Deaths from childhood asthma, 2004–2013: what lessons can we learn?

New South Wales data highlight areas for improvement in asthma management

The *NSW Child Death Review Team annual report 2013* included an analysis of deaths from asthma during the 10-year period 2004–2013.[1] A total of 20 children, aged up to 17 years, died from asthma in New South Wales. While this death rate was low, and therefore the findings need to be interpreted cautiously, lessons from the analysis can be extrapolated to help reduce morbidity and mortality associated with asthma in children. The main findings were:

- deaths from asthma among children were rare, and more common in older children
- there has been a recent increase in deaths, the cause of which is not clear
- risk factors include low socioeconomic status, psychosocial problems, and Asian and Pacific Islander backgrounds
- all the children who died had been diagnosed with asthma; most had persistent asthma and were atopic; seven had a history of food allergy (five confirmed on skin prick testing); and three had a history of anaphylaxis and had been prescribed or had used an adrenaline autoinjector
- younger children were more likely to be hospitalised and less likely to die, and older children were less likely to be hospitalised and more likely to die
- three-quarters of those who died had been hospitalised in the previous 5 years and 11 had been hospitalised in the year before their death, of whom eight did not receive follow-up care
- all those who died had seen a general practitioner about their asthma, but regular review was uncommon (most just saw a GP when they were unwell) and only eight of those who died had seen a specialist
- two-thirds of those who died had been given a written asthma action plan and about half had one developed in the year before death
- written asthma action plans were on the school files of half (seven) of the children who were attending school and five of these were developed in the year before death
- most of those who died had been prescribed reliever and preventer medication (19); most were using inhaled corticosteroids (ICSs) (17); and 15 of those who were using ICSs were also using a long-acting β-agonist (LABA) and/or an oral corticosteroid (13 and five, respectively)
- the records of nine children who died indicated that asthma medications were not being used as recommended (intermittent preventer use in eight cases, irregular reliever use in one case)
- for most of those who died (17), factors that may have increased risk of death were identified; these included: suboptimal asthma control, presentation or admission to hospital in the year before death, poor follow-up care, poor adherence to medication or written asthma action plan, lack of written asthma action plan, and exposure to tobacco smoke.

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Possible adverse effects of therapy

One concerning matter that was identified was the large number of children who had been prescribed ICS–LABA combination therapy. While this may have reflected asthma severity, just under half of the children were using their preventer therapy intermittently, which is suboptimal. Concerns about inappropriate prescribing of ICS–LABA combination therapy as first-line preventer therapy (also often used intermittently) prompted the recent Pharmaceutical Benefits Advisory Committee Post-market Review of Pharmaceutical Benefits Scheme Medicines Used to Treat Asthma in Children (http://www.pbs.gov.au/info/reviews/asthma-children-reviews). This review confirmed the ongoing inappropriate use of ICS–LABA combination therapy as well as the lack of evidence of efficacy and potential adverse effects (increased exacerbation risk,[2,3] loss of bronchoprotection against exercise-induced asthma and loss of efficacy of short-acting β-agonists [SABAs][4]) of LABAs in children.

A recent study has also highlighted the possibility that a particular polymorphism in the β receptor gene (homozygous for arginine at codon 16) may

predispose patients to these adverse effects.[5] Thus, LABA use in the children who died from asthma may have, theoretically, put these children at risk of severe exacerbation and reduced the efficacy of SABAs during acute episodes of wheezing. It might, therefore, explain the increase in asthma deaths seen in recent years. It might also be responsible for increases in exacerbations and episodes of exercise-induced asthma in children who are taking LABAs, particularly those who may be genetically predisposed to adverse effects.

Recommendations

The recently revised National Asthma Council Australia *Australian asthma handbook* highlights the importance of a stepwise approach to asthma management in children and emphasises that ICS–LABA combination therapy should not be used as first-line preventer therapy in children. Instead, LABA add-on therapy should be reserved as one of the three possible options for step-up treatment in children with persistent asthma who continue to have poor asthma control despite low-dose ICS treatment. The other two possible options for step-up treatment are montelukast add-on therapy and increased ICS dose. Each of these step-up options may be a potential optimal approach in different patients.[6]

ICS–LABA combination therapy should not be used as first-line preventer therapy in children

The handbook also recommends that because of lack of evidence of efficacy and safety in preschool children, LABAs should not be used in children 5 years or younger.[6] This recommendation is also included in the recently revised Global Initiative for Asthma guidelines.[7]

Another recommendation in the *Australian asthma handbook* is to consider specialist review for children requiring step-up treatment, particularly those with ongoing poor asthma control.[6] Although the children who died from asthma met this criterion, fewer than half had seen a specialist for review of their asthma. In addition, regular asthma reviews and follow-up care after hospital admission for asthma were uncommon. This probably reflects general non-adherence to asthma management guidelines for children, which could result in unnecessary morbidity.

It is pertinent to also highlight that the risk factors identified in the children who died from asthma (namely suboptimal asthma control, presentation or admission to hospital in the year before death, poor adherence to medication or written asthma action plan and lack of written asthma action plan) predict future asthma risk and therefore ongoing asthma morbidity. The three most common reasons for poor asthma control are misdiagnosis, poor adherence to medication and poor inhaler technique.[6] While inhaler technique could not be checked in the review of asthma deaths, poor adherence to medication or written asthma action plan and lack of written asthma action plan were identified as risk factors in the children who died from asthma.

The *Australian asthma handbook* also recommends education about asthma medication, inhaler technique, preventing symptoms, managing acute episodes, self-monitoring and asthma control, as well as regular reviews and a written asthma action plan to help the patient and/or caregiver recognise and manage acute asthma episodes.[6] There is also evidence to support the benefit of providing a written asthma action plan in paediatric emergency settings.[8]

Innovative strategies

Innovative educational strategies aimed at primary health care have been shown to improve asthma outcomes in children. A randomised controlled trial of the Practitioner Asthma Communication and Education (PACE) Australia program showed increased use of written asthma action plans by GPs, more appropriate evidence-based management of childhood asthma, and a higher rate of spacer prescription.[9] The National Asthma Council Australia now has funding for wider dissemination of the PACE Australia program through GP networks.

Giving Asthma Support to Patients (GASP) is an online tool that was developed in New Zealand to provide asthma education at point of care and to provide primary health care professionals with the skills and knowledge they need to undertake a structured asthma assessment.[10] For a retrospective cohort of patients aged 5–64 years, use of GASP resulted in decreased risk of exacerbation, hospital admission and emergency department presentation, decreased requirement for oral corticosteroids and less reliance on bronchodilators.[10] Asthma Foundation NSW is in the process of producing an Australian version of GASP, consistent with Australian recommendations, which will be piloted in general practices.

Conclusion

Findings from the review of asthma deaths in NSW can help optimise management of childhood asthma and therefore improve outcomes. Guidelines for asthma management are not being adhered to and inappropriate prescribing of ICS–LABA combination therapy may be putting children at unnecessary risk of adverse effects. Innovative educational strategies such as PACE Australia and GASP are important for promoting asthma management guidelines and reducing asthma morbidity and mortality in children.

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