qualified surgeon who has extensive experience in performing this procedure must be required.

Maintenance of Robotic Surgery Skills:

A plan should be formulated for the maintenance and development of robotic psychomotor skills. Continued training in robotic surgery using simulation, especially virtual, should be encouraged. A program that involves a specific curriculum with specific objectives, a minimum number of weekly training hours, an objective performance evaluation and the possibility of debriefing would be ideal. The use of private social media that allow the submission of videos for the evaluation of specialist surgeons, can be interesting and useful in the technical development of the surgeon[7,13]. Appropriate level of continuous clinical activity is also required. The surgeon must be up to date, carrying out the minimum necessary number of cases, annually and duly accompanied by the criteria of quality of care determined by the institution. In addition, it is important that the surgeon routinely participates in robotic procedures as a bedside assistant to maintain familiarity with the instrumentation and the robotic platform, in addition to being aware of the problems and situations that may occur during these procedures. Continuing medical education related to robotic surgery is essential. Participation in local meetings and national or international courses on the topic should be encouraged.

Maintenance of Privileges in Robotics

Once the qualification is granted, the surgeon's performance must be monitored by quality care mechanisms determined by the institution. These mechanisms can be modified as appropriate and should assess the results and competence, in comprehensive patient care[11]. As virtual simulation training for robotic surgical systems continues to be validated and more widely available, Advancing Minimally Invasive Gynecology Worldwide (AAGL) in its guidelines[11] suggests that in the future all robotic surgeons are required to demonstrate proficiency annually in a robotic simulator or equivalent.

SPECIAL SITUATIONS

Preceptor Surgeon - "Proctor"

Robotic surgery assumes a more efficient and safer surgical procedure for the patient[2]. In this context, the preceptor surgeon should be the vector that will allow beginning surgeons to acquire technical competence in a faster and safer way[10]. The preceptor surgeon needs to have proven experience in his / her specialty, to be a full member of the Brazilian College of Surgeons or to a specialty society linked to the Brazilian Medical Association and to be properly certified in Robotic Surgery[6]. The minimum experience required is 35 to 50 robotic procedures in the specialty in which you will practice preceptorship[6,9,11,22]. It is not necessary that the preceptor always be the same, as surgical procedures may vary as well as the preceptor's availability. However, the preceptor must supervise the certification surgeon only in robotic surgical procedures related to his specialty. The identification of the preceptor must be included in the documentation of registration of the surgery.

Courses

The industry must offer pedagogical tools so that the surgeon can learn about the different aspects, components and functioning of the robotic platform, corresponding to training in specific "hardware" and "software"[14]. However, courses must be organized by recognized and independent educational institutions and, in cooperation with scientific and surgical associations[15]. A course alone does not enable a surgeon to perform robotic procedures independently, but it is a fundamental and initial step in training. The conclusion should be considered only as preparation for carrying out the clinical training stage under tutorship.

Ultimately, the preclinical training steps should be carried out in courses, in most cases. These courses may be accredited or certified both by the industry depending on the need for mastery and knowledge of specific robotic platforms, as well as by specialist associations as they contemplate the necessary training steps to enable robotic procedures[6,9,10]. Surgeons who have completed a Residency or Fellowship program that incorporate a structured curriculum in minimally invasive and robotic surgical procedures, including adequate clinical experience, may be able to qualify. In this case, the coordinators of the educational program and the institution must provide the training documentation and the necessary clinical experience, which will be analyzed by the CBC Committee on Minimally Invasive Surgery and Robotics or by the Specialized Society of Surgery, for the purpose of providing a certificate of qualification.

CONCLUSION

A robotic surgery program in a hospital must be non-exclusive and aggregating. It is essential to integrate assistance, teaching and research from the beginning and create a minimum structure for training and retraining in robotic surgery within the institution or in partnership with training centers. In addition, it must encompass all surgical specialties (General, Digestive, Bariatric, Oncological, Thoracic, Cardiovascular, Colorectal, Head and Neck, Urology and Gynecology) within the concept of "Robotic Surgery Service". The creation of a normative for qualification in robotic surgery prepared by the Commission of Minimally Invasive and Robotic Surgery of the Brazilian College of Surgeons in partnership with the Brazilian Medical Association should encourage Brazilian hospitals to welcome and apply objective qualification criteria for this type of technologically dependent procedure. In addition to assisting in the structuring of services and the development of robotic surgery, the creation of qualification criteria should have an important influence on the provision of high quality and safe care to patients.

The normative proposes a minimum curriculum for the development of proficiency for performing robotic surgical procedures. The curriculum must integrate training and objective performance evaluation. In summary, the training will consist of a pre-clinical stage aimed at knowledge and adaptation to a specific robotic platform and the development of psychomotor skills based on surgical simulation. The use of organic models, animal or human cadavers or experimental animals is not mandatory. Once this step is over, the surgeon must: 1) to accompany in person, at least, five specialty operations, performed by a preceptor surgeon; 2) participate as an assistant surgeon (bedside assistant) in at least 10 cases and; 3) finally perform 10 operations under the supervision of a preceptor surgeon. The preceptor surgeon must be duly qualified in robotic surgery and have a minimum experience of 35 to 50 robotic procedures.

The surgeon who completes all the steps described above will be considered qualified in robotic surgery in his specialty. The final qualification certification must be issued by specialty companies affiliated to AMB.

R E S U M O

Com a expansão da realização de procedimentos cirúrgicos robóticos, a aquisição de conhecimentos e habilidades específicas para que o cirurgião alcance proficiência antes de realizar procedimentos cirúrgicos em humanos torna-se fundamental. Neste sentido, os autores apresentam uma proposta de estabelecimento de uma certificação baseada em critérios objetivos e validados para a realização de procedimentos robóticos. Um estudo foi executado pela Comissão de Cirurgia Minimamente Invasiva e Robótica do Colégio Brasileiro de Cirurgiões baseado em uma estratégia de revisão da literatura científica. O estudo serve de referência para a criação de uma normativa para a habilitação e certificação em cirurgia robótica de acordo com comunicado da Associação Médica Brasileira anunciado em 17 de dezembro de 2019. A normativa propõe um currículo mínimo, integrando treinamento e avaliação de desempenho. A etapa inicial (pré-clínica) visa o conhecimento e adaptação a uma plataforma robótica específica e o desenvolvimento de habilidades psicomotoras baseada em simulação cirúrgica. Após, o cirurgião deverá acompanhar presencialmente pelo menos cinco cirurgias na especialidade, participar como cirurgião auxiliar em pelo menos 10 casos e realizar 10 cirurgias sob supervisão de um cirurgião preceptor. O cirurgião que concluir todas as etapas será considerado habilitado em cirurgia robótica em sua especialidade. A certificação de habilitação definitiva deverá ser emitida pelas sociedades de especialidades filiadas à AMB. Os autores concluem que a criação de uma normativa para habilitação em cirurgia robótica deve estimular que os hospitais brasileiros apliquem critérios objetivos de habilitação para este tipo de procedimento, no sentido de qualificar a assistência.

Palavras chave: Treinamento por Simulação. Educação Médica. Procedimentos Cirúrgicos Robóticos. Currículo. Preceptoria.

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