Implications of using conversational robots (chatbots) in uro-oncology: A patient and physician perspective

Daniel Alfonso Nieva-Posso[1], Daniel Andrés Nieva-Posso[1], Herney Andrés García-Perdomo[1,2]
[1]UROGIV, Group Research, School of Medicine, Universidad del Valle, Cali, Colombia; [2]Division of Urology/Uro-Oncology, Department of Surgery, School of Medicine, Universidad del Valle, Cali, Colombia

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Corresponding author: Dr. Herney Andrés García-Perdomo, Universidad del Valle, Cali, Colombia; herney.garcia@correounivalle.edu.co

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ABSTRACT

Chatbots, or conversational robots, have become a strategy or support tool for urologic patient care, diagnostic communication, and treatment. With regard to patients, studies have shown that chatbots can answer medical questions with similar percentages of acceptability as urologists. In addition, they can contribute to patient education, allowing them to ask questions that do not arise during medical consultation. They have also proven to be good tools for health promotion and disease prevention. These benefits can also serve doctors, as robots can support medical consultation and the reading of medical records, making patient care more efficient; however, there are several limitations, including the accuracy of bot-generated answers and the acceptability that urologists give to this type of tool.

INTRODUCTION

Artificial intelligence (AI) has changed how we acquire, analyze, and transmit information [1]. Currently, there are various forms of AI, but one of the most discussed, used, and promoted is the so-called Chatbots or intelligent bots; these are defined as a set of programs that can hold a conversation with a person using a series of algorithms that allow the construction of complex answers through the introduction of data or specific questions [2,3]. By 2023, at least 100 million people worldwide will be using chatbots[4] for a variety of purposes: entertainment, travel assistance, timely information retrieval, transcription, and education [5]; several studies have evaluated the effectiveness and benefits of implementing this type of program in education, customer service and even in research [6]. The COVID-19 pandemic restricted the possibility of in-person care. It led to the implementation of measures such as telemedicine, which worked in the field of urology. Still, the medical fatigue, the need for care, and questions that arose in the collective panic and the effects of the virus on cancer meant that it was minimal. There was 24-hour coverage to support patients and families [7,8].

The application possibilities and benefits proposed by chatbots in medical consultation and as a support to establish conversations with patients who have questions about their disease, treatment, and eventualities are high. Ayers et *al.* compared the answers from a chatbot with those offered by general practitioners to patients consulting about their disease. They found that 78.6% of patients preferred the chatbot response because they felt that the AI response had more empathy and quality in the response, especially in patients with terminal diseases or poor prognoses [9]. Similar results have been identified in other studies such as that of Goodman et *al.* (2023), where a group of general practitioners and recently graduated specialists evaluated the answers generated by chatbots on medical knowledge, consultation, identification of clinical signs and symptoms, finding almost perfect answers with scores of 5.5/6.0, which shows the usefulness of the implementation of this type of AI in medical consultation as support for the resolution of doubts or as support for patients in non-attention hours or to reduce the workload [10]. Chatbots have proven helpful in medical education, especially in prostate cancer patients. Allen et *al.* (2020) demonstrated that using chatbots as information and communication channels in African American prostate cancer patients contributes significantly to their knowledge of their disease, improves their treatment decisions, and makes them more responsive to their treating urologist [11].

Chi *et al.* (2021) found that the application of conversational AI systems has benefited physicians in the review of medical records, as it reduces the time it takes to do so by 18% and allows the identification of critical processes within the history much faster[12], increasing the chances of a more effective diagnosis or treatment, greater concentration of resources and reduction of errors or omission of data that may occur with some cases, especially in patients with communication problems, and has also reduced the number of patients who are unable to communicate. Urological cancers account for 13 % of all cancer cases worldwide, with an estimated 2.6 million cases by 2022, surpassing figures for breast cancer, which averages only

2.3 million cases [13,14], of the most frequent is prostate cancer with 1.4 million [15], followed by bladder cancer with 613,800 cases per year and in third place renal cell carcinoma with 434,00 instances [16], epidemiologically it is one of the leading causes of disease in the world and involves the health of men mainly. Therefore, its workload is high for the health system and professionals, especially in urology and uro-oncology.

Cancer is a complex disease that requires four medical phases: prevention, diagnosis, treatment (including surgery), and care [17]; these study phases are complementary and cross-cutting and require a multidisciplinary team to address individual and collective health. This need for multidisciplinarity, accompanied by epidemiological figures, leads to the need to implement AI systems that allow better support for the consultation, supporting the doctor and giving patients the possibility of remote contact, always available and that can provide support in moments in which the doctor cannot. Therefore, this article aims to review the benefits and limitations of applying conversational robots in uro-oncology consultation, focusing on both a medical perspective and for the patient and their families and covering some considerations about uro-oncology education.

EPIDEMIOLOGY OF UROLOGIC CANCERS

Epidemiologically, urological cancers represent one of the leading causes of malignancy in the world, accounting for 13% of all cancers by 2022 [13], with an estimated 2.6 million cases per year, surpassing cases such as breast cancer with 2.3 million cases per year [14]. Prostate cancer remains the most frequent cancer worldwide, with an average of 1.4 million cases per year [15]; second is bladder cancer, with 613,800 cases per year [16]; third is renal cell carcinoma, with 434,000 cases [18], fourth is testicular cancer with 72,000 cases, and the last is penile cancer with 37,000 cases per year by 2022 [19]. Penile cancer has become, by 2022, the type of cancer with the highest mortality rate, with an estimated 36.4% of cases, followed by bladder and kidney cancer with 36%, in third place prostate cancer with 27%, and lastly testicular cancer with 12.6% [13] (Figure 1).

The COVID-19 pandemic limited the medical care provided to patients with chronic non-communicable diseases such as cancer, leading to telemedicine as one of almost the only alternatives to follow up with these patients [7]. Studies such as Oderda et *al.* (2021) found that there was a 77% decrease (due to COVID-19) in the control, treatment, and follow-up activities of patients with some urological cancer in Italy, leading to a reduction in the effectiveness of treatments in 60% of cases[8].

USE OF CHATBOTS IN UROLOGY

Education, psychosocial support, and care

Chatbots have proven to be an excellent tool to support patients, as they can be available 24 hours a day, help identify signs and symptoms, understand precautions about medication use, and provide emotional support [20]. Different chatbots have been determined according to their purpose; these can be useful for education, tourism, and research [1]. Therefore, the applications

can support consultation, identification of signs and symptoms, palliative care, and education in Uro-oncology.

The main benefits that have been identified have been in the field of medical education; chatbots can contribute to the transmission of accurate medical information according to the questions that the patient asks; their effectiveness has been evaluated in fields such as sex education, for example, Kobori et *al.* (2018) demonstrated in a study that chatbots can help patients to identify in 77.7% if they have signs and symptoms of a sexually transmitted disease (which generate feelings of shame), also stimulating them to visit their trusted doctor and achieving it in 97.7% of cases, becoming an alternative for diagnostic support especially in young population [21], prevention of sexually transmitted diseases also contributes to uro-oncology, mainly because of the relationship between HPV and penile[22] and bladder cancer [23].

Cancer education has been one of the areas in which the implementation of chatbots has had the most significant impact on urological cancer patients, as it offers remote, easily accessible for some patients, help that can be programmed to answer questions about treatment, surgical procedures, emotional support, and above all 24-hour availability, allowing the patient also to take control of their health and contribute positively to the discussion about their cancer, as well as to the discussion of their condition [24]. Studies such as Allen et *al*. (2023) have shown that the use of this type of AI has multiple benefits in patients since 62% of the participants found the application very good, significantly increased their percentage of general knowledge of the disease, clarified many doubts about the treatment they were receiving, increased by 86% the confidence and expertise with which they make decisions about their treatment and can have much more constructive discussions with their treating urologist, making more efficient control appointments and improving doctor-patient communication [11].

Owens et *al*. (2019) evaluated the usefulness of the use of conversation simulation software in African American patients diagnosed with prostate cancer, finding that the use of this type of application stimulates the confidence of patients to ask questions about things they think may be obvious, improves their confidence in decision-making by 67% [25]. There are many identified benefits of applying this type of AI to patients. The versatility and programming possibilities of these systems make their applications in the context of the management of an oncological patient many and propose an alternative not only in treatment but also palliative care, helping the companion or family to prevent diseases by focusing and helping to identify risk factors associated with it [1,24]. (Figure 2)

Chatbots have also been shown to be helpful in other problems, such as urolithiasis. Goldenthal et *al.* (2019) demonstrated that the use of chatbots in patients who had undergone ureteroscopy found that the use of this type of AI, finding that people felt comfortable consulting the chatbots and were relatively helpful in identifying non-urgent situations or when they were unable to contact the chatbot [26]. These studies allow us to recognize that many benefits can be obtained in the field of uro-oncology by implementing this type of AI, which can serve from

stages of prevention, diagnosis, and even treatment, including care and palliative care. Kim *et al.* 2023 evaluated the usefulness of conversational AI in women who frequently suffer from interstitial cystitis, finding that this type of application improves patients' self-efficacy, making them feel more confident in receiving information from their treating physicians [27].

It has even been discussed its implementation in contexts that link male health in all aspects, having as its primary focus the adult population over 50 years, which, from the urological point of view, develops problems such as erectile dysfunction, incontinence problems and is more prone to urolithiasis and Chen et *al.* (2023) who evaluated the effectiveness of this type of AI, although still under study, allows assessing the efficacy of the same in more areas of urology [28].

Another benefit that can be found from the application of chatbots is health promotion; studies such as that of Aggarwal *et al.* (2023) found that the programming of chatbots for the acquisition of healthy habits is good, reducing the habit of smoking in 4.27% [29] of the participants in a short period and also allowed greater adherence to medications, as it is available 24 / 7 and be able to answer almost all the questions that the patient may have in their daily activities. It is also essential to evaluate the effectiveness of chatbots in their ability to answer questions about urological cancers and determine whether it is possible to implement them; studies such as Musheyev et *al*. (2024) found that conversational AI can accurately answer (in a range of 4/5) the typical questions asked by patients and families about urological cancers [30], becoming an alternative implementation to help combat the misinformation that can be found in conventional research media.

Support for the doctor, resident, and student

The benefits that physicians can exploit are many, mainly as a support to identify critical elements in medical records, improving decision making, and contributing to improving aspects such as efficiency and consultation time. Kim Y et *al.* (2023) demonstrated that the use of chatbots in medical consultations can streamline the diagnosis and medical interview process for ambulatory patients with urological problems, improving the throughput rates of hospitals, clinics, and urology residents, allowing for more accurate diagnosis in a shorter amount of time [31], this can be extrapolated to the medical consultation of control and follow-up of uro-oncology patients, allowing more efficient consultation processes for the identification of signs and symptoms, among other elements that may be key. Reviewing the medical records of oncology patients represents one of the main challenges for residents, general practitioners, and specialists due to their complexity, length, and sometimes the poor writing of some treating doctors. Chi et al. (2021) found that the application of chatbots as support for the review of medical records, finding that the application of this type of tools allows the identification of critical aspects of history faster, is more efficient, and reduces the review time by 18 % [12], making it a vital alternative to improve performance in the processes of identifying critical aspects in clinical records that may be useful for the diagnosis, treatment, and monitoring of uro-oncological patients.

The degree of acceptability by doctors of this type of support tool is high and was most popular during the COVID-19 pandemic; a study carried out by Linares et *al.* (2022) found that 66% of doctors have a lot of enthusiasm and interest in the application of AI such as chatbots to monitor patients in isolation [32]. Also, the massification of other types of AI, such as smartwatches that contribute to health monitoring, caring for people, and building good habits, can be applied to patients with mobility difficulties and contribute to their monitoring, thus helping to develop spaces for greater participation not only of patients but also of their families. Chatbots have also impacted clinical research by supporting data analysts, identifying patterns, helping to characterize patients, and extracting data for research processes[33]. In addition to contributing significantly to the production of articles, scientists, although their participation is still in doubt.

Chatbots and urologic education

Education has been one of the areas most influenced by chatbots, and medical and urological education is no exception. Currently, the training and practice opportunities offered by AI are many, and the possibility of recreating practice scenarios that allow evaluation, study, and review for students are unlimited, in addition to offering, as for patients, the possibility of remote access and availability 24/7 [34]. Currently, it has had its main impact in the field of surgery; since it is accompanied by robotic surgery, it has become a training tool for urology residents, contributing significantly to improving the results obtained with actual patients. Gómez et *al.* (2021) found that implementing this tool improves students' ability to make complex decisions and understand complex surgeries and improves results, efficiency, and performance in a urological surgical process [35].

It is essential to clarify that chatbots are a support tool and, therefore, are not definitive elements in the training and education of urology students, in addition to the fact that the teacher-student or specialist-resident interaction is one of the primary keys to guaranteeing efficient academic training [33].

Limitations of the use of chatbots in the field of uro-oncology

It is essential to mention that limitations and negative consequences have been found regarding implementing chatbots in the context of uro-oncology. Zhang *et al.* (2023) have shown that chatbots, or language models, have a high risk of answering some questions with ambiguity, bias, incomplete answers, or omitting information that may be relevant [36]. Also, May *et al.* (2024) have shown that different types of chatbots have different response accuracy, so it is essential that the physician constantly supervises their implementation and is continuous [37].
Another element to consider is the low acceptability of the use of chatbots such as ChatGPT in urological practice; Eppler *et al.* (2024) have shown that less than half (47% of urologists) use ChatGPT in their daily academic activities, and less than 20% (19.8%) use it for their clinical activities. More than half (62%) believe there are ethical limitations to using ChatGPT, especially as support in research[38].

As for patients, it is essential to consider some limitations, such as Accessibility and digital literacy. The first corresponds to the possibility of **accessing electronic devices that** they have; by 2019, 27% of US inhabitants do not have access to quality internet, and 20% do not have a smartphone, which would limit their possibility of accessing this type of tools to support your health and control your disease [39]. The lack of connectivity represents an enormous challenge for implementing this tool. It can become deeper in regions or countries where poverty rates are higher, and the possibility of having access to the Internet is more limited [38].

Regarding digital literacy, access is necessary and ensuring that the patient knows how to use the tool and its limitations in terms of accuracy or what questions it can answer, functioning as support for the urologist, but not his replacement [37,38]. There are many discussions about the effects of using ChatGPT in education, including the possibility of a decrease in practical skills such as critical thinking or the development of surgical skills. Studies have shown that students who use simulation elements have positive effects on them, but several speak of consequences on the critical capacity of students. Zawiah *et al.* (2023) have not found significant differences in the skills of students who use ChatGPT and those who do not [40].

CONCLUSIONS

Finally, artificial intelligence, such as chatbots, has become a strategy that can have both clinical, healthcare, and teaching applications. It has been shown to have comprehensive utility for the education and care of urological patients, becoming an indispensable clinical support tool available 24/7 and allowing greater patient confidence. The advantages that the doctor and resident receive are also many; they support identifying critical elements or points in the clinical history, contribute to research processes, and help improve the efficiency of services, especially in outpatients. AIs have come to consolidate themselves as support tools in urology.

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FIGURES AND TABLES

Figure 1. Epidemiology of urologic cancers. (A) Cases of urological cancers in the world by 2022. (B) Deaths from urological cancers worldwide by 2022.

Figure 2. Mind map of the main aspects and benefits of chatbots in uro-oncology.