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Hospitalizations for influenza after introduction of pneumococcal conjugate vaccines at Chris Hani Baragwanath Academic Hospital in South Africa, 2009-2018

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ABSTRACT

Background

Pneumococcal diseases are of public health importance among children under 5 years of age due to the high burden of morbidity and mortality. Disease and mortality due to pneumococcus can be prevented by using suitable vaccines. Pneumococcal conjugate vaccines (PCVs) have been introduced into the childhood vaccination programs globally, what has resulted in significant decreases in pneumococcal disease in both vaccinated and unvaccinated children due to indirect effects. Secondary respiratory infection by *Streptococcus pneumoniae* following influenza infection is a common and challenging clinical problem. PCV-7 was introduced in the South African Expanded Program on Immunization in April 2009. The current research aimed to describe hospitalization and mortality due to influenza after introduction of pneumococcal vaccines in South Africa. Data from the Chris Hani Baragwanath Academic Hospital (CHBAH) was used.

Methods

This study used secondary data obtained from the Severe Acute Respiratory Illness Surveillance (2009 to 2013) and the Respiratory and Meningeal Pathogens Unit surveillance (2015 to 2018) studies done at CHBAH, in Soweto, South Africa among children <5 years old. Adjusted incidence rates of influenza associated hospitalizations and deaths were calculated by month, year, and age group. Poisson regression was used to describe the trend in incidence of influenza associated hospitalizations and deaths among children by year and age group. The proportion of hospitalized children infected with influenza virus among the pneumonia cases was determined by year, age group, and HIV exposure.

Results

There were 14 941 children <5 years of age enrolled into the surveillance studies at CHBAH between 2009 to 2018, 894 (6.0%) were PCR positive for influenza and 7 389 (49.5%) had disease coded as pneumonia. There were 63 influenza-associated in-hospital deaths during the study period. The incidence estimates of influenza associated hospitalization varied by month, year, and the seasonality varied from year to year. There was a decreasing trend in influenza associated hospitalization from 2010 up to 2017 and an increase in the incidence of influenza associated death from 2009 to 2017. The overall incidence of influenza associated

hospitalizations and deaths varied between 67-272 per 100 000 population and 6-24 per 100 000 population in all age categories, respectively. Influenza associated hospitalization incidence was highest in children 4 months to <1 year [372 (95% CI: 347-398)] and in 2009 [378 (95% CI: 344-413)] per 100 000 population. The incidence of influenza associated death was elevated in 2017 [24 (95% CI: 15-33)] per 100 000 population and in children aged 4 months to <1 year [24 (95% CI: 17-31) per 100 000 population]. Compared to children hospitalized in 2009, children admitted from 2010 to 2018 were less likely to be hospitalized for influenza associated illness and the relative risk for all age groups ranged from 0.09 (95% CI: 0.03-0.19) to 0.73 (95% CI: 0.38-0.95). Overall, 12% (95% CI: 11%-13%) of all the children hospitalized for influenza associated illness had pneumonia.

Conclusion

There was a decreasing trend in influenza associated hospitalizations incidence from 2010 to 2017 and an increasing trend of influenza associated deaths from 2009 to 2017. The incidence estimates of influenza-associated hospitalization and deaths varied by month, year, season, and age with high estimates being recorded in children aged 4 months to <1 year and in 2009. Despite the introduction of PCV, extra interventions are still required to further reduce influenza associated hospitalizations and deaths in children <5 years of age.