

## The global decline in asthma death rates: can we relax now?

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Whilst global asthma mortality seems to be decreasing, childhood asthma incidence is rising, and early warnings from Australia show an increase in asthma-related deaths in under-15s; this article considers whether we should view the future impact of asthma with trepidation. Age-adjusted mortality statistics for asthma have been reevaluated to provide an international standard. Comparisons across regions and time are complex, yet over the last two decades asthma mortality has clearly decreased, coinciding with a significant change in asthma management. The majority of remaining asthma deaths are preventable.

Nonetheless, ongoing vigilance is required. Asthma remains under-diagnosed and under-treated. Childhood asthma has become more common; it is a matter of debate whether it is also more severe. Rather than being encouraged by the fall in numbers of asthma deaths, we should focus on the surging numbers of children suffering from the disease - and the worrying increase in asthma death rates in Australian children - and work to avert future issues.

**Key words:** Asthma mortality; Asthma incidence; Asthma clinical trials

### INTRODUCTION

Complacency against the backdrop of falling asthma mortality would be a grave error. The deaths that do occur - and which remain tragic and unnecessary - take place mostly in low and lower-middle income countries. In the US, African Americans still have higher rates of asthma emergency room visits, hospitalizations and deaths than Caucasians. For Hispanics the

statistics are even worse, with Puerto Ricans suffering an asthma rate 50% higher than non-Hispanic black people. There are also important early warning signs from Australia, which has high asthma prevalence and death rates by international standards, and is recording a disturbing rise in asthma-related deaths among under-15s. Given the continuing increase in childhood asthma, this is sufficient to fuel a sense of trepidation for the future impact of this disabling disease.

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## RECALCULATION OF ASTHMA DEATHS: IMPACT ON TRENDS

Over the last decade, age adjusted mortality statistics in asthma have been reevaluated employing the 2000 population numbers instead of the previously used 1940 population [1]. As a result, all government agencies are now able to use the same standard, knowing that the statistics are not out of date [2]. Most lung diseases increase with age. Accordingly, death rate calculations would likely be increased using the new standard. Indeed, age-adjusted death rates for asthma were approximately 1.5 times greater using the standard 2000 population than those based on the 1940 population.

Yet another factor that has complicated the recalculation of asthma deaths in the past has been the revision of the International Classification of Diseases (ICD) coding system in classifying mortality data from death certificates. When ICD-9 was changed to ICD-10, the deaths from asthma indicated an 11% decrease in assignment [3].

In the 1980s, there was, by any standard, a high death rate from asthma in Australia and New Zealand, probably the highest in the world according to published data in the literature at that time. In 1989, the standardized mortality rate for asthma reached 5.8/100,000/yr in Australia [4]. A number of case-control and cohort studies pointed the finger of blame at preventable factors such as inadequate assessment of severity, discontinuity of medical care, poor adherence to prescribed therapy and inadequate treatment of acute attacks [5-8]. The Australasian literature specifically mentioned over-use of beta-agonist bronchodilators and there were attempts to have at least one of the newer drugs removed from the market [9]. In an evaluation of risk of death and near death from asthma in North America, it was concluded that underuse of preventative, anti-inflammatory therapy was more to blame than over-use of any specific beta-agonist [10].

## DECREASING MORTALITY DESPITE INCREASING INCIDENCE

While comparisons between regions and across time are complex, it is clear that over the last two decades, mortality and hospitalizations from asthma have decreased [11]. Ironically, over the same time period, the burden of asthma in North America has increased. In 2001, 4,269 people in the US died of asthma, over

65% of these deaths occurring in women. The age adjusted death rate was 1.5 per 100,000, a dramatic difference from that being experienced in Australia in the 1980s [4, 12].

The 'epidemic' of asthma deaths in the 1980s can now be attributed at least in part, to inadequate management of the disease and less-than-satisfactory compliance with prescribed treatment. Until the year 2000, in the US, the rate of age-adjusted mortality for asthma increased steadily from 0.93 per 100,000 in 1979 to 1.49 per 100,000 in 1995. The age-adjusted rate among females was higher than that in males and among African Americans was higher than in whites. So what's the good news?

## REDUCTION IN MORTALITY CORRELATED WITH CHANGES IN ASTHMA MANAGEMENT

The American Lung Association (2012) recently issued a report from its Epidemiology and Statistics Unit on trends in Asthma mortality and morbidity. In 2009, the 3,388 people who tragically died from asthma represented a 26% decrease over a 10-year period. At last, after a long period of steady increase, asthma mortality seems to be decreasing. In New York City, for example, the number of deaths from asthma fell from 213 to 149 over an eight year period. The age-adjusted rate fell from 2.7 to 1.7 per 100,000 over the same time. The overall decrease in asthma mortality seemed to be driven by the older population and coincided with an increase in use of inhaled corticosteroids. While it is not possible to prove that inhaled corticosteroids is the sole explanation responsible for the decreased mortality rate, the fact remains that there is a correlation between a significant reduction in asthma mortality and a significant change in asthma management. The Royal College of Physicians, in partnership with Asthma UK state categorically that 90% of asthma deaths in the UK, currently at a rate of three every day, are preventable.

In view of the encouraging statistics concerning asthma mortality, can we now relax our vigilance in the expectation that things are only going to get better? Nothing could be further from the truth. To become complacent now would be a grave error.

## "TRAGIC AND UNNECESSARY" DEATHS CONTINUE

According to the Centers for Disease Control and Prevention, an

estimated 25.7 million people in the US alone, including 7.1 million children have asthma [12]. The World Health Organization reports that 235 million people currently suffer from asthma, such that the condition has become the most common chronic disease among children [13-16]. Asthma deaths might be falling, but they remain tragic and unnecessary. Most occur in low and lower-middle income countries. As noted in the Introduction, there continue to be ethnic disparities in asthma statistics in the US. Compared with Caucasians, African Americans have higher rates of asthma emergency room visits, hospitalizations and deaths. The statistics are even more concerning among Hispanics, with Puerto Ricans suffering an asthma rate 50% higher than non-Hispanic black people. The mantra has remained unchanged for at least three decades: *Asthma is under-diagnosed and under-treated* [17].

But there is even worse news to come. It would be foolhardy in the extreme to ignore the early warnings from Australia, where prevalence and death rates are high by international standards.

### Early warning from Australia: disturbing rise in under-15 asthma deaths

The latest Australian Bureau of Statistics data released show an *increase* in asthma-related deaths among children under the age of 15. This is deeply disturbing news. While overall asthma deaths in the country continue to decline, for the first time, asthma deaths among children have increased, specifically: 17 deaths in 2010 compared with 7 in 2006. The question that must be addressed is whether doctors and parents have become less vigilant, or whether childhood asthma has become more severe. Are they lulled into a false sense of security because of the notoriously poor correlation between lung function and symptoms in children with asthma?

Beyond doubt, childhood asthma has become more common. According to the American Academy of Allergy, Asthma and Immunology, the overall number of people with asthma continues to grow, with approximately 8% of the population now having asthma. One in ten children in the US suffer from asthma, boys being more likely than girls to have the condition. The rate is rising more rapidly in preschool aged children than in any other group. Over the past twelve years, 5-7 year olds have had the highest asthma attack prevalence rates, while those over 65 have had the lowest rates.

As to whether there has been an increase in asthma severity in children in addition to the documented increase in prevalence, severity assessment in clinical practice is difficult. The choice

of medication is typically based on frequency of attacks and response to current therapy, rather than the more objective pulmonary function test and bronchial reactivity. The International Study of Asthma and Allergies in Childhood (ISAAC) measured asthma, rhinitis and eczema prevalence in two million children in 105 countries (a Guinness World Records for any collaborative research project in children). Surprisingly, the study showed little evidence of genetic factors in asthma. Furthermore, most asthma, rhinitis and eczema were found to have a non-allergic basis, especially in developing countries. There was clear evidence that in developing countries asthma and allergic diseases were increasing. Notwithstanding the 340 articles in over 100 journals that were produced by the ISAAC collaborators, it remains a matter of debate as to whether childhood asthma is more severe as well as more common than it was. Assessment of severity has been complicated by racial, socio-economic and ethnic factors. For example, Black and Hispanic children had similar acute asthma severity and Emergency Room course, but there were disconcerting differences in outpatient prescription practices [18-20].

### Complexity of pediatric asthma drives clinical trial interest

These complex issues regarding asthma in children have not escaped the attention of researchers. Currently the US National Institutes of Health website lists 3,816 asthma trials. Among these studies, those classified as being in children, infants and pediatric comprise 53.6%.

Should we be encouraged by the fall in numbers of asthma deaths, or should we look at the surges in numbers of children suffering from asthma with a sense of trepidation as to what the future holds? The latter seems more likely.

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