Case fatality risk among individuals vaccinated with rVSVΔG-ZEBOV-GP: a retrospective cohort analysis of patients with confirmed Ebola virus disease in the Democratic Republic of the Congo

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Background

The rVSVΔG-ZEBOV-GP vaccine constitutes a valuable tool to control Ebola virus disease (EVD) outbreaks. This study aimed to assess the protective effect of the vaccine against death among patients with confirmed EVD.

Methods

In this retrospective cohort analysis of patients with confirmed EVD admitted to Ebola health facilities in the Democratic Republic of the Congo between July 27, 2018, and April 27, 2020, we performed univariate and multivariate analyses to assess case fatality risk (CFR) and cycle threshold for nucleoprotein according to vaccination status, EVD-specific treatments, and other risk factors.

Results

We analysed all 2279 patients with confirmed EVD. Vaccination significantly lowered CFR (vaccinated: 25% (106/423) vs not vaccinated: 56% (570/1015); p<0·0001). In adjusted analyses, vaccination significantly lowered the risk of death compared with no vaccination, with protection increasing as time elapsed from vaccination to symptom onset (vaccinated ≤2 days before onset: 27% [27/99], adjusted relative risk 0·56 [95% CI 0·36–0·82, p=0·0046]; 3–9 days before onset: 20% [28/139], 0·44 [0·29–0·65, p=0·0001]; ≥10 days before onset: 18% [12/68], 0·40 [0·21–0·69; p=0·0022]; vaccination date unknown: 33% [39/117], 0·69 [0·48–0·96; p=0·0341]; and vaccination status unknown: 52% [441/841], 0·80 [0·70–0·91, p=0·0011]).

Cycle threshold values were significantly higher—indicating lower viraemia—among patients who were vaccinated compared with those who were not vaccinated; the highest difference was observed among those vaccinated 21 days or longer before symptom onset (median 30·0 cycles [IQR 24·6–33·7]) compared with patients who were not vaccinated (21·4 cycles [18·4–25·9], p<0·0001).

Conclusion

To our knowledge, this is the largest observational study describing the protective effect of rVSVΔG-ZEBOV-GP vaccination against death among patients with confirmed EVD admitted to an Ebola health facility. Vaccination was protective against death for all patients, even when adjusted for EVD-specific treatment, age group, and time from symptom onset to admission.

Among EVD-confirmed patients, vaccination reduced the risk of dying from EVD by more than half compared to being unvaccinated, even after adjusting for risk factors.