paediatric Watch
Lessons from the frontline
Edition 3/2023

Asthma in adolescents

An ambulance was called for a 13-year-old adolescent with difficulty breathing and a history of asthma. Paramedics arrived at the house to find the adolescent being carried out by an older brother. On assessment he was in obvious respiratory distress, pale and breathless. He had an audible wheeze, increased respiratory rate and was speaking in phrases. It was discovered that he had also run out of preventer and reliever inhalers. He was administered Atrovent and Salbutamol via a nebuliser and nasal prong oxygen which improved his low oxygen saturations and work of breathing. He arrived at the Emergency Department approximately 20:00.

A verbal handover between paramedics and Emergency Department staff occurred however it was interrupted resulting in a fragmented handover of communication where key information was lost. It was reported that staff in emergency did not see the ambulance documentation, nor was it kept with the patient's clinical record. A copy of the ambulance documentation was later made available to the team reviewing the case. It described the adolescent's condition as being more severe than those assessments documented in the Emergency Department.

On arrival the adolescent had an audible wheeze with increased work of breathing. Oxygen saturations were 90% in room air however improved to 99% with oxygen via a Hudson mask (3L/min). It was noted the adolescent had run out of Salbutamol at home. By approximately 22:30 the adolescent had no respiratory distress or work of breathing and was saturating well in room air.

Following review by the medical team, it was discovered the adolescent had poor adherence with regular preventative medication and had poor inhaler technique. It was reported that while the adolescent had no history of previous admissions with exacerbations of asthma, he recently had regular daily exacerbations of asthma in the evenings.

Four hours post initial Salbutamol therapy the adolescent had improved, was speaking in full sentences, and had no increased work of breathing. On auscultation there was a 'diffuse coarse wheeze'. Salbutamol 'burst therapy' was commenced at 00:00. The plan was to stretch to three hourly Salbutamol and discharge with outpatient follow up. The adolescent had no wheeze on auscultation and his vital signs were 'Between the Flags' at 02:04 and at 03:57. A registrar reviewed the adolescent at approximately 04:00 and was 'cleared for discharge' home with the father.

The diagnosis on discharge was 'exacerbation of **mild-moderate** asthma'. An asthma action plan was provided to the father, including education on the use of preventers and spacer technique. The father was given two Salbutamol inhalers to take home. As part of the investigation, it was understood there were psychosocial issues that could have been explored further regarding access to the preventer medication in the context of the adolescent 's regular exacerbations of asthma in the evenings.

That afternoon at approximately 17:00, a 000-Emergency call was made from the family's home address reporting the adolescent was having trouble breathing, however was conscious. When the paramedics arrived on scene the adolescent was receiving cardiopulmonary resuscitation. He was intubated and transferred to the closest Emergency Department in asystole. Despite the efforts of emergency staff, the Newborn and Paediatric Emergency Transport Service, and the tertiary referral hospital team, the adolescent died the following day.

Lessons:

The National Review of Asthma Deaths in the UK found that in almost all paediatric cases, there were significant avoidable contributing factors and that the deaths may have been preventable.

When the paramedics arrived at the house on the first visit, they described an adolescent with an audible wheeze, tachypnoea, tachycardia, decreased oxygen saturations, and inability to speak in full sentences. As per The Paediatric Improvement Collaborative Clinical Practice Guideline for Acute Asthma these symptoms are indicative of **moderate to severe** exacerbation of asthma, rather than **mild to moderate**, as initially determined in this case. The adolescent 's management of asthma in the Emergency Department however was deemed to be appropriate based on the adolescent's assessment and observations which aligned with a diagnosis of **mild to moderate** exacerbation of asthma.

Wheeze

Wheeze is a poor predictor of severity of asthma. The absence of wheeze in an asthmatic may indicate either improvement of the bronchoconstriction or severe, widespread airflow obstruction. The latter suggests that the airflow rates are too low to generate a wheeze, or the viscous mucus is obstructing large regions of the peripheral airways.

Red flags & Risk factors

Red flags for adolescents at high-risk for exacerbations of asthma include those with poor asthma control, and/or adherence with medication, under-recognition of symptoms, psychosocial stressors, risk-taking behaviours, and communication barriers. Nonadherence to asthma medications is a well-known problem in the adolescent age group. This is often further complicated by risk-taking behaviours such as smoking, vaping, and other substance use. These can lead to unexpected exacerbations and complications. Special consideration should be given to managing asthma in adolescents due to an increased risk of death.

Recommendations

Communication & Handover

A breakdown in both verbal and written communication between paramedics and staff in the Emergency Department contributed to the under appreciation of the severity of the adolescent 's exacerbation and management. It is important to be aware of underplaying the assessment and history provided by parents or another clinician. In the Emergency Department setting, this may include seeking out the ambulance record and speaking to people who were present at the time. On the ward this may involve verifying the 'story' with a general practitioner or paramedic where relevant as part of the history on admission. This led to a missed opportunity to admit the adolescent overnight for observation and administration of an oral steroid.

Steroids

The Paediatric Improvement Collaborative Clinical Practice Guideline for Acute Asthma recommends the use of oral prednisolone for severe symptoms (agitated distressed; moderate-marked increased work of breathing, accessory muscle use/recession; tachycardia; marked limitation of ability to talk). If the adolescent is vomiting, intravenous Methylprednisolone or Hydrocortisone is recommended.

Oral prednisolone should be 'considered' in those with **mild or moderate** asthma.

Communication with families on discharge

Educating families and carers prior to discharge is a crucial step in empowering them to care for their adolescent at home. It plays a vital role in reducing preventable re-presentations and readmission to hospital and can lead to improved parent and patient outcomes. The 'Teach back' method is a comprehensive, evidence-based strategy which can empower staff to verify understanding, correct inaccurate information, and reinforce teaching with patients and their families and carers. It involves asking patients, families, and carers to repeat back information you have told them in their own words. This often includes important information to manage their adolescent at home. This may include verbal and written information (particularly standardised fact sheets) as well as demonstrating a procedure such as giving salbutamol via a spacer. Examples of this may include:

"Just to confirm you understand your child's discharge plan, can you repeat to me what you have learnt"

"I just want to make sure I have explained everything clearly. Can you tell me the signs that would indicate the need to bring your child back to hospital?"

The Clinical Excellence Commission has developed a short video demonstrating the 'Teach Back' method and the IDEAL Discharge Tool.

References

Palit V. et al. (2020) 'Asthma in adolescents Often overlooked, not to be forgotten', *Medicine Today,* 21(10): 12-19

The Royal Children's Hospital Melbourne (2020) *Acute Asthma*, Clinical Practice Guidelines website, accessed March 2023.

Asthma Australia (2021) *Youth Asthma 12-24 years*, Asthma Australia website, accessed March 2023.

Levy M. (2015) 'The national review of asthma deaths: what did we learn and what needs to change?', *Breathe (Sheff)*, 11(1): 14–24