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Submitting author: Dr Kwok Keung Daniel NG

Post title: Chief of Service, Kwong Wah Hospital

NO₂ and the rising trend of preschool wheeze hospitalization in Hong Kong, China

*Ng DK, Siu KK, Wong CP, Lee SP, Chan PY, Chan EY, Kwok KL, Yip YF, Leung SY
Department of Paediatrics, Kwong Wah Hospital, Kowloon, Hong Kong SAR, China*

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Introduction

Preschool wheeze in children was reported to occur in a third of children aged 1–6 years in Europe and the USA. Various pollutants were implicated in childhood respiratory diseases, e.g. cough without infection and dry cough at night and respiratory and cardiovascular admissions in preschool children.

Objectives

To investigate the secular trend of hospitalization for preschool wheeze and its relationship with various outdoor pollutants from Hong Kong, China.

Methodology

Preschool wheeze admission data, i.e. bronchiolitis, asthma, bronchitis, wheeze and all emergency admission data of 6-year-old patients in all public hospitals were retrieved for the study period from 2004 to 2015 from a central information system for all public hospitals in Hong Kong. Preschool population data were obtained from the Hong Kong Census and Statistics Department. Air pollution data were obtained from Environmental Protection Department of the Hong Kong Government

Result

Admission for preschool wheeze rose from 9.8 per 1,000 preschool children in 2004 to 13.3 per 1,000 preschool children in 2015, a highly significant trend ($p=0.05$). The preschool wheeze admission rate has increased by 35% over the past 12 years with an average year-on-year rise of 4.2%, whilst there is no significant rising trend for emergency admission rate with other diagnosis. For outdoor pollutants, PM_{2.5}, PM₁₀ and SO₂ improved in the same period but NO₂ and ozone were on the rise. The correlation of preschool wheeze admission with NO₂ and ozone were undertaken. Only NO₂ was found to have a significant positive relationship with preschool wheeze admission $r=0.69$ ($p=0.03$).

There was significant increase of emergency admission of preschool wheeze in the last 12 years, overall 34% with an average year-on-year rise of 4.2 % associated with a rise in NO₂. This carries important implications for Hong Kong and more importantly for China which saw a 4 folds rise in car ownership in the last decade.