Key messages:

- Methodological features of prostate cancer screening model affect the predicted benefit-harm balance of screening
- Prostate cancer screening model should account for over-diagosis and HRQoL

Methodological features of prostate cancer screening models – A review of simulation models

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Background

Although Prostate-Specific antigen (PSA) screening is currently the most used prostate cancer (PCa) screening method, its benefits are still controversial. In absence of empirical data on the lifetime consequences of screening and potential overdiagnosis, which is difficult to assess in empirical studies, mathematical models are frequently used to assess the benefit-harm balance of PSA screening. Such models differ in methodological features and provide controversial results. The goal of our study is to conduct a systematic review which will answer (1) What are the necessary features that should be included in models evaluating the benefit and harms of PCa screening? and (2) How can those affect the model-generated benefit-harm results?

Methods

We performed a systematic literature search for studies modeling the effect of PSA screening in PUBMED up to March 2016. For extracting methodological features, we applied a set of criteria based on identifying key variables or processes that a PCa screening model should have to provide a comprehensive and unbiased benefit-harm evaluation.

Results

We identified 41 articles based on 28 models. 24 of those used a stage-shift approach to model the screening effects. Health-related quality of life (HRQOL) was considered in nine models. Six of the models explicitly modeled the preclinical phase and only ten models controlled for overdiagnosis. Nine models validated the clinical incidence, stage distribution at clinical diagnosis and survival against published data.

Conclusions

PCa screening models differ in important methodological aspects. Understanding the consequences of using some features will enable easier interpretation of the results and improvement in future modeling.