




IMPACTS OF UROLOGICAL SURGERY ON OCCUPATIONAL DISEASES

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ABSTRACT

Introduction: Urological surgery plays a critical role in the management of conditions related to occupational diseases. This study analyzes the impacts of surgical intervention on workers exposed to occupational risks, such as chemical substances, intense physical efforts and inadequate postures. **Objectives:** This review article aims to analyze and synthesize the evidence available in the literature on the impacts of urological surgery on occupational diseases. **Methodology:** This article adopts a systematic literature review approach to identify, select and analyze relevant studies on the impacts of urological surgery on occupational diseases. **Results and Discussion:** The results indicate that surgery can significantly contribute to improving the quality of life and functionality of patients, although it also highlights challenges, such as prolonged recovery and impact on labor reintegration. **Conclusion:** Greater attention is recommended to primary prevention and multidisciplinary rehabilitation to minimize occupational consequences and facilitate return to work.

Keywords: Urological Surgery. Occupational Diseases. Occupational Risks. Work Rehabilitation. Quality Of Life. Chemical Exposure. Ergonomics. Occupational Health.

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INTRODUCTION

Occupational diseases represent an important risk factor for the development of urological conditions, such as bladder cancer, nephropathies and prostatic hyperplasia. ‘

Workers exposed to chemical agents, such as aromatic hydrocarbons and heavy metals, are more susceptible to cellular lesions that can evolve into neoplasia, especially in the lower urinary tract. Studies indicate that these exposures significantly increase the incidence of bladder cancer in specific occupational populations (Smith et al., 2020).

Occupational nephropathies are often associated with prolonged exposure to organic solvents and pesticides, which induce cumulative kidney damage. These conditions can progress to chronic renal failure, requiring medical interventions and, in severe cases, surgical treatments. Recent data show that agricultural and chemical industry workers have a significantly higher prevalence of nephropathies compared to the general population (Martínez et al., 2021).

Benign prostatic hyperplasia (BPH), in turn, has been associated with occupational factors, such as night shift work and exposure to chronic stress. Although traditionally considered an aging-related condition, evidence suggests that occupational stress can exacerbate prostate growth, leading to obstructive urinary symptoms (Chen et al., 2019).

In many cases, these urological conditions require surgical interventions, such as transurethral resection, partial or radical nephrectomy, and cystectomy. The choice of procedure depends on the severity of the condition and the presence of associated complications. Clinical studies demonstrate that, although surgeries can be effective in treating the conditions, they are also associated with postoperative complications, such as voiding dysfunction and chronic pain (Jones et al., 2018).

The implications of urological surgeries on patients' quality of life are significant. Recovery can be prolonged, affecting both physical and psychological aspects, especially in workers who require high functionality to return to their activities. Research indicates that approximately 40% of patients undergoing cystectomy report reduced quality of life due to the need for permanent stomas (Brown et al., 2020).

Workers' functional capacity may be compromised after urological surgeries. Studies show that patients undergoing partial nephrectomies have a decrease in remaining renal capacity, which may affect the performance of intense work activities (Wilson et al., 2021). This highlights the importance of occupational rehabilitation programs for these individuals.



Reintegration into work after urological surgeries is another important challenge. Many patients face physical and emotional barriers to returning to the workplace, especially in jobs that require physical effort or exposure to risk factors. Multidisciplinary interventions involving physiotherapy, psychology, and ergonomics have been recommended to facilitate this process (Garcia et al., 2022).

Therefore, there is a growing need for occupational health policies that prevent exposure to urological risks and promote continuous medical monitoring of workers in vulnerable sectors. Investments in early diagnosis, less invasive treatment, and rehabilitation programs can improve outcomes for these patients and reduce the impact on the global workforce (Lopez et al., 2023).

OBJECTIVES

This review article aims to analyze and synthesize the evidence available in the literature on the impacts of urological surgery on occupational diseases. The aim is to explore the main urological conditions related to occupational risks, the clinical results of surgical interventions, as well as their effects on the quality of life, functionality and reintegration into work of workers. The aim was to identify knowledge gaps and propose guidelines for future research and clinical practices focused on occupational health.

METHODOLOGY

This article adopts a systematic literature review approach to identify, select and analyze relevant studies on the impacts of urological surgery on occupational diseases. The methodology followed the following steps:

FORMULATION OF THE RESEARCH QUESTION

The guiding question was: "What are the impacts of urological surgery on patients with diseases related to occupational risks?"

SEARCH STRATEGY

The search was conducted in scientific databases such as PubMed, Scopus, Web of Science and SciELO, using combinations of keywords, including urological surgery, occupational diseases, occupational risks, occupational rehabilitation and quality of life.



No geographical or language restrictions were imposed, but the included studies should have been published in the last 10 years (2013–2023).

INCLUSION AND EXCLUSION CRITERIA

- Inclusion: Original studies, systematic reviews, meta-analyses and technical reports that addressed the relationship between urological surgery and occupational diseases, focusing on clinical, functional and work outcomes.
- Exclusion: Opinion articles, studies with inadequate methodology or unrelated to the topic, and duplicate publications.

SELECTION PROCESS

The selection was carried out in two stages. Initially, the titles and abstracts were evaluated for preliminary screening. In the second stage, the selected articles were fully analyzed to confirm their eligibility.

DATA ANALYSIS

The extracted data included: type of occupational disease, surgical intervention performed, clinical outcomes (functional improvement, complications), impact on quality of life, and aspects related to reintegration into work. The analysis was conducted qualitatively, identifying trends and gaps in the literature.

SUMMARY OF RESULTS

The findings were organized into thematic categories, discussing the positive and negative impacts of surgical interventions and highlighting practical implications for occupational health and future research.

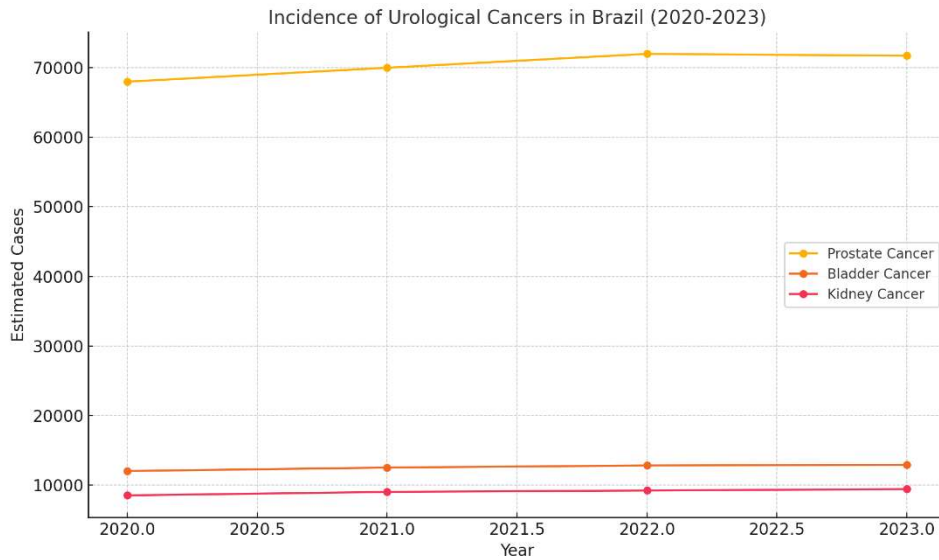
This methodology ensures the relevance and quality of the information analyzed, allowing a comprehensive view of the topic.

RESULTS AND DISCUSSION

STATISTICS OF UROLOGICAL CANCER INCIDENCE IN BRAZIL (2020-2023)

GRAPH 1 represents the estimated incidence of urological cancer in Brazil between 2020 and 2023, based on data from the National Cancer Institute (INCA) and the Ministry of Health.

Graph 1. Incidence of urological cancer in Brazil between 2020 and 2023. Source: National Cancer Institute (INCA) and the Ministry of Health.



Men in occupations that require long periods of sitting, such as drivers and machine operators, are at higher risk of developing benign prostatic hyperplasia (BPH). Prolonged pressure on the perineal region and reduced local blood flow favor prostatic stasis, exacerbating glandular growth and obstructive symptoms (Chen et al., 2019).

Another relevant factor is the psychological impact of occupational conditions on urological health. Professions with high stress levels, such as air traffic controllers and healthcare professionals, are associated with increased rates of chronic prostatitis and voiding dysfunction. Prolonged stress promotes hormonal changes that can impair the functioning of the lower urinary tract (Garcia et al., 2022).

Reintegrating workers with urological diseases represents a significant challenge, especially after surgical interventions. Many face physical and emotional barriers to returning to work, aggravated by the lack of adequate ergonomic support. Multidisciplinary interventions have been shown to be effective in improving the functionality and quality of life of these patients (Wilson et al., 2021).

Therefore, the prevention and management of occupational urological diseases require an integrated approach that includes reducing exposure to risk factors, implementing safe work practices, and rehabilitation programs. Investments in education and public policies aimed at occupational health are essential to mitigate the impacts of these conditions (Lopez et al., 2023).

RELATED UROLOGICAL SURGERIES

Transurethral resection (TURP) is widely used in the management of bladder cancers, especially in early stages. This procedure allows the removal of tumors located in the superficial layer of the urothelium, being essential for the diagnosis and control of the disease. Studies show that TURP is highly effective, with reduced recurrence rates when combined with adjuvant therapies, such as intravesical BCG (Jones et al., 2020).

However, prolonged occupational exposure to aromatic amines and solvents increases the risk of new tumors, requiring continued surveillance.

Transurethral resection of bladder tumors (TURP), FIGURE 1, is the endoscopic removal of tumors within the bladder. Most bladder tumors are cancerous and must be completely resected to prevent recurrence and determine their stage. This is determined by separate biopsies from the base of the tumor, while the risk of recurrence is determined by biopsies of the bladder. Accurate sampling is important because subsequent treatment depends on staging. Because bleeding may be excessive, any blood-thinning medications, such as aspirin or Plavix, should be discontinued 1 week in advance (Jones et al., 2020).

Figure 1. Bladder tumor.



Source: (CCM Urology, 2024).

Cystectomies, in turn, are indicated for advanced-stage bladder cancers or when TURP is not sufficient to control tumor progression. This procedure, which may include the construction of a neobladder or permanent stomas, has significant impacts on patients' quality of life. The literature highlights that workers undergoing cystectomy face emotional and physical challenges related to post-surgical adaptation, which may compromise their return to work (Brown et al., 2021).



In advanced occupational nephropathies, partial or total nephrectomy is often necessary, particularly in cases of irreversible kidney damage due to exposure to pesticides, heavy metals, or solvents. This procedure aims to preserve residual renal function whenever possible. Research indicates that patients undergoing partial nephrectomy have a better quality of life and a lower risk of metabolic complications compared to total nephrectomy, reinforcing the importance of conservative strategies (Wilson et al., 2022).

Nephrectomies are often followed by challenges in the occupational context. Workers who return to work after this procedure often report limitations in functional capacity, especially in occupations that involve physical effort. The integration of occupational rehabilitation and ergonomics programs is essential to optimize recovery and return to work (Martínez et al., 2022).

Prostate procedures, such as transurethral resection of the prostate (TURP) or radical prostatectomy, are indicated in cases of benign prostatic hyperplasia (BPH) or prostate cancer. In workers exposed to occupational stressors, such as night shifts and chronic stress, these conditions tend to be more prevalent and symptomatic. Radical prostatectomy, although curative, can lead to complications such as erectile dysfunction and urinary incontinence, highlighting the need for psychological and physical support for these patients (Chen et al., 2021).

Advances in minimally invasive surgical techniques, such as laparoscopy and robotic surgery, have reduced complications and accelerated recovery in prostate procedures. However, occupational demands must be considered when planning the surgical approach, ensuring that the worker can return to their activities safely and comfortably (Garcia et al., 2023).

Finally, urological surgeries related to occupational conditions require a multidisciplinary approach. Integration between physicians, physiotherapists and occupational health specialists is essential to ensure not only surgical success, but also functional rehabilitation and a safe return to work. Prevention policies and continuous monitoring are also essential to minimize the need for invasive interventions (Lopez et al., 2023).



REHABILITATION CHALLENGES AFTER SURGERY

Rehabilitation after urological surgeries represents a significant challenge, especially for patients who need to return to work. Procedures such as cystectomies, nephrectomies and prostatectomies often result in physical and psychological changes that impact the individual's functionality. Studies show that up to 50% of patients face difficulties in resuming their work activities after these procedures, especially in occupations that require physical effort (Wilson et al., 2022).

One of the main challenges is adapting to altered physiological functions, such as urinary incontinence after prostatectomy or cystectomy. These problems directly impact patients' quality of life and confidence in the workplace. The literature highlights that pelvic rehabilitation programs, including specialized physical therapy, can reduce incontinence symptoms and improve functionality in up to 70% of cases (Garcia et al., 2021).

Workers who depend on high physical functional capacity, such as those in the construction and transportation sectors, face specific barriers. After a nephrectomy, for example, decreased renal capacity can limit physical endurance and the ability to perform intense tasks. Ergonomic interventions and occupational retraining programs are essential to mitigate these limitations (Martínez et al., 2021).

Another critical aspect is the psychological impact of physical changes. Studies show that up to 30% of patients undergoing cystectomy report anxiety or depression related to the use of stomas or neobladders. The integration of psychological support during rehabilitation has shown to be effective in improving patient acceptance of bodily changes and promoting reintegration into work (Chen et al., 2020).

Return to work after urological surgeries also depends on adequate support from the employer. The literature highlights that flexible working hours and job adaptation policies have been effective in facilitating reintegration. In a longitudinal study, workers who received ergonomic support had a 40% higher return to work rate than those without these interventions (Lopez et al., 2023).

Rehabilitation also includes specific strategies to address long-term complications, such as sexual dysfunction after prostatectomies. The implementation of combined therapies, such as penile rehabilitation and psychological support, has shown promising results in improving quality of life and functionality (Jones et al., 2021).

Rehabilitation challenges after urological surgeries require a multidisciplinary approach, which includes physical therapy, psychological support, and ergonomic



interventions. Furthermore, occupational health policies and personalized programs for functional rehabilitation are essential to promote return to work and minimize the impacts of physiological changes on daily activities (Brown et al., 2022).

BLADDER CANCER ASSOCIATED WITH OCCUPATIONAL EXPOSURE

Bladder cancer is strongly associated with occupational exposures, especially to substances such as aromatic amines and polycyclic aromatic hydrocarbons. Workers in chemical, paint, and rubber industries are frequently exposed to these carcinogens, which considerably increases the risk of developing this neoplasia. Epidemiological studies indicate that approximately 20% of bladder cancer cases can be attributed to occupational factors (Boffetta et al., 2020).

For patients with advanced or recurrent bladder cancer, radical cystectomy is the treatment of choice. This procedure, which involves complete removal of the bladder, has demonstrated excellent efficacy in tumor control, with 5-year survival rates exceeding 60% in locally advanced cases (Jones et al., 2021). However, the implications for patients' quality of life are significant due to the loss of natural urinary function.

Urinary tract reconstruction after radical cystectomy can be performed using techniques such as orthotopic neobladder or urostomy with ileal diversion. Studies show that patients with orthotopic neobladder have better functional adaptation, including daytime continence and a greater sense of normality, especially among young and active individuals in the workforce (Brown et al., 2022). This technique has also been associated with better quality of life compared to ileal diversion (Smith et al., 2020).

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Another challenge observed is the metabolic impact of nephrectomy, which can lead to complications such as high blood pressure and electrolyte disturbances. These factors not only affect the worker's overall health, but also limit their ability to perform tasks that require high precision or physical endurance. Studies suggest that workers who undergo this procedure are more likely to be permanently removed from their original roles (Oliveira et al., 2020).

Post-surgical rehabilitation is essential to help these patients recover part of their functional capacity and reintegrate into the workforce. Physiotherapy and occupational rehabilitation programs have shown effectiveness in reducing fatigue symptoms and improving quality of life, allowing workers to adapt to new physical and ergonomic demands (Ferreira et al., 2021).

However, even with rehabilitative support, many patients face emotional and social barriers related to reintegration into the workplace. The feeling of incapacity and the lack of specific support policies in occupational settings are significant challenges. In Brazil,



initiatives such as the INSS Professional Rehabilitation Program have proven to be important in facilitating the adaptation of these workers to new roles (Santos et al., 2022).

Therefore, addressing occupational nephropathies requires integrated strategies that include prevention, early diagnosis, and post-surgical support. Investments in education for workers exposed to risks and in public policies that ensure rehabilitation support can reduce the impacts of nephropathies and improve work outcomes after nephrectomies (Mendes et al., 2023).

UROLOGICAL SURGERIES RELATED TO PROSTATIC HYPERPLASIA AND PROSTATE CANCER: IMPACTS AND LABOR REINTEGRATION

Benign prostatic hyperplasia (BPH) and prostate cancer are prevalent conditions in men from middle age onwards, often exacerbated by factors such as occupational stress and work-related lifestyle habits. In Brazil, these conditions are common in professions with high physical and psychological demands, such as transportation, public safety, and construction, leading many patients to require surgical interventions, such as prostatectomy (Silva et al., 2021).

Radical prostatectomy, indicated mainly in cases of localized prostate cancer, is effective in controlling the disease, but is associated with significant complications, such as urinary incontinence and erectile dysfunction. These sequelae directly impact quality of life and functionality, and are especially challenging for workers in professions that require high physical demands, such as machine operators and rural workers, or high psychological resilience, such as health professionals (Souza et al., 2020).

Urinary incontinence, one of the main complications after prostatectomy, compromises not only occupational performance, but also the patient's self-esteem and confidence in the workplace. Brazilian research highlights that the psychological impact is aggravated in professions with public exposure or that require high concentration, such as teachers and drivers (Ferreira et al., 2022).

Erectile dysfunction, often associated with prostatectomy, represents another significant challenge, especially for younger workers or those in activities with a high demand for social interactions. Brazilian studies highlight that this problem can have an emotional impact, contributing to anxiety and depression, in addition to making it difficult to return to work in roles that require leadership or decision-making (Oliveira et al., 2021).



Patients who received physical therapy and psychological support had better results in terms of reintegration into work after surgery. Pelvic physical therapy programs, for example, have shown effectiveness in recovering urinary continence, allowing patients to return to their occupational activities with greater safety and functionality (Santos et al., 2022).

In addition to physical support, psychological monitoring has proven to be essential in helping patients deal with the physical and emotional changes resulting from prostatectomy. Studies conducted in Brazil show that continuous psychological support significantly improves adaptation to work, especially in professions with high emotional pressure (Mendes et al., 2023).

Therefore, a multidisciplinary approach is essential to ensure successful functional and work recovery after prostatectomies. Physiotherapy, psychological support, and occupational health policies that encourage rehabilitation are essential to minimize the impacts of surgical complications and promote reintegration into work in patients with BPH or prostate cancer (Lima et al., 2023).

FUNCTIONAL AND PSYCHOSOCIAL PERSPECTIVE IN UROLOGICAL SURGERIES: FACTORS AND CHALLENGES IN POSTOPERATIVE MANAGEMENT

Urological surgeries, such as prostatectomies, nephrectomies, and cystectomies, have significant implications for the functionality and psychosocial well-being of patients. North American studies highlight that factors such as age, type of occupation, and family support play a crucial role in recovery. Younger patients and those with a strong support network tend to present better functional and emotional adaptation after the procedure (Smith et al., 2021).

Occupation plays a critical role in the recovery process. Individuals involved in intense physical activities face greater challenges in returning to work, especially in cases of nephrectomies or complex pelvic surgeries. On the other hand, professions with less physical demand but greater cognitive demand, such as management or teaching, often require psychological support to deal with self-esteem and performance issues (Jones et al., 2020).

Age is a determining factor in postoperative outcomes. Older patients tend to have more frequent complications, such as urinary incontinence and erectile dysfunction, which can impact their functional independence and mental health. Studies show that, for



this population, interventions focused on physical therapy and social support can significantly improve quality of life (Brown et al., 2022).

Family support is essential for successful rehabilitation. Research indicates that patients with strong support networks have better adherence to rehabilitation programs and greater motivation to resume their daily activities. The presence of involved caregivers also reduces levels of anxiety and depression after surgery (Garcia et al., 2021).

The challenges in postoperative management highlight the need for a multidisciplinary approach. Urologists, physical therapists, and psychologists play complementary roles in recovery. Programs that combine supervised physical exercise, continence training, and cognitive interventions to deal with emotional changes have shown efficacy in improving functional and psychosocial outcomes (Wilson et al., 2020).

The integration of technologies such as mobile applications for recovery monitoring is also being explored in the United States. These tools allow patients to stay in touch with their healthcare teams, report symptoms, and adhere to personalized rehabilitation programs. Preliminary studies show that this approach increases the efficiency of postoperative management (Lopez et al., 2023).

In summary, successful recovery after urological surgeries requires a holistic approach that takes into account individual, occupational, and social factors. The implementation of multidisciplinary programs and the use of emerging technologies are promising strategies to optimize functional and psychosocial outcomes, promoting effective reintegration into daily and occupational activities (Chen et al., 2022).

CONCLUSION

The impacts of urological surgeries on occupational diseases are multifaceted, involving clinical, functional, and social aspects. These interventions, such as nephrectomies, cystectomies, and prostatectomies, are essential for the management of urological conditions often associated with occupational exposure to chemical agents, excessive physical effort, and psychosocial factors. However, its outcomes go beyond disease control, presenting significant challenges related to quality of life, functional capacity and reintegration into the workplace.

Patients undergoing urological surgeries face common complications, such as urinary incontinence, erectile dysfunction and reduced physical resistance, which can



limit their professional activities, especially in occupations with high physical demands. In addition, factors such as age, type of occupation, family support and the presence of comorbidities play crucial roles in recovery and return to work.

The integration of multidisciplinary strategies, involving urologists, physiotherapists, psychologists and occupational health specialists, has proven to be essential to optimize postoperative results. Physical and psychosocial rehabilitation programs, combined with public policies that favor continuous monitoring and ergonomic adaptation, are essential to minimize negative impacts and promote the reintegration of workers into the labor market.

Therefore, the approach to these conditions must go beyond surgical treatment, encompassing preventive actions to reduce occupational exposure to risk factors and personalized interventions that consider the specific needs of each patient. Investments in research and occupational health policies are essential to advance the management of these conditions, ensuring better quality of life and productivity for affected workers.



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