

Abstract

Problem and Purpose

Despite improvements in global vaccination coverage, the burden of vaccine-preventable diseases (VPDs) remains high and causes annual death of 1.5 million under five years children globally, of these deaths more than 500,000 were from Africa. The purpose of the study was to determine the proportion of hospitalization due to VPDs at Chris Hani Baragwanath Academic Hospital and quantify in-hospital mortality for less than 15 years children hospitalised with a VPD from January 2014 to December 2018. We also determined factors associated with under < 15 years children Vaccine-preventable diseases (VPD)-related hospitalisations at CHBAH.

Methods

Children < 15 years of age who were hospitalized in CHBAH starting from January 2014 to December 2018 were included in the study. Paediatric and neonatal patients were retrospectively searched from the hospital discharge summaries database by using the ICD-10 codes for the first, second and third diagnosis. From the discharge summaries the following variables were included: patient date of birth, age, gender, date of admission, date of outcome/discharge, outcome (discharged to home, death, and transfer), primary, secondary and tertiary discharge diagnosis and HIV-infection. The proportion of hospitalization and in-hospital mortality with 95% CI were computed for each of VPDs and pooled outcome variables: EPI-VPDs; if a patient is diagnosed for at least one of the following VPDs; Tetanus, Polio, Diphtheria, TB, Hepatitis B, Hemophilus influenza type (Hib), Pertussis, Pneumococcal and Measles, non-EPI VPDs; if a diagnosis was for at least one of VPDs; Varicella, Rubella, Mumps, Hepatitis A and Meningococcal and overall VPDs; is a sum of the EPI_VPDs and the non-EPI-VPDs, by using the total number of admission as the

denominator. Changes in hospitalisation and in-hospital death due to VPDs were assessed by using trend analyses. Logistic regression was used to determine factors associated with the pooled proportion of hospitalization due to VPDs outcome variables.

Results

A total of 83,031 under 15 years children were hospitalized and included in the hospital discharge summary database from January 2014 to December 2018, among them, 13,113 have no ICD-10 discharge diagnosis and excluded for further analysis. There were 69,918 paediatric and neonate participants in this study with a median age of 6.44 months, with an interquartile range of 0.46 to 29.34 months over the five years. The majority of the participants (65.7%) were aged 18 months and below. The overall hospitalization due to VPDs were observed in 2,361 (3.38% (95%CI: 3.24-3.51%)) participants. There were 2,147 (3.07%) who had EPI-VPDs. There were 221 (0.32%) had Non-EPI VDPs admissions in this study.

None of the participants had hospitalized due to Tetanus, Polio, and Diphtheria in this study. The most occurring cause of admission for the EPI-VPDs was TB which was observed in 1,936 (2.77% (95%CI: 2.65-2.89%)) participants followed by Pneumococcal disease (n=125; 0.18% (95%CI: 0.15-0.21%)), pertussis (n=69; 0.10% (95%CI: 0.8- 0.12%)), Hib (n=20; 0.03%(95%CI: 0.02- 0.044%)), measles (n=11; 0.02% (95%CI: 0.1-0.3%)) and lastly Hepatitis B (n=5; 0.01% (95%CI: 0.00-0.02%)).

The most occurring cause of admission for the Non-EPI-VPDs was Varicella which was observed in 116 (0.17% (95%CI: 0.14-0.20)) participants followed by Hepatitis A (n=69; 0.10% (95%CI: 0.08-0.12%)), Meningococcal and Rubella with equal estimates (n=13; 0.02% (95%CI: 0.01-0.03%)) and lastly Mumps (n=10; 0.01% (95%CI: 0.00-0.02%))

There were 4,111 deaths outcomes (5.88%; 95%CI: 5.71-6.06%) which were observed among the study participants. Of these deaths, 142 (3.45%) were due to VPDs. Out of 2361 patients hospitalised due to VPDs, 142 (6.01%) died; of the 142, 134 were from EPI-VPDs.

There was a gradual increase in the number of patients admitted with non-EPI-VPDs from 2014 to 2016, which then decreased onwards; however, the increase was not statistically significant, $p\text{-value} > 0.05$. The EPI-VPDs increase swiftly from 2014 to 2015 in which it peaked before decreasing in the subsequent years. The overall VPDs which is the sum of EPI and non-EPI followed a similar pattern with the EPI-VPDs, which was predominant in this study. The EPI-VPDs showed a general decrease in the number of in-hospital mortality over time; however, there were significant oscillations in the trend. The Non-EPI-VPDs showed a gradual increase in in-hospital mortality which peaked in 2016 and decreased after that. The participant's age was associated with high odds of being hospitalized due to EPI-VPDs, non-EPI and overall VPDs. Those who were HIV positive had increased odds to have EPI, non-EPI and overall EPI VPDs when compared to those who were HIV negative.

Conclusion

The results show that vaccine-preventable diseases are contributing 3.38% of < 15 years children hospitalization in CHBAH from 2014 to 2018. From admissions due to VPDs, EPI-VPDs share was significant especially hospitalization due to Tuberculosis was the most common cause. From non-EPI-VPDs, the highest proportion was due to varicella, followed by Hepatitis A. Strengthening the national immunization system and reaching eligible children for vaccination is important for the prevention of hospitalization and death of VPDs. The Department of health should start looking for additional evidence for the inclusion of selected non-EPI VPDs in the national EPI system.