The Widening Technology Gap in Prostate Cancer Diagnosis and Management

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Abstract

Disparities between racial and socioeconomic groups exist in the diagnosis and management of prostate cancer. This has been further exacerbated by the development of advanced technologies such as MRI-ultrasound guided fusion biopsy for diagnosis and Robotic Assisted Laparoscopic Prostatectomy for treatment. This article explores these disparities and provides potential solutions to mitigate them, including legislative measures to support public hospitals as well as implementation of performance-based incentive payment models.

Prostate cancer is the second most common cancer amongst men in the United States (Daniyal et al., 2014). While extensive progress has been made in prostate cancer management, disparities between racial and socioeconomic groups still remain. Today, black men are 2.5 times more likely to die of prostate cancer than their white male counterparts (Roebuck et al., 2022). Also, married, insured, and high socioeconomic status patients are more likely to receive treatment (Sayyid et al., 2021). Prevalent examples of treatment disparities are the use of MRI-ultrasound guided fusion biopsies for diagnosis and Robotic Assisted Laparoscopic Prostatectomy (RALP) for treatment.

Transrectal ultrasound (TRUS) guided biopsy had long been the diagnostic standard for prostate cancer. However, TRUS guided biopsy under-grades cancer in 46% of patients and completely fails to detect cancer in up to 35% of patients (Jayadevan et al., 2019). Technological advancements in recent years have led to the development of MRI-ultrasound guided fusion biopsy, the new gold standard of diagnosis. Compared to the 60% sensitivity of TRUS guided biopsy, MRI-ultrasound guided fusion biopsy has a sensitivity of 96% in detecting cancerous lesions (Jayadevan et al., 2019).

A 2021 single center retrospective study examining patients who received either an MRI-ultrasound guided fusion biopsy or standard TRUS guided biopsy elucidated stark contrasts in patient populations. Only 18% of black men received a fusion biopsy, compared to 41% of their white counterparts (Roebuck et al., 2022). Standard biopsy patients were found to have a lower median household income, lower education level, and higher rates of unemployment. In patients who are in the highest tertile of percent below the poverty

line and are more likely to be treated at public rather than private hospitals, only 25% received a fusion biopsy, compared to 75% receiving a standard biopsy (Roebuck et al., 2022). Additionally, only 15% of Medicaid patients received a diagnostically superior MRI-ultrasound guided fusion biopsy (Roebuck et al., 2022).

In the early 2000s, the da Vinci robot became the latest treatment tool in urological oncology. Historically, prostatectomies were open surgical procedures. In 2003, less than 1% of prostatectomies were performed robotically. However, by 2014, over 90% of prostatectomies were performed robotically (Crew, 2020). RALP has many intraoperative benefits compared to the open surgical approach, including lower blood loss, lower incidence of bladder neck contracture and anastomotic strictures, lower intraoperative complications rate, and shorter hospital stay (Chandrasekar & Tilki, 2018).

At a lofty price tag of $2 million per da Vinci robot, robotic surgery has widened existing healthcare disparities between hospitals and patients. A 2015 retrospective study analyzed over 20,000 patients who underwent a prostatectomy at 225 hospitals. When comparing hospitals performing RALP versus hospitals performing open procedures, RALP-performing hospitals had a higher proportion of white patients (71.0% vs. 57.7%), private payers (62.5% vs 53.7%), and patients residing in wealthy neighborhoods (37.3% vs. 23.5%) (Kim et al., 2015). Additionally, Hispanic populations, Medicare and Medicaid patients, and patients with low socioeconomic status were found to have less access to a RALP-performing hospital (Kim et al., 2015). Lastly, at RALP-performing hospitals, Medicaid patients had a significantly lower chance of receiving a RALP than privately insured patients (Kim et al., 2015).

Addressing these disparities in prostate cancer diagnosis and treatment likely requires innovative solutions. One potential avenue is legislation designed to increase financial investment by private hospitals into their communities. RALP-performing hospitals tend to be private hospitals, while hospitals primarily performing open prostatectomies tend to be public safety net hospitals. In communities such as New York City (NYC), private hospitals benefit and are profitable due to public health networks such as the New York City Health and Hospitals Corporation (NYCHHC). NYCHHC often bears financial responsibility for treating much of the uninsured and low-income population, which are mostly non-white patients. Private hospitals in NYC derive 47% of their revenue from private insurers, compared to only 7% for NYCHHC (Citizens Budget Commission, 2019). Treating a significantly higher proportion of privately insured patients allows hospitals to increase their profitability, thus allowing these private hospitals to afford the latest diagnostic and treatment options. Legislation decreasing tax exemptions private hospitals receive and mandating private hospitals increase investment in the public health systems they benefit from can provide the financial capital necessary for public hospitals to purchase

new equipment, such as fusion biopsy software or a robotic surgery platform.

Performance-based payment models for employees can also narrow the technology gap between public and private hospitals. Continuing to use NYCHHC as an example, NYCHHC has an average annual operating deficit of $3 billion, partly due to inefficient billing and collection practices (Citizens Budget Commission, 2019). Compared to NYC public hospitals outside the NYCHHC system, NYCHHC recovers less money from Medicaid for associated costs (53% vs. 81%) and from private insurers (42% vs. 90%) (Citizens Budget Commission, 2019). Furthermore, adjusting for case mix index, NYCHHC has higher average costs per admission ($16,590) than other public hospitals in NYC ($12,033) and private hospitals in NYC ($13,561) (Citizens Budget Commission, 2019). Performance-based payment models incentivize employees to improve patient documentation, treatment, billing, and insurance collection practices, thus improving overall efficiency. This can reduce operation deficits, freeing up money to invest in the latest technologies for prostate cancer management.

In conclusion, despite significant technological advances in prostate cancer management, only a fraction of the male population in the US have benefited. Both legislation increasing the financial role private hospitals play in supporting public hospitals, and implementing performance-based employee payment models at public hospitals to reduce operating deficits can provide the financial capital needed to improve these disparities.

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