# ARE 10V CONJUGATED PNEUMOCOCCAL AND INFLUENZA VIRUS VACCINES- PROTECTIVE FACTORS FOR SEVERE PNEUMONIA?

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## BACKGROUND

Pneumonia plays an important role in children's morbidity and mortality. In Brazil, epidemiological and social changes occurred concomitantly with the universal introduction of the 10-valent pneumococcal conjugate vaccine. This study identified risk factors for pneumonia following the implementation of a pneumococcal vaccination program.

## METHODS

A hospital-based, case-control study involving incident cases of pneumonia in children aged 1-59 months was conducted between October 2010 and September 2013 at a tertiary hospital in northeastern Brazil. The diagnosis of pneumonia was based on the World Health Organization (WHO) criteria. The control group consisted of children admitted to the day-hospital ward for elective surgery. Children with comorbidities were excluded. The risk factors for pneumonia that were investigated were among those classified by the WHO as definite, likely and possible. A multivariate analysis was performed including variables that were significant at $p \leq 0.25$ in the bivariate analysis.

## RESULTS

The study evaluated 407 children in the case group and 407 children in the control group. Household crowding (OR=2.15; 95% CI, 1,46-3,18) and not having been vaccinated against the influenza virus (OR=3.59; 95% CI, 2,62-4.91) were the only factors found to increase the likelihood of pneumonia. Male gender constituted a protective factor (OR=0.53; 95% CI, 0,39-0,72).

## DISCUSSION/CONCLUSION

When the present results are compared with the findings of previous studies, it is clear that the risk factors for severe pneumonia have changed. Most likely, this fact is not only associated with the expansion of the vaccine program but also with the social improvements that have occurred in the country in recent years. However, these changes remain insufficient to overcome social inequalities, as shown by the findings related to household crowding. Although the vaccine is offered only during the largest circulation period of the virus (autumn), the influenza virus circulates almost continuously throughout the year. The possible protection offered by the influenza and pneumonia vaccine, as shown in this study, must be evaluated in etiological studies to assess the true role of immunization on the incidence of pneumonia in Brazil.

**Table 1 -** Multivariate analysis of risk factors for community-acquired pneumonia in children aged 1-59 months.

| Variable | Odds Ratio | Standard Error | z | p-value (z) | 95% CI |
|---|---|---|---|---|---|
| Household crowding | 2.08 | 0.41 | 3.72 | **< 0.01** | 1.41 – 3.06 |
| Male gender | 0.52 | 0.08 | -4.20 | **< 0.01** | 0.38 – 0.70 |
| Not immunized against the influenza virus | 3.70 | 0.38 | 8.39 | **< 0.01** | 2.72 – 5.02 |
| Constant | 0.87 | 0.11 | -1.07 | 0.29 | 0.67 – 1.12 |

**Table 2** Distribution of the child-related factors and bivariate analysis for the risk of acquiring pneumonia.

| Variable | | Cases (n=452) | Controls (n=407) | p-value | OR | 95% CI |
|---|---|---|---|---|---|---|
| | | N (%) | N (%) | | | |
| 10-valent pneumococcal vaccine | Vaccinated | 228 (50.4) | 225 (55.3) | | 1.0 | |
| | unvaccinated | 224 (49.6) | 182 (44.7) | 0.18 | 1.21 | 0.92-1.60 |
| Influenza virus vaccine | Vaccinated | 190 (42.0) | 289 (71.0) | | 1.0 | |
| | unvaccinated | 262 (58.0) | 118 (29.0) | **<0.01** | 3.38 | 2.52-4.53 |

* Data missing in 59 cases (6.9%); † Data missing in 45 cases (5.2%); ‡ Data missing in 9 cases (1.0%); Data missing in 3 cases (0.3%).