

# *Electronic and Postal reminders for Immunisation coverage in children: A Systematic review and Meta-Analysis*

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**Background:** Worldwide, suboptimal immunisation coverage causes the deaths of more than one million children under five years of age from vaccine-preventable diseases every year. Reasons for suboptimal coverage are multifactorial, and a combination of interventions is needed to improve compliance with immunisation schedules. One intervention relies on reminders, where the health system prompts caregivers to attend immunisation appointments on time or re-engages caregivers who have defaulted on scheduled appointments. We undertook this systematic review to investigate the effectiveness of caregiver telephone, and postal reminders in improving on immunisation coverage in children under five years of age.

**Methods:** We searched PubMed, Scopus, CINAHL, CENTRAL, Science Citation Index, WHOLIS, Clinicaltrials.gov, and WHO International Clinical Trials Platform for randomised controlled (RCTs). We conducted screening of search results, study selection, data extraction and risk-of-bias assessment in duplicate and resolved disagreements by consensus. We pooled data using random-effect meta-analysis, assessed heterogeneity of effects using the chi-square test of homogeneity, and quantified observed heterogeneity using the ( $I^2$ ) statistic. In addition, we assessed the strength of evidence using the Grading of Recommendation Assessment Development and Evaluation GRADE approach.

**Results:** The search produced 1425 records, from which we identified 51 potentially eligible studies. Finally nine

RCTs meet our inclusion criteria. These RCTs were conducted in the United States of America (eight RCTs), and Australia (one RCT). There were no studies from low income and middle-income countries; contrary they RCTs in the meta-analysis were from low income settings in high income countries. The number of RCTs per intervention were three for telephone reminders (n=1103 participants), five for postal reminders (n=12,854 participants), and five for combined telephone and postal reminders (n=3402 participants). Overall there were 17,359 participants in nine included studies. All studies were at low risk of bias. All interventions improved immunisation coverage: telephone reminders (risk ratio [RR] 1.25 to 95% Confidence Interval (CI) 1.04 to 1.51), postal reminders (RR 1.09; 95% CI 1.00 to 1.20), and a combination both telephone and postal reminders (RR 1.28; 95% CI 1.18 to 1.39). There was no significant heterogeneity for telephone reminders ( $P=0.15$ ,  $I^2=47\%$ ) and combined telephone and postal reminders ( $P=0.27$ ,  $I^2=23\%$ ) but there was significant for postal reminders ( $P=0.0007$ ,  $I^2=74\%$ ). Overall using any reminder was effective in improving immunisation coverage (RR 1.18; 95% CI 1.09 to 1.27) with significant heterogeneity ( $P<0.00001$ ,  $I^2=71.2\%$ ). The test for subgroup different was significant ( $\chi^2=6.93$ ,  $df=2$  ( $P=0.03$ ),  $I^2=71.2\%$ ).

**Conclusion:** Telephone and postal reminders, used alone or combination, are effective interventions for increasing immunisation coverage in children under 5 years of age.

**Systematic review registration:** PROSPERO (International Prospective Register of systematic reviews), registration number: CRD42014012888.

