

SENSITIVITY OF THE KAISER PERMANENTE EARLY-ONSET SEPSIS CALCULATOR: A SYSTEMATIC REVIEW AND META-ANALYSIS

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Background

- Determining which babies should receive antibiotics for possible early onset sepsis (EOS) is challenging
- An electronic risk calculator has been developed by Kaiser Permanente, providing an estimation of EOS risk for an individual baby
- Use of the calculator resulted in a substantial reduction in antibiotic use in published studies (1)
- We aimed to determine what proportion of cases would be 'missed', *additional* to any missed by using the NICE guidance (2)

Results

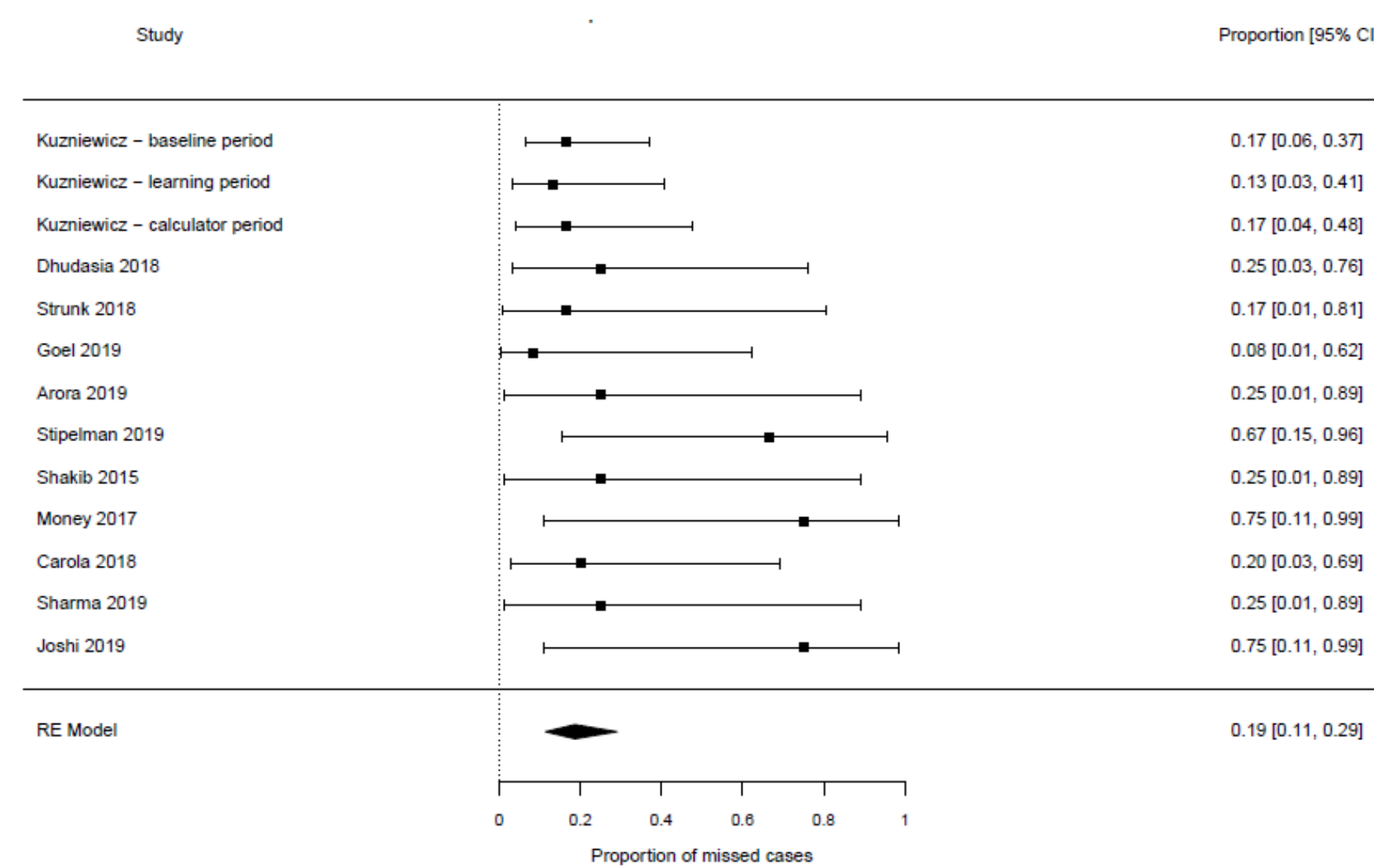
- Eleven studies were eligible.
- There were a total of 75 EOS cases across the studies and a minimum of 14 (best case scenario), and a maximum of 22 (worst case scenario) cases where use of the calculator would have resulted in delayed or missed treatment, in comparison to standard NICE guidance.
- The probability of 'calculator' delayed or missed treatment for an EOS case (additional to cases missed by following NICE guidelines) were:
 - best case 0.19 [95% confidence intervals: 0.11 – 0.29]
 - worst case 0.31 [95% CI: 0.17 – 0.49].
- The probability of missing cases was significantly ($p=0.03$) more in babies exposed to chorioamnionitis:
 - best case 0.33 [95% CI: 0.11-0.67]
 - worst case 0.56 [95% CI: 0.25-0.82]

Kaiser Permanente early onset sepsis electronic calculator online interface, from: <https://neonatalesepsiscalculator.kaiserpermanente.org/>
Blood cultures are recommended if the risk is $\geq 1/1000$ live births, plus empirical antibiotics if $\geq 3/1000$ live births.

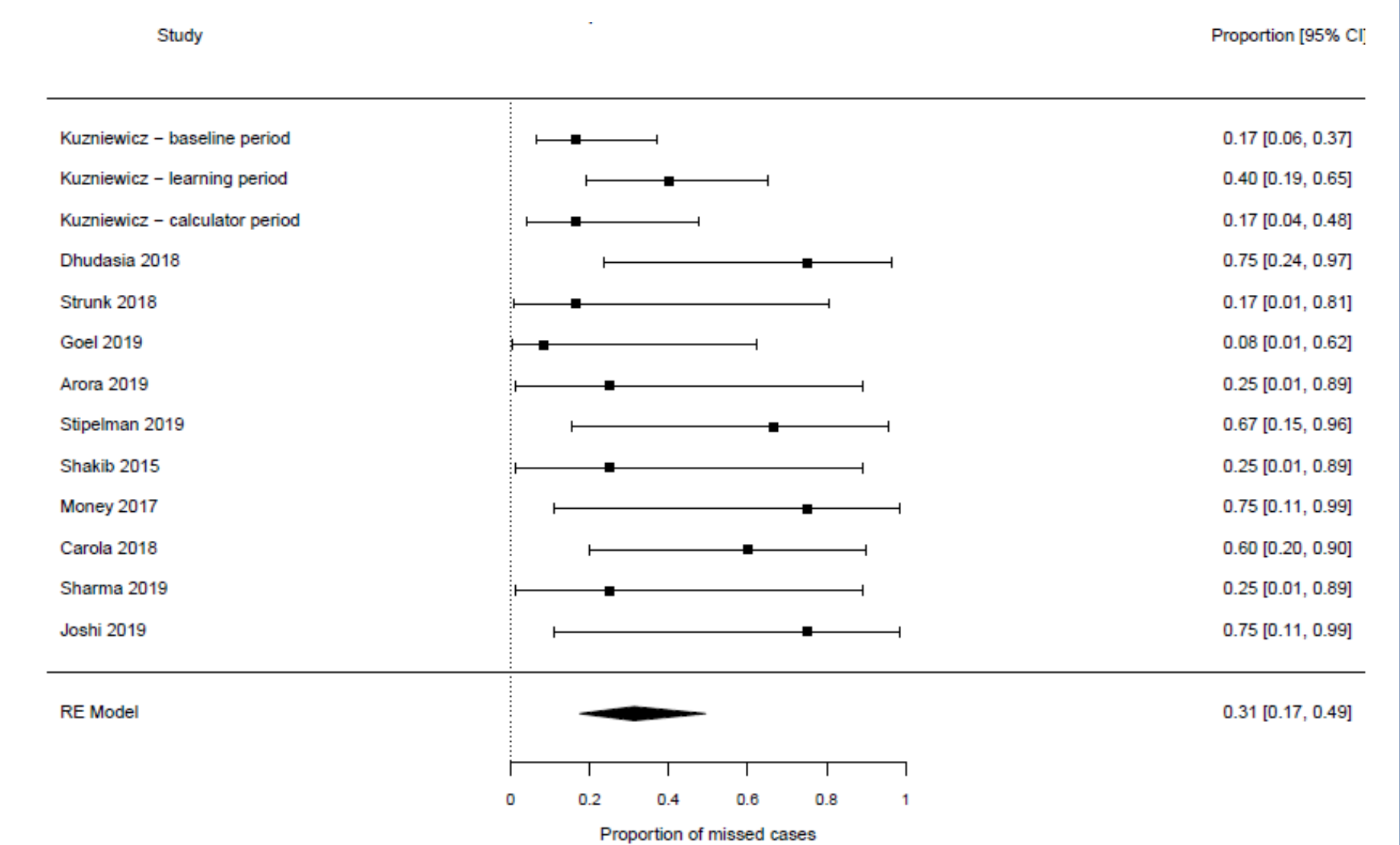
Methods

- A systematic literature search using a modified cluster technique, snowballing from studies citing the article in which the calculator was widely publicised (1) on Ovid MEDLINE, Embase, Maternity & Infant Care Database and Google scholar. Reference lists were reviewed.
- Studies were eligible if they presented data evaluating the calculator, either by retrospective case review or prospective cohort study and identified at least one episode of EOS.
- The primary outcome measure was numbers of culture positive EOS cases where the calculator did not recommend empirical antibiotics. If the NICE guidelines would not have recommended treatment either this was *not* classified as a 'miss'. Risk of bias was assessed using QUADAS-2.
- When it was impossible to determine whether a case would have been missed, 'Best' and 'Worst' cases were calculated, based on the minimum and maximum numbers of 'missed' cases respectively
- Data were pooled using a random effect meta-analysis, quantifying heterogeneity using I^2 .
- A subgroup analysis was performed using data from studies of babies exposed to chorioamnionitis.

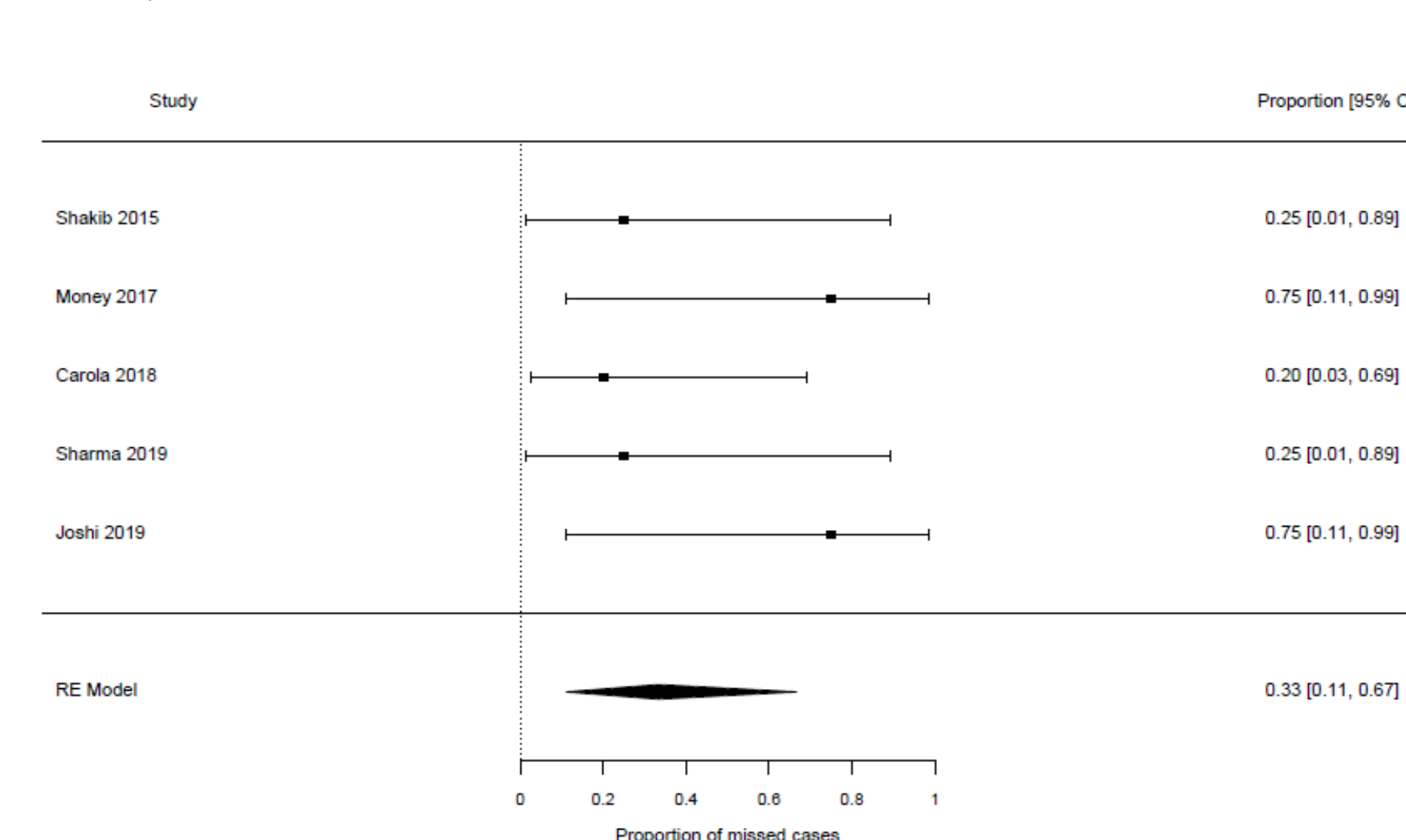
Proportion of EOS cases missed, all studies, best case scenario



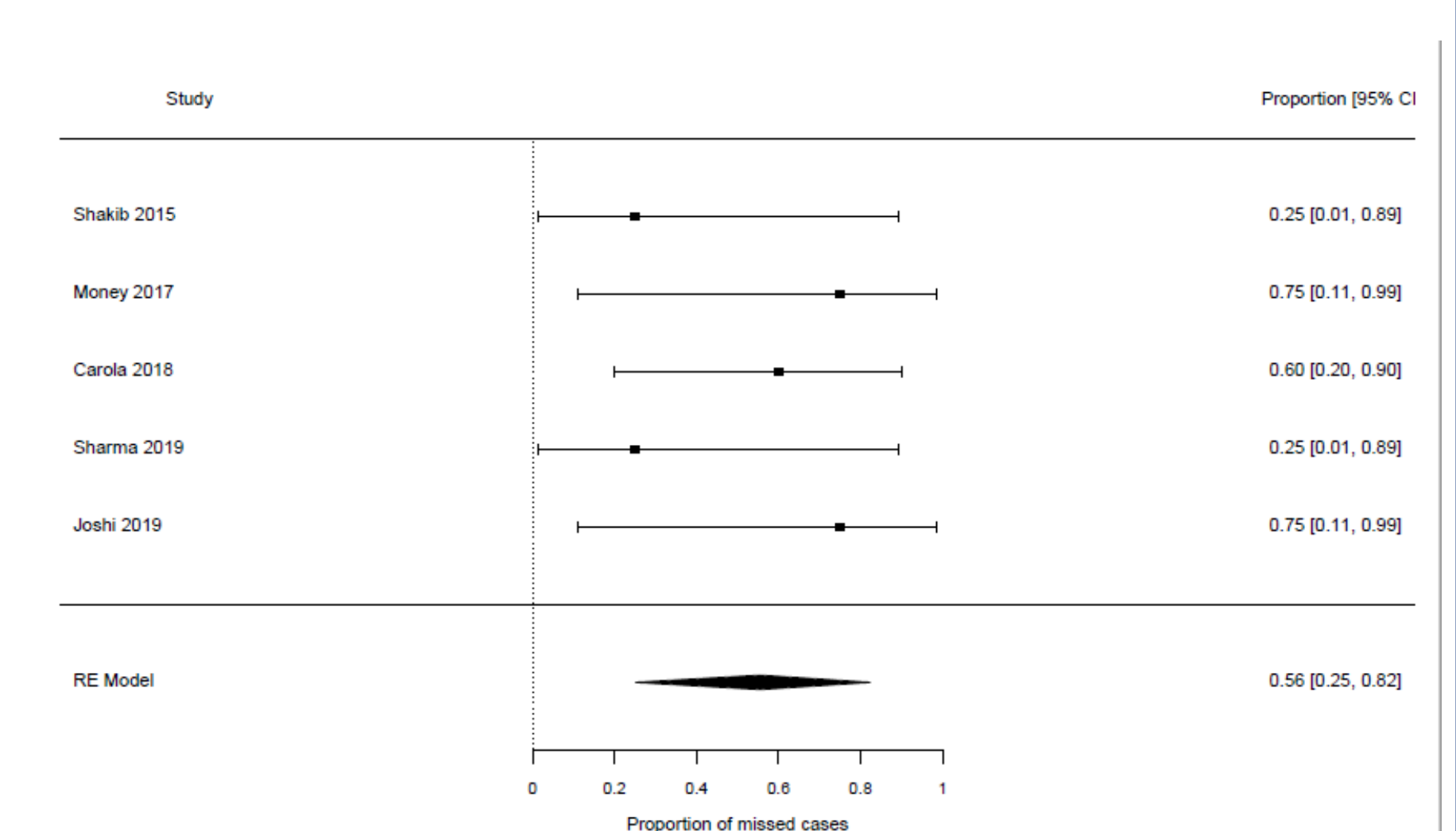
Proportion of EOS cases missed, all studies, worst case scenario



Proportion of EOS cases missed, chorioamnionitis studies, best case scenario



Proportion of EOS cases missed, chorioamnionitis studies, worst case scenario



Conclusion

A substantial proportion of EOS cases were 'missed' by the calculator. Further evaluation of the calculator is recommended before it could be safely introduced into clinical practice in the UK.

References

- 1) Kuzniewicz MW, Puopolo KM, Fischer A et al. A quantitative, risk-based approach to the management of neonatal early-onset sepsis. *JAMA Pediatr.* 2017;171(4):365–71.
- 2) National Institute for Health and Care Excellence (NICE). Neonatal infection (early-onset): antibiotics for prevention and treatment. Clinical Guideline [CG149]. 2012; Available from: <https://www.nice.org.uk/guidance/cg149/resources/neonatal-infection-early-onset-antibiotics-for-prevention-and-treatment-35109579233221>

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