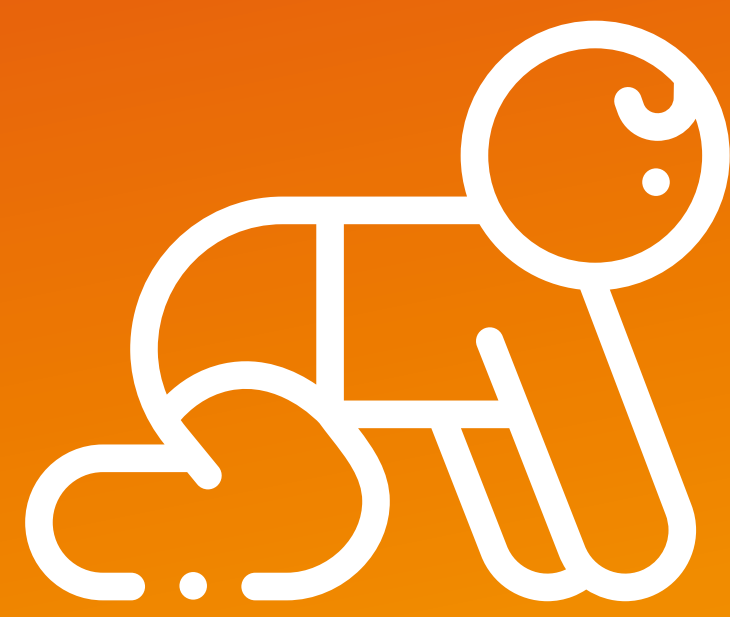


Recent Evidence on the Comprehensive Burden of Pediatric Invasive Meningococcal Disease in the United States: A Systematic Literature Review

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IMD poses a substantial burden among infants and young children in the US. Further research is needed to comprehensively define the impact of IMD and understand the potential benefits of prevention strategies in this population.

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Background

- Invasive meningococcal disease (IMD) is associated with high case fatality rates (CFRs) and severe long-term sequelae.¹
- In the United States (US), the highest IMD incidence is observed among infants <1 year of age.²
- However, no vaccine is approved in the US to prevent IMD caused by meningococcal serogroup B (MenB) in children <10 years of age, and vaccination against meningococcal serogroups A, C, W, and Y (MenACWY) is only recommended for infants at increased risk for IMD.³

Objective

To identify published US-specific evidence on IMD epidemiology, the economic impact of IMD, and the effect of IMD and its sequelae on health state utilities among pediatric patients (<10 years of age) and their caregivers.

Methods

- A systematic literature review (SLR) was performed in accordance with the guidelines of the Cochrane Handbook for Systematic Reviews of Interventions and Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Supplementary Figure 1).
- Searches were conducted in February and March 2024 across Embase and Ovid MEDLINE and targeted the following domains: **incidence, sequelae, risk factors, and survival; costs and resource use; health state utilities.**
- All studies were screened against domain-specific population, intervention, comparator(s), outcomes, and study design criteria.

Embase

Ovid
MEDLINE

Incidence, sequelae, risk factors, and survival
articles published between 2019–February 2024
abstracts published between 2022–February 2024

Cost and resource use
articles and abstracts published between 2010–March 2024

Health state utilities
articles and abstracts published between 2010–March 2024

Results

- 24 studies were identified^{4–27,a,b}

20 studies included outcomes on incidence, sequelae, risk factors, and survival

7 studies included outcomes on costs and resource use

0 studies included outcomes on health state utilities

Incidence, sequelae, risk factors, and survival

- 4 studies reported data on IMD incidence among children in the US.^{9,14,18,19}

The highest incidence identified was in infants (<1-year-olds)



0.38 cases per 100,000 people in 2022

and another peak in cases occurred in those aged 1–4 years.



0.09 cases per 100,000 people in 2022⁹

7.7% experienced acquired sensorineural hearing loss



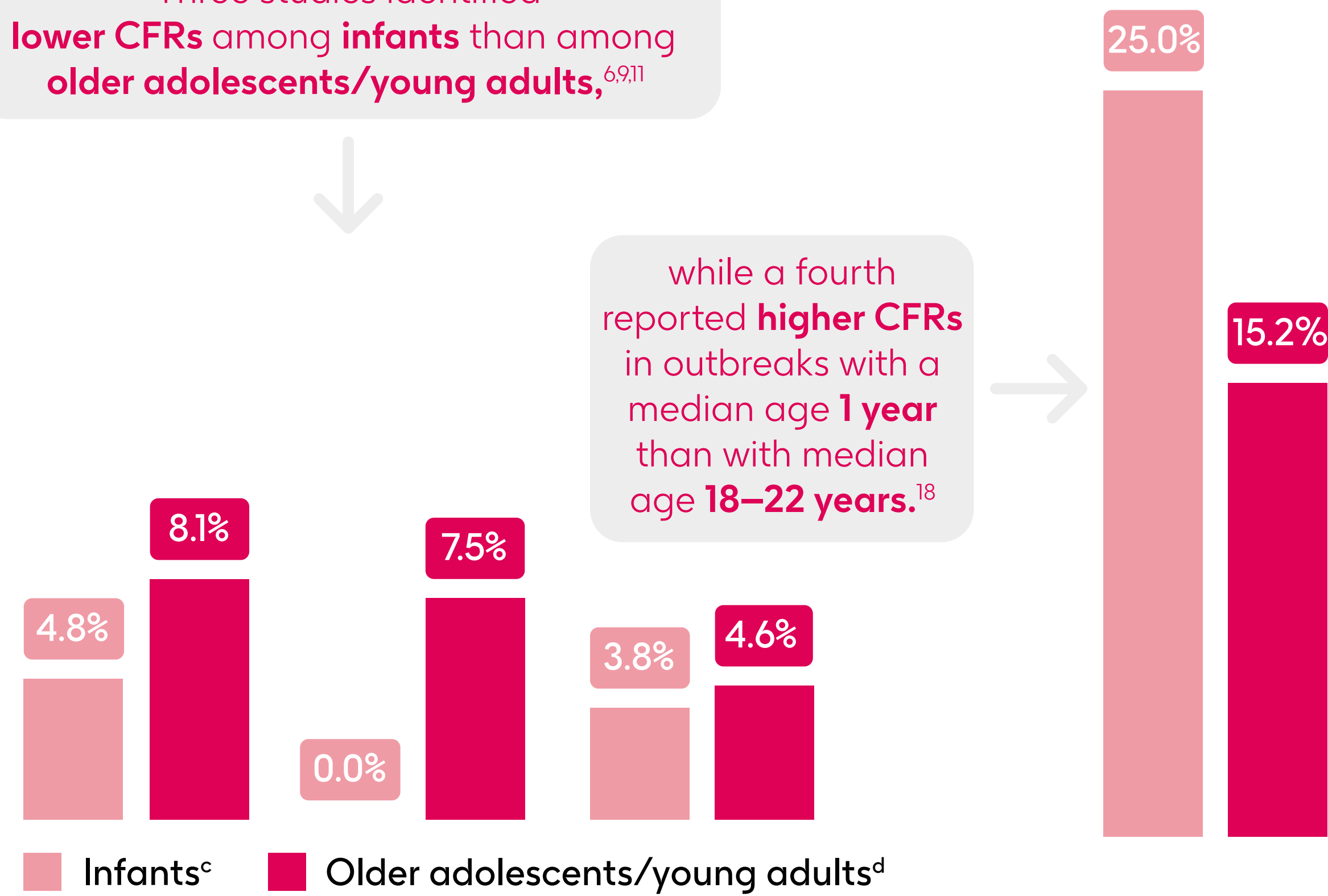
in a retrospective review of 326 ≤18-year-olds discharged with meningococcal meningitis from 2010–2022.¹³

- No studies reported risk factors for developing IMD or sequelae in the pediatric population, although 3 studies evaluated IMD risk factors in older adolescents and college age young adults.^{16,17,27}

- Five studies evaluated survival outcomes for pediatric IMD patients, four of which compared survival between different age groups.^{6,9,11,13,18}

Three studies identified lower CFRs among infants than among older adolescents/young adults.^{6,9,11}

while a fourth reported higher CFRs in outbreaks with a median age 1 year than with median age 18–22 years.¹⁸

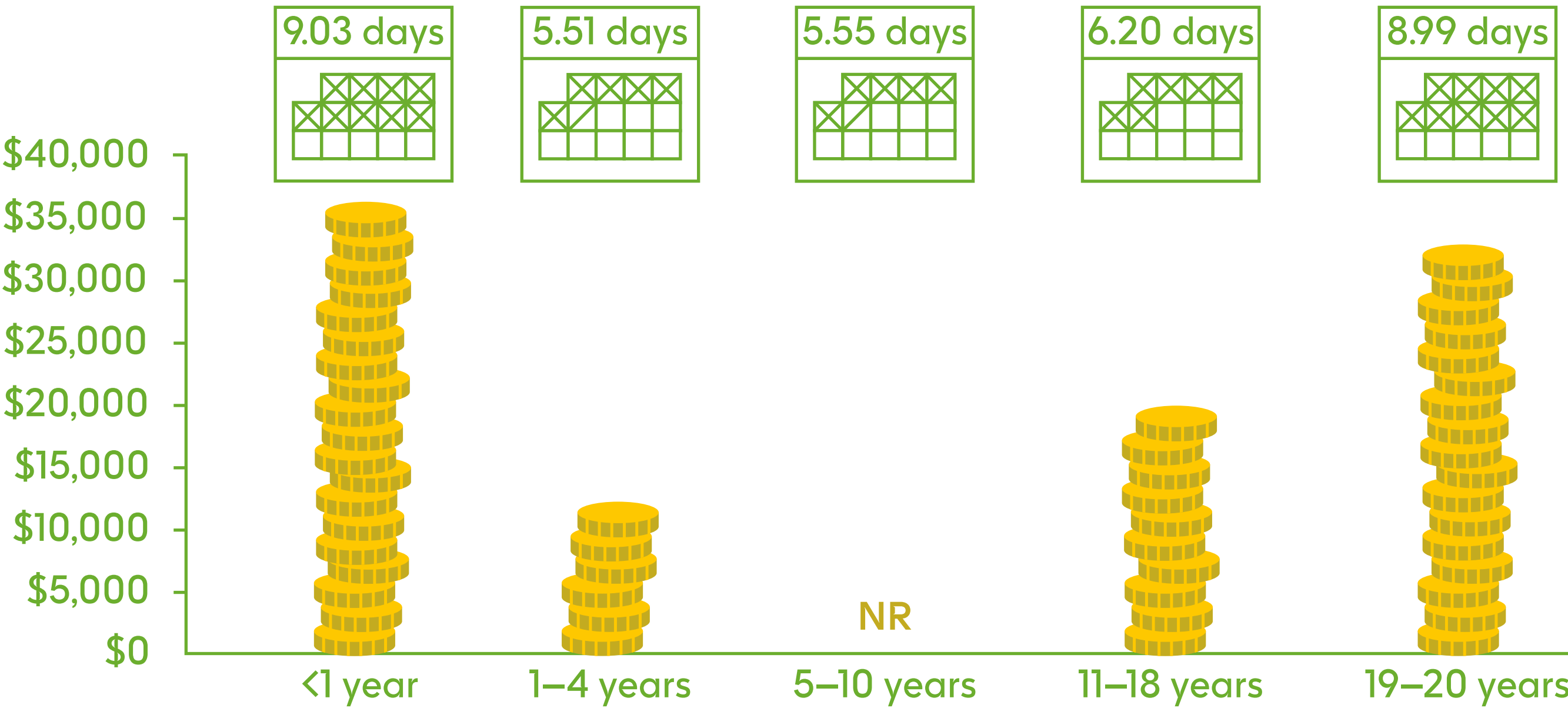


^cNot all studies explicitly defined this age group as those <1 year of age.
^dThe range of ages included for this subgroup varied between studies.

Costs and resource use

- Seven studies reported costs and resource use data relating to pediatric patients with IMD in the US.^{6,8,10–12,15,23}
- Only one study evaluated costs and resource use by pediatric age subgroup. Among <20-year-old patients with IMD hospital admission in 2006, the mean length of stay and cost per admission (USD 2009) were greatest among <1-year-olds and lowest among 1–4-year-olds.¹¹

Mean cost of admission Mean length of stay



^aA broad literature search was conducted to ensure data relevant to the young pediatric population were not missed; several identified studies did not include any data specific to infants and children.
^bThree studies were included in both the incidence, sequelae, risk factors, and survival domain as well as the costs and resource use domain.

Conclusions



IMD incidence peaks in infants and children in the US; among pediatric populations, IMD burden was often reported to be highest for infants <1 year of age.



Data gaps were identified regarding risk factors for developing IMD or sequelae in children <10 years of age.



No recent publications reported health state utilities of IMD or IMD sequelae in pediatric patients or their parents or caregivers in the US.

Abbreviations

CFR, case fatality rate; IMD, invasive meningococcal disease; MenACWY, meningococcal serogroups A, C, W, and Y; MenB, meningococcal serogroup B; NR, not reported; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SLR, systematic literature review; US, United States; USD, United States dollar.

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 - CDC. Meningococcal Disease Surveillance and Trends. 2024.
 - CDC. Meningococcal Vaccine Recommendations. 2024.
- References for the included publications (4–27) are available in the Supplement (scan QR code).

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Disclosures

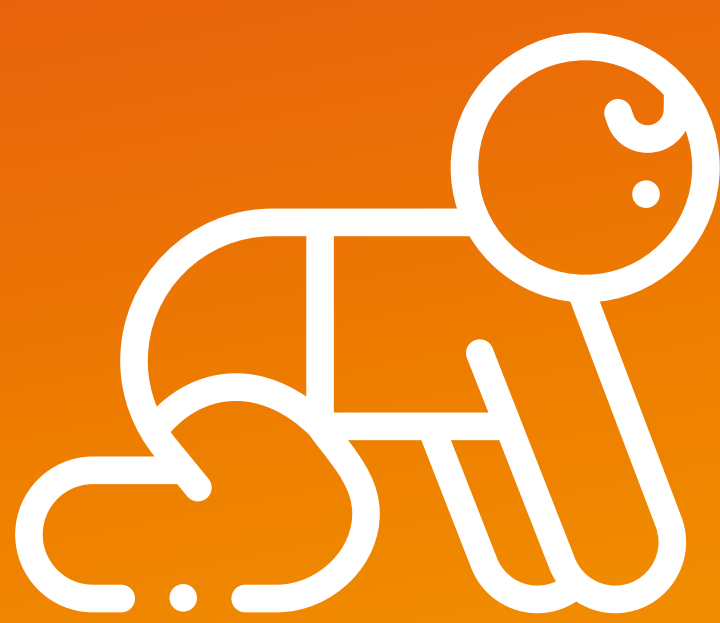
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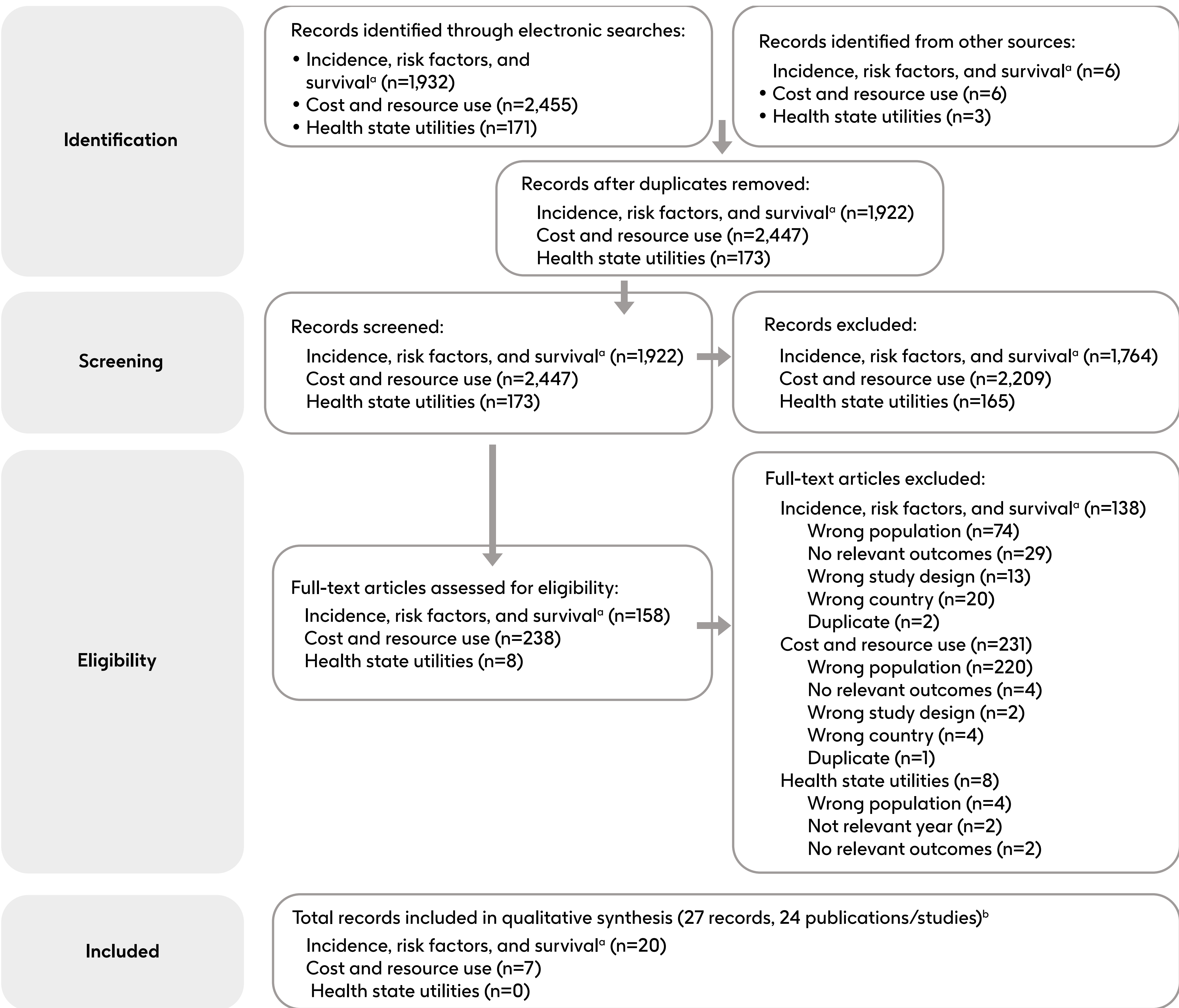
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Supplement

Supplementary Figure 1: Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) Flow Diagram of Included Studies



^aOutcomes included epidemiology (incidence), risk factors for developing acute IMD, IMD sequelae, and survival associated with acute IMD and sequelae
^bThree publications were included in both the incidence, risk factors, and survival domain as well as the cost and resource use domain.

Abbreviations
IMD, invasive meningococcal disease; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

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