

Cost-effectiveness of Intensity-Modulated Radiation Therapy versus Robot-Assisted Radical Prostatectomy in Patients with Prostate Cancer: A Systematic Review

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Introduction:

Prostate cancer is one of the most common malignancies among men worldwide. Intensity-Modulated Radiation Therapy (IMRT) and Robot-Assisted Radical Prostatectomy (RARP) are widely used curative treatment options for localized disease. Although both provide favorable oncological outcomes, they require substantial healthcare resources and treatment costs. Therefore, assessing their cost-effectiveness is crucial for guiding evidence-based clinical decision-making and optimizing the allocation of healthcare resources.

Methods:

A systematic review was conducted to evaluate the cost-effectiveness of IMRT and RARP in patients with localized prostate cancer. In order to identify economic evaluation studies that compared both interventions, we conducted a thorough literature search in PubMed, Google Scholar, Europe PMC, and Springer. Of 118 records identified, four studies met the predefined inclusion criteria and were included in the final analysis.

Results:

Four studies were analysed. IMRT and RARP both had similar oncological outcomes. One study reported a 90% prostate-specific antigen (PSA) control rate for both treatments and another reported excellent 15-year cancer-specific survival. IMRT was mainly associated with gastrointestinal (9.8%) and genitourinary (3.1%) toxicities, whereas RARP was more frequently associated with urinary incontinence and erectile dysfunction. Economically, hypofractionation IMRT achieved 11.55 quality-adjusted life years (QALYs) compared with 11.44 QALYs for RARP, with an incremental cost-effectiveness ratio (ICER) of JPY 143.685/QALY (USD 890.847/QALY). Stereotactic body radiation therapy (SBRT) also resulted in higher QALYs than robotic prostatectomy (8.373 vs. 6.845), with an ICER of €332/QALY (USD 378.48/QALY). The median cost of treatment was not significantly different between IMRT (USD 12.833) and RARP (USD 12.689), and active surveillance was the least expensive strategy (USD 1.074).

Conclusions:

IMRT and RARP are effective for localized prostate cancer in clinical practice but have different toxicity profiles. Current evidence suggests that IMRT, especially hypofractionation IMRT and SBRT, is more cost-effective with higher QALY gains with little additional cost. These findings will need to be confirmed by more high-quality economic studies.