Screening for hypertension in children and adolescents to prevent cardiovascular disease

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CRD summary
This review found that there was no direct evidence that screening for hypertension in children and adolescents reduced their adverse cardiovascular outcomes as adults; the available evidence was generally poor. The limited nature and poor quality of the evidence suggest that these conclusions are appropriate.

Authors' objectives
To assess the effectiveness of screening asymptomatic children and adolescents for hypertension to prevent cardiovascular disease.

Searching
MEDLINE and The Cochrane Library were searched in July 2012, for studies published in English. Reference lists were searched, and the search strategy was reported.

Study selection
The review addressed several key questions on childhood and adolescent hypertension, including the efficacy of screening for hypertension in reducing adverse health outcomes; its diagnostic accuracy; its association with hypertension and other outcomes in adulthood; the effectiveness of hypertension interventions; and the adverse events of treatment and screening. Full inclusion criteria were reported; studies had to be observational or randomised controlled trials (RCTs), of children or adolescents without hypertension (for diagnostic studies) or with primary hypertension (for intervention trials).

In the included studies, the interventions were blood pressure measurements, performed in primary care clinics; anti-hypertensive medications; and diet or lifestyle interventions. The study characteristics were reported in appendix tables.

Two reviewers selected studies for inclusion, with disagreements resolved by consensus.

Assessment of study quality
Two authors assessed study quality as good, fair or poor, using the criteria of the US Preventive Services Task Force. Discrepancies were resolved by consensus. The overall strength of the evidence was assessed in a similar fashion.

Data extraction
Relevant data were extracted from each paper, as appropriate. This included the sensitivity and specificity for diagnostic studies; odds ratios for studies of association; and mean reductions in blood pressure, or numbers of adverse events, for RCTs.

One reviewer extracted the data, which were checked by a second reviewer.

Methods of synthesis
No meta-analysis was considered because of the diversity of the studies. A narrative synthesis was presented, with the results of studies discussed and overall conclusions summarised in tables.

Results of the review
The review included 34 studies.

Diagnostic accuracy: Two fair-quality studies were found. One used office-based measurement, with 24-hour ambulatory measurement as the reference standard. This found a sensitivity of 65% (95% CI 45 to 80) and a specificity of 75% (95% CI 63 to 84). The other study measured initial blood pressure with persistent elevation of blood pressure as the reference standard. This one found a sensitivity of 72% (95% CI 65 to 78) and a specificity of 92% (95% CI 91 to 92).
Association between childhood and adult hypertension: Ten studies were found. In three studies, the sensitivity of childhood hypertension in predicting adult hypertension ranged from zero to 63% and specificity from 77% to 100%, depending on the threshold used to define hypertension. Five studies reported significant associations between high childhood blood pressure and adult hypertension, with odds ratios ranging from 1.1 to 4.5. Two studies reported conflicting findings on the association of childhood blood pressure and carotid intima media thickness in young adulthood.

Efficacy of interventions: Fourteen fair-quality RCTs were found. Seven trials evaluated different drugs, mostly compared with placebo. Most trials reported more children reaching target blood pressure on the active drug (range 15% to 86%, compared with 26% to 47% on placebo). Most trials reported significant decreases in systolic (1.9 to 10.2 mmHg) and diastolic (0.4 to 8.1 mmHg) blood pressure. Six trials examined lifestyle interventions. Only one small trial of physical education found a significant reduction in blood pressure with the intervention, compared with control. One trial found a benefit of a low-sodium diet for girls but not for boys.

Adverse effects of treatment: Twelve trials were found; 11 were of fair quality and one was good. Adverse effects were generally poorly reported. Five trials of monotherapy found no difference in adverse effect rates between intervention and placebo. Two reports pooled data across trials and found similar rates of adverse effects across treatment groups.

Other results were reported, mostly for single studies, or noting where no studies were available. In particular, the authors reported that no studies were found that examined if screening for childhood hypertension reduced their adverse health outcomes.

Authors' conclusions
There was no direct evidence that screening for hypertension in children and adolescents reduced their adverse cardiovascular outcomes as adults. The available evidence was generally poor.

CRD commentary
This review sought to answer a range of relevant key questions in the broad research area. An appropriate search was conducted, but unpublished and foreign-language studies were not sought, so relevant studies may have been missed. Appropriate actions were taken to reduce reviewer error and bias.

Study quality was assessed and generally found to be poor or fair. The diversity of studies meant that no statistical syntheses were performed, and the results were discussed in an appropriate narrative synthesis. The authors acknowledged several limitations in their review, particularly the diversity of studies, their poor quality, and that no studies addressed the primary research question.

Given the limited nature and poor quality of the studies, the authors' conclusions are appropriate.

Implications of the review for practice and research
Practice: The authors made no recommendations for practice.

Research: The authors highlighted a number of gaps in the evidence for the diagnostic accuracy of blood pressure measurement; the adverse effects of blood pressure screening; the epidemiology of the association between childhood blood pressure and adult outcomes; the long-term benefits of anti-hypertensive drugs; and non-drug interventions in high-quality trials.

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