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EXPERIENCE REPORT

Management and creativity in robotic surgery: the nurse and the use of playful and technical checklists

Gestión y creatividad en cirugía robótica: la enfermera y el uso de listas de verificación lúdicas y técnicas

Gestão e criatividade na cirurgia robótica: o enfermeiro e o uso de checklists lúdicos e técnicos

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Abstract

The growth of robotic surgery has brought challenges to perioperative nursing that demand technical-managerial, educational, and creative skills. This experience report describes the nurse's role in materials management, process planning, and checklist execution on robotic platforms used in the institution – da Vinci X/Xi (Intuitive Surgical), Hugo RAS System (Medtronic), ROSA Knee (Zimmer Biomet), Mako System (Stryker), and Mazor X (Medtronic). Based on an analysis of the practices of the Central Sterile Supply Department (CSSD) and a literature review, the study proposes the use of playful and technical checklists as educational tools that combine images, metaphors, and descriptions to promote team engagement and strengthen the safety culture. The nurse's leading role is evident in the transformation of complex processes into safe, traceable, and humanized actions, demonstrating how creativity can enhance management and safety in robotic surgery.

Descriptors: Perioperative Nursing; Robotic Surgery; Materials Management; Playful Checklist; Patient Safety.

Resumén

El auge de la cirugía robótica ha planteado nuevos retos para la enfermería perioperatoria que exigen habilidades técnico-gerenciales, educativas y creativas. Este informe de experiencia describe el papel de la enfermera en la gestión de materiales, la planificación de procesos y la ejecución de listas de verificación en las plataformas robóticas utilizadas en la institución: da Vinci X/Xi (Intuitive Surgical), Hugo RAS System (Medtronic), ROSA Knee (Zimmer Biomet), Mako System (Stryker) y Mazor X (Medtronic). Basado en un análisis de las prácticas del Servicio Central de Esterilización (SCE) y una revisión bibliográfica, el estudio propone el uso de listas de verificación lúdicas y técnicas como herramientas educativas que combinan imágenes, metáforas y descripciones para fomentar la participación del equipo y fortalecer la cultura de seguridad. El liderazgo de la enfermera se evidencia en la transformación de procesos complejos en acciones seguras, trazables y humanizadas, demostrando cómo la creatividad puede mejorar la gestión y la seguridad en la cirugía robótica.

Descriptores: Enfermería Perioperatoria; Cirugía Robótica; Gestión de Materiales; Lista de Verificación Lúdica; Seguridad del Paciente.

Resumo

O crescimento da cirurgia robótica trouxe à enfermagem perioperatória desafios que exigem competências técnico-gerenciais, educativas e criativas. Este relato de experiência descreve a atuação do enfermeiro na gestão de materiais, planejamento de processos e execução de checklists em plataformas robóticas utilizadas na instituição - da Vinci X/Xi (*Intuitive Surgical*), Hugo RAS System (Medtronic), ROSA Knee (Zimmer Biomet), Mako System (Stryker) e Mazor X (Medtronic). A partir da análise das práticas do Centro de Material e Esterilização (CME) e revisão da literatura, o estudo propõe o uso de checklists lúdicos e técnicos como ferramentas educativas que combinam imagens, metáforas e descrições para promover o engajamento da equipe e fortalecer a cultura de segurança. O protagonismo do enfermeiro é evidenciado na transformação de processos complexos em ações seguras, rastreáveis e humanizadas, demonstrando como a criatividade pode potencializar a gestão e a segurança na cirurgia robótica.

Descritores: Enfermagem Perioperatória; Cirurgia Robótica; Gestão de Materiais; Checklist Lúdico; Segurança do Paciente.

Introduction

The incorporation of robotics in the surgical field represents one of the most significant advancements in modern medicine. Robotic platforms increase precision and reduce surgical trauma, benefiting the patient and expanding the complexity of care processes. The nurse, as a technical manager and process coordinator, plays a leading role in the planning, organization, and control of permanent and disposable instruments, as well as in conducting safety checklists on each robotic platform[1-3].

With technological advancements, the role of nurses in robotic surgery demands not only technical expertise but also managerial and educational skills to ensure patient safety and process efficiency. The diversity of robotic platforms available on the market requires specific knowledge about each system, as well as the ability to adapt protocols and routines according to the requirements of each manufacturer and type of procedure[4-6].

In this context, the use of checklists becomes an essential tool for standardizing practices, preventing errors, and promoting a safety culture. The proposal to integrate playful elements into technical checklists emerges as an innovative strategy to engage the multidisciplinary team, facilitate learning, and reinforce attention to critical details of the surgical process. The use of visual metaphors, simplified descriptions, and graphic resources contributes to making protocols more accessible and memorable, especially in highly complex environments[4,6].

Therefore, this study aims to present a theoretical and practical reflection on the role of nurses in the management of materials and processes in robotic surgery, proposing the use of playful and technical checklists as educational and safety tools in the perioperative environment.

Methodology

This is a theoretical-practical reflection study, based on a literature review and professional experiences acquired up to 2025 in the context of the Central Sterile Supply Department (CSSD) and the surgical center. The main robotic platforms present in the institution were analyzed - da Vinci X/Xi (Intuitive Surgical), Hugo RAS System (Medtronic), ROSA Knee (Zimmer Biomet), Mako System (Stryker), and Mazor X (Medtronic) - detailing permanent and specific materials for each procedure and/or specialty, disposables, checklists and the strategic role of the nurse.

Experience Report

Throughout the experience, it was possible to identify challenges related to the development of specific processes for handling materials dedicated to robotic surgery. Among the activities observed, the following stand out: the correct identification of forceps and their respective reference codes, verification of the usage indicator, meticulous inspection of the integrity of the instruments with the aid of a magnifying glass, and lubrication of the forceps to ensure their functionality and efficiency. Specific care was also observed with robotic endoscopes, such as the evaluation of the physical structure, inspection of monopolar and bipolar cables, trocars, and the application of sterilization methods compatible with the manufacturers' guidelines. Preparing instruments for robotic procedures, such as laparoscopic retractors and clips, requires attention to detail and in-depth technical knowledge. To facilitate understanding and adoption by unit staff, a playful yet technical checklist was developed, utilizing visual elements, metaphors, and simplified descriptions. This approach aims to make processes more accessible, promote team engagement, and consolidate best practices for safety and traceability[7,8].

The diversity of robotic platforms available in the surgical environment demands that nurses possess in-depth knowledge of the specifics of each system, its clinical applications, and the materials involved. Each technology has its own characteristics that directly impact the routine of the Central Sterile Supply Department (CSSD), the setup of the operating room, and the management of safety procedures[9,10]. The following describes the main robotic platforms used at the institution, highlighting their surgical specialties, permanent and disposable materials, emphasizing the complexity and responsibility of the nursing team in managing these resources.

Da Vinci X/Xi (Intuitive Surgical)

- Specialties: urology, gynecology, gastroenterology, coloproctology, thoracic surgery, cardiac surgery, pediatric surgery, head and neck surgery.
- Permanent materials: surgeon's console, robotic arms, endoscope, robotic forceps, robotic monopolar cable, robotic bipolar cable, surgical instruments, and permanent trocar.
- Disposable materials: trocars, sterile drapes, coupling adapters.

Hugo RAS System (Medtronic)

- Specialties: urology, gynecology, gastroenterology, and coloproctology.
- Permanent materials: independent towers, modular robotic arms, portable console, robotic forceps, interface module, endoscope adapter, endoscope, fiber optic cable.
- Disposable materials: tower drapes, adapters, disposable trocars, and connection cables.

ROSA Knee (Zimmer Biomet)

- Specialty: Total knee arthroplasty.
- Permanent materials: ROSA robotic arm, optical sensors, infrared cameras, control unit, surgical instruments, surgical motor (drill and saw).
- Disposable materials: navigation adapters, disposable cutting kits and drill bits, robotic arm cover.

Mako System (Stryker)

- Specialties: knee and hip arthroplasty.
- Permanent materials: surgical instruments, robotic arm, planning unit with tomography, navigation system, and console.

- Disposable materials: disposable milling cutters, drill bits and pins, and sterile caps.

Mazor X (Medtronic)

- Specialty: spine surgery.
- Permanent materials: Mazor X™ navigation unit, robotic arm attached to the table, and surgical instruments.
- Disposable materials: guides, pins, disposable sterile drapes, fixation, and navigation adapters.

Playful and technical checklist

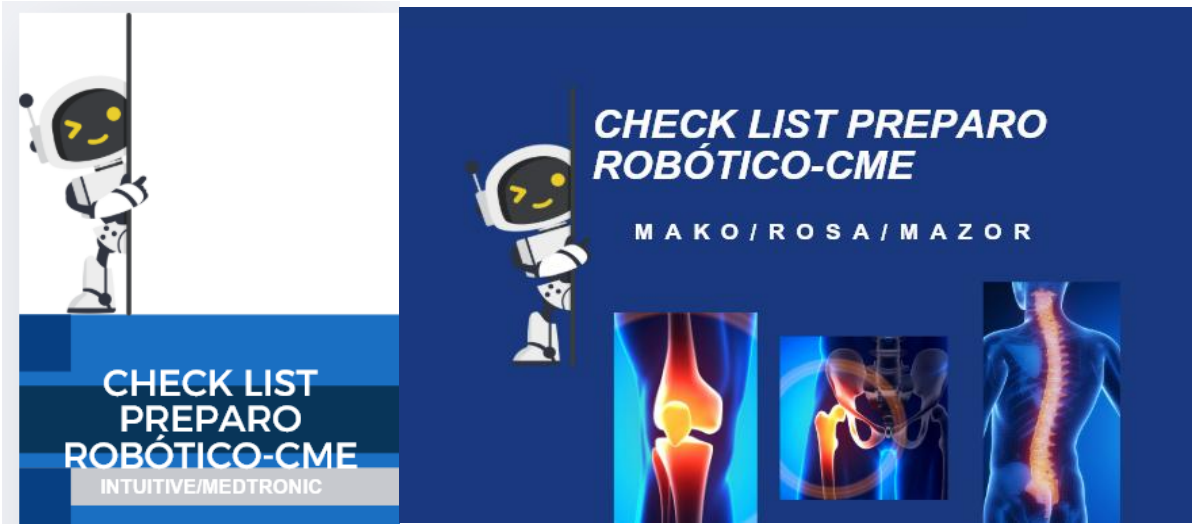
The playful and technical checklist was developed as an educational tool to support the nursing team in the quick and safe identification of instruments for each robotic platform, ensuring traceability and technical compliance during the preparation, sterilization, assembly, and intraoperative use stages. In addition to systematizing the operational steps, the checklist contains visual and descriptive resources that make the process more interactive, accessible, and educational. Each checklist contains standardized sections: platform identification, instrument image, technical description, physical specifications, recommended sterilization method, associated disposable materials, integrity conditions, traceability, and nurse observations[1-3,8].

The use of this playful model does not replace the official checklist, but complements the practice, reinforcing the safety culture and stimulating the active learning of nursing and instrumentation teams, favoring memorization and team involvement as steps in the process and unidirectional flow of the unit, functionality, verification of the quantification of uses of control instruments according to the provider, detailed listing of the components included in each box/kit, traceability, and with indication that changes in instruments may occur between kits on the platforms, method of sterilization of the instruments.

Educational and safety impact

With the implementation of this explanatory and playful checklist, a significant transformation is observed in the routine of the material and sterilization center. The tool not only reduces errors in the identification of instruments and prevents their incorrect use, but also substantially facilitates the training of new professionals by intuitively associating the image of the instrument with its function and the appropriate sterilization method. This approach standardizes the flow of verification and recording, providing greater reliability to the processes. Finally, by stimulating active and visual learning in daily technical work, the checklist transcends its initial function, becoming a catalyst that transforms theoretical knowledge into safe and consolidated practice, thus raising the quality and safety of care.

Figure 1. Robotic preparation checklist - CSSD. São Paulo, SP, Brazil, 2025



Source: Author's collection.

Final Considerations

The use of robotic platforms represents a technological leap sustained by the nurse's competence. The management of instruments, the control of reprocessing, and the use of innovative tools, such as playful and technical checklists, reaffirm the nurse's role as a protagonist in the safety and efficiency of robotic surgery. The incorporation of advanced robotic technologies demands a broader role from the nurse that goes beyond conventional care: it requires logistical planning, management of permanent and disposable instruments, the creation and execution of rigorous checklists, and ensuring traceability. Regardless of the specialty or platform - whether general surgery, urology, gynecology, orthopedics, or spine - the nurse is a protagonist in converting technology into patient outcomes. Investing in technical training, standardized protocols, and a safety culture is imperative.

This reflection seeks to stimulate integration between nursing, clinical engineering, the central sterile supply department, and the surgical team, contributing to improved quality and safety in robotic surgery.

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