An overview of respiratory disease in Indigenous communities: A comparison to the wider Australian population

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Aim: The objective of this article is to compare the differences in long term health outcomes between Indigenous and non-Indigenous populations with respect to respiratory disease. In order to gain a deeper understanding of the knowledge presented regarding differences in Indigenous and non-Indigenous health, the epistemological grounds for the study will be considered. **Methods:** A literature review was conducted. The data for this review was assembled through searching Medline, Informit, PubMed and the Indigenous Healthinfonet for English language peer- reviewed publications containing the keywords: respiratory disease, Indigenous, rural and Queensland. Thirty-two documents were selected. **Results:** Respiratory disease is distributed disproportionately and occurs with peculiar frequency among Indigenous Australians. Key health indicators such as the disability adjusted life year highlight the inequality between Indigenous and non-Indigenous Australians in terms of health outcomes, although to a much lesser extent than in the past. **Conclusions:** An innovative approach to public health has seen Indigenous communities become more actively engaged in medical care. Of particular note is the increasing frequency with which Indigenous health workers are being integrated into rural practice to follow up patients and bridge cultural and societal gaps. Environmental antecedents are important contributors to health which may be responsible for the high burden of disease seen in many Indigenous communities. These challenges must be addressed as part of a new public health drive to bring health equality to all Australians.

Introduction

Closing the gap between Indigenous and non-Indigenous populations has been a major long-term challenge for many developed countries. [3] In many basic areas such as health, socioeconomic status [4] and education, Indigenous people are left behind. Australia's Indigenous population continues to face a high burden of disease. Many recognised health indicators (such as Quality/Disability Adjusted Life Years) corroborate the severe disadvantage faced by Indigenous Australians when compared with the wider community. [56] In many Indigenous communities respiratory disease is a major cause of morbidity and mortality, particularly in infants and children born into rural and remote Aboriginal communities. [7]

What is respiratory disease?

In order to accurately examine the effects of respiratory disease, it is necessary to define the scope and limits of the group of diseases collectively known to affect the respiratory system. The World Health Organisation defines respiratory tract diseases as those which affect air passages ranging from acute to chronic infections, with common examples being pneumonia and asthma respectively. [8]

The prevalence of acute lower respiratory infections (ALRIs) in Australian Indigenous populations mirrors levels seen in developing countries and are a major cause of hospitalisation among young children. [9-11] Consequently, ALRIs are a leading cause of childhood mortality and morbidity, and place a considerable cost and time burden on carers and medical professionals. [9,12]

In recent decades, population-based studies have focused on intriguing temporal trends affecting Indigenous and non-Indigenous populations

and rates of respiratory disease. It was observed that between 1992 and 2000 the rates of hospitalisation for bronchiolitis in infants (those aged <12 months) were 10% greater in non-Indigenous children when compared to their Indigenous counterparts. [9]

Environmental antecedents were identified by several studies [5-7,9] as a likely causative factor in the high prevalence of respiratory disease in Aboriginal communities. It was noted that Indigenous children commonly show higher rates of purulent nasal and aural discharge [13] in addition to dense colonisation of nasopharyngeal passages with common respiratory pathogens. [13,14] Moore *et al.* [9] offer explanations for observed changes in respiratory disease incidence and hospitalisation rates, which include:

1. Increasing day-care attendance rates. Identified as a clear risk factor for respiratory disease transmission [15] and an important explanatory factor for the increased respiratory disease in non-Indigenous children, as Indigenous children do not use day care facilities to the same extent. [16]

2. Introduction of Haemophilus influenzae Type B (Hib) immunisation in 1993. This has seen a marked concurrent decline in pneumonia hospital admissions. Prior to widespread vaccination, pneumonia accounted for 43% of HiB infection in Indigenous children compared to 7% in non-Indigenous children. [9]

3. Introduction of diagnostic assays which rapidly detect common viral agents responsible for ALRIs. Diagnostic assays allow the rapid identification of viruses such as respiratory syncytial virus (RSV), the leading cause of influenza and bronchitis. Appropriate treatment regimes can be subsequently implemented, thus reducing disease severity. [17]

4. Better management of asthma outside of hospital in primary care facilities. [18] The success of primary health care can in some part be attributed to the high levels of community nvolvement in the practice. Recent changes in the approach to public health have seen Aboriginal health workers become more involved in medical care. Currently, they comprise 65% of the health workforce in Indigenous communities. [19]

The heavy bacterial colonisation rates of young children in Indigenous communities is commonly cited as one of the ramifications of high density living characteristic of many communities, due to a lack of housing. [6] These living arrangements may not be simply due to housing shortages but also from the cultural tradition of centralised

extended family groups living together. The introduction of permanent settlements and contemporary Western-style housing may have altered the context of this cultural practice and many studies have found an increasing risk of lower respiratory tract infections to correlate with the increasing density of living. [12]

Common respiratory diseases

Indigenous Australians are affected by many common respiratory diseases and in order to evaluate and compare the associated health challenges, this discussion will focus on major diseases including asthma and acute lower respiratory infections.

Asthma is a chronic lung disease characterised by a severe immune allergic response. [12] This inflammatory condition is one of the two most common causes of hospitalisation for Indigenous Australians, second only to renal dialysis. In addition, asthma is the second most common self-reported long-term illness among Indigenous Australians. Mortality rates due to asthma among Indigenous Australians are 3.2 times that of other Australians. [35]

Typical reactions cause bronchoconstriction and difficulty breathing. [20,21] Vitalis *et al.* [22] confirmed latent adenovirus-5 infection (causing bronchiolitis or pneumonia) increased the inflammatory cell response in an acute exposure to cigarette smoke in animal models. The resultant activation of CD8+ T-cells in response to ADV-5 causes pulmonary damage, as demonstrated by O'Shaughnessy *et al.* [23] Furthermore, investigations by Fryer indicated that viral infections can reduce M2 muscarinic receptor numbers in the airways, thereby increasing vagally-mediated bronchoconstriction. [25] In the opinion of several authors, it is clear that viral infection may be a predisposing factor for respiratory disease.

Levels of lung function are measured by spirometry, with key measures including forced expiratory volume (FEV) and forced vital capacity (FVC). [4] FEV/FVC ratios are typically lower in Indigenous people than in those of European descent. [7] Musk *et al.* [7] found FEV levels 20% lower than predicted even for asymptomatic patients when conducting a survey of respiratory health in the tropical Kimberley regions of northern Australia. Concurrently, a cross sectional study in Norway [26] found the level of serum RSV antibodies was associated with reduced FEV. It is therefore possible to relate repeated infection with common respiratory pathogens to a cumulative and detrimental effect on airway function, or increased susceptibility to other agents such as tobacco smoke. [26]

Burden of disease

The impact of respiratory disease (and the impact of other illnesses) on Indigenous communities is represented by an aggregate concept known as the burden of disease. The most extensive levels of fatal disease and injury among Indigenous Australians are reported in the Northern Territory Aboriginal population. Overall, respiratory tract infections were a prominent cause of hospitalisation and 50% of infants presented an average of two to three times a month within the first year of life, indicating a higher than average disease burden amongst the population. [27] Generally, Indigenous people suffer a rate of burden of disease approximately 2.5 times greater than the non-Indigenous population. [5] An important measure used by the World Health Organisation to standardize and compare the burden of disease between population groups is the Disability-Adjusted Life Year (DALY). [5] The DALY is a time-based measure of health status used to summarise the burden of premature mortality and disability. [28] The DALY is regularly used interchangeably with a similar measure known as the QALY, or Quality-Adjusted Life Year. [29] In this review it is more accurate to apply the DALY, as it combines the years of life lost due to premature mortality and years of life lost due to disability in summarising the overall disease burden. [5]

The Aboriginal population of the Northern Territory was found to be over-represented in total DALYs, accounting for 47.4% while only consisting 29% of the population. [28] Comparisons with the national average show that the NT has higher proportions of DALYs attributable to acute respiratory infection. [9]

In performing a comparison study based on epidemiological data available from Australian State and Territory Health Departments, Zhao *et al.* [30] explored the discrepancy between health outcomes in Aboriginal and non-Aboriginal people. Much of the difference is said to be attributable to diseases with preventable and environmental antecedents. [31] However, although it was noted that gender differences are apparent in Indigenous respiratory disease mortality ratios, Zhao *et al.* [30] agree with previous studies [3,6,7] that the greater contributing factors to Indigenous health status include diet, lifestyle, education and physical activity, all of which are responsive to intervention. [31,32]

Although rarely recognised, information on the burden of disease and injury in Aboriginal populations comes mostly from comparative studies correlating Indigenous populations with the prevalence of infectious disease and lifestyle disorders. [30,33,34] As such, literature describing the burden of disease is incomplete. This is not necessarily due to lack of interest or endeavour in the field. The extraordinarily low population densities in remote and rural areas make it difficult to 'catch everyone' and correctly record the relevant information.

Epistemological grounds and data collection issues for study

In gaining a deeper understanding and appreciation of the data presented in the literature regarding Indigenous health, it is critical to be mindful of the scope and limitations of knowledge. When approaching public health policy development, it is necessary to engage studies providing quantifiable measures of efficacy and financial cost/benefit analysis. [29] In addition to purely quantifiable instruments, a key element in the success of Indigenous health policy is found by understanding the many interposing qualitative vectors operating in a particular community.

The West Australian Data Linkage System (WADLS) was used in the investigation of the prevalence and changing trends in respiratory disease among Indigenous and non-Indigenous populations. In the context of the population-based study performed, the data available through WADLS presented strong evidence for a change in the prevalence of respiratory disease. However, potential changes in clinical interpretations of symptoms over time could lead to bias or inaccuracy in the study. To avoid this possibility, the study recommends increasing the resolution of ALRI data by desegregation of this categorical term (respiratory disease) into specific pathologies. When ALRI data is categorized by diagnosis, it is easier to avoid sweeping clinical interpretations which may misrepresent the true situation. [9]

Conclusion

Respiratory disease is one of the major causes of morbidity and mortality among Australia's Indigenous people. [7] Population-based studies have demonstrated the higher prevalence of asthma, bronchiectasis and pneumonia among Aboriginal children even in urban environments where access to primary healthcare is significantly improved. [12]

At present, literature on the subject of Indigenous respiratory health is somewhat insufficient in scope and specificity. Although statistics and quantitative instruments are significant in evaluating financial impacts, Indigenous health policy is influenced to a far greater extent by qualitative measures. [29] Focusing on consultative dialogue and furthering policy-makers' understanding of Indigenous health behaviours, beliefs and expectations will continue to see improvements in health and mutual cooperation.

Future research efforts should focus on underlying cultural and traditional input into healthcare in indigenous communities.

Despite a lack of quality research relating to Indigenous respiratory disease, there are many environmental antecedents which can be

improved. Bridging the gap in all areas of disadvantage in Indigenous populations will continue to be an on-going challenge for authorities around Australia. [7]

Conflicts of Interest

None declared.

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