Retiring trends: The role of artificial intelligence in mitigating the urologist shortage in Canada

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ABSTRACT

The aging urologist workforce in Canada is becoming an urgent issue, as a growing number of specialists are approaching retirement. This phenomenon is mirrored across the globe, particularly in the United States and other developed countries. A shortage of urologists threatens patient care, especially in rural and underserved areas, where access is already limited. This review explores the factors driving urologist retirement in Canada and discusses how emerging technologies like artificial intelligence could help manage workforce challenges.

INTRODUCTION

Canada is currently experiencing a critical challenge in urology: the impending retirement of many practicing specialists. Data from a survey conducted by the Canadian Urological Association (CUA) reveals that over 72% of urologists are over 45, with one-third of this number older than 55. [(1)] This survey [(1)] showed that 15% of participants were aiming to retire within a year and most of the participants are planning to retire at the age of 65. This coincides with an increase in demand for urological care, driven by the aging population and the rising prevalence of diseases such as prostate cancer and benign prostatic hyperplasia.

Similarly, other countries, including the United States, are facing this issue, raising questions about workforce sustainability in urology worldwide [(2)]. In response, AI has been proposed as a potential solution to alleviate the pressure caused by physician shortages. Additionally, initiatives such as utilizing advanced practice providers (APPs) and developing flexible retirement models could also offer long-term solutions. This review will explore these approaches in the Canadian context.

CHALLENGES IN CANADA

Aging workforce

As of the most recent data [(1)], one-third of Canadian urologists are aged 55 or older, and with the average retirement age hovering around 65, Canada is on the cusp of losing a substantial portion of its urologist workforce. A study looking at the demographics of first-year students in Canadian medical schools identified that 35% of the students were 25 or older. [(3)] This demographic shift is exacerbated by the lengthy training required for urology, with new specialists often entering practice in their mid to late 30s. The Queen's University reported the statistics of their upcoming first-year medical students, demonstrating an age range of 20- 40. [(4)]

Geographic disparities

The shortage of urologists is more pronounced in rural and underserved areas. Some Canadian cities are already facing significant challenges in recruiting and retaining urologists. [(5)] As these regions rely heavily on a few specialists, even a single retirement can severely disrupt access to care.

Limited residency positions

Although the demand for urological services is steadily increasing, the number of residency positions in Canada has remained largely unchanged. This restricts the influx of new graduates who are available to replace retiring specialists. Additionally, urology appears to lack strong popularity among medical students applying for residency. A recent study examining the CaRMS R1 match found that only 2% of applicants chose urology. [(6)]

FACTORS CONTRIBUTING TO UROLOGIST RETIREMENT

Burnout and workload

Burnout is a well-documented medical issue, particularly in high-demand specialties like urology. Long hours, administrative burdens, and the emotional toll of treating complex and often life-threatening conditions contribute to earlier retirements. In Canada, the rural-urban disparity further intensifies burnout in rural areas, where a smaller number of urologists serve disproportionately large populations. A study on Ontario physicians reported a 28% prevalence of burnout among physicians, increasing to 34% during the COVID-19 pandemic. [7] A Vancouver study reported nearly the same percentage affecting internal medicine physicians. [8] Another study looking at residents showed that more than 50% of the medical residents in Alberta reported burnout. [9] A study on Canadian urologists reported the same burnout rate of 32%, unaffected by the subspeciality, but increased to 50% in female urologists and those under financial restraints. [10]

Administrative burden and early retirement

The growing administrative workload for physicians has become a significant factor contributing to burnout and early retirement. Tasks such as extensive documentation, compliance with regulatory requirements, and navigating electronic health records (EHRs) often consume a substantial portion of physicians' time, detracting from direct patient care. This administrative burden adds stress, reduces job satisfaction, and leaves physicians feeling overwhelmed, ultimately diminishing their sense of purpose and fulfillment in their roles. Over time, these factors compound and contribute to higher levels of burnout, which can prompt physicians to consider early retirement to escape the relentless cycle of paperwork and bureaucratic demands. Addressing these issues is critical to retaining experienced practitioners and sustaining a robust healthcare workforce. [11, 12]

Additional challenges

Limited role of advanced practice providers (APPs)

Unlike the United States and some European countries, Canada has been slower to incorporate Advanced Practice Providers (APPs), such as nurse practitioners and physician assistants (PAs), into urology care teams. APPs have the potential to play a vital role in managing benign conditions, performing follow-up visits, and handling routine tasks, thereby alleviating some of the workload on urologists. Expanding the role of APPs could help offset the impact of urologists' retirement, especially in underserved areas. Canadian studies show mixed findings; one study from a urology group in Ontario demonstrated that PAs effectively reduced physicians' workload without adding financial strain [13], while a broader Ontario study confirmed the competence of PAs but highlighted challenges due to the financial burden of their salaries and billing limitations. [14]

Challenges in rural areas

Rural areas in Canada are often underserved and require focused efforts to retain physicians. However, working in these regions presents unique challenges that can deter healthcare providers from staying long-term. Studies from New Brunswick, for example, indicate that rural practice is associated with significant risks, particularly for young and female physicians. High

rates of exposure to abusive behaviour and physical threats are commonly reported, making rural practice more challenging and potentially unsafe. In addition, living in small communities can lead to a lack of privacy and boundaries in personal life. Physicians in rural areas may face situations where patients or their families, due to proximity and familiarity, intrude on their personal lives, sometimes even engaging in stalking-like behaviours. These stressors, coupled with the professional isolation that can occur in rural practice, make it essential to create supportive policies and resources to help retain physicians and improve their quality of life in these regions. [15, 16]

THE ROLE OF AI IN MANAGING UROLOGIST RETIREMENT

AI has the potential to play a transformative role in addressing the shortage of urologists in Canada. Here are some key areas where AI can contribute:

Enhancing workflow efficiency

AI systems can assist urologists by automating routine tasks such as patient triage, documentation, and diagnostic interpretation. [17] This reduces the administrative burden and allows physicians to focus more on direct patient care. By lightening workloads, AI can delay the onset of burnout and potentially extend the careers of urologists.

AI in robotic surgery

The integration of AI into robotic-assisted surgeries is reshaping the field of urology and has significant potential to extend the careers of urologists. With AI enhancing precision in procedures like prostatectomy, surgeons experience less physical strain and reduced fatigue. By improving outcomes and easing the demands of complex surgeries, AI allows urologists to continue practicing longer without compromising quality of care.

Beyond surgical assistance, AI tools such as ChatGPT are becoming valuable resources for patient counselling. A recent study comparing ChatGPT's responses on robotic prostatectomy complications with traditional information leaflets from the British Association of Urological Surgeons found that ChatGPT provided accurate, useful insights. [18] This suggests that AI could support urologists in preoperative counselling, making it easier to convey complex information to patients, thereby lightening the load on physicians in one of the most time-intensive aspects of care. Such support tools can help reduce burnout, a major factor in early retirement.

In addition, augmented reality (AR) offers powerful training resources, allowing urologists to practice and refine complex procedures like robotic radical prostatectomy with guided, step-by-step instructions. [19] This technology enables urologists to stay current with evolving techniques, which is essential in a rapidly advancing field. By keeping skills sharp and reducing the steep learning curve often associated with new technologies, AR training can enhance confidence, skill, and endurance, potentially delaying retirement.

Together, AI and AR provide critical support that not only enhances the quality of patient care but also makes urology practice more sustainable and fulfilling. As these technologies continue to evolve, they hold promise as pivotal tools in addressing the workforce challenges faced by urology and in ensuring that experienced specialists can continue practicing longer.

AI-assisted diagnostics

AI-based diagnostic tools, such as machine learning algorithms for interpreting imaging and pathology results, are advancing diagnostic precision in urology while helping to alleviate the cognitive load on physicians. By improving diagnostic accuracy, these technologies enable urologists to make well-informed decisions more efficiently. With AI's support, urologists can maintain high standards of care without the intense mental strain associated with complex diagnostic work, allowing them to potentially reduce their working hours while still delivering quality care.

Recent Canadian studies have demonstrated AI's potential in urological diagnostics. One study [(20)] showed that AI could accurately interpret histopathology slides from prostate biopsies, reliably differentiating between benign and malignant tissues, as well as identifying low-grade cancers. This capability not only enhances diagnostic confidence but also minimizes the risk of misdiagnosis. Another Canadian study [(21)] highlighted AI's role in managing benign prostatic hyperplasia (BPH), where it analyzed images and clinical data to help determine the necessity of surgery. By personalizing management decisions in this way, AI can support urologists in making timely and patient-specific treatment choices, ultimately improving outcomes and reducing unnecessary procedures.

These AI advancements are invaluable for all urologists, who can leverage such tools to continue practicing with reduced stress and workload. With AI aiding in diagnosis and treatment planning, urologists can focus more on patient interactions and less on exhaustive diagnostic tasks, making their workday more manageable and fulfilling. This technological support may enable them to delay retirement, retain their expertise within the healthcare system, and continue contributing to the field of urology during a time when their experience is needed most. The integration of AI into diagnostic practices not only strengthens the overall quality of care but also makes the profession more sustainable and enjoyable for experienced urologists, potentially addressing the growing workforce challenges in urology.

AI-enhanced telemedicine

Telemedicine has grown in importance, especially post-COVID-19, and has become a critical tool for maintaining healthcare access across diverse geographical regions. AI can enhance telemedicine by assisting in virtual consultations—triaging patient questions, interpreting symptoms, and supporting clinical decision-making remotely. [(22)] For near-retirement urologists, AI-powered telemedicine could offer a practical way to continue practicing part-time, providing care to patients without the need for physically demanding clinical hours or the pressures of full-time practice.

In rural and underserved areas, where the scarcity of urologists is most acute, AI-enhanced telemedicine allows urologists to extend their reach and maintain patient service levels without relocation or exhaustive travel schedules. By offloading some of the cognitive burden through automated diagnostic support and symptom analysis, AI also lightens the decision-making load on practitioners, allowing them to remain engaged in clinical work without the fatigue that often drives early retirement.

Additionally, retired or semi-retired urologists could contribute to the workforce as telemedicine consultants, assisting with cases that require specialist input while working from their preferred location. This model not only helps alleviate the shortage of urologists but also enables experienced practitioners to stay connected to the profession, sharing their expertise in a manageable and flexible way. Thus, AI-enabled telemedicine not only expands access to urological care but also offers a viable path for older urologists to gradually scale down their clinical duties while remaining active contributors to the healthcare system, ultimately delaying the need for full retirement.

AI to improve waiting time

A recent study in Toronto highlighted a significant issue in healthcare accessibility: the median wait time for a first consultation with a specialist after a referral from a primary care provider was 42 days, but for urology, this was notably longer at 75 days, the highest among all surgical specialties. [(23)] While there are no current studies specifically examining the impact of AI on referral rates or wait times, one can anticipate that as machine-learning tools continue to evolve, family physicians will gain access to more precise diagnostic and decision-support systems. These AI-driven tools could empower primary care providers to better manage a wider range of cases, potentially reducing unnecessary referrals to specialists. By providing family physicians with the ability to more accurately assess and treat patients, AI could help alleviate some of the pressure on urologists, ultimately leading to reduced wait times, lower burnout rates, and a more sustainable workload.

This would not only enhance the efficiency of healthcare delivery but also support the retention of urologists in Canada, particularly in light of the growing demand for urological services. As the workforce ages, with a significant number of urologists nearing retirement, AI's ability to streamline workflows and reduce the strain on specialists could play a crucial role in extending the careers of experienced urologists. By enabling more efficient management of patient care, AI could allow urologists to focus on more complex cases and high-level decision-making, thus delaying retirement and ensuring a more balanced and sustainable work environment. Ultimately, AI holds the potential to address both the shortage of urologists and the challenges of an aging workforce, supporting a healthcare system that can better meet the needs of all patients.

Moreover, the integration of AI in urology has the potential to greatly enhance patient satisfaction by improving care quality, efficiency, and personalization. AI-enabled telehealth platforms and chatbots can provide immediate access to information and support, fostering greater patient engagement and empowerment throughout their care journey. While challenges such as privacy and ethical considerations persist, the thoughtful implementation of AI holds significant promise for enhancing the overall patient experience in urological practice.

CONCLUSIONS

The looming retirement of urologists in Canada presents a critical challenge to the healthcare system, potentially exacerbating an already strained urology workforce. As a significant portion

of urologists approach retirement age, the demand for specialized care is expected to outpace supply. In this context, artificial intelligence offers a promising solution to alleviate some of these pressures. By automating routine tasks, improving clinical decision-making, and supporting complex procedures, AI has the potential to enhance the efficiency and effectiveness of urological practice, allowing urologists to extend their careers and reduce burnout. Strategic implementation, along with investment in training and infrastructure, will be key to maximizing the benefits of AI in addressing the urologist shortage and ensuring the continued provision of high-quality care.

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