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Improving the Diagnosis of Prostate Cancer

Policy & Research Briefing

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- Men with clinically significant prostate cancer benefit from early diagnosis and treatment.
- The question is how best to find clinically significant cancer, given the costs and consequences of diagnosis and management.
- We compared all possible ways of using multiparametric Magnetic Resonance Imaging (mpMRI), TRansrectal UltraSound guided biopsy (TRUS-biopsy) and TemPlate Mapping Biopsy (TPM-biopsy).
- We concluded that using mpMRI first then up to two TRUS-biopsies detects more clinically significant cancers than the current way of diagnosing prostate cancer and is good value for money for the NHS.

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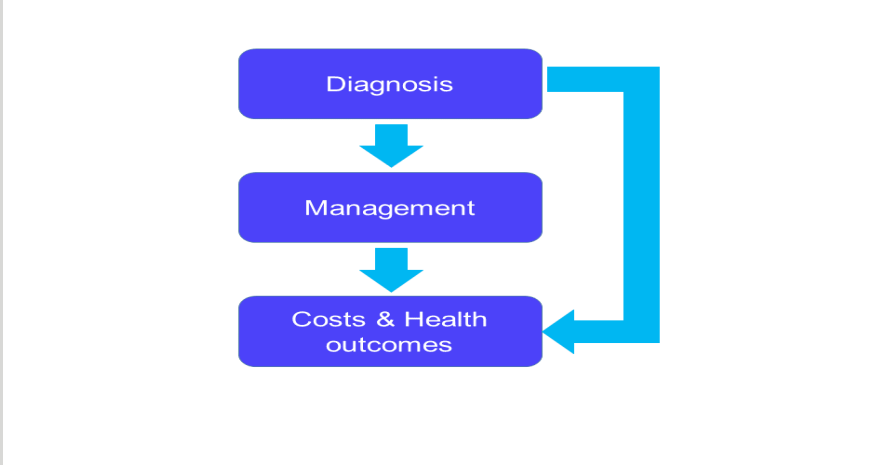

Background

Men with clinically significant prostate cancer are at a high risk of metastases and death if they are not treated, as the cancer can progress fast. Non-clinically significant prostate cancer progresses much slower and typically has few adverse consequences to health. Therefore, a good diagnostic strategy is one that distinguishes between the men with clinically significant prostate cancer, who should be referred for immediate treatment, and the men with non-clinically significant prostate cancer, who are best managed with monitoring.

The PROMIS study compared 2 diagnostic tests in their accuracy to detect clinically significant prostate cancer: multiparametric Magnetic Resonance Imaging (mpMRI) and TRansrectal UltraSound guided biopsy (TRUS-biopsy) versus TemPlate Mapping Biopsy (TPM-biopsy) as the reference standard. The PROMIS study found that mpMRI is more sensitive but less specific than TRUS-biopsy.

The economic evaluation for PROMIS aimed to find what is the best way to use mpMRI, TRUS-biopsy, and TPM-biopsy in combination to diagnose clinically significant prostate cancer, given the costs and health consequences not only of the diagnosis tests themselves, but also of treatment and monitoring.

The research

We built a decision analytic model to compare all the ways of using mpMRI, TRUS-biopsy, and TPM-biopsy.

In the short-term, the model calculates the proportion of clinically significant cancers detected by each strategy, costs and health-related quality of life consequences from the tests.

In the long-term, the model calculates the health benefits and costs of diagnosing and then managing the disease, as well as the health losses and costs of missing cancers.

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The model uses information collected in the PROMIS diagnosis study on the accuracy of these tests, as well as information from other studies.

Findings

Using mpMRI first then up to two TRUS-biopsies detects more clinically significant cancers than the current clinical standard of using TRUS-biopsy first. This strategy only misses up to 5% of men with clinically significant cancer.

Using mpMRI first is also good value for money for the NHS, as it detects the most clinically significant cancers per pound spent at the commonly used cost-effectiveness thresholds of £13,000, £20,000 and £30,000 per quality-adjusted life year gained.

These findings are sensitive to the cost of mpMRI, TRUS-biopsy, and TPM-biopsy; the sensitivity of TRUS-biopsy after mpMRI; and the long-term outcomes of men with cancer. These factors warrant more empirical research.

Further project details can be found at:

Faria R, Soares M, Spackman E, Ahmed H, Brown L, Kaplan R, Emberton M, Sculpher MJ. Optimising the diagnosis of prostate cancer in the era of multiparametric magnetic resonance imaging: A cost-effectiveness analysis based on the Prostate MR Imaging Study (PROMIS). *European Urology* 2018;doi:10.1016/j.eururo.2017.08.018.

Ahmed HU, El-Shater Bosaily A, Brown LC et al. Diagnostic accuracy of multi-parametric MRI and TRUS biopsy in prostate cancer (PROMIS): a paired validating confirmatory study. *The Lancet* 2017*;* 389(10071):815-822.

Brown LC, Ahmed HU, Faria R, El-Shater Bosaily A, et al. The PROMIS study: diagnostic accuracy of MRI and TRUS biopsy in prostate cancer. Forthcoming in *Health Technology Assessment*.

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