



CME Review

Lung disease in indigenous children

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EDUCATIONAL AIMS

The reader will be able to:

- Discuss the common respiratory problems encountered by indigenous children.
- Appreciate the similarities and differences in the aetiology, associations and management of these common respiratory problems.
- Understand the many facets that impact on the clinical outcomes of common respiratory conditions affecting indigenous children.
- Discuss potential intervention targets that can reduce the morbidity and mortality of respiratory diseases in indigenous children.

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SUMMARY

Children in indigenous populations have substantially higher respiratory morbidity than non-indigenous children. Indigenous children have more frequent respiratory infections that are, more severe and, associated with long-term sequelae. Post-infectious sequelae such as chronic suppurative lung disease and bronchiectasis are especially prevalent among indigenous groups and have lifelong impact on lung function. Also, although estimates of asthma prevalence among indigenous children are similar to non-indigenous groups the morbidity of asthma is higher in indigenous children. To reduce the morbidity of respiratory illness, best-practice medicine is essential in addition to improving socio-economic factors, (eg household crowding), tobacco smoke exposure, and access to health care and illness prevention programs that likely contribute to these issues. Although each indigenous group may have unique health beliefs and interfaces with modern health care, a culturally sensitive and community-based comprehensive care system of preventive and long term care can improve outcomes for all these conditions. This article focuses on common respiratory conditions encountered by indigenous children living in affluent countries where data is available.

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INTRODUCTION

Globally, the disparity in health between indigenous and non-indigenous people is striking. It is most marked and well documented in affluent countries; Aboriginal and Torres Strait Islanders in Australia; Māori in New Zealand (NZ); First Nation, Inuit and Metis People in Canada; and American Indians and Alaska Natives (AI/AN) and Native Hawaiians in USA (here forth referred as indigenous). [1] Indigenous populations of these countries bear

a high burden of ill health from acute and chronic respiratory disease. In indigenous Australians, respiratory disorders are the second most common reason for hospitalisation. [2] In indigenous populations of the USA, Canada and NZ, respiratory illnesses are also one of the most prevalent acute and chronic illness. [3,4]

This review focuses on the most common acute and chronic respiratory diseases in indigenous children living in Australia, NZ, Canada and USA. The little data on indigenous populations in other countries with indigenous and colonial/immigrant populations precludes meaningful comparison. This review does not discuss basic treatment principles as the same high quality best practice care is paramount in these settings and readers are referred to evidence based guidelines. Tobacco exposure and its effects are briefly mentioned but not discussed in depth.

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In these countries, the disease patterns (frequency, age distribution, severity and/or co-morbidities) in indigenous children have important differences compared with that of non-indigenous children. The severity and morbidity (eg hospitalisations) of asthma, acute and other chronic respiratory diseases in indigenous populations are greater compared to their non-indigenous counterparts. [5,6] Across these countries, indigenous children share some similarities but also differences in respiratory diseases. [1,4] For example, indigenous children with bronchiectasis living in USA, NZ and Australia share similarities in the frequency of household crowding, prematurity and early respiratory infections. [4] However, there are also differences among these populations with respect to prevalence of wheeze, ear disease and plumbed water. [4]

ASTHMA

Asthma is one of the most common chronic respiratory illness in indigenous children, with prevalence rates of asthma of 14.3% in Canadian indigenous children aged 6–14 years, [7] 14.8% of New Zealand Māori and Pacific children aged 2–14 years, [5] 12–23% in Australian indigenous children (0–17 years) [8] and 13% in USA AI/AN children. [9] However, the accuracy of these data is limited by the various definitions of asthma used. Nevertheless, asthma prevalence in indigenous children tends to be lower in rural regions compared to urban centres. [7]

While the prevalence of asthma in indigenous children, is similar to that of non-indigenous children, the associated chronic morbidity of asthma is higher in indigenous children compared to their non-indigenous counterparts. [5,10,11] For example, the hospitalization and mortality rate for asthma is 2–3 times higher in indigenous Australians. [12] The poorer clinical outcomes have also been documented in indigenous children of New Zealand, Canada and USA as well as other minority groups globally. [5,13]

There is little data on whether the risk factors for having asthma in indigenous children are identical to that in non-indigenous children. Factors that have been identified were being male, allergy, obesity, low birth weight, poor housing, tobacco exposure, urban residence and history of bronchitis. [7,14] Reasons why indigenous children have poorer asthma outcomes is largely unknown and is likely multi-factorial. There is paucity of data that have directly compared outcomes between indigenous with non-indigenous children within a single setting. Through interviews, a NZ study found that Māori and Pacific children were more likely to receive sub-optimal asthma treatment, such as lower rates of the use of inhaled corticosteroids in primary care despite higher rates of chronic symptoms. [5] An Australian study of 200 children hospitalized for asthma found that intrinsic biological factors are unlikely to account for the poorer asthma outcomes as there was no significant difference between indigenous and non-indigenous children in the length of hospitalisation and risk factors (eg prematurity), other than environmental tobacco smoke (ETS) exposure. [12] The retrospective Australian study also identified possible intervention points to improve the management of asthma, particularly in indigenous children. These included better identification, documentation and management of ETS exposure, and improvement of acute management and discharge planning including education and utilisation of asthma action plans. [12]

Improvement in asthma outcomes for indigenous children will need to focus on better individual management and systems that support such care. Despite major advances in the understanding of the pathogenesis of asthma (with relatively large amounts of research dollars), the accompanying benefits from public health initiatives have arguably been less than expected. [13] Some have proposed that the priority for asthma research should be improving the use of existing treatments as evidence-based measures to

prevent (or reduce) the prevalence of asthma in children are unavailable (other than reducing tobacco smoke exposure). [13]

Management of asthma

The principles of managing asthma with respect to evidence-based use of appropriate medications (though a step-wise approach), use of spacers and asthma action plans to control asthma symptoms and reduce exacerbations are no different in indigenous populations compared to non-indigenous children. The key difference is the delivery of service and the framework of care (e.g. inclusion of indigenous healthcare workers, appropriate education resources). [5,15] The problems of poor access to high-quality health care, affordable medications for indigenous and other minority groups in affluent countries has been documented. [1] Indigenous children have very high rates of ETS exposure, a particular concern in people with asthma. Obesity and diagnostic accuracy (given high relatively high levels of co-morbidities such as chronic suppurative lung disease (CSLD) where wheeze is also common) are also of particular importance. In addition to the specific management issues relevant to asthma, other generic respiratory health measures (see section below) should be embedded in a culturally specific context.

ACUTE LOWER RESPIRATORY INFECTIONS (ALRIS)

Epidemiology and context

Globally, ALRIs including pneumonia represent the largest (18%) single cause of death in children aged <5-years. [16] While there are substantial inter-country and inter-continental differences in the annual incidence of pneumonia globally (0.33 episodes per child-year in Africa, 0.05 in developed countries [16]), there is also wide intra-country variability. [16] For example, in contrast to the rest of Australia, ALRIs are the commonest cause of preventable deaths in infants, emergency medical retrievals from remote communities, and hospitalizations among indigenous children aged <5-years. [17] The incidence of hospitalized-pneumonia among infants in the Northern Territory of Australia (the region with the highest proportion of indigenous people) is 0.43 per child-year. [18] The same preponderance of ALRI in indigenous children (vs non-indigenous children) is also seen in the USA, New Zealand and Canada. [4,11,19] Hospitalisation rates for respiratory infections in AI/AN children were almost double that for the rest of the paediatric population (116.1 versus 63.2/1000 respectively). Hospitalized ALRIs in Australian indigenous children are decreasing, [20] but they are increasing among AN children (39% of all infectious disease hospitalisations and 74% of infant infectious disease hospitalizations). [21] In New Zealand, hospitalised ALRI rates in children aged <2 years are 103/1,000 nationally but reach 177/1,000 in South Auckland Māori and Pacific children. [22] These higher rates in indigenous populations in affluent countries compared to developing countries is likely related to the invariably better data collection in affluent countries. Bronchiolitis and pneumonia account for the majority of the hospitalized ALRI burden and these are discussed in further details below.

In addition to the high disease burden, the importance of ALRIs is also reflected in non-hospitalised morbidity and mortality and long term consequences especially when ALRIs are recurrent. Recurrent ALRIs are an independent risk factor for subsequent bronchiectasis [23] and lower pulmonary function later in life. [24] Not only are low birth weight and pre-existing small lungs important determinants of future lung function, but there is increasing evidence that early events in life are at least equally important determinants of adult pulmonary dysfunction. [24,25] Early infectious or inflammatory insults in the first few years of life,

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