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Brief report

Pneumococcal pneumonia in adults 60 years or older: Incidence, mortality and prevention

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ABSTRACT

Background: This study investigated the burden (incidence, mortality and serotype distribution) of pneumococcal pneumonia among older adults in the region of Tarragona (Spain).
Methods: Population-based cohort study involving 27,204 individuals ≥60 years in Tarragonès county (Southern Catalonia), who were prospectively followed between 01/12/2008 and 30/11/2011. Bacteremic and nonbacteremic (positive sputum culture and/or urinary antigen test) pneumococcal pneumonias were recruited.
Results: A total of 125 pneumococcal pneumonias (16 bacteremic and 109 nonbacteremic) was observed. Incidence rates (per 1000 person-years) were 0.21 (95% confidence interval [CI]: 0.13–0.35) for bacteremic cases and 1.45 (95% CI: 1.20–1.75) for nonbacteremic cases. Case-fatality rate was 10.4% (12.5% in bacteremic and 10.1% in nonbacteremic cases). Five serotypes (types 3, 6C, 19A, 22F and 35B) were the most common serotypes, accounting for 64.3% of overall isolated serotypes. 73.1% of cases were due to the strains included in the 23-valent vaccine whereas 53.6% were due to the strains included in the 13-valent vaccine.
Conclusion: The burden of pneumococcal pneumonia remains considerable (especially among oldest people and nursing-home residents) despite a publicly funded anti-pneumococcal vaccination program operative for several years.

Neumonía neumocócica en adultos mayores de 60 años: incidencia, mortalidad y prevención

Palabras clave:
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RESUMEN

Fundamento: Este estudio analiza la epidemiología (incidencia, letalidad y distribución de serotipos) de la neumonía neumocócica en adultos mayores de Tarragona.
Métodos: Cohorte de base poblacional que incluyó 27.204 individuos ≥ 60 años en la comarca del Tarragonès, con seguimiento prospectivo entre 1-12-2008 y 30-11-2011 y selección de todos los casos de neumonía neumocócica bacteriémica y no-bacteriémica (cultivo de esputo y/o antigenuria positiva).
Resultados: Se observaron 125 neumonías neumocócicas (16 bacteriémicas y 109 no bacteriémicas). Las tasas de incidencia (por 1.000 personas-año) fueron 0,21 (intervalo de confianza [IC] 95%: 0,13-0,35) para casos bacteriémicos y 1,45 (IC 95%: 1,20-1,75) para casos no bacteriémicos. La letalidad global fue del 10,4% (12,5% en casos bacteriémicos y 10,1% en no bacteriémicos). Cinco serotipos (3, 6C, 19A, 22F y 35B) fueron los más comunes, representando un 64,3% del total de serotipos aislados. Un 73,1% de los casos fueron debidos a serotipos incluidos en la vacuna 23-valente, mientras que un 53,6% fueron debidos a serotipos incluidos en la vacuna 13-valente.

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Conclusión: La incidencia de neumonía neumocócica es considerable (especialmente en personas mayores y/o institucionalizadas) a pesar del programa público de vacunación antineumocócica implementado desde hace años.

Introduction

Infections caused by *Streptococcus pneumoniae* remain a major public health problem worldwide. Pneumonia is the most common presentation of pneumococcal infection in adults, but the true burden of the disease is not well known because of difficulties to characterize nonbacteremic cases.[1,2]

This study describes the epidemiology (incidence, mortality and serotype distribution) of pneumococcal pneumonia (bacteremic and nonbacteremic cases) among Southern Catalonian people 60 years or older. This work is part of the CAPAMIS Study,[3] a cohort study conducted in Tarragona (Southern Catalonia, Spain) whose results of the effectiveness of antipneumococcal vaccination have been published.[4]

Methods

Population-based prospective cohort study that included 27,204 individuals, who were all people 60 years or older registered in any of nine primary care centers (PCCs) of the Institut Catala de la Salut in the Tarragones county (a mixed industrial–residential urban area in the Mediterranean coast of Southern Catalonia) with an overall population of 337,289 all-age inhabitants at study start. Design and study population have been extensively described elsewhere.[3]

Cohort members were followed since study start (01/Dec/2008) until the occurrence of a first event, enrolment from the PCC ceased, death, or until the end of the study (30/Nov/2011). Presumptive cases of pneumonia were initially identified on the basis of primary hospital discharge ICD-9 diagnosis codes for pneumonia (480–486). All presumptive cases were further reviewed by two trained physician investigators who checked the hospital medical records, only being definitively included if, on conclusion of the medical record review, the diagnosis was verified according to classical criteria previously described.[3] Death from pneumonia (case-fatality) was considered when the patient died (in-hospital or not) within the first 30 days after the diagnosis.

Conventional diagnostic workup included blood culture, sputum culture and *S. Pneumoniae* urinary antigen test (Binax-NOW),[5] which were performed as indicated by the attending physician in each case. The isolates of *S. pneumoniae* were identified from blood and sputum samples by standard methods in the microbiology laboratory of two hospitals in the study area (Joan XXIII and Santa Tecla). Strains were serotyped in the Pneumococci Reference Laboratory of the Instituto de Salud Carlos III (Majadahonda, Madrid).

Incidence rates were calculated as person-years, considering in the denominator the sum of the person-years contributed by each individual during the study period. The 95% confidence intervals (CIs) were calculated assuming a Poisson distribution. Chi-squared or Fisher's test and Nonparametric equality-of-medians test were used to compare proportions and quantitative data as appropriate. Statistical significance was set at $p < 0.05$ (two-tailed).

Results

The 27,204 cohort members (mean age 71.7 years; 44.6% male) were followed for a total of 75,360 person-years. Across study period, 125 cohort members suffered pneumococcal pneumonia (16 bacteremic and 109 nonbacteremic cases). Of the 109 nonbacteremic cases, 14 were identified by positive sputum culture, 5 by positive sputum culture plus urinary antigen test and 90 by positive urinary antigen test alone. Incidence rates (per 1000 person-years) were 0.21 (95% CI: 0.13–0.35) for bacteremic pneumococcal pneumonia, 1.45 (95% CI: 1.20–1.75) for nonbacteremic pneumococcal pneumonia and 1.66 (95% CI: 1.39–1.98) for all pneumococcal pneumonia.

Table 1 shows the study population, time followed, absolute number of events and incidence rates for all pneumococcal pneumonia according to age strata, sex and type of residence.

The median days of hospitalization were 8 days (interquartile range [IQR]: 5–11). No statistical differences were observed when comparing length-stay according to age strata and sex. Ten (8%) of 125 cases (three bacteremic and seven nonbacteremic) were admitted into the Intensive Care Unit (ICU), with a median stay of 3 days (IQR: 2–4) in the ICU and 9 days (IQR: 6–13) in the total hospital-stay.

Thirty-day case-fatality rate was 10.4% (12.5% in bacteremic cases and 10.1% of nonbacteremic cases; $p = 0.885$). Case-fatality was 3.2% in people 60–69 years, 7.3% in people 70–79 years and 17% in people 80 years or more; $p = 0.101$. Case-fatality rate was 8.7% for community-dwelling individuals and 30% of nursing-home residents ($p = 0.069$).

Serotypes 3 and 19A (with 5 cases each one) were the most commonly identified serotypes, accounting for 35.7% of the total 28 serotyped isolates. The remaining identified serotypes were type 22F and 35B with 3 cases each one, 6C in two cases and types 1, 4, 6A, 7F, 8, 9N, 16F, 19F, 23B and 29 in one case. Table 2 compares prevalence of infections caused by serotypes contained in the 13-valent and 23-valent pneumococcal vaccines.

Discussion

This study investigated the burden of pneumococcal pneumonia among the general population 60 years or older in a well defined geographical area in Southern Catalonia. Our data show an intermediate incidence rate (21 episodes per 100,000 person-year) and mortality (10.4%).

Incidence largely varied by sex (double in men than in women) and age strata (approximately 4-fold greater in people 80 years or more than in people 60–69 years). A similar trend has been reported in prior epidemiological studies, considering that the frequent association between increasing age and presence of underlying diseases accounts for an increased morbidity–mortality due to pneumococcal pneumonia in the oldest adults.[6] Moreover, the incidence was dramatically greater among nursing-home residents (who suffered an incidence 8-fold greater than community-dwelling individuals).

The reported incidences of pneumococcal infections vary widely in different settings.[7] It is believed that these differences largely reflect differences in surveillance methods and blood culture practices, but they could also reflect geographical and epidemiological differences. Considering bacteremic pneumococcal pneumonia, the incidence rate observed in our study is within the range of 12–76 cases per 100,000 person-year reported for invasive pneumococcal diseases (mainly bacteremic pneumococcal pneumonia) among older adults in distinct European countries.[7] We note that an incidence of 19 cases of bacteremic pneumococcal pneumonia per 100,000 population-year was reported among