**Guideline Statement for the Surgical Assistant in Robotic Surgery** **Adopted by the ASA Board 5/17/2017**

## Introduction

The following Guidelines for the Surgical Assistant were researched and authored by the ASA Education and Professional Standards Committee and have been approved by the ASA Board of Directors. They are Effective May 17, 2017.

Robotic surgical systems are being used at an increasing rate in an increasing number of surgical specialties. It is crucial for all members of the surgical team to understand the roles and responsibilities that relate to this sophisticated instrumentation.

ASA developed this statement in order to provide criteria for the surgical staff regarding the requisite educational requirements, proven clinical experience and an understanding of the function of the surgical robotic system components and their clinical advantages and limitations. In addition, ASA developed the guidelines for the Surgical Assistant in Robotic Surgery to support healthcare facilities in defining best practice related to robotic surgery.

The purpose of the Association of Surgical Assistants guideline is to demonstrate that surgical assisting for robotic procedures whereby the surgeon remains at the console during the surgical procedure requires additional training beyond that of an entry-level surgical assistant to ensure prompt and effective actions are taken when additional trocar placement, exposure, tissue manipulation, suctioning or other emergent assistant skills are needed during the case.

## Rationale

The surgical assistant has received training in the basics of minimally invasive surgical principles and techniques for all endoscopic surgery including trocar placement and tissue manipulation. The addition of robotic equipment adds an element of complexity and surgeon dependence on the surgical assistant. Currently certification of robotic skill is largely guided by the industry and relies heavily on the individual institution requirements. There are no governing-body mandated credentialing guidelines. Leadership from the Association of Surgical Assistants and other bodies can improve public trust and ensure patient safety by establishing recognized guidelines and recommendations for best practice.

## ASA Guideline Statement for the Surgical Assistant in Robotic Surgery

Credentialed surgical assistants who have completed additional training beyond the entry-level surgical assistant are qualified to assist the surgeon and provide safe patient care in robotic procedures.

### Guideline I

**Advanced Knowledge of Surgical Anatomy, Pathology and Procedure**

The foundational concepts for surgical assisting must be grounded in knowledge of surgical anatomy, physiology and pathology.

I. The surgical assistant must understand the medical status of the patient including the pathological process that is necessitating the surgery and the overall general condition of the surgical patient that can affect the course of surgery and the patient outcomes.
II. The surgical assistant must have a thorough appreciation of what the surgeon is planning to accomplish and the hazards associated with the plan.
III. The surgical assistant must demonstrate expertise in regional anatomy with surgical anatomy as the critical component, as opposed to an entry-level approach of systemic anatomy.
    A. Critical factors include an advanced anatomical knowledge of critical structures that must be identified prior to and during dissection.
    B. Port placement requires a thorough knowledge of the muscles, nerve(s) and major vessels within the layers of the skin so that they can be avoided and/or retracted out of harm's way.
    C. In addition, knowledge of the key structures surrounding the areas of dissection, retraction and tissue manipulation is essential in the identification of key landmarks and the prevention of long term complications including loss of function.
IV. The surgical assistant must be aware of potential complications and mechanisms that led to those complications to improve proficiency.
    A. Potential complications that have occurred include hepatic tear due to blind retraction, splenic lesion due to traction on adhesions, esophageal rupture due to acute retching, fistula formation, hemorrhage, hemoperitoneum, gastric leakage, colorectal leakage, splenic infarction, stenosis, abscess formation, potential tumor dissemination (port metastasis and peritoneal carinomatosis), and death due to sepsis (Giulianotti, et al, 2003).
    B. Other laparoscopic concerns include subcutaneous emphysema, pneumothorax, pneumomediastinum, venous gas embolism due to $CO_2$ or argon beam gas embolism. (Some recommend avoidance of the argon beam coagulation or opening one port to vent for any excessive gas pressure.)

**Guideline 2 Laparoscopic Skills and Proficiency**

Due to rapid advancement and adoption of robotic surgery in virtually every specialty, the need for a well-trained proficient surgical team has become self-evident. Key factors that contribute to a successful surgery include "a good understanding of the surgery, superior surgical skills and training, flawless teamwork, and, most importantly, patient positioning and robotic port placement."[6] The perioperative role of the surgical assistant for the robotic case is similar to that of any case requiring specific training for use of any equipment and/or devices to be used in surgery prior to solo participation in the case. Therefore, it is advocated that all surgical assistants complete the following training.

A. A robotic training program that utilizes simulation, video clips and course attendance. It is recognized that the learning curve can be greatly reduced by using simulation, visualization of video clips and/or attending to courses.[5, 17]
    i. Due to the complexity of the robotic equipment, it is required that the surgical assistant attend specific robotic training by the manufacturer.
        1. Specific training should be required by the manufacturers of the advanced robotic devices. For example, Intuitive Surgical requires both guided and self-directed training through the da*Vinci*® Technology Training Pathway for the robotic surgical team to gain the knowledge and skills needed to use *da Vinci* System technology safely and efficiently. The required pathway for training as a surgical assistant consists of live case observation, completion of online daVinci modules, and hands on in-service with a da Vinci representative.
    ii. It is recommended that the surgical assistant must attend a Manufacturer Technology Training and/or multi-port Surgical Assistant course which includes advanced courses for the development of specific robotic skills as identified below.
B. Utilize a mentor to facilitate the development and mastery of important key skills such as port placement.
    i. According to Giulianotti, for basic training operations such as a cholecystectomy and Nissen fundoplication whereby an individual has previous experience in open and laparoscopic surgery, generally a learning curve of 20 cases can lead to mastery of the skillset.[9] Other more complex cases may require more cases to reach the same level of mastery. According to Bokhari et al, the learning curve may take as many as 50 robotic procedures for proficiency to develop.[4] (*However, Buchs et al, indicate that this number can be reduced using an animal/cadaver model or though visualization of video clips or attending courses. Virtual simulation trainers for specific procedures has emerged which provides step by step guidance to increase understanding and provide hands-on simulation.)*[5]
    ii. Documentation of competency from the surgeon mentor should be maintained as part of the SA training records.
C. It is further recommended that the surgical team should practice the emergency drill for de-docking the robotic system if necessary to prevent a delay in resuscitation.[13]

**Guideline 3: The Perioperative Role of the Surgical Assistant**

The Surgical Assistant, in collaboration with the other team members should review the surgical plan and implement the necessary precautions to prevent patient injury or complications. Robotic technology and the robotic equipment can add a dimension of difficulty that must be considered in the care of the surgical patient. According to Chang, robotic surgical interventions have certain key goals

that include patient safety, avoidance of compression injuries, maximum mobility of robotic arms, and the facilitation of a smooth and efficient surgery.[6]

I. During the preoperative period, the surgical assistant role includes the following responsibilities. The surgical assistant should:
    A. Facilitate the surgical setup regarding the patient, positioning, and/or equipment.
    B. Communicate any special needs that the surgeon or patient requires and discuss any concerns or problems with the OR team.
    C. Assist with and/or assure that patient positioning has been optimized to eliminate any potential for excessive pressure or stretching that may cause nerve, muscle or tissue damage and provides optimal exposure of the operative site. With extreme positioning, patient shifting can occur during the procedure, so the patient should be assessed periodically to ensure limbs and patient remain secure and properly aligned.
        i. Preoperative assessment factors should be considered when preparing and planning for the surgical procedure.
            1. Age
            2. Height
            3. Weight
            4. Skin integrity
            5. Range of motion
            6. Preexisting conditions such as diabetes, Peripheral vascular disease, congestive heart disease, chronic obstructive pulmonary disease, etc.
            7. Mental competence including brain damage, Down's syndrome, dementia or Alzheimer's disease, etc.
            8. Implanted devices or prosthetics
            9. Presence of external devices such as indwelling catheters or ostomy bags.
            10. The surgical procedures, potential length of surgery and the surgeon/anesthesia provider's preferred surgical position must also be factored into the assessment plan formulated.
            11. Lastly, additional equipment or personnel that may be needed due to the surgical procedure such as X-ray radiolucent tables, weight limits of an OR table, and additional positioning needs.
            12. The position chosen can also cause some common physiological changes that can affect the patient outcome and must be considered in the care for this patient. These include a decrease in respiratory system functional residual capacity (FRC) as the steep Trendelenburg and pneumoperitoneum encroach upon the diaphragm. In addition, steep Trendelenburg can cause the cardiovascular central venous pressure to be increased while the pneumoperitoneum can increase the systemic vascular resistance (SVR), decrease the cardiac output may decrease. Intracranial and intraocular pressure can also be significantly affected.

Lastly, swelling of the face and upper airway may occur leading to potential difficulties with emergence and extubation.

ii. Key Points of consideration specific to each position should be included in the collaboration with other team members to prevent patient injury and ensure ease of use for the robotic camera and manipulation arms.
    1. Lateral positioning or semilateral position whereby the bed is tilted to one side. Points to consider:
        a. Prevent sliding off the OR table/bed.
        b. Protect the face and arm with padding. A horizontal bar can be utilized to prevent pressure or placement of items on the face.
        c. Secure the arm to prevent falling. Additional padding to decrease the risk of brachial plexus injury is necessary.
        d. Ensure cervical alignment is maintained using a headrest or pillow
        e. Turning the patient's shoulders and hips at the same time to prevent torsion of the spine.
        f. Secure with safety straps at the shoulders, hips and knees using tape over the straps to secure the patient to the OR table/bed to prevent shifting or sliding.
        g. Padding at all bony prominences to prevent tissue and nerve damage.
        h. Place pillows between the knees/legs to prevent pressure and back strain.
    2. Extreme Trendelenburg Position, with or without Lithotomy points to consider.
        a. Shearing injury (dermal and nerve injury) due to sliding must be prevented.
        b. Positional aids that may be utilized include:
            i. Bandito position: features tape and foam criss-crossing the patient's chest. The use of tape may impede respirations and cause nerve damage.
            ii. Michelin Man position: Similar to Bandito, but does not utilize tape across the chest.
            iii. Bean bags attached to the OR table rail for security. However, it may slip causing the straps to become taut.
            iv. Disposable friction conforming pad straps to the OR table rail.
            v. Full length gel pads or Egg crate with foam to skin contact taped to the table top may be used.
        c. Careful attention to arm placement (padded with foam, palms facing thighs) to prevent collision with the control arms and ulnar nerve injury.

d. Careful attention to position of the head in the midline position with no dorsal extension or lateral flexion of the head to prevent brachial plexus injury. (Use of shoulder braces are no longer recommended since instances of brachial plexus injury have been reported.)
e. Careful attention to lithotomy positioners to prevent collision with the robotic arms.
f. Protection for hands that may extend beyond the end of the table.
g. Limit time (5 hours maximum) in steep Trendelenburg allowing a five-minute rest intervention to relieve elevated Intraocular pressure (IOP) and possible blindness.

3. Reverse Trendelenburg used for upper abdominal surgery.
   a. Skin shearing, tissue damage and nerve damage due to sliding on the OR table/bed must be prevented.
   b. Venous pooling in the lower extremities should have Sequential Compression Devices (SCD) applied to prevent thrombus formation and pulmonary embolism.
   c. Use of a padded footboard can prevent sliding.
   d. Use of a pillow under the patient's knees can help minimize back strain taking care to prevent pressure in the popliteal space.
   e. Use of two safety straps to prevent bending of knees (one below the knees across the lower legs and one across the thighs).
   f. Using a foam headrest to protect the patient's face from contact with the robotic arms that extend over the patient's head.

D. The surgical assistant must be proficient in setting up and draping the robot equipment ensuring that the Robotic Equipment is functional.
   i. Robot Setup
      1. Console connection
      2. Self-test has been successfully completed
      3. Draping of the robotic arms is accomplished without contamination.
      4. Mechanical supports for trocars fixed into place.
   ii. Optic System Setup
      1. White balance of robotic camera.
      2. Ensure the position of the scope is accurate.

II. The intraoperative role of the assistant is more sophisticated than in regular laparoscopy (Giulianottidue to less room for complementary working. Requirements for the Surgical Assistant includes:[9]
   A. The intraoperative role of the surgical assistant in robotic surgery includes

i. Trocar insertion,
    1. Essential in the placement of trocars is the need for each patient's body habitus to be assessed so that port placement can be adjusted as necessary to avoid arm collision while achieving optimal exposure.[10]
    2. Prior to port placement, local anesthesia may be utilized to provide analgesia and minimize postoperative pain.
    3. Making an indention into the abdomen with an empty trocar for the initial incision when using the open Hassan placement can enhance a snug fit for the port placed.[6]
    4. Care is taken during port placement to prevent the formation of an oblique tract which can restrict robotic arm movements.[6]
    5. The camera port principles:
        a. In alignment with the target anatomy.
        b. Placed a minimum of 10-20 cm from the target anatomy.
        c. Aligned so that the port is in line with the center column of the patient cart.
    6. Right and left robotic arm ports:
        a. Placed greater than 8 cm from another port to prevent collision.
        b. Placed a minimum of 10-20 cm from the target anatomy.
    7. Assistant port:
        a. Placed 5 – 10 cm away from the R & L robotic arm ports.
    8. "Burping" of the ports (lifting the ports away from the abdomen) can tent the abdominal wall outward to create more intraabdominal space.[6]

ii. Insertion of Instruments and scope
    1. Establishment of the pneumoperitoneum
    2. Note: Conventional laparoscopy may be useful to perform lysis of adhesions when found.

iii. Docking and undocking of the robot,
    1. Ensure alignment of the patient and OR table so that the camera port, target anatomy and center column of the patient cart are aligned.
    2. Manage the setup of the arms to prevent collision.
        a. Always stabilize the port when connect or disconnecting.
        b. Camera arm placed first with the target anatomy and aligned so the "sweet spot" for maximum range of motion is attained as indicated for Joint #2 on the camera arm. Finally align the camera, with the clutch button, the 3rd setup joint and the center column.
        c. Next place the t position instrument arms making sure there is a 45 degree angle between each arm. Ensure setup Joint #2 for each arm is positioned at approximately a 90 degree angle opposite each other to prevent potential collisions of the instrument arms.

iv. Advancement exchange of laparoscopic instruments,
    1. Inspection of the insulation is essential to prevent unintentional cauterization of surrounding tissue.
v. Using the assistant port(s), the surgical assistant can aid in the
    1. manipulation of tissues,
    2. assistance in maintaining hemostasis, and
    3. provision of lavage and suctioning
vi. Troubleshooting of related equipment.

B. Perform additional maneuvers to keep the operative field clear such as
    i. Provide accurate washing and suctioning.
    ii. Provide changes to the patient and instrument positioning to improve exposure.
    iii. Provide instrument changes for improve retraction and exposure.

C. The postoperative role includes
    i. port removal and
    ii. Closure of all trocar sites ensuring a deep stitch to close the peritoneum/transversalis fascia and superficial skin closure is recommended to prevent future herniation.

**Competency Statements**

| Competency | |
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| Best practices – A related set of generalizations derived from past experience arranged in a coherent structure to facilitate appropriate responses to specific situations. This set of standard operating practices has a broad base of acceptance among experts in the field. | The competent SA seeks to formalize standardized operating practices. |
| The SFA applicant must have or obtain privileges for performing independent robotic skills including robotic surgical system setup and docking, skills training using inanimate models or simulation for port placement, exchange of robotic arms, troubleshooting, manipulation of tissue, suctioning, and other critical maneuvers. | The competent SA has demonstrated proficiency by attending and successfully completing formalized training sessions that provide simulation training specifically for the surgical assistant. |

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