Exploring the sex-differential effects of MenAfriVac vaccination: An observational study from rural Guinea-Bissau

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Background

Multiple studies indicate that several non-live vaccines increase child mortality despite protection against the targeted disease, whereas live vaccines reduce mortality beyond specific protection. These non-specific effects (NSEs) are stronger for girls than boys. We investigated the potential sex-differential NSEs of the new non-live meningitis A vaccine (MenAfriVac) in rural Guinea-Bissau, hypothesizing that it may increase susceptibility to other infections for girls.

Methods

We utilized Bandim Health Project's nationally representative rural health and demographic surveillance system for this observational study. Among children aged 1-5 years, we assessed female and male event rates one year before and one year after a MenAfriVac vaccination campaign in 2016. Using Cox proportional hazards models with age as underlying timescale we compared and contrasted the rates deriving the female/male hazard ratios (F/M-HR) of death and hospital admission (separately and as a composite outcome).

Results

16,844 children were included in the pre-MenAfriVac cohort (51% male, 49% female) and 17,265 in the post-MenAfriVac cohort (51% male, 49% female). The composite outcome event rates were similar across sex pre-MenAfriVac (male: 152 events, 21.2/1,000 person-years (PYRS); female: 147 events, 21.3/1,000 PYRS; F/M-HR 1.00 (95%CI: 0.80-1.25)) and tended to increase for males and decrease for females post-MenAfriVac (male: 143 events, 22.3/1,000 PYRS; female: 122 events, 19.4/1,000 PYRS; F/M-HR 0.86 (95%CI: 0.65-1.15)), but there was no significant difference in the pre- versus post-MenAfriVac F/M-HRs (p=0.42). Pre-MenAfriVac, event rates for the separate outcomes were similar across sex: deaths: F/M-HR=1.02 (95%CI: 0.73-1.41) and hospitalizations: F/M-HR 1.01 (95%CI: 0.77-1.05). Post-MenAfriVac, death rates decreased for males but not for females (F/M-HR 1.13 (95%CI: 0.76-1.69)), while hospitalization rates increased for males but decreased for females (F/M-HR 0.75 (95%CI: 0.54-1.06)).

Conclusion

This study is the first to evaluate NSEs of MenAfriVac and while we found little evidence supporting our hypothesis of a negative NSE in females, further studies of the real-life effect of MenAfriVac are warranted. The different sex-differential development in mortality and hospital admission rates is unexpected and calls for further investigation while limiting the usefulness of the composite outcome.