

Article

# The Role of Artificial Intelligence in Patient Education: A Bladder Cancer Consultation with ChatGPT

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**Abstract: Objectives:** ChatGPT is a large language model that is able to generate human-like text. The aim of this study was to evaluate ChatGPT as a potential supplement to urological clinical practice by exploring its capacity, efficacy and accuracy when delivering information on frequently asked questions from patients with bladder cancer. **Methods:** We proposed 10 hypothetical questions to ChatGPT to simulate a doctor–patient consultation for patients recently diagnosed with bladder cancer. The responses were then assessed using two predefined scales of accuracy and completeness by Specialist Urologists. **Results:** ChatGPT provided coherent answers that were concise and easily comprehensible. Overall, mean accuracy scores for the 10 questions ranged from 3.7 to 6.0, with a median of 5.0. Mean completeness scores ranged from 1.3 to 2.3, with a median of 1.8. ChatGPT was also cognizant of its own limitations and recommended all patients should adhere closely to medical advice dispensed by their healthcare provider. **Conclusions:** This study provides further insight into the role of ChatGPT as an adjunct consultation tool for answering frequently asked questions from patients with bladder cancer diagnosis. Whilst it was able to provide information in a concise and coherent manner, there were concerns regarding the completeness of information conveyed. Further development and research into this rapidly evolving tool are required to ascertain the potential impacts of AI models such as ChatGPT in urology and the broader healthcare landscape.

**Keywords:** bladder cancer; patient education; ChatGPT; artificial intelligence



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## 1. Introduction

Bladder cancer is a significant contributor to morbidity and mortality in urological patients. In Australia, nearly 3000 patients are newly diagnosed with bladder cancer each year [1]. The incidence and mortality rates closely parallel those of other developed countries, which see over 430,000 patients with new bladder cancer diagnoses worldwide, making it the 4th most common cancer in men and 11th most common cancer in women [2]. Newfound bladder cancer diagnoses can be difficult for patients, leading to pre- and post-treatment psychological distress, which may manifest as worse outcomes if left untreated [3]. As such, patients are often burdened with questions relating to their diagnoses, treatment options and prognosis that must be addressed by clinicians.

With the advent of new technology, accessible information is now more readily available than ever before. Artificial intelligence (AI) language generator tools represent one of the most recent and exciting developments that has the potential to transform the delivery

of scientific and medical information to the public. One of the most well-recognized tools is ChatGPT, a large language model capable of generating human-like text [4]. Through extensive training using a vast body of text data accrued from a wide variety of sources across the internet, this large language model is able to comprehend and respond to natural language queries. Thus, ChatGPT may provide patients with an opportunity outside of clinician appointments to alleviate any pressing questions or concerns that they may have. However, it is important to remain cognizant of the potential limitations associated with such technology, especially in relation to the accuracy and comprehensiveness of the information provided.

Despite the rapid expansion of AI, there remains a paucity of literature on the applicability of large language models to the medical field. Further research is required to evaluate its potential significance as a tool for patient education. In order to further explore the utility of ChatGPT as a clinical adjunct, this study opted to conduct a hypothetical consultation using ChatGPT for patients with bladder cancer. The aim of this study was to evaluate the potential for ChatGPT to supplement urological clinical practice by exploring its capacity, efficacy and accuracy when delivering information on frequently asked questions from patients with bladder cancer.

## 2. Methods

We proposed 10 hypothetical questions to ChatGPT (version 3.5) with the intention of simulating a doctor–patient consultation for patients recently diagnosed with bladder cancer. Version 3.5 was chosen for the present study as it is free, making it the most probable large language model patients would consult with their queries. The questions were based on multiple websites that patients recently diagnosed with bladder cancer would have immediate access to. These websites include ‘Cancer.net’, an educational website developed and endorsed by the American Society of Clinical Oncology [5]; ‘Cancer.org’, a website developed by the American Cancer Society [6]; and ‘Cancercouncil.com.au’, an Australian website aimed at educating and raising awareness for patients diagnosed with cancer [7]. Additionally, bladder cancer support forums were assessed to identify common questions from real patients affected by bladder cancer to improve the authenticity of the proposed questions that we generated. These questions were further discussed to consensus with senior consultants such that they were an accurate representation of questions that have been experienced in a real-life consultation scenario.

The objective of producing these questions was to cover a broad range of information relating to bladder cancer and its overall impact on a patient’s well-being. These questions were then entered into ChatGPT, and responses were recorded for evaluation by specialist urologists at our institution (Figure 1). For consistency, and to model the role of the patient, a preface of: “*I am a patient with bladder cancer. In 200 words or less please tell me: (insert question)*” was used. It should be noted that ChatGPT has a probabilistic algorithm, which uses random sampling to generate a variety of responses leading to slightly different answers to the same question. In our study, the first response provided by ChatGPT was used for assessment, with no further clarification or correction. All questions were entered on the same day (26 July 2023) on a single ChatGPT account owned by one of the authors. We opted to exclude the use of ChatGPT Plus as this is a subscription-only service, and so, most patients would not have access to this feature.

#### Questions for Bladder Cancer:

1. What are the different stages of bladder cancer and what is the cure rate of the different stages?
2. Are there different types of bladder cancer and what is the cure rate of the different types?
3. Is chemotherapy and radiation instead of bladder removal surgery an option for bladder cancer?
4. Is immunotherapy an alternative to cystectomy for bladder cancer?
5. What are the main risks and complications of radical cystectomy?
6. What are the side effects of chemotherapy, immunotherapy and radiation for bladder cancer?
7. How will my life change with a stoma bag?
8. How long will it take to return to normal activities after radical cystectomy?
9. What is the chance of bladder cancer coming back after treatment?
10. What are the follow up tests for bladder cancer?

**Figure 1.** Ten commonly asked patient questions developed for input to ChatGPT.

The responses provided by ChatGPT were then assessed using two predefined scales of accuracy and completeness by Specialist Urologists (JV, KR and AC). The accuracy scale was a 6-point Likert scale (1—completely incorrect, 2—more incorrect than correct, 3—approximately equal correct and incorrect, 4—more correct than incorrect, 5—nearly all correct, 6—correct), and the completeness scale was a 3-point Likert scale (1—incomplete, addressed some aspects of the question but significant parts are missing or incomplete, 2—adequate, addresses all aspects of the questions and provides minimum amount of information required to be considered complete, 3—comprehensive, addresses all aspects of the question and provides additional information) [8]. Score results were listed descriptively. The mean accuracy and completeness scores were presented for each question. The median and range of these means were also included in the results section.

Through the rigorous evaluation of these responses, we sought to determine the utility of large language models in supplementing doctor–patient consultations.

### 3. Results

ChatGPT generated responses to each of the 10 questions (Appendix A) asked. The mean accuracy and completeness scores as assessed by the Specialist Urologists were calculated for each question (Table 1). Overall, mean accuracy scores for the 10 questions ranged from 3.7 to 6.0, with a median of 5.0. Mean completeness scores ranged from 1.3 to 2.3, with a median of 1.8.

To initiate the consult, ChatGPT was asked questions relating to the staging (Q1) and types (Q2) of bladder cancer. ChatGPT provided an accurate response (Q1—5.0; Q2—5.0) that mentioned the different stages and their defining characteristics as well as a reduction in cure rate with more advanced stages, though it lacked completeness (Q1—1.7; Q2—2.0). The response also outlined some differences between transitional cell and non-transitional cell carcinoma. Although the information provided was accurate, it failed to recognize that most Australian consultants use TNM staging and neglected to provide specific cure rates for each stage.

ChatGPT was then asked about the possible treatment modalities (Q3 and Q4) including cystectomy, chemotherapy, radiotherapy, and immunotherapy. ChatGPT provided both accurate (Q3—5.3; Q4—5.3) and complete (Q3—2.3; Q4—2.3) answers that adequately described the treatment options mentioned as well as their utility, which depends on patient and disease factors. Additionally, ChatGPT demonstrated knowledge of combining therapeutic options stating “immunotherapy can be used as a primary treatment. . . immunotherapy

may also be used as neoadjuvant therapy before surgery to shrink the tumor. . . it can be employed as adjuvant therapy after cystectomy to lower the risk of cancer recurrence” and “radiation may be used in combination with chemotherapy for a more comprehensive approach”. These responses were considered excellent by the assessing Specialist Urologists.

**Table 1.** Summary of the mean scores of accuracy and completeness after review by specialist urologists.

| Question No. | Accuracy (/6) | Completeness (/3) |
|--------------|---------------|-------------------|
| 1            | 5.0           | 1.7               |
| 2            | 5.0           | 2.0               |
| 3            | 5.3           | 2.3               |
| 4            | 5.3           | 2.3               |
| 5            | 5.7           | 1.3               |
| 6            | 5.0           | 1.7               |
| 7            | 5.7           | 2.0               |
| 8            | 4.3           | 1.7               |
| 9            | 3.7           | 1.3               |
| 10           | 6.0           | 2.3               |

Following questions regarding therapeutic options, we asked for further clarification of the risks and side effects associated with these interventions (Q5 and Q6). Whilst the answers supplied were accurate (Q5—5.7; Q6—5.0), the responses were superficial and thus failed to address many aspects of the question, scoring poorly in completeness (Q5—1.3; Q6—1.7). Post-operative complications such as “urinary problems. . . sexual dysfunction. . . bowel problems” are mentioned; however, the brevity of the response prevented adequate exploration of these issues with a failure to mention bowel obstruction, parastomal hernia and wound complications in detail. Similarly, the side effects outlined for chemotherapy, radiotherapy and immunotherapy were generalized, whereby the information was accurate but grossly lacking in detail.

The remainder of the consultation focused on postoperative aspects. Questions regarding how a stoma bag may affect the patient’s life (Q7) and the length of time to return to normal activities were asked of ChatGPT (Q8). The responses were effective in accounting for the psychosocial impact of a permanent stoma but were remiss in addressing how these issues may be rectified. Though the response was reasonable in providing a list of possible postoperative considerations and their impact on a patient’s quality of life in the immediate and long-term postoperative periods, there was a notable lack of nuance in their response, which we anticipated. Most information provided could be generalizable to all postoperative patients and neglected important instructions such as avoiding driving for 4 weeks. Ultimately, despite generally accurate information, the paucity of depth in the responses led to comparatively poorer scoring in both accuracy (Q7—5.7; Q8—4.3) and completeness (Q7—2.0; Q8—1.7).

The final questions posited were related to the risk of recurrence (Q9) and any follow-up testing that would be required (Q10). ChatGPT managed to qualitatively report the risk of recurrence, though there were no quantitative figures provided. Additionally, there was no delineation of treatment outcome according to cancer grade. Thus, the accuracy (Q9—3.7) and completeness (Q9—1.3) scores for this question were mediocre. However, the follow-up tests suggested were accurate and adequately encompassed most aspects of monitoring, with the exception of a surveillance schedule, reflecting an accurate (Q10—6.0) and complete (Q10—2.3) answer.

In all answers provided, ChatGPT consistently recommended adherence to personalized recommendations from the treating healthcare team to determine the best treatment plan.

#### 4. Discussion

This exploratory study investigated the utility of large language models in a health-specific context, specifically as an informative supplement for patients diagnosed with bladder cancer. The results indicate that ChatGPT was able to produce coherent answers that were concise and easily comprehensible. ChatGPT was also cognizant of its own limitations and recommended all patients should adhere closely to medical advice dispensed from their healthcare provider. However, the answers provided ranged in accuracy and completeness. Responses were often accurate, but superficial, and failed to offer more nuanced information on the topic at hand. Furthermore, there was a marked paucity of quantifiable figures drawn from evidence-based sources to reinforce and supplement the information that was dispensed in these responses.

Generative AI, and particularly the role of large language models, remains a contentious area of excitement and apprehension in medical and scientific communities given its far-reaching utility and implications [9]. Indeed, the last half-decade has seen gradually increasing adoption in medical communities ranging from drug development to health monitoring, despite the technology being in its infancy stages [10]. The application of this technology has even yielded demonstrations of AI models, such as IBM Watson, being on par with specialist oncologists when recommending treatment options for cancer patients [11]. A recently released large language model, ChatGPT, has been further utilized and studied in a medical context given its accessibility and simple user interface. For example, multiple publications have explored the variety of use cases for ChatGPT, ranging from passing Medical Licensing Exams [12,13] and specialty board exams [14,15] to reducing clinician burnout [16].

In the context of specialized medical management, there has been a cursory exploration of the role of ChatGPT, which demonstrates promising outcomes, though further development is necessary. Zhu et al. proposed 22 questions related to prostate cancer to ChatGPT and reported the 'accuracy' and 'comprehensiveness' of the large language model was greater than 90% [17]. This study indicated that ChatGPT performed well for basic information questions with definite answers, but more specific scenarios led to reduced accuracy. Conversely, Coskun et al. compared ChatGPT to a reference source for patient information from the European Association of Urology and found that ChatGPT-sourced information had suboptimal accuracy levels [18]. Furthermore, the information provided was not always consistent with the reference source. Although our results indicated that ChatGPT was predominantly accurate, the lack of depth in each response may account for the inconsistencies from the reference source mentioned in the aforementioned study. This may be attributed to ChatGPT's lack of specialized knowledge and training in urology, in conjunction with the incorporation of inaccurate or outdated sources during the machine learning process.

Despite forays into the role of ChatGPT in prostate cancer, there is a paucity of literature pertaining to the utility of ChatGPT as a consultation tool for patients diagnosed with bladder cancer. A recent study by Szczesniowski et al. briefly explores the knowledge of different bladder cancer treatment modalities possessed by ChatGPT as a part of a larger examination of common urological diseases [19], though it does not account for commonly asked patient questions in relation to adverse effects and postoperative considerations. Our study provides further context as to the capabilities of ChatGPT to act as a valuable adjunct to the consultation process, given its relative accuracy when tackling frequently asked patient questions pertaining to treatment modalities, adverse effects and complications, long-term psychosocial impacts related to stoma formation and postoperative recovery, and risk of recurrence.

Although ChatGPT has demonstrated its reliability in knowledge-based areas such as medical licensing or board examinations, its greatest utility to clinicians may lie in its ability to alleviate the burdens of electronic patient messaging by serving as a proxy to answer patient questions [16]. ChatGPT has been suggested to reduce the administrative load by improving clinical workflow and aid in low-complexity tasks, thus allowing urologists and

medical practitioners alike to focus more on the human element of medicine. Beyond this, the aim of our study was to explore the efficacy and accuracy of ChatGPT as a virtual clinical assistant and its ability to handle more complex medical questions that would commonly require specialized knowledge and patient empathy. Another study by Xie et al. also sought to replicate a patient consultation using ChatGPT for rhinoplasty [20]. They concluded that ChatGPT served as a valuable resource for patients seeking information but had limited use in addressing the psychosocial aspects of patient selection and setting realistic expectations. Similarly, patients facing bladder cancer diagnoses also require compassionate counseling and shared decision-making to identify the best treatment modality for their circumstances. Thus, ChatGPT remains a useful tool for urological consultations; however, it cannot replace the psychological competency and empathy of a human clinician.

Our study has a few limitations. Firstly, though the responses were assessed qualitatively and quantitatively using two predefined Likert scales by experienced urological specialists, this was not performed using a validated test. Furthermore, the responses generated by ChatGPT would likely vary depending on how the questions are formulated. This may result in inconsistent results when questions that are asked differ between patients. However, ChatGPT has already demonstrated an exceptional understanding of natural language in a urology-specific context, which may mitigate this issue.

## 5. Conclusions

This study provides further insight into the role of ChatGPT as an adjunct consultation tool for answering frequently asked questions from patients with bladder cancer diagnoses. Whilst it was able to provide information in a concise and coherent manner, there were concerns regarding the completeness of information conveyed. In addition, ChatGPT was unable to account for the psychosocial aspects required to deal with sensitive issues such as oncological diagnoses. Overall, further development and research into this rapidly evolving tool is required to ascertain the potential impacts of AI models such as ChatGPT in urology and the broader healthcare landscape.

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## Appendix A. Questions and Responses Generated by ChatGPT

### Questions + Responses (Chat-GPT)

1. *What are the different stages of bladder cancer and what is the cure rate of the different stages?*

Bladder cancer is classified into different stages based on its extent and spread. The stages are:

1. Stage 0 (Carcinoma in situ—CIS): Cancer is only present on the innermost lining of the bladder without invading deeper layers. It is non-invasive.

2. Stage I: Cancer has grown into the connective tissue beneath the bladder lining but has not reached the muscle layer.
3. Stage II: Cancer has invaded the muscle layer of the bladder wall but hasn't spread beyond the bladder.
4. Stage III: Cancer has spread to nearby tissues around the bladder, such as the prostate or uterus, but not to lymph nodes or distant organs.
5. Stage IV: Cancer has spread to lymph nodes, other nearby organs, or distant organs like the lungs, liver, or bones. Cure rates vary for each stage. Early stages (Stage 0 and I) generally have higher cure rates, often above 80%, especially with timely and appropriate treatment. For Stage II, the cure rate is lower but still possible with surgery, chemotherapy, or radiation. Stage III has a more guarded prognosis, and the cure rate drops further. Stage IV has the lowest cure rate, but treatments like chemotherapy, immunotherapy, and targeted therapy may help manage the disease and prolong survival. However, individual factors like age, overall health, and response to treatment can impact outcomes. It's essential to work closely with your medical team for personalized information and the best treatment plan.

**2. *Are there different types of bladder cancer and what is the cure rate of the different types?***

Yes, there are different types of bladder cancer, and the cure rate can vary depending on the specific type, stage, and individual factors. The two main types of bladder cancer are:

1. Transitional Cell Carcinoma (also known as Urothelial Carcinoma): This is the most common type, accounting for about 90% of cases. It starts in the urothelial cells lining the bladder. Cure rates for transitional cell carcinoma depend on the stage at diagnosis. Early stage tumors (Stage 0 and I) generally have higher cure rates, often above 80% with appropriate treatment. Advanced stages (Stage II, III, and IV) have lower cure rates, but treatment options like surgery, chemotherapy, and immunotherapy can improve outcomes.
2. Non-Transitional Cell Carcinoma: This type includes several subtypes, such as squamous cell carcinoma, adenocarcinoma, and small cell carcinoma. Non-transitional cell carcinomas are less common and have different characteristics and treatment responses compared to transitional cell carcinoma. The cure rates for these subtypes can vary widely based on their aggressiveness and stage at diagnosis. It's essential to work closely with your healthcare team to understand your specific diagnosis, treatment options, and potential outcomes. The medical team will consider your individual health, the stage and type of bladder cancer, and other relevant factors to develop a personalized treatment plan aimed at maximizing the chances of cure or effective disease management. Regular follow-up care and communication with your medical team are crucial for monitoring progress and making any necessary adjustments to the treatment plan.
3. ***Is chemotherapy and radiation instead of bladder removal surgery an option for bladder cancer?***

Yes, for some cases of bladder cancer, chemotherapy and radiation therapy can be used as alternatives to bladder removal surgery (cystectomy). These treatments are often considered when surgery is not the preferred option due to various factors such as the patient's overall health, age, and preferences.

1. Chemotherapy: Chemotherapy uses drugs to kill or slow the growth of cancer cells. It can be used as a primary treatment for some early-stage bladder cancers or as neoadjuvant or adjuvant therapy in combination with surgery or radiation for more advanced cases. Neoadjuvant chemotherapy may help shrink the tumor before surgery, while adjuvant chemotherapy can target any remaining cancer cells after surgical removal.
2. Radiation therapy: Radiation therapy involves using high-energy rays to target and destroy cancer cells. It can be used as the primary treatment for early-stage bladder

cancer, especially when surgery is not the best option. In some cases, radiation may be used in combination with chemotherapy for a more comprehensive approach. While chemotherapy and radiation can be effective in treating bladder cancer, their success depends on factors like the stage and extent of the disease and the individual's response to treatment. It's essential for patients to discuss all available treatment options with their medical team, including the potential benefits and risks of each approach, to make an informed decision based on their unique situation.

#### **4. *Is immunotherapy an alternative to cystectomy for bladder cancer?***

Immunotherapy can be an alternative or complementary treatment to cystectomy for bladder cancer, particularly in certain cases. Immunotherapy works by stimulating the body's immune system to recognize and attack cancer cells, and it has shown promising results in treating various types of cancer, including bladder cancer.

For some patients with early-stage bladder cancer or in situations where cystectomy may not be the best option, immunotherapy can be used as a primary treatment. Immune checkpoint inhibitors are a common form of immunotherapy used in bladder cancer, targeting specific proteins that cancer cells use to evade the immune system.

In certain cases, immunotherapy may also be used as neoadjuvant therapy before surgery to shrink the tumor, potentially making the cystectomy procedure more effective. Additionally, it can be employed as adjuvant therapy after cystectomy to lower the risk of cancer recurrence.

The decision to use immunotherapy as an alternative or complementary treatment to cystectomy depends on various factors, including the stage and type of bladder cancer, the patient's overall health, and their response to treatment. It is crucial to discuss all available treatment options with your medical team to determine the most suitable approach tailored to your specific condition and goals. Close monitoring and regular follow-up care are essential to evaluate the treatment's effectiveness and ensure the best possible outcome.

#### **5. *What are the main risks and complications of radical cystectomy?***

Radical cystectomy is a major surgical procedure used to treat bladder cancer by removing the entire bladder and surrounding tissues. While it can be highly effective in treating the disease, it also carries certain risks and potential complications. Some of the main risks and complications of radical cystectomy include:

1. **Surgical Risks:** As with any major surgery, there is a risk of bleeding, infection, blood clots, and adverse reactions to anesthesia.
2. **Urinary Problems:** After bladder removal, patients will need a new way to store and pass urine. This is typically achieved through a urinary diversion (e.g., ileal conduit or neobladder), which can lead to complications like urinary leakage, urinary tract infections, or difficulty controlling urine.
3. **Sexual Dysfunction:** Nerve damage during surgery can lead to sexual difficulties in both men and women.
4. **Bowel Problems:** In some cases, the intestine may be used for urinary diversion, which can result in bowel-related issues such as changes in bowel habits or bowel leakage.
5. **Stoma Complications:** If a stoma is created for urinary diversion, there may be issues with skin irritation or infection around the stoma site.
6. **Lymphedema:** Removal of lymph nodes can lead to lymphedema, a condition characterized by swelling in the legs or genital area.
7. **Psychological Impact:** Adjusting to the changes in bodily function and body image can lead to emotional and psychological challenges. It's important to discuss these potential risks and complications with your medical team before the surgery. They can provide guidance, support, and post-operative care to help manage and minimize any adverse effects and ensure the best possible outcome after radical cystectomy.

#### **6. *What are the side effects of chemotherapy, immunotherapy and radiation for bladder cancer?***

Chemotherapy, immunotherapy, and radiation therapy are common treatments for bladder cancer, and they can be associated with side effects. Here are some of the potential side effects for each treatment:

1. **Chemotherapy:** Chemotherapy uses drugs to kill or slow the growth of cancer cells. Side effects can include nausea, vomiting, fatigue, hair loss, decreased blood cell counts (increasing the risk of infections or bleeding), and gastrointestinal issues. These side effects are often temporary and can be managed with medications and supportive care.
2. **Immunotherapy:** Immunotherapy works by stimulating the body's immune system to fight cancer. Common side effects include fatigue, flu-like symptoms, skin rash, and diarrhea. More serious but less common side effects can affect organs like the lungs, liver, or kidneys. Prompt reporting of any new or worsening symptoms to your healthcare team is essential for early intervention.
3. **Radiation Therapy:** Radiation therapy uses high-energy rays to target and kill cancer cells. Side effects can include fatigue, skin irritation in the treated area, urinary problems, and bowel changes. These side effects are generally localized to the treatment area and improve after the completion of radiation. The severity and duration of side effects can vary from person to person, and not everyone will experience all of these effects. Your medical team will closely monitor you during treatment and provide supportive care to manage and minimize side effects. Open communication with your healthcare providers about any concerns or discomforts can help optimize your treatment experience and overall well-being.

#### **7. *How will my life change with a stoma bag?***

Having a stoma bag after bladder cancer surgery will bring some adjustments to your daily life, but it doesn't mean you cannot lead a fulfilling and active life. Initially, there might be emotional challenges as you adapt to the changes, but with time and support, many people adjust well. Here are some aspects of life that may be affected:

1. **Self-care:** You'll need to learn how to care for your stoma and change the bag regularly. Your medical team will guide you in this process.
2. **Dietary considerations:** Certain foods may affect the odor and consistency of output, so you may need to make adjustments to your diet.
3. **Clothing choices:** You might prefer looser clothing to accommodate the stoma bag comfortably.
4. **Physical activities:** Most activities can still be enjoyed, but contact sports or strenuous exercises may require precautions.
5. **Emotional impact:** It's natural to experience emotional ups and downs, and seeking support from loved ones or support groups can be beneficial.
6. **Social situations:** Engaging in social events may require planning for bag changes and discreet disposal.
7. **Intimacy:** Open communication with your partner about your concerns is crucial to maintain a healthy intimate life. Remember, stoma bags have improved significantly in design and discretion, making them less intrusive to daily life. Your healthcare team will provide education and support, helping you adapt to the changes and regain confidence. You can still lead an active and fulfilling life with a stoma bag, and many people find that over time, it becomes just another aspect of their routine.

#### **8. *How long will it take to return to normal activities after radical cystectomy?***

The recovery period and the time it takes to return to normal activities after radical cystectomy can vary from person to person. Generally, it is a major surgery, and the recovery process can be significant. Here are some general guidelines:

1. **Hospital Stay:** Patients typically stay in the hospital for about 5 to 10 days after the surgery, depending on their progress and any complications.

2. **Immediate Post-Surgery:** In the first few weeks, you may need to rest and avoid strenuous activities. Your medical team will monitor your healing and manage any pain or discomfort.
3. **Physical Activities:** Gradually, you may start light activities, like short walks, but avoid heavy lifting or vigorous exercise for several weeks.
4. **Stoma Management:** If a stoma is created for urine drainage, you'll need to learn how to care for it and manage the stoma bag.
5. **Resuming Normal Activities:** The timeline for returning to work or other normal activities can vary. It may take several weeks to a few months, depending on your overall health, the extent of surgery, and how well you heal.
6. **Long-term Adaptation:** Some aspects of life, like dietary adjustments or considerations for physical activities, may be permanent. Your medical team will provide you with specific guidance on your recovery, wound care, and stoma management. Follow their instructions, attend follow-up appointments, and communicate any concerns during your healing process. With time and support, many patients can resume a fulfilling and active life after radical cystectomy.

**9. *What is the chance of bladder cancer coming back after treatment?***

The chance of bladder cancer coming back after treatment can vary depending on several factors, including the stage and grade of the cancer, the type of treatment received, the individual's overall health, and lifestyle factors. It is essential to work closely with your medical team to understand your specific situation and risk factors. For non-invasive bladder cancer (Stage 0 and Stage I), the recurrence rate is relatively higher compared to muscle-invasive bladder cancer (Stage II, Stage III, and Stage IV). However, early-stage bladder cancer also tends to be more treatable, and regular surveillance and follow-up are crucial to detect and manage any recurrence promptly. For muscle-invasive bladder cancer, the risk of recurrence depends on the success of the initial treatment, the presence of any residual cancer cells, and the effectiveness of adjuvant therapies like chemotherapy or radiation. Furthermore, certain factors such as smoking, exposure to certain chemicals, and previous cancer recurrences may increase the risk of cancer returning. To reduce the risk of recurrence, it's essential to adhere to the recommended follow-up schedule, make necessary lifestyle changes (e.g., quitting smoking), and discuss with your medical team any concerning symptoms promptly. Regular surveillance and early intervention can improve the chances of successful treatment if cancer were to recur.

**10. *What are the follow up tests for bladder cancer?***

As a patient with bladder cancer, follow-up tests are essential for monitoring your condition and detecting any recurrence or new developments. The specific follow-up schedule will depend on factors like the stage of your cancer, the type of treatment received, and your individual health status. However, common follow-up tests for bladder cancer include:

1. **Cystoscopy:** This is a standard test for surveillance of bladder cancer. A thin, flexible tube with a camera is inserted through the urethra to examine the bladder lining for any signs of tumor recurrence or abnormalities.
2. **Imaging Studies:** Depending on your case, periodic imaging tests like CT scans or MRI may be done to assess the bladder and surrounding structures for any signs of cancer spread or recurrence.
3. **Urine Cytology:** This involves analyzing a urine sample under a microscope to check for cancer cells shed by the bladder lining.
4. **Biopsies:** If any suspicious areas are found during cystoscopy or other tests, a biopsy may be performed to confirm the presence of cancer.
5. **Blood Tests:** Certain blood markers may be monitored to assess the response to treatment or detect any signs of cancer recurrence.
6. **Regular Check-ups:** Regular visits to your healthcare provider are essential for discussing any symptoms or concerns and evaluating your overall health. It's crucial to adhere to the recommended follow-up schedule and promptly report any new

or unusual symptoms to your medical team. Early detection of any recurrence or progression of the cancer can lead to timely intervention and better outcomes.

## References and Note

- Cheluvappa, R.; Smith, D.P.; Cerimagic, S.; Patel, M.I. A comprehensive evaluation of bladder cancer epidemiology and outcomes in Australia. *Int. Urol. Nephrol.* **2014**, *46*, 1351–1360. [\[CrossRef\]](#) [\[PubMed\]](#)
- Kamat, A.M.; Hahn, N.M.; Efstathiou, J.A.; Lerner, S.P.; Malmström, P.U.; Choi, W.; Guo, C.C.; Lotan, Y.; Kassouf, W. Bladder cancer. *Lancet* **2016**, *388*, 2796–2810. [\[CrossRef\]](#) [\[PubMed\]](#)
- de Lima, M.M., Jr.; Tobias-Machado, M. Suicide in patients with genitourinary malignancies. *Eur. J. Cancer Care* **2017**, *26*, e12635. [\[CrossRef\]](#) [\[PubMed\]](#)
- Homolak, J. Opportunities and risks of ChatGPT in medicine, science, and academic publishing: A modern Promethean dilemma. *Croat. Med. J.* **2023**, *64*, 1–3. [\[CrossRef\]](#) [\[PubMed\]](#)
- Cancer.Net. Bladder Cancer: Questions to Ask the Health Care Team. 2021.
- American Cancer Society. *Questions to Ask about Bladder Cancer*; American Cancer Society: Atlanta, GA, USA, 2019.
- Cancer Council. *Question Checklist for Bladder Cancer*; Cancer Council: Victoria, Australia, 2022.
- Johnson, D.; Goodman, R.; Patrinely, J.; Stone, C.; Zimmerman, E.; Donald, R.; Chang, S.; Berkowitz, S.; Finn, A.; Jahangir, E.; et al. Assessing the Accuracy and Reliability of AI-Generated Medical Responses: An Evaluation of the Chat-GPT Model. *Res. Sq.* **2023**. [\[CrossRef\]](#) [\[PubMed\]](#)
- Stokel-Walker, C.; Van Noorden, R. What ChatGPT and generative AI mean for science. *Nature* **2023**, *614*, 214–216. [\[CrossRef\]](#) [\[PubMed\]](#)
- Amisha, M.P.; Pathania, M.; Rathaur, V.K. Overview of artificial intelligence in medicine. *J. Fam. Med. Prim. Care* **2019**, *8*, 2328–2331. [\[CrossRef\]](#) [\[PubMed\]](#)
- Zhou, N.; Zhang, C.T.; Lv, H.Y.; Hao, C.X.; Li, T.J.; Zhu, J.J.; Zhu, H.; Jiang, M.; Liu, K.W.; Hou, H.L.; et al. Concordance Study Between IBM Watson for Oncology and Clinical Practice for Patients with Cancer in China. *Oncologist* **2019**, *24*, 812–819. [\[CrossRef\]](#) [\[PubMed\]](#)
- Flores-Cohaila, J.A.; García-Vicente, A.; Vizcarra-Jiménez, S.F.; De la Cruz-Galán, J.P.; Gutiérrez-Arratia, J.D.; Quiroga Torres, B.G.; Taype-Rondan, A. Performance of ChatGPT on the Peruvian National Licensing Medical Examination: Cross-Sectional Study. *JMIR Med. Educ.* **2023**, *9*, e48039. [\[CrossRef\]](#)
- Gilson, A.; Safranek, C.W.; Huang, T.; Socrates, V.; Chi, L.; Taylor, R.A.; Chartash, D. How Does ChatGPT Perform on the United States Medical Licensing Examination? The Implications of Large Language Models for Medical Education and Knowledge Assessment. *JMIR Med. Educ.* **2023**, *9*, e45312. [\[CrossRef\]](#)
- Humar, P.; Asaad, M.; Bengur, F.B.; Nguyen, V. ChatGPT Is Equivalent to First-Year Plastic Surgery Residents: Evaluation of ChatGPT on the Plastic Surgery In-Service Examination. *Aesthetic Surg. J.* **2023**, *43*, NP1085–NP1089. [\[CrossRef\]](#) [\[PubMed\]](#)
- Hofmann, H.L.; Guerra, G.A.; Le, J.L.; Wong, A.M.; Hofmann, G.H.; Mayfield, C.K.; Petrigliano, F.A.; Liu, J.N. The Rapid Development of Artificial Intelligence: GPT-4's Performance on Orthopedic Surgery Board Questions. *Orthopedics* **2023**, *47*, e85–e89. [\[CrossRef\]](#)
- Benjamin, L.; Emily, C. ChatGPT: A novel AI assistant for healthcare messaging—A commentary on its potential in addressing patient queries and reducing clinician burnout. *BMJ Lead.* **2023**, leader-2023-000844. [\[CrossRef\]](#) [\[PubMed\]](#)
- Zhu, L.; Mou, W.; Chen, R. Can the ChatGPT and other large language models with internet-connected database solve the questions and concerns of patient with prostate cancer and help democratize medical knowledge? *J. Transl. Med.* **2023**, *21*, 269. [\[CrossRef\]](#) [\[PubMed\]](#)
- Coskun, B.; Ocakoglu, G.; Yetemen, M.; Kaygisiz, O. Can ChatGPT, an Artificial Intelligence Language Model, Provide Accurate and High-quality Patient Information on Prostate Cancer? *Urology* **2023**, *180*, 35–58. [\[CrossRef\]](#) [\[PubMed\]](#)
- Szczesniewski, J.J.; Tellez Fouz, C.; Ramos Alba, A.; Diaz Goizueta, F.J.; García Tello, A.; Llanes González, L. ChatGPT and most frequent urological diseases: Analysing the quality of information and potential risks for patients. *World J. Urol.* **2023**, *41*, 3149–3153. [\[CrossRef\]](#) [\[PubMed\]](#)
- Xie, Y.; Seth, I.; Hunter-Smith, D.J.; Rozen, W.M.; Ross, R.; Lee, M. Aesthetic Surgery Advice and Counseling from Artificial Intelligence: A Rhinoplasty Consultation with ChatGPT. *Aesthetic Plast. Surg.* **2023**, *47*, 1985–1993. [\[CrossRef\]](#) [\[PubMed\]](#)

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