

Prostate cancer testing in Sweden—a study on cost and effectiveness

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Shuang Hao, PhD student at the Department of Medical Epidemiology and Biostatistics. Credit: Stefan Zimmerman

Prostate cancer constitutes an essential public health issue, as it is a major cause of male deaths. Early detection through an organized testing

program with the prostate-specific antigen (PSA) test and systematic biopsy is not in place in most countries due to the risk of over-diagnosis and over-treatment of low-risk cancers. Now there are two proposed approaches to tackle this problem; magnetic resonance imaging (MRI) and the serum-based reflex test Stockholm3.

In her thesis, Shuang Hao at the Department of Medical Epidemiology and Biostatistics, aimed to characterize the societal economic burden due to [prostate cancer](#) in Sweden and assess the [cost-effectiveness](#) of [prostate cancer testing](#) using MRI with or without the reflex Stockholm3 test.

What are the most important results in your thesis?

The cost-of-illness study found a substantial economic burden for prostate cancer in Sweden, with the main costs from the direct health care and informal care provided to the patients. Our results now provide reference values for future cost-effectiveness analyses of prostate cancer screening and treatment.

The cost-effectiveness assessments showed that the incorporation of MRI to the PSA screening every 4th year for men age 55–69 years with or without a so called reflex Stockholm3 is associated with reductions in prostate cancer mortality and over-diagnosis of low risk cancers, higher quality-adjusted life years (QALY), incremental cost-effectiveness ratios that are classified as a moderate cost per QALY gained in Sweden, and higher probability to be cost-effective than the traditional PSA screening. My thesis highlights that MRI-based screening may be considered the optimal option for early detection of prostate cancer in Sweden.

Why did you choose to study this particular area?

Worldwide, prostate cancer screening is only available in Lithuania and Kazakhstan. The major concern is that the widely used PSA testing is accompanied by a large number of unnecessary biopsies, over-diagnosis of low risk cancers and over-treatment.

Prostate cancer is the most common form of male cancer in Sweden which has caused a substantial disease burden. With more advanced and more costly diagnosis technologies such as the Stockholm3 test and MRI showing evidence on the improved sensitivity and specificity, there was strong need to assess whether these emerging technologies can be effective and cost-effective for early detection of prostate cancer in the Swedish setting and can thus be considered as an option in forming a national screening program. This has been driving me with devotion to find the answers.

What do you think should be done moving forward in this research area?

There is a lot to be done moving forward. As the Organized Prostate Cancer Testing (OPT) projects have started or is being planned in 17 out of 21 regions in Sweden, assessing the cost-effectiveness for different regional projects and for OPT at a national level is critical before a future national screening program can be formed.

To realize this, a research project needs to do several things; firstly, to model for the opportunistic screening which reflects the current testing situation in Stockholm/Sweden; secondly to extend our microsimulation model by including the measure of PSA density in the base algorithm of OPT. Thirdly, we need to incorporate the evidence regarding the subsequent rescreening results from the STHLM3-MRI Reinvite trial; and finally to recalibrate the model. Once these things are achieved, we hope to provide solid evidence on the cost-effectiveness of OPT to the

policy makers to make informed decision-making.

Other considerations

In addition, although MRI has been recommended by the national treatment guidelines and by the OPT protocol, one should note that there may still be limited access to MRI in some regions that have less health resources. An investigation has been conducted to understand if using the Stockholm3 test and the systematic biopsy can be an alternative in these areas to address the access issue with MRI and the combined targeted and systematic biopsy. A cost-effectiveness analysis comparing these two testing strategies would be necessary to support the decision making.

Other novel technologies currently under investigation may become important components in future testing or care pathways. The artificial-intelligence assisted pathology in aiding the prediction of the risk levels for the prostate cancer patients may reduce resource utilization, time and costs. Assigning related therapies to patients with target signatures from the sequencing is anticipated to improve the survival and quality of life of the metastatic prostate cancer patients. Cost-effectiveness analyses examining the [health consequences](#) and costs for these technologies are therefore very important.

Measuring the health state values along the prostate cancer diagnosis and care pathways using the same health outcome instrument is also of great priority. This could systematically reflect the patient-reported outcomes and provide more valid input to future economic evaluations.

International collaborations

With the increasing awareness of the potential benefits of early detection

of prostate cancer, many countries have started assessing or planning to assess the cost-effectiveness of prostate [cancer](#) screening using different strategies.

Our [open-source](#), well calibrated and validated microsimulation model has been recalibrated to the U.K. setting and we are currently supporting our collaborators from the German Cancer Research Center in recalibrating the model to the local setting. We have also been contacted by collaborators from Switzerland to support the modeling. We would be happy to provide support also to other collaborators.

More information: Prostate cancer testing in Sweden: the interplay between cost and effectiveness.

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