

DOI: <https://doi.org/10.36489/nursing.2021v24i277p5775-5784>

# Skin injuries occasioned by robotic procedure versus open

**ABSTRACT** | Objective: to identify factors associated with skin lesions resulting from robotic versus conventional urological surgery in adults / elderly. Method: integrative review, stages: Construction of the research protocol; Formulation of the question - evidence-based practice, using the acronym PICO; Definition of search strategy descriptors in each of the selected databases, which should be varied; Determination, selection and review of inclusion and exclusion criteria; Critical evaluation of studies; Data collection using instruments that analyzed in pairs; and Summary of results / data grouped by similarity. Results: the search strategy generated 207 articles. Resulting in 7 articles for final analysis. Conclusion: further clinical studies are needed, addressing the losses and benefits related to robotic and open surgical positioning, thus directing accurate nursing interventions to patients at higher risk.

**Keywords:** Perioperative Nursing; Robotic Surgical Procedures; Urology; Wounds and Injuries; Intraoperative Care.

**RESUMEN** | Objetivo: identificar los factores asociados a las lesiones cutáneas resultantes de la cirugía urológica robótica versus convencional en adultos / ancianos. Método: revisión integradora, etapas: construcción del protocolo de investigación; Formulación de la pregunta - práctica basada en evidencia, utilizando el acrónimo PICO; Definición de descriptores de estrategias de búsqueda en cada una de las bases de datos seleccionadas, que deben ser variadas; Determinación, selección y revisión de criterios de inclusión y exclusión; Evaluación crítica de estudios; Recolección de datos utilizando instrumentos que se analizaron por parejas; y Resumen de resultados / datos agrupados por similitud. Resultados: la estrategia de búsqueda generó 207 artículos. Resultando en 7 artículos para el análisis final. Conclusión: se necesitan más estudios clínicos que aborden las pérdidas y beneficios relacionados con el posicionamiento quirúrgico robótico y abierto, dirigiendo así intervenciones de enfermería precisas a los pacientes de mayor riesgo.

**Palabras claves:** Enfermería Perioperatoria; Procedimientos quirúrgicos robóticos; Urología; Heridas y lesiones; Cuidados intraoperatorios.

**RESUMO** | Objetivo: identificar fatores associados a lesões de pele decorrentes de cirurgias urológicas robóticas versus convencionais em adultos/idosos. Método: revisão integrativa, etapas: Construção do protocolo de pesquisa; Formulação da pergunta - prática baseada em evidência, utilizando o acrônimo PICO; Definição dos descritores das estratégias de busca em cada uma das bases de dados selecionadas, que deviam ser variadas; Determinação, seleção e revisão dos critérios de inclusão e exclusão; Avaliação crítica dos estudos; Coleta de dados utilizando instrumentos que analisassem em pares; e Síntese dos resultados/dados agrupados por semelhança. Resultados: a estratégia de busca gerou 207 artigos. Resultando para análise final 7 artigos. Conclusão: são necessários novos estudos clínicos, que abordem os prejuízos e benefícios relacionados ao posicionamento cirúrgico robótico e abertos, direcionando assim, intervenções de enfermagem acuradas aos pacientes sob maior risco.

**Palavras-chaves:** Enfermagem Perioperatória; Procedimentos Cirúrgicos Robóticos; Urologia; Ferimentos e Lesões; Cuidados Intraoperatórios.

## Beatriz Laureano de Souza

Nursing student/ Aurora de Afonso Costa School of Nursing/ Universidade Federal Fluminense/ UFF, Niterói/RJ, Brazil.  
ORCID: 0000-0002-1143-5240

## Máira Danielle Gomes de Souza

PhD and Master in Surgery from the Federal University of Pernambuco/ UFPE, Post-graduate student in robotic surgery/ Albert Einstein. PhD and Master in Surgery from the Federal University of Pernambuco/ UFPE, Recife, Brazil.  
ORCID: 0000-0002-1814-0226

## Cecília da Silva Moroni Primo

Master's student of the Professional Master's Degree in Nursing Assistance at the Aurora de Afonso Costa School of Nursing/ Universidade Federal Fluminense/ UFF. Post-graduate in nursing from Surgical Center, CME and RPA, Nurse HUCFF/UFRJ, Brazil.  
ORCID: 0000-0002-6423-1604

## Natália Kaizer Rezende Ortega de Barros

Nurse EEAAC / UFF, Resident in Surgical Center and CME/ Hospital Sírio-Libanês/ São Paulo/SP, Brazil.  
ORCID: 0000-0001-5326-1237

## Thalita Gomes do Carmo

PhD in nursing, professor at the Department of Medical Surgical Nursing/ MEM at the Aurora de Afonso Costa School of Nursing/ at the Universidade Federal Fluminense/ UFF, Niterói/RJ, Brazil.  
ORCID: 0000-0002-5868-667X

## Allanna da Costa Moura

Student/ Aurora de Afonso Costa School of Nursing/ Universidade Federal Fluminense/ UFF, Niterói/RJ, Brazil  
ORCID: 0000-0001-6300-631X

## INTRODUCTION

Minimally invasive surgeries, unlike conventional surgeries, are those performed with reductions in the size of the incisions, postoperative pain, bleeding and inflammatory response. There are different procedures considered to be minimally invasive, such as video-laparoscopy, in addition to robotic surgery, which has gained space in most surgical specialties.<sup>1-2</sup>

In 2000, the use of robotics in medical treatments reached a dizzying growth, due to the development of the Da Vinci robotic system.<sup>3</sup> This platform has three main components: console (place where the doctor performs the procedure); patient cart (4 robotic arms, <sup>1</sup> for endoscopic camera

and 3 for surgical instruments); and the vision car. <sup>2-4</sup>

Robotic surgery in the field of urology has been used in many surgical treatments, mainly in nephrectomy, cystectomy and prostatectomy.<sup>5</sup> In the past 20 years, there has been a considerable increase in the incidence of prostate cancer in most countries, in addition to bladder cancer, which is a malignant tumor with a high rate of invasiveness and is one of the most common types of cancer. <sup>5-7</sup>

In the operating room, the nurse performs specific activities, being responsible for organizing and ensuring safe care for the surgical patient, using the Perioperative Nursing Care Systematization (SAEP - Sistematização da Assistência de Enfermagem Perioperatória). <sup>8</sup> The nursing process performed through SAEP is an essential activity for nurses to individualize care, thus promoting the promotion, maintenance and recovery of the patient's health. <sup>9</sup>

To start a robotic surgery program, well-trained employees are of paramount importance, and for this, the nurse has the competence of training and updating its staff. <sup>10</sup> The nursing professional must guarantee the best possible support, both for the team and for the patient. <sup>11</sup> To ensure patient safety during the intraoperative period, attention must be paid to the surgical positioning and immobilization of the patient, minimizing adverse events such as pressure injuries.<sup>10,12</sup>

The present study seeks to identify

the factors associated with skin lesions resulting from robotic surgeries when compared with conventional surgeries in urology in adults and the elderly, aiming at improving the assistance provided by nurses working in the area.

#### METHOD

Integrative review: 1.construction of the research protocol; 2.formulation of the question within the evidence-based practice (PBE), using the acronym PICO; 3.definition of search strategy descriptors in each of the databases selected by the researcher; 4.determination, selection and inclusion and exclusion criteria; 5. critical assessment of studies; 6. data collection using instruments of analysis in pairs; and 7. synthesis of results / data grouped by similarity.

#### Eligibility criteria

Study question: What are the factors associated with skin lesions resulting from robotic surgeries compared to conventional surgeries in urology in adults and the elderly?

Inclusion criteria: studies with adults over 18 years of age, comparing skin lesions resulting from robotic versus conventional / open surgery; observational, experimental or quasi-experimental design, and studies with or without randomization. Secondary source studies, time series or case control were excluded, without determining a clear methodology, theses and dissertations. As filters, studies were

applied in English, Spanish or Portuguese; without temporal cut.

#### Information sources

The definition of controlled descriptors was referenced from the following thesaurus: Health Sciences Descriptors (DeCS), MESH (Medical Subject Headings) and the study's keywords. The controlled descriptors mentioned below were used considering the Boolean operators "AND" and "OR" for research.

Due to the specific characteristics of each database, the search strategies were adapted according to the objectives and inclusion criteria of this study. The search for the articles took place in May 2020, and updated in June 2020, according to Chart 1.

The search was carried out in the following databases: CINAHL (Cumulative Index to Nursing and Allied Health Literature); PubMed (Search facility provided by the National Center for Biotechnology Information) and EMBASE (Elsevier publisher) via CAPES Portal. During the selection of sources of evidence, the study was divided into two moments (1st search in the databases and insertion in a spreadsheet; 2nd Spreadsheet was sent to 2 independent reviewers, who evaluated the studies in pairs, blindly, applying eligibility criteria).

#### Data collection and synthesis of results

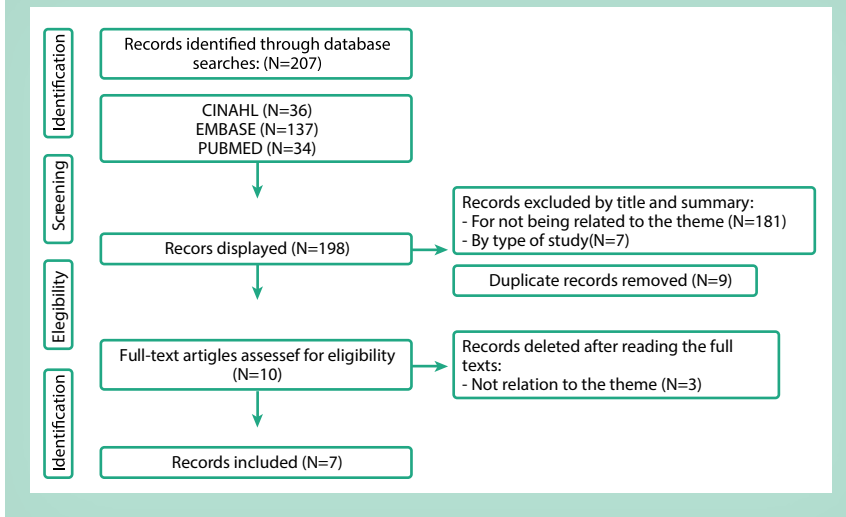
Selection of texts and filling in an Excel spreadsheet built on the basis of the research protocol prepared by the authors, to obtain the necessary infor-

Chart 1. PICO strategy. Brazil, 2020.

	Key words	MESH	DECS
Population (and)	Adulto ou Idoso	Adult/Aged	Adulto/Idoso
Interest (and)	Cirurgias urológicas robóticas/Período Intraoperatória	Robotic Surgical Procedures/Urology	Procedimentos Cirúrgicos Robóticos/Urologia
Comparison (and)	Cirurgia convencional/Aberta	General surgery	Cirurgia geral
Outcome	Fatores associados a lesões de pele	Wounds and Injuries	Ferimentos e lesões

Source: Own author.

**Figure 1. Flowchart of the study selection and inclusion process according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA 2009), Niterói, Rio de Janeiro, 2020.**



Source: Own author.

information for analysis, considering the study question and identifying what are the factors associated with skin lesions resulting from compared robotic surgery conventional surgeries in urology.

**RESULTS**

Figure 01 details the flowchart for selecting articles.

Chart 2 shows the 07 articles included in the study.

All the studies analyzed made a comparison between robotic and open surgical techniques in urological surgeries, highlighting the pros and cons of each of these techniques, with regard to: complication rates, length of stay, survival up to 90 days and quality of recovery in the postoperative period.

**Chart 2. Main outcomes and references of the included studies. Niterói, Rio de Janeiro, Brazil, 2020.**

Author/ Year	Country	Objective(s)	Sample	Study type	Main Outcome
Haglund E, et al. 2015	Sweden	Compare the incidence of urinary incontinence and erectile dysfunction, between radical open prostatectomy vs. robotics	Total: 2100 Open: 700 Robotics: 1400	Multicenter, prospective cohort (1 year), controlled and consecutive randomization	There was no difference in the improvement in the rate of urinary incontinence, with a small improvement in erectile function after surgery by the robot.
Bochner BH, et al. 2015	USA	Compare the complication rates between open radical cystectomy vs. robotics.	Total: 118 Open: 58 Robotics: 60	Prospective cohort (4 years) and consecutive randomization	There were no differences between the two comparison groups after 90 days postoperatively.
SoriaF,et al. 2018	Austria	To evaluate long-term Perioperative mortality, comparing open radical cystectomy vs. robotics.	Total: 1887 Open: 690 Robotics: 1197	Multicenter, retrospective cohort, consecutive randomization	The robotic technique presents less blood loss and shorter hospital stay, but with longer operative times and more readmissions.
Bochner BH, et al. 2018	USA	Compare the evolution of cancer in patients undergoing radical open cystectomy vs. robotics.	Total: 118 Open: 58 Robotic: 60	Prospective cohort (4 years) and consecutive randomization	No differences were found in the risk of recurrence or death from bladder cancer between the two groups.
Parekh DJ, et al. 2018	USA	Compare survival in patients with bladder cancer treated by open cystectomy vs. robotics.	Total: 350 Open: 174 Robotics: 176	Multicenter, prospective cohort (2 years) and consecutive randomization	There was no difference in the survival rate between patients who underwent robotic and open cystectomy at follow-up.
Moschini M, et al. 2019	EUA	To evaluate the survival of patients undergoing radical robot-assisted cystectomy vs. open.	Total: 9757 Open: 8990 Robotics: 767	Multicenter, prospective cohort (3 years), consecutive randomization	Patients treated with robotic and open surgery have similar survival results.
Lenfant L, et al. 2019	France	Compare the oncological results between robotic cystectomy vs. opened, by surgeons who started their experience in robotic surgery.	Total: 242 Open: 118 Robotics: 124	Multicenter, prospective cohort (2 years)	There was no difference between the perioperative oncological results in robotic and open cystectomy.

Own author.

## DISCUSSION

Most of the articles included showed more benefits in the robotic surgery technique compared to open surgery, demonstrating the relevance of this technique for patients with shorter hospital stay and blood loss, less intra and postoperative complications and preservation of erectile function. Three studies showed that there was no significant difference in the patients' survival rate. While two articles highlighted the need for further studies to detect the superiority of robotic surgery.

In a prospective, controlled, non-randomized study comparing patients who underwent prostatectomy using a robot-assisted technique and an open technique at 14 centers in Sweden, 2625 men were eligible for the survey and, after 12 months, 21,3% who underwent robot surgery and 20,2% who underwent open surgery had urinary incontinence. After robotic prostatectomy 70,4% compared to 74,7% after open prostatectomy, he presented erectile dysfunction. There was a subtle improvement in erectile function after robot operation.<sup>13</sup>

Sooriakumaran et al. demonstrated that robotic surgery favors better recognition of preservation planar nerves during radical prostatectomy, thus helping to preserve the neurovascular and erectile bundle. Also according to the study, recovery of erectile function was higher in the group that underwent robotic surgery between 12 and 24 months of follow-up, however, in patients with high-risk tumors, recovery of erectile function after 24 months was greater in the group who performed the open surgery.<sup>14</sup>

The home education program after hospital discharge consists of an educational intervention carried out through the combination of oral, written and telephone counseling that sought to encourage patients in their development about self-care and the reduction

of psychological morbidity. This study proved to be clinically effective for the proposed intervention, demonstrating the importance of the nursing professional in preparing patients for hospital discharge and postoperative care in the treatment of neoplasms through educational strategies.<sup>15</sup>



“ Still with regard to the survival rate, a prospective multicenter study observed that there are disadvantages with regard to the time of the procedure (learning curve), cost and there is no significant difference regarding the cancer survival rate when comparing open surgery and robotics.”



The study by Khan et al. compared the three surgical techniques demonstrating that the surgical time was significantly longer in robotic surgery

and that there were no significant differences in the quality of life measures analyzed, however, the study had some limitations such as the reduced sample size and the surgeon's bias.<sup>16</sup> In this context, a study of 118 patients randomly assigned to undergo radical cystectomy plus pelvic lymphadenectomy (60 by robotic technique and 58 by open technique), found no differences in the risk of recurrence or death of bladder cancer between the two groups.<sup>17</sup>

The robotic surgery technique was associated with less blood loss in the intraoperative period, but with an increased surgical time, facilitating the appearance of lesions on the patient's skin. The study also showed that there were no significant differences regarding the length of hospital stay or complication rates in both surgical techniques.<sup>18</sup>

Still with regard to the survival rate, a prospective multicenter study observed that there are disadvantages with regard to the time of the procedure (learning curve), cost and there is no significant difference regarding the cancer survival rate when comparing open surgery and robotics.<sup>19</sup> Comparatively, Soria et al. demonstrated that, robotic radical cystectomy showed less blood loss and shorter hospital stay, and longer operative times.<sup>20</sup> Moschini et al. demonstrated that robotic surgery has many short-term benefits, such as: decreased blood loss and length of stay, however, there was no significant difference in cancer survival rate when comparing open and robotic surgery, suggesting more prospective studies.<sup>21</sup>

Robotic surgery, despite being an effective method of surgical technique, presents costly disadvantages, currently the costs for the acquisition of the Da Vinci Surgical System® range from US\$ 1 million to US\$ 2,5 million per unit, in addition to reforms to adapt the environment system maintenance and generating a high cost for its operation.<sup>11</sup>

There is a knowledge gap that was detected during the search for articles, since studies that addressed a comparison between robotic and open techniques with regard to skin lesions by intraoperative positioning were not recovered. Since robotic procedures have a longer duration, they can generate more damage to patients' skin and tissues.<sup>22</sup> It is therefore suggested that further studies on the potential risks to the patient's

skin constitute a limitation of the study, the failure to search for articles in other databases.

#### CONCLUSION

There is a greater benefit of robotic surgery compared to conventional surgery in radical prostatectomies, with preservation of erectile function, whereas in cystectomy there is less bleeding, and even shorter

hospital stay. No studies were found to compare factors related to the incidence of skin lesions between patients undergoing robotic surgery and those undergoing conventional open surgery treatment. Therefore, it is concluded that new clinical studies are needed, addressing the losses and benefits related to robotic and open surgical positioning, thus directing accurate nursing interventions to patients at higher risk. 🍷

## References

- Mariani AW, Pêgo-Fernandes PM. Minimally invasive surgery: a concept already incorporated. *Sao Paulo Med. J.*, São Paulo, v. 131, n. 2, p. 69-70, 2013. [acesso em 2020 Jun 10]. DOI: <https://doi.org/10.1590/S1516-31802013000100015>
- Veiga, DNMFR. Cirurgia minimamente invasiva-sistema Da Vinci-cirurgia robótica assistida. [tese]. Porto (PT): Instituto de Ciências Biomédicas de Abel Salazar da Universidade do Porto; 2011.
- Cem ah, MD. Does Robot-assisted Surgery in Urology Has Benefits? The Current Status. *Bull Urooncol.* v. 18, p. 117-119, 2019. DOI: <https://doi.org/10.4274/uob.galenos.2019.1202>
- Pitasse C et al. A Cirurgia Robótica nas Organizações Públicas de Saúde: O Caso do Instituto Nacional de Câncer (INCA). *Administração Pública e Gestão Social*, v. 8, n. 3. 2016. Disponível em: <http://www.apgs.ufv.br>
- Wang Y, Gieschen H, Greenberger M et al. Survival After Robotic-Assisted Prostatectomy for Localized Prostate Cancer: An Epidemiologic Study. *Annals of Surgery*. 2019 Oct. [acesso em 2020 Jun 12]. Doi: <https://doi.org/10.1097/SLA.0000000000003637>
- Cao L, Yang Z, Qi L, Chen M. Robot-assisted and laparoscopic vs open radical prostatectomy in clinically localized prostate cancer: perioperative, functional, and oncological outcomes: a systematic review and meta-analysis. *Medicine*. 2019; v. 98, n22. [acesso em 2020 Jun 12]. Disponível em: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6709105/>
- Junior JRC, Andreoni C, Lemos GC, da Fonseca Filho LL, Di Pietro DL, Pinto W, Neto MC. Resultados iniciais da prostatectomia radical robô-assistida no Brasil. *Rev. Einstein*. 2018; 7(4), 488-493. [acesso em 2020 Jun 12]. Disponível em: [http://apps.einstein.br/revista/arquivos/PDF/1294-Einsteinv7n4p488-93\\_port.pdf](http://apps.einstein.br/revista/arquivos/PDF/1294-Einsteinv7n4p488-93_port.pdf)
- Jost MT et al. Sistematização da assistência de enfermagem perioperatória: avaliando os processos de trabalho no transoperatório. *Enfermagem em Foco*. 2020 Fev. v. 10, n. 7. [acesso em 2020 Jun 11]. Disponível em: <http://revista.cofen.gov.br/index.php/enfermagem/article/view/2354/548>.
- Prearo M, Fontes CMB. Sistematização da assistência de enfermagem na sala de recuperação pós anestésica: revisão integrativa. *Enfermagem em Foco*. 2020 Fev. v. 10, n. 7. [acesso em 2020 Jun 11]. Disponível em: <http://revista.cofen.gov.br/index.php/enfermagem/article/view/2470/562>.
- Peng L, Li J, Cao D, Ren Z, Wei T, You C, Li Y. Can robotic-assisted radical cystectomy provide patients with a smaller trauma and faster recovery period? A systematic review and meta-analysis of comparative trials. *Journal of Cancer Research and Clinical Oncology*. 2020; p. 1-11. [acesso em 2020 Jun 12]. Disponível em: <https://link.springer.com/article/10.1007/s00432-020-03183-0>
- Pinto EV, Lunardi LS, Treviso P, Botene DZDA. Atuação do enfermeiro na cirurgia robótica: desafios e perspectivas. *Rev. SOBEC*. 2018; v. 23, n.1. [acesso em 2020 Jun 12]. Disponível em: <http://brutus.facol.com/plataforma/assets/uploads/base/publicados/4fe664f61075e001cf78cb9e4bce29a8.pdf>
- Ferreira F, dos Santos PF, Dalto APP, da Silva Granadeiro D, de Azeredo Granadeiro RM, de Melo NGS, Passos JP. Autonomia e gerenciamento do enfermeiro no serviço de cirurgia robótica. *Saúde Coletiva (Barueri)*. 2019; n. 51, p.1954-1958. [acesso em 2020 13 Jun]. Disponível em: <http://revistas.mpmcomunicacao.com.br/index.php/saudecoletiva/article/view/182>
- Haglund E et al. Urinary incontinence and erectile dysfunction after robotic versus open radical prostatectomy: a prospective, controlled, non randomised trial. *European Urology*. 2015;68(2):216-25. [acesso em 2020 Jul 07]. Doi: <https://doi.org/10.1016/j.eururo.2015.02.029>.
- Sooriakumaran P et al. Erectile Function and Oncologic Outcomes Following Open Retropubic and Robot-assisted Radical Prostatectomy: Results from the Laparoscopic Prostatectomy Robot Open Trial. *European Urology*. 2018;73(4):618-627.
- da Mata LRFP, Bernardes MFVG, Azevedo C, Chianca TCM, Pereira MG, Carvalho EC. Jacobson and Truax Method: evaluation of the clinical effectiveness of a home care program after prostatectomy. *Rev. Latino-Am. Enfermagem*. 2018; v. 26. [acesso em 2020 Jun 14]. Disponível em: [https://www.scielo.br/scielo.php?pid=S0104-11692018000100319&script=sci\\_arttext&tlng=pt](https://www.scielo.br/scielo.php?pid=S0104-11692018000100319&script=sci_arttext&tlng=pt)
- Khan MS et al. A Single-centre Early Phase Randomised Controlled Three-arm Trial of Open, Robotic, and Laparoscopic Radical Cystectomy (CORAL). *European Urology*. 2016; v. 69, n. 4. [acesso em 2020 Jun 16]. Doi: <https://dx.doi.org/10.1016/j.eururo.2015.07.038>
- Bochner BH et al. Randomized Trial Comparing Open Radical Cystectomy and Robot-assisted Laparoscopic Radical Cystectomy: Oncologic Outcomes. *European Urology*. 2018 Oct;74(4):465-471. [acesso em 2020 Jul 05]. Doi: <https://doi.org/10.1016/j.eururo.2018.04.030>.
- Satkunasivam R, Tallman CT, Taylor JM, MILES BJ, Klaassen Z, Wallis CJ. Robot-assisted Radical Cystectomy Versus Open Radical Cystectomy: a meta-analysis of oncologic, perioperative, and complication-related outcomes. *European Urology Oncology*. 2019 [S.L.], v. 2, n. 4. [acesso em 2020 Jul 10]. Doi: <https://dx.doi.org/10.1016/j.euo.2018.10.008>.
- Parekh DJ et al. Robot-assisted radical cystectomy versus open radical cystectomy in patients with bladder cancer (RAZOR): an open-label, randomised, phase 3, non-inferiority trial. *The Lancet*. 2018; v. 391. [acesso em 2020 Jul 10]. Doi: [https://dx.doi.org/10.1016/S0140-6736\(18\)30996-6](https://dx.doi.org/10.1016/S0140-6736(18)30996-6).
- Soria F et al. Comparative Effectiveness in Perioperative Outcomes of Robotic versus Open Radical Cystectomy: Results from a Multicenter Contemporary Retrospective Cohort Study. *Eur Urol Focus*. 2018. Doi: <https://doi.org/10.1016/j.euf.2018.11.002>.
- Moschini M et al. Open Versus Robotic Cystectomy: a propensity score matched analysis comparing survival outcomes. *Journal Of Clinical Medicine*. 2019; v. 8, n. 8. [acesso em 2020 Jul 08]. Doi: <https://dx.doi.org/10.3390/jcm8081192>.
- Angelo C da S et al. Efetividade do protocolo prevenção de lesões de pele em cirurgias urológicas robóticas. *Revista Sobec*. 2017; v. 22, n. 3. [acesso em 2020 Jun 14]. Doi: <https://dx.doi.org/10.5327/z1414-4425201700030006>.