Metaanalysis of the accuracy of rapid prescreening relative to full screening of Pap smears
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CRD summary
This review assessed the accuracy of rapid pre-screening (RPS) of routine cervical smears. The authors concluded that RPS has the potential to be used as a quality control procedure in the screening process. The pooled measures reported should be viewed with caution, but the authors' recommendation for further research is justified.

Authors' objectives
To assess the accuracy of rapid pre-screening (RPS) of unreported cervical smears relative to subsequent full screening.

Searching
MEDLINE was searched; the search terms were reported. Other sources of primary studies were reference lists of retrieved papers and tables of contents of several specialised cytologic journals (to the end of 2001), which were handsearched.

Study selection
Study designs of evaluations included in the review
No inclusion criteria relating to the study design were specified. The included studies assessed RPS prior to a full routine evaluation.

Specific interventions included in the review
Studies involving RPS of unreported routine smears were eligible for inclusion. RPS was defined as a partial microscopic inspection of a slide for a limited duration (maximum 120 seconds) prior to full evaluation. Studies of rapid reviewing of smears, or of rapid screening of sets of selected slides, were excluded. The included studies involved RPS of varying duration (30 to 120 seconds) and slide movement technique, performed by cytotechnologists with a range of experience. The number of slides screened per session also differed between studies.

Reference standard test against which the new test was compared
No inclusion criteria relating to the reference standard were defined. The reference standard used was the result given at subsequent full routine screening, including a final check where full screening gave a negative result.

Participants included in the review
No detailed inclusion criteria relating to the participants were specified. The included studies were required to be of routine smears.

Outcomes assessed in the review
No inclusion criteria relating to the outcome measures were specified. However, the authors stated that all calculated parameters were derived from original 2x2 tables.

Sensitivity was assessed for three cytologic thresholds: atypical squamous cells of undetermined significance or more severe (ASCUS+); low-grade squamous intraepithelial lesion or more severe (LSIL+); high-grade squamous intraepithelial lesion or more severe (HSIL+). The following outcomes were assessed at the threshold ASCUS+: specificity; positive predictive value (PPV); negative predictive value (NPV); the proportion of additional positive slides detected only by RPS; the prevalence of cytologic abnormality; and the proportion of suspicious slides at RPS.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.
Assessment of study quality
The authors did not state that they assessed validity.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

The numbers of true-positives, false-positives, true-negatives and false-negatives were extracted or calculated from the original data for each study. These were used to calculate the sensitivity, specificity, PPV, NPV and other outcome variables. Details of the screening procedure, including the number of slides and operator experience, were also extracted.

Methods of synthesis
How were the studies combined?
The study outcomes were pooled in meta-analyses. The studies were weighted by the inverse of their variance. Where significant inter-study heterogeneity was detected, a random-effects model was used; otherwise a fixed-effect model was used to estimate the pooled measure. Studies judged to have outlying results were excluded from some meta-analyses.

How were differences between studies investigated?
Heterogeneity of the studies was assessed using a Q test. A regression analysis was also performed to assess the influence of various factors on sensitivity outcomes.

Results of the review
Six studies, involving a total of 28,420 assessments, were included in the review.

Sensitivity.
The pooled sensitivity estimate for the ASCUS+ threshold was 64.9% (95% confidence interval, CI: 50.7, 79.1). Five studies contributed to the LSIL+ and HSIL+ estimates, which were 72.6% (95% CI: 60.0, 85.2) and 85.7% (95% CI: 77.8, 93.6), respectively. A regression analysis using data from 4 studies showed a positive relationship between sensitivity and duration of RPS, with an increase of 0.26% (95% CI: 0.09, 0.42) for every second spent screening above 30 seconds. Sensitivity was also influenced by the severity of cytologic abnormality, with a 23.2% (CI: 11.1, 35.2) increase in sensitivity at the HSIL+ threshold compared with the ASCUS+ threshold. Workload had a negative effect on sensitivity: each additional slide per session decreased sensitivity by 0.68%. The mode of slide movement did not affect sensitivity. Data from one study suggested that the level of experience of the cytotechnologists had no effect on sensitivity at the HSIL+ threshold, but that at the ASCUS+ threshold, greater experience led to greater sensitivity.

Specificity.
The pooled specificity estimate (at the ASCUS+ threshold) was 95.0% (95% CI: 92.8, 97.3). However, the false-positive rate of one study was considered to be too high, and with the exclusion of this study specificity was 96.8% (95% CI: 95.8, 97.8).

Predictive values.
Five studies were pooled to give a PPV of 60.4% (95% CI: 49.6, 71.2). One study was excluded from this meta-analysis as it had a very low PPV of 3.0% and a prevalence of cytologic abnormality of only 0.4% (compared with a range of 2.7 to 4.7% in the other studies). The pooled NPV was 97.4% (95% CI: 96.2, 98.5).

Additional positives detected by RPS.
Half of the studies had abnormal smears that were detected at RPS, but not at full screening. The pooled proportion of
additional positives detected by RPS was 2.9% (95% CI: 0.0, 5.8).

**Authors’ conclusions**
RPS appears to have diagnostic properties that support its use as a quality control procedure, as it enhances the sensitivity of the full screening process to a similar extent as rapid reviewing. Further studies are required to determine its value in practice.

**CRD commentary**
This review had a clear question with clear inclusion criteria in terms of the screening intervention. The general inclusion criteria were poorly defined, but a broad sample is acceptable in a screening context. Relevant sources were searched for primary studies but, as the search was limited to one database, some relevant studies might have been missed. There was no search for unpublished literature, nor an assessment of publication bias. It was not stated how the study selection or data extraction processes were carried out, so it is not clear whether adequate steps were taken to avoid errors or the introduction of bias at these stages. Sufficient detail on both the outcomes and the procedure of each primary study was provided. Study quality was not assessed and, therefore, the potential impact of methodological flaws in primary studies cannot be assessed.

Appropriate meta-analytic techniques were used to combine the studies and give pooled outcome measures. The results of the heterogeneity tests were not reported, although the authors themselves highlighted the limitations in interpreting pooled measures given the significant heterogeneity of the studies. Regression analyses were used to assess the impact of potential sources of heterogeneity.

The conclusion that the sensitivity of screening is increased by RPS (and is comparable to other procedures) is bold given that half of the studies reported no additional detection of abnormal smears. However, the authors also concluded that there is a need for further research to fully assess the procedure and this appears reasonable.

**Implications of the review for practice and research**
Practice: The authors stated that RPS has the potential to be used as an internal quality control measure for Pap smear screening.

Research: The authors stated that research should be carried out to assess the efficiency of RPS in comparison with other quality control processes.

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