The diagnostic value of macroscopic haematuria in diagnosing urological cancers: a meta-analysis
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Authors' objectives
To evaluate the diagnostic value of macroscopic haematuria for the diagnosis of urological cancers in primary care, as well as referred patients.

Searching
MEDLINE was searched from 1966 to 1995 using MeSH terms and free text (the keywords were provided); FAMLI was searched from 1980 to 1991. In addition, a number of general practice journals that were published in Dutch and not indexed in MEDLINE were searched manually, and the reference lists of all selected papers were examined.

Study selection
Study designs of evaluations included in the review
No inclusion criteria were specified with respect to the study design. The included studies were prospective or retrospective diagnostic cohorts.

Specific interventions included in the review
Studies evaluating visual observation of gross/macroscopic haematuria were eligible for inclusion. For the estimation of sensitivity, only studies presenting information on the presence or absence of gross haematuria for all patients were eligible for inclusion. For the estimation of positive predictive value (PPV), studies in which some or all of the patients presented with self-reported gross haematuria were included.

Reference standard test against which the new test was compared
No inclusion criteria were specified with respect to the reference standard test. The detection of urological cancers was used as the reference standard for estimating the PPV, but the methods of detection used in the individual studies were not reported. For the estimation of sensitivity, primary studies included only patients with known urological cancers.

Participants included in the review
For the estimation of PPV, studies of ambulatory patients complaining to their physicians of gross haematuria were eligible for inclusion. For the estimation of sensitivity, studies of patients with proven cancer of the kidney, ureter, bladder, urethra or prostate were eligible for inclusion.

Outcomes assessed in the review
No inclusion criteria were specified with respect to the outcome measures. The outcome measures used in the review were the sensitivity and PPV of macroscopic haematuria. Where these data were not presented in the primary studies, they were calculated.

How were decisions on the relevance of primary studies made?
The authors do not state how the papers were selected for the review, or how many of the reviewers performed the selection.

Assessment of study quality
The methodological quality was gauged through the systematic scoring of five quality indicators: type of data collection, setting, number of patients in the study, age distribution and gender ratio. An estimate of indication bias for PPV studies was given by listing the other diagnostic investigations performed systematically. The authors do not state how the papers were assessed for quality, or how many of the reviewers performed the quality assessment.
**Data extraction**
The authors do not state how the data were extracted for the review, or how many of the reviewers performed the data extraction.

**Methods of synthesis**
*How were the studies combined?*
The statistical pooling of the study results was based upon a random-effects model. The results were reported as the pooled sensitivity or pooled PPV and their 95% confidence intervals (CIs).

*How were differences between studies investigated?*
Heterogeneity was tested using the chi-squared test. If heterogeneity was found, subgroups were identified and tested for internal homogeneity. The results of studies in referred patients and non-referred patients were considered separately.

**Results of the review**
Twenty studies were included: 14 assessed sensitivity (1,185 patients) and 6 assessed PPV (1,976 patients).

No study executed in a primary care setting was included. Significant heterogeneity was found in the 14 studies so a subgroup analysis was carried out.

Sensitivity: in referred patients, the pooled sensitivity was 0.83 (95% CI: 0.80, 0.85) for macroscopic haematuria for bladder cancer (based on 7 homogeneous studies), 0.66 (95% CI: 0.53, 0.77) for ureteral cancer (based on 4 reports), and 0.48 (95% CI: 0.36, 0.60) for renal cancer (based on 3 studies).

PPV: the pooled PPV of haematuria for urological cancer was 0.22 (95% CI: 0.17, 0.27) in referred patients in 6 studies. PPV was highest in patients aged 40 years or more (0.41, 95% CI: 0.10, 0.78).

**Authors' conclusions**
The advice that all patients with macroscopic haematuria should receive a thorough diagnostic programme seems justified in a specialised setting dealing with referred patients. There are currently no available data to support or discourage a similar policy for general practitioners. Prospective studies on the diagnostic value of macroscopic haematuria for urological cancer in a primary setting are urgently needed. This may result in the definition of subgroups for which referral and further investigation is recommended.

**CRD commentary**
The review had a clearly stated objective. However, the inclusion criteria used to select the primary studies were poorly defined and, in terms of patient population, inappropriate to the stated objective. The search strategy was adequate in terms of published studies. No attempt was made to identify unpublished studies and no assessment of publication bias was presented. The review methodology was very poorly described, and it is therefore difficult to assess the potential impact of bias introduced by the review process. The criteria described for the quality assessment of the primary studies were inadequate for the assessment of possible sources of bias in diagnostic studies. The combination of sensitivity and PPVs from heterogeneous studies, in order to produce summary estimates, was not appropriate and was not mitigated by the post-hoc use of subgroup analyses. This type of blanket analysis ignores numerous potential sources of heterogeneity and is rarely appropriate. In addition, the estimation of sensitivity in a population containing only diseased patients, and the related presentation of sensitivity and PPV values in isolation from specificity and negative predictive values, have rendered the data presented meaningless in terms of the stated objectives of the review.

Given the weaknesses outlined, it would be difficult to draw any reliable conclusions from this review beyond the need for prospective studies of the diagnostic value of gross haematuria in a primary care setting described by the authors.
Implications of the review for practice and research
Practice: The authors state that all referred patients with macroscopic haematuria, dealt with in a specialised setting, should receive a thorough diagnostic programme.

Research: The authors state that prospective studies on the diagnostic value of macroscopic haematuria for urological cancer in a primary care setting are urgently needed.

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This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.