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## Comparison of screening method and cohort design to estimate pertussis vaccine effectiveness in Denmark, 2000-2014

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**Background:** In Denmark, laboratory-confirmed pertussis is notifiable, and national laboratory, vaccination and population registries permit individual data linkage for analysis. Since 1997, acellular pertussis vaccine has been delivered as a primary series (PS) of three doses at 3, 5 and 12 months, with a pre-school booster at age 5. We estimated VE for children receiving PS versus unvaccinated children, and for those receiving booster dose versus not having received the booster, comparing estimates from a screening method and a cohort design (CD).

**Methods:** The Danish civil registration number was used to link individual case laboratory data to vaccination and population registries. We estimated PS VE by birth cohort from 2000 to 2014, and for the booster from 2000 to 2010, using both methods. For the SM, VE was calculated for PS using the proportion of PS-vaccinated versus totally unvaccinated among cases, and in the population to January 2015. For the CD, linked data was used to estimate time at risk among individuals in each birth cohort from birth or arrival in Denmark, until tested positive for pertussis, moved out of country, death or end of study period. VE was estimated as 1 minus the incidence rate ratio (IRR) between incidence rate (IR = cases/time at risk) among PS-vaccinated and IR for totally unvaccinated using Poisson regression. For the booster, VE was estimated for the booster-vaccinated versus no-booster, independent of other vaccines received.

**Results:** From 2000 to 2015, 3621 confirmed cases were reported among 1,024,906 children in all birth cohorts. Using SM, the median VE for PS was 89.1% (range 63.9% to 99.7%). For the CD, median VE was, 77.2% (range 38.2% to 96.2%). For the booster, SM produced a VE median estimate of 94.0% (range 88.7% to 98.2%), compared to 57.2% (range 50.2% to 69.7%) using CD.

**Conclusions:** This study shows that acellular pertussis vaccine is highly effective. However, VE estimates for children who received PS, and for those who received booster, are substantially higher using SM than CD. CD incorporates the dynamics of time-at-risk and produces a more robust VE estimates. Therefore, SM is likely to overestimate VE, and countries using this approach need to be aware of this limitation. When individual data can be collected or linked, we recommend using the cohort design to obtain a more valid VE estimate.

### Biography

Lara Ricotta, she had completed her medicine in preventive medicine, Epidemiology, Public Health and Neurology from 2000-2008 and Preventive Medicine Residency Program (PMRP) from 2010-2015 University of Bologna. She had worked with Istituto Superiore di Sanità, Rome, Italy from 2012 to 2014. And from 2015 to present she is working European Centre for Disease Prevention and Control (ECDC) Università di Bologna

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