Management of an Acute Asthma Attack in Adults (aged 16 years and older)

National Clinical Guideline No. 14

Summary

November 2015
Guideline Development Group
The National Clinical Guideline on Management of an Acute Asthma Attack in Adults was developed by a sub-group of the National Clinical Programme for Asthma (NCPA). The Guideline Development Group was chaired by Professor Pat Manning.

Using this National Clinical Guideline
The aim of this guideline is to assist health care professionals in all healthcare settings, (prehospital services, primary care and secondary care including Emergency Department/ Acute Medical Unit and specialist services including maternity, mental health, disability and specialised orthopaedic centres) in assessing and making decisions on the management of acute asthma in adults and to assist policy makers and those planning acute services for adult asthma patients.

The National Clinical Programmes including the National Clinical Programme for Asthma (NCPA) were set up through the HSE’s Clinical Strategy and Programmes Division with the aim of delivering better care and outcomes through the best use of resources, delivered through standardised care pathways and models of care for the patient journey throughout the national health system. The Programmes are focused on transforming the way care is delivered in Ireland, with the overarching aim of improving the quality and safety of patient care. The National Clinical Programmes have a direct impact on the patient experience and are improving care in a number of ways through defining the patient journey and this includes the development and dissemination of clinical evidenced-based guidelines to standardise and improve treatment. The development and dissemination of this Guideline on the Management of an Acute Asthma Attack in Adults is in line with this policy. This guideline provides recommendations based on current evidence for best practice in the management of an asthma attack in adults including pregnant women.

This Guideline Summary should be read in conjunction with the full version National Clinical Guideline.
The full National Clinical Guideline and Summary versions are available at: www.health.gov.ie/patient-safety/ncec

The complete list of references can be found in the full version of the National Clinical Guideline.

Reference of National Clinical Guideline
National Clinical Guideline No. 14 should be referenced as follows:
Department of Health – Management of an Acute Asthma Attack in Adults
November 2015. ISSN 2009-6267.

Disclaimer
This guideline is not intended to be construed or to serve as a standard of care. Standards of care are determined on the basis of all clinical data available for an individual case and are subject to change as scientific knowledge and technology advance and patterns of care evolve. Adherence to guideline recommendations will not ensure a successful outcome in every case, nor should they be construed as including all proper methods of care or excluding other acceptable methods of care aimed at the same results. The ultimate judgment must be made by the appropriate healthcare professional(s) responsible for clinical decisions regarding a particular clinical procedure or treatment plan. This judgment should only be arrived at following discussion of the options with the patient, covering the diagnostic and treatment choices available. It is advised, however, that significant departures from the national guideline should be fully documented in the patient’s case notes at the time the relevant decision is taken.
National Clinical Effectiveness Committee (NCEC)

The National Clinical Effectiveness Committee (NCEC) was established as part of the Patient Safety First Initiative. The NCEC is a partnership between key stakeholders in patient safety. NCEC’s mission is to provide a framework for national endorsement of clinical guidelines and audit to optimise patient and service user care. The NCEC has a remit to establish and implement processes for the prioritisation and quality assurance of clinical guidelines and clinical audit so as to recommend them to the Minister for Health to become part of a suite of National Clinical Guidelines and National Clinical Audit.

The aim of the suite of National Clinical Guidelines is to provide guidance and standards for improving the quality, safety and cost-effectiveness of healthcare in Ireland. The implementation of these National Clinical Guidelines will support the provision of evidence-based and consistent care across Irish healthcare services.

NCEC Terms of Reference

1. Provide strategic leadership for the national clinical effectiveness agenda.
2. Contribute to national patient safety and quality improvement agendas.
9. Establish sub-committees for NCEC work streams.

Information on the NCEC and endorsed National Clinical Guidelines is available at: www.health.gov.ie/patient-safety/ncec
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Definition and impact of acute asthma

1.1 Need for a National Clinical Guideline

There are no grounds for complacency regarding asthma in the Republic of Ireland, as we have one of the highest rates of asthma prevalence in the world. It is a chronic medical condition, which for many patients, begins in childhood, and is thus life-long. A great number of patients live and work without being free of regular asthma symptoms, due primarily to having uncontrolled disease, even despite the availability of well-constructed international evidence-based guidelines and excellent, accessible and safe medicines. Uncontrolled asthma leads to poor quality of life for many of these patients as well as their families and caregivers. It is a condition often associated with increased cost due to out of hours GP visits, emergency department visits, and hospitalisation for acute asthma attacks as well as the associated loss of time from work and school.

The National Clinical Programme for Asthma (NCPA) was set up to design and standardise the delivery of high quality asthma care to all who need it. The NCPA also focuses on improving asthma control in the community, reducing acute asthma attendances at emergency departments, in-patient admissions and needless deaths from asthma. A specific priority solution to help manage patients with acute asthma attacks has been the development of this national evidence based guideline by the NCPA, the full version of which can be found at www.health.gov.ie/patient-safety/ncec.

1.2 Clinical impact of acute asthma

Figure 1 Asthma Epidemiology – based on 2011 data
1.2.1 Current levels of asthma in Ireland
Asthma is a high prevalence disease in the Republic of Ireland with nearly 460,000 people estimated to have been diagnosed with asthma and nearly a quarter of a million may have asthma that is not controlled. About 50,000 patients are estimated to use the GP out-of-hours service for the treatment of acute asthma in a year. Over 19,000 people visit Emergency Departments annually with acute asthma and over 5,000 patients are admitted to hospital. Of these about 100 are so severely ill that they are admitted to an intensive care unit.

1.2.2 Asthma deaths
About one person dies from asthma every week in Ireland.
Confidential enquiries into asthma deaths or near fatal asthma attacks from the UK and Ireland have identified a number of factors which contribute to an asthma death. Most deaths from asthma occur before admission to hospital, and usually occur in patients who have chronic asthma, who are on inadequate inhaled corticosteroid therapy with increased reliance on inhaled $\beta_2$ agonists. There is generally poor perception by the patient or physician caring for the patient of the overall severity of the asthma attack. In addition, inadequate management in the acute event including using sedation in some cases are also factors linked to asthma deaths. Deaths from asthma, while uncommon, are generally preventable and occur usually in association with an acute attack. Although most of these patients have chronically severe asthma, in a minority the fatal attack has occurred suddenly in a patient with mild or moderately severe background disease. Most asthma deaths occur before admission to hospital. Many deaths occur due to patients receiving inadequate treatment with inhaled steroids or steroid tablets and/or inadequate objective monitoring of their asthma, where follow-up was inadequate in some and others should have been referred earlier for specialist advice.

1.3 Scope of National Clinical Guideline, target population and target audience
The National Clinical Guideline for the Management of an Acute Asthma Attack in Adults are for the management of acute adult asthma attack in all care settings including primary and secondary care and specialist centres. The guideline considers all adult patients (>16 years) with a diagnosis of asthma.

The guideline does not cover patients whose primary respiratory diagnosis is not asthma, for example those with chronic obstructive pulmonary disease (COPD) or cystic fibrosis (CF), although these patients may also have asthma and the principals outlined in these guidelines may also apply to the management of their asthma component symptoms.

The scope of the recommendations set out in the guideline does not extend to children or youth populations, or difficult/severe but stable asthma. Nor do the recommendations relate to specific settings, such as primary care, and/or populations, such as pregnant women, unless the recommendations refer to the management of an acute asthma attack in such settings/populations.

There are separate Acute Paediatric Asthma Guidelines which have been developed by the National Clinical Programme for Asthma.
The recommendations set out in this National Clinical Guideline seek to address the following clinical questions:

**Figure 2 Clinical questions**

<table>
<thead>
<tr>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is best practice management of patients with an acute asthma attack in primary care?</td>
</tr>
<tr>
<td>What are the criteria for referral to the Emergency Department for a patient with an acute asthma attack?</td>
</tr>
<tr>
<td>What are the hospital admission criteria with an acute asthma attack?</td>
</tr>
<tr>
<td>What are the signs to distinguish the severity of an asthma attack?</td>
</tr>
<tr>
<td>What are the key components of an objective assessment of an attack in the adult asthma patient?</td>
</tr>
<tr>
<td>What is the best practice treatment of the adult asthma patient during an acute attack?</td>
</tr>
<tr>
<td>What is best practice management of an acute asthma attack in pregnancy?</td>
</tr>
<tr>
<td>What discharge and follow-up planning is required for patients with an acute asthma attack?</td>
</tr>
<tr>
<td>What role can patient education play in asthma management following an acute attack?</td>
</tr>
<tr>
<td>What should the follow up process be after an attack?</td>
</tr>
</tbody>
</table>

### 1.4 Grading of recommendations

The National Clinical Guideline for the Management of an Acute Asthma Attack in Adults is an evidence-based clinical practice guideline, based on the highest quality scientific evidence available, is a systemically developed statement containing recommendations for healthcare professions on the care of individuals with asthma. Guidelines are not intended to replace the healthcare professional’s expertise or experience but are a tool to assist practitioners in their clinical decision-making process, with consideration for their patient’s preferences.

To assist the reader of the guideline, the key to the grading of evidence and recommendations is as follows:

**Levels of evidence**

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1+++</td>
<td>High quality meta-analyses, systematic reviews of RCTs, or RCTs with a very low risk of bias</td>
</tr>
<tr>
<td>1+</td>
<td>Well conducted meta-analyses, systematic reviews, or RCTs with a low risk of bias</td>
</tr>
<tr>
<td>1-</td>
<td>Meta-analyses, systematic reviews, or RCTs with a high risk of bias</td>
</tr>
<tr>
<td>2++</td>
<td>High quality systematic reviews of case control or cohort studies</td>
</tr>
<tr>
<td></td>
<td>High quality case control or cohort studies with a very low risk of confounding or bias and a high probability that the relationship is causal</td>
</tr>
<tr>
<td>2+</td>
<td>Well conducted case control or cohort studies with a low risk of confounding or bias and a moderate probability that the relationship is causal</td>
</tr>
<tr>
<td>2</td>
<td>Case control or cohort studies with a high risk of confounding or bias and a significant risk that the relationship is not causal</td>
</tr>
<tr>
<td>3</td>
<td>Non-analytic studies, eg case reports, case series</td>
</tr>
<tr>
<td>4</td>
<td>Expert opinion</td>
</tr>
</tbody>
</table>
## Grades of recommendation

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
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<tbody>
<tr>
<td>A</td>
<td>At least one meta-analysis, systematic review, or RCT rated as 1++, and directly applicable to the target population; or body of evidence consisting principally of studies rated as 1+, directly applicable to the target population, and demonstrating overall consistency of results</td>
</tr>
<tr>
<td>B</td>
<td>A body of evidence including studies rated as 2++, directly applicable to the target population, and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 1++ or 1+</td>
</tr>
<tr>
<td>C</td>
<td>A body of evidence including studies rated as 2+, directly applicable to the target population and demonstrating overall consistency of results; or Extrapolated evidence from studies rated as 2++</td>
</tr>
<tr>
<td>D</td>
<td>Evidence level 3 or 4; or Extrapolated evidence from studies rated as 2+</td>
</tr>
</tbody>
</table>

## Good practice points

√ Recommended best practice based on the clinical experience of the guideline development group

## Grading of evidence and recommendations

Recommendations within this guideline are based on the best clinical evidence.
2. National Clinical Guideline recommendations

2.1 Summary of national recommendations

The CEO/General Manager, the Clinical Director and the Director of Nursing of the hospital have corporate responsibility for the implementation of the recommendations in the National Clinical Guideline. Each member of the multidisciplinary team is responsible for the implementation of the individual guideline recommendations relevant to their discipline.

### Risk Factors for Developing Fatal Asthma

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>1. Healthcare professionals must be aware that patients who present with a severe asthma attack and one or more adverse psychosocial factors are at risk of death.</td>
</tr>
</tbody>
</table>

### Management of Acute Asthma in Adults

#### Hospital Referral/Admission

<table>
<thead>
<tr>
<th>Grade</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>2. Clinicians in primary and secondary care should treat asthma attacks according to recommended guideline.</td>
</tr>
<tr>
<td>B</td>
<td>3. Refer patients to hospital who display any features of acute severe or life threatening asthma.</td>
</tr>
<tr>
<td>B</td>
<td>4. Admit patients to hospital with any feature of a life threatening or near fatal attack.</td>
</tr>
<tr>
<td>B</td>
<td>5. Admit patients to hospital with any feature of a severe attack persisting after initial treatment.</td>
</tr>
<tr>
<td>C</td>
<td>6. Admit patients to hospital whose peak flow is less than 75% best or predicted after initial treatment.</td>
</tr>
</tbody>
</table>
| C     | 7. Patients whose peak flow is greater than 75% best or predicted one hour after initial treatment may be discharged from ED unless they meet any of the following criteria, when admission may be appropriate:  
  • still have significant symptoms  
  • concerns about adherence  
  • living alone/socially isolated  
  • psychological problems  
  • physical disability or learning difficulties  
  • previous near-fatal asthma attack  
  • asthma attack despite adequate dose steroid tablets pre-presentation  
  • presentation at night  
  • pregnancy. |
### Treatment of Acute Asthma

<table>
<thead>
<tr>
<th>OXYGEN</th>
<th>( \beta_2 ) Agonist Bronchodilators</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>8. Give supplementary oxygen to all hypoxaemic patients with acute asthma to maintain an ( \text{SpO}_2 ) level of 94-98%. Lack of pulse oximetry should not prevent the use of oxygen.</td>
</tr>
<tr>
<td>A</td>
<td>9. In hospital, ambulance and primary care, nebulised ( \beta_2 ) agonist bronchodilators should be driven by oxygen.</td>
</tr>
<tr>
<td>C</td>
<td>10. The absence of supplemental oxygen should not prevent nebulised ( \beta_2 ) agonist therapy being given if indicated.</td>
</tr>
<tr>
<td>A</td>
<td>11. Adults with mild and moderate attacks of asthma should be treated by pMDI + spacer with doses titrated according to clinical response.</td>
</tr>
<tr>
<td>A</td>
<td>12. In hospital, ambulance and primary care, nebulised ( \beta_2 ) agonist bronchodilators should preferably be driven by oxygen.</td>
</tr>
<tr>
<td>A</td>
<td>13. Consider continuous nebulisation in patients with severe asthma who respond poorly to an initial bolus dose of ( \beta_2 ) agonist, using an appropriate nebulizer.</td>
</tr>
<tr>
<td>A</td>
<td>14. In acute asthma with life threatening features the nebulised route (oxygen-driven) is recommended.</td>
</tr>
<tr>
<td>A</td>
<td>15. Use high dose inhaled ( \beta_2 ) agonists as first line agents in acute asthma and administer as early as possible. Reserve intravenous ( \beta_2 ) agonists for those patients in whom inhaled therapy cannot be used reliably.</td>
</tr>
</tbody>
</table>

### Steroid Therapy

<table>
<thead>
<tr>
<th>Ipratropium Bromide</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 16. Give steroids in adequate doses in all cases of acute asthma.</td>
</tr>
<tr>
<td>✓ Continue oral prednisolone 40mg daily for at least 5 days or until recovery.</td>
</tr>
<tr>
<td>B 17. Add nebulised ipratropium bromide (0.5 mg 4-6 hourly) to ( \beta_2 ) agonist treatment for patients with acute severe or life threatening asthma or those with a poor initial response to ( \beta_2 ) agonist therapy.</td>
</tr>
</tbody>
</table>

### IV magnesium, antibiotic use, Heliox

<p>| |</p>
<table>
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<tbody>
<tr>
<td>B 18. Consider giving a single dose of IV magnesium sulphate for patients with:</td>
</tr>
<tr>
<td>• Acute severe asthma who have not had a good initial response to inhaled bronchodilator therapy</td>
</tr>
<tr>
<td>• Life threatening or near fatal asthma.</td>
</tr>
<tr>
<td>✓ IV Magnesium sulphate (1.2 - 2g IV infusion over 20 minutes) should only be used following consultation with senior medical staff.</td>
</tr>
<tr>
<td>B 19. Routine prescription of antibiotics is not indicated for patients with acute asthma.</td>
</tr>
<tr>
<td>B 20. Heliox is not recommended for use in acute asthma outside a clinical trial setting.</td>
</tr>
</tbody>
</table>
Referral/Admission to the Intensive Care Unit (ICU) for Acute Asthma

B 21. Refer any patient:
- Requiring ventilator support
- With acute severe or life threatening asthma, failing to respond to therapy, evidenced by:
  - Deteriorating PEF
  - Persisting or worsening hypoxia
  - Hypercapnea
  - ABG analysis showing ↓ pH or ↑ H⁺
  - Exhaustion, feeble respiration
  - Drowsiness, confusion, altered conscious state
  - Respiratory arrest.

C 22. All patients transferred to intensive care units should be accompanied by a doctor suitably equipped and skilled to intubate if necessary.

✓ Patients with acute asthma should not be sedated unless this is to allow anaesthetic or intensive care procedures.

Acute Asthma in Pregnancy

C 23. Give drug therapy for acute asthma as for the non-pregnant patient including systemic steroids and magnesium sulphate.

D 24. Deliver high flow oxygen immediately to maintain oxygen saturation between 94-98%.

Discharge from Hospital

A 25. Discharge from hospital or ED should be a planned, supervised event which includes self-management planning. It may safely take place as soon as clinical improvement is apparent

A 26. Prior to discharge, in patients should receive written personalised action plans, given by clinicians with expertise in asthma management

B 27. Prescribe inhalers only after the patient has received training in the use of the device and has demonstrated satisfactory technique

A 28. All people attending hospital with acute attacks of asthma should be reviewed by a clinician with particular expertise in asthma management, preferably within 30 days

2.2 National recommendations

2.2.1 Risk factors for developing fatal asthma

Confidential enquiries into asthma deaths or near fatal asthma attacks from the UK and Ireland have identified a number of factors which contribute to an asthma death. Most deaths from asthma occur before admission to hospital, and usually occur in patients who have chronic asthma, who are on inadequate inhaled corticosteroid therapy with increased reliance on inhaled β₂ agonists. There is generally poor perception by the patient or physician caring for the patient of the overall severity of the asthma exacerbation. In addition, inadequate management in the acute event, including using sedation in some cases, are also factors linked to asthma deaths. Deaths from asthma while uncommon are generally preventable and occur usually in association with an acute attack. Although most of these patients have chronically severe
asthma, in a minority the fatal attack has occurred suddenly in a patient with mild or moderately severe background disease. Most asthma deaths occur before admission to hospital. Many deaths occur due to patients receiving inadequate treatment with inhaled steroids or steroid tablets and/or inadequate objective monitoring of their asthma, where follow up was inadequate in some and others should have been referred earlier for specialist advice.

Level of evidence 2++ (BTS/SIGN 2014)

Risk factors for developing fatal asthma include:

A combination of severe asthma recognised by one or more of:

• previous near-fatal asthma, e.g. previous ventilation or respiratory acidosis
• previous admission for asthma especially if in the last year
• requiring three or more classes of asthma medication
• heavy use of β₂ agonist
• repeated attendances at ED for asthma care especially if in the last year

AND adverse behavioural or psychosocial features recognised by one or more of:

  o non-adherence with treatment or monitoring
  o failure to attend appointments
  o fewer GP contacts
  o frequent home visits
  o self discharge from hospital
  o psychosis, depression, other psychiatric illness or deliberate self harm
  o current or recent major tranquilliser use
  o denial
  o alcohol or drug abuse
  o obesity
  o learning difficulties
  o employment problems
  o income problems
  o social isolation
  o childhood abuse
  o severe domestic, marital or legal stress

“Studies comparing near-fatal asthma with deaths from asthma have concluded that patients with near-fatal asthma have identical adverse factors to those described above and that these contribute to the near-fatal asthma attack. Compared with patients who die, those with near-fatal asthma are significantly younger, are significantly more likely to have had a previous near-fatal asthma attack, are less likely to have concurrent medical conditions, are less likely to experience delay in receiving medical care, and more likely to have ready access to acute medical care.”

Level of evidence 2+ (BTS/SIGN 2014)

“With near-fatal asthma it is advisable to involve a close relative when discussing future management.” (BTS/SIGN 2014)

Good practice point

√ Keep patients who have had a near-fatal asthma attack under specialist supervision indefinitely

All personnel who may be in contact with a patient with an acute asthma attack e.g. GP practice receptionists, pre-hospital emergency care practitioners and responders, out of hours staff and community pharmacists, should be aware that asthma patients complaining of respiratory symptoms may require immediate access to a physician or a nurse trained in acute asthma management as they may deteriorate suddenly.
Patients with asthma should have an agreed guided written asthma management plan - this can be discussed during the follow-up after discharge. They should know when and how to increase their medication and when to seek medical assistance if their asthma is not controlled. Agreed treatment steps should be clearly illustrated within the written asthma management plan. Such plans can decrease acute asthma, hospitalisation and deaths from asthma.

**Responsibility recommendation 1: All healthcare professionals**

**Recommendation 1:** Healthcare professionals must be aware that patients who present with a severe asthma attack and one or more adverse psychosocial factors are at risk of death

**Grade:** B

### 2.2.2 Management of acute asthma attacks

**What is best practice management of patients with an acute asthma attack in primary care?**

Patients with asthma including all patients with severe asthma should have an agreed written asthma management plan, with regular checks of inhaler technique and medication compliance at every clinical assessment with the healthcare system.

Patients should know when and how to increase their medication and when to seek medical assistance. This should be contained within the written asthma management plan with treatment steps clearly illustrated. Such plans can decrease hospitalisation for and deaths from asthma.

De-escalating treatment steps must also be outlined in management plan once acute episode is resolved.

All personnel who may be in contact with a patient with an acute asthma attack e.g. GP practice receptionists, pre-hospital emergency care practitioners and responders, out of hours staff and community pharmacists, should be aware that asthma patients complaining of respiratory symptoms should have immediate access to a physician or a nurse trained in acute asthma management as they may deteriorate rapidly.

“The assessments required to determine whether the patient is suffering from an acute attack of asthma, the severity of the attack and the nature of treatment required are detailed in this guideline. It may be helpful to use a systematic recording process. Proformas such as protocols and care bundles in Appendix 2 have proved useful in acute asthma management”

(BTS/SIGN 2014)

The vast majority of acute asthma attacks are managed at Primary Care level including GP Out of Hours (GPOOH) settings. These attacks are characterised by worsening symptoms including shortness of breath, cough, wheezing or chest tightness, or a combination of these symptoms.

Factors which may increase the likelihood of an attack include:

- Non adherence with regular asthma therapy
- Failure to attend for regular follow up after an attack
- Self discharge from hospital following an attack
- Psychological issues
- Drug/Alcohol abuse
- Obesity
- Learning difficulties
- Social issues

(BTS/SIGN 2014)
Some key points when dealing with an attack include:
- Take a good history from the patient in order to:
  - Identify when symptoms started?
  - How have symptoms progressed?
  - What therapy has the patient taken to deal with asthma symptoms to date?
  - Has a similar episode occurred in the past

It is important to be aware that patient’s symptoms may underestimate the severity of the attack and to have objective measurements of the event, to include:
- Peak expiratory flow (PEF) or FEV1
- Respiratory rate
- Heart rate
- Oxygen saturation (when available)

The severity of asthma exacerbation can be categorised according to the algorithms included in this guideline (see Appendix 2).

**Good practice point**
- Ongoing education of GP practice staff in dealing with acute asthma should be in place. This involves doctors, nurses and practice reception/telephone staff to ensure that patients with asthma are offered prompt appointments.
- GP support is required to allow patients who are seen in an acute event to be followed up and offered structured care and education. This may involve making contact per phone or flagging notes when patient attends again for any reason including repeat prescriptions.

**What are the criteria for referral to the Emergency Department for patient with an acute asthma attack?**

Always dial 999/112 if:
- Symptoms persist
- No immediate improvement in symptoms after initial treatment or within 5 minutes after treatment
- Too breathless or exhausted to talk
- Lips turn blue
- Or if in doubt

Most deaths from asthma occur before admission to hospital.

Protocols for the emergency treatment of asthma attacks in the pre-hospital setting can be found on the Pre-Hospital Emergency Care Council (PHECC), [www.phecc.ie](http://www.phecc.ie), and are replicated in Appendix 2.

**What are the Hospital Admission Criteria with an acute asthma attack?**

**Criteria for admission**
“Adult patients with any feature of a life-threatening or near-fatal asthma attack or a severe asthma attack that does not resolve after initial treatment should be admitted to hospital. Admission may also be appropriate when peak flow has improved to greater than 75% best or predicted one hour after initial treatment but concerns remain about symptoms, previous history or psychosocial issues.” (BTS/SIGN 2014)
Admit patients with any feature of a life-threatening or near-fatal asthma attack.

Admit patients with any feature of a severe asthma attack persisting after initial treatment.

Patients whose peak flow is greater than 75% best or predicted one hour after initial treatment may be discharged from ED unless they meet any of the following criteria, when admission may be appropriate:

- still have significant symptoms
- concerns about adherence
- living alone/socially isolated
- psychological problems
- physical disability or learning difficulties
- previous near-fatal asthma attack
- asthma attack despite adequate dose steroid tablets pre-presentation
- presentation at night
- pregnancy.

(ASTM/SIGN 2014)

Asthma attacks (attacks of acute asthma) are associated with progressive increase in asthma symptoms (typically, shortness of breath (SOB), cough, wheeze, chest tightness or any combination of these) but the patient’s own perception of asthma symptoms in some cases may be poor and thus unreliable. In addition to symptoms there is usually an objective decrease in expiratory flow rates on lung function testing. This should be quantified by PEF or spirometry (FEV₁). The PEF or FEV₁ expressed as percentage (%) of personal best is the most useful clinically but in the absence of this the % predicted value is a rough guide. Of note a reduction to 50% or less from predicted or best values indicates a severe attack. Pulse oximetry can be of use as low oxygen levels may indicate the necessity for referral to hospital but normal levels greater than 92% do not exclude a severe asthma attack. These measures along with history, examination, pulse and respiratory rate and response to treatment are all required to determine the need for hospitalisation or risk of relapse after acute management. The assessment and management should follow the guidelines outlined in the following acute asthma management protocols.

The SEVERITY evaluation of an attack is important and should be determined as to whether it is mild, moderate, severe or life-threatening. Severe or life-threatening attacks require close observation and should be referred to an Emergency Department (ED). Patients with life threatening features at any time during the initial assessment in ED should be admitted to hospital for at least 24 hours. In addition, patients with severe features persisting after the first salbutamol nebulisation should be considered for admission until stable.

Patients at high risk of asthma deaths include those with:

- History of near fatal asthma requiring intubation and mechanical ventilation
- Hospital admission or ED attendance in past year
- Those using or recently stopped oral steroids
- Over use of β₂ agonists (more than 1 inhaler per month)
- Psychiatric disease or psychosocial problems including sedative use
- History on non-compliance with asthma medication plan.

Recognition of acute asthma is done by assessing the level of severity of the patient and this includes the clinical history, examination, (including chest, pulse and respiration rates), peak flow rates (PEF) with peak flow meter and oxygen saturation (SpO₂) with a pulse oximeter.
Responsibility recommendation 2: Clinicians in primary and secondary care

**Recommendation 2:** Clinicians in primary and secondary care should treat asthma exacerbations according to recommended guidelines.
**Grade:** B

Responsibility recommendation 3: General practitioners

**Recommendation 3:** Refer patients to hospital who display any features of acute severe or life threatening asthma.
**Grade:** B

Responsibility recommendation 4: Clinicians

**Recommendation 4:** Admit patients to hospital with any feature of a life threatening or near fatal attack.
**Grade:** B

Responsibility recommendation 5: Clinicians

**Recommendation 5:** Admit patients to hospital with any feature of a severe attack persisting after initial treatment.
**Grade:** B

Responsibility recommendation 6: Clinicians

**Recommendation 6:** Admit patients to hospital whose peak flow is less than 75% best or predicted
**Grade:** C

Responsibility recommendation 7: Clinicians

**Recommendation 7:** Patients whose peak flow is greater than 75% best or predicted one hour after initial treatment may be discharged from ED unless they meet any of the following criteria, when admission may be appropriate:
- still have significant symptoms
- concerns about adherence
- living alone/socially isolated
- psychological problems
- physical disability or learning difficulties
- previous near-fatal asthma attack
- asthma attack despite adequate dose steroid tablets pre-presentation
- presentation at night
- pregnancy.
**Grade:** C

**What are the signs to distinguish the severity of an asthma attack?**
In acute asthma it is important to assess and record the level of severity as in the tables below.

Delay in treatment and under-dosing in an asthma attack can adversely affect outcomes. By using objective measures, the level of asthma severity is less likely to be underestimated. This will enable prompt treatment at the right dose to be effective.
Table 1 Levels of severity for adults

<table>
<thead>
<tr>
<th>Level of Severity</th>
<th>Life Threatening Asthma Features</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Level of Severity</td>
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<tr>
<td></td>
<td>Peak Flow Rate (PEF)</td>
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<tr>
<td></td>
<td>Oxygen Saturation (SpO₂)</td>
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<tr>
<td></td>
<td>Speech</td>
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<td></td>
<td>Respiratory Examination</td>
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<td></td>
<td>Pulse</td>
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<tr>
<td></td>
<td>BP</td>
</tr>
<tr>
<td>Life Threatening Features</td>
<td>PEF &lt;33% best or predicted</td>
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<tr>
<td></td>
<td>SpO₂ &lt;92%</td>
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<tr>
<td></td>
<td>Unable to talk - Exhausted, confusion, or coma</td>
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<tr>
<td></td>
<td>Poor respiratory effort, silent chest, cyanosis</td>
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<tr>
<td></td>
<td>Bradycardia, arrhythmia</td>
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<tr>
<td></td>
<td>Hypotension</td>
</tr>
<tr>
<td>Severe Asthma Features</td>
<td>No life threatening features</td>
</tr>
<tr>
<td></td>
<td>PEF 33–50% best or predicted</td>
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<tr>
<td></td>
<td>SpO₂ &gt;92%</td>
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<tr>
<td></td>
<td>Cannot complete sentence in one breath</td>
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<tr>
<td></td>
<td>Respiration Rate &gt;25 breaths/min</td>
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<tr>
<td></td>
<td>Pulse Rate &gt;110 beats/min</td>
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<tr>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td>Moderate Asthma Features</td>
<td>No life threatening features</td>
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<tr>
<td></td>
<td>PEF between 50-75% best or predicted</td>
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<tr>
<td></td>
<td>Greater than 92%</td>
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<tr>
<td></td>
<td>Talks in phrases, and prefers to sit</td>
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<tr>
<td></td>
<td>Loud wheeze and respiratory rate less than 25 breaths/min</td>
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<tr>
<td></td>
<td>Mild tachycardia but less than 110 beats/min</td>
</tr>
<tr>
<td></td>
<td>Normal</td>
</tr>
<tr>
<td>Mild Asthma Feature</td>
<td>No life threatening features</td>
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<tr>
<td></td>
<td>Greater than 75% best or predicted</td>
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<td></td>
<td>Greater than 92%</td>
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<tr>
<td></td>
<td>Talks in sentences and can lie down</td>
</tr>
<tr>
<td></td>
<td>Mild wheeze and respirations less than 25 breaths/min</td>
</tr>
<tr>
<td></td>
<td>Pulse is less than 100 beats/min</td>
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<tr>
<td></td>
<td>Normal</td>
</tr>
</tbody>
</table>

Clinical features

“Clinical features can identify some patients with severe asthma, e.g. severe breathlessness (including too breathless to complete sentences in one breath), tachypnea, tachycardia, silent chest, cyanosis, accessory muscle use, altered consciousness or collapse. None of these singly or together is specific. Their absence does not exclude a severe attack.”

Level of evidence 2+ (BTS/SIGN 2014)

What are the key components of an objective assessment of an attack in the adult asthma patient?

Pulse oximetry

Good clinical practice would support a measure of oxygen saturation (SpO₂) with a pulse oximeter to determine the adequacy of oxygen therapy and the need for arterial blood gas (ABG) measurement. The aim of oxygen therapy is to maintain SpO₂ 94-98%. In hypoxic patients it is important to consider alternative diagnosis e.g. Pneumothorax or pneumonia.

PEF or FEV₁

“Measurements of airway calibre improve recognition of the degree of severity, the appropriateness or intensity of therapy, and decisions about management in hospital or at
home. PEF or FEV₁ are useful and valid measures of airway calibre. PEF is more convenient in the acute situation. PEF expressed as a percentage of the patient’s previous best value is most useful clinically. PEF as a percentage of predicted gives a rough guide in the absence of a known previous best value. Different peak flow meters give different readings. Where possible the same or similar type of peak flow meter should be used.”

Level of evidence 2+ (BTS/SIGN 2014)

Chest X-ray
“Good clinical practice suggests that a chest X-ray is not routinely recommended in patients with an asthma attack in the absence of:
• suspected pneumomediastinum or pneumothorax
• suspected consolidation
• life threatening asthma
• failure to respond to treatment satisfactorily
• requirement for ventilation.”

Level of evidence 4 (BTS/SIGN 2014)

Blood gases
“Patients with SpO₂ less than (<) 92% (irrespective of whether the patient is on air or oxygen) or other features of life threatening asthma require ABG measurement. SpO₂ less than 92% are associated with a risk of hypercapnea (raised blood CO₂). Hypercapnea is not detected by pulse oximetry. In contrast the risk of hypercapnea with SpO₂ greater than 92% is much less.”

Level of evidence 2+ and 4 (BTS/SIGN 2014)

What is the best practice treatment of the adult asthma patient during an acute attack?
The primary therapies for the management of an attack to relieve airflow obstruction and hypoxemia include:
• Repetitive administration of rapid-acting inhaled β₂ agonist bronchodilator via pMDI with spacer or O₂ driven nebuliser
• Early introduction of systemic glucocorticosteroids
• Oxygen supplementation
• (The clinician may decide if antibiotic therapy is appropriate in some cases)

Oxygen
“Many patients with acute severe asthma are hypoxemic (low blood oxygen). Supplementary oxygen should be given urgently to hypoxemic patients, using a face mask, Venturi mask or nasal cannula with flow rates adjusted as necessary to maintain SpO₂ of 94-98%.” (BTS/SIGN 2014)

“Hypercapnea (raised blood CO₂ levels) indicates the development of near-fatal asthma and the need for emergency specialist/anaesthetic intervention”.

Level of evidence 2+, 4 (BTS/SIGN 2014)

Responsibility recommendation 8: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 8: Give supplementary oxygen to all hypoxaemic patients with acute severe asthma to maintain SpO₂ level of 94-98%. Lack of pulse oximetry should not prevent the use of oxygen.

Grade: C
Responsibility recommendation 9: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 9: (see β₂ agonist recommendations)
In hospital, pre-hospital emergency care and primary care, nebulised β₂ agonist bronchodilators should preferably be driven by oxygen.
Grade: A

Responsibility recommendation 10: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 10: (see β₂ agonist recommendations)
The absence of supplemental oxygen should not prevent nebulised β₂ agonist therapy being given if indicated.
Grade: C

β₂ agonist bronchodilators – repeated administration of rapid-acting inhaled β₂ agonist

“In most cases inhaled β₂ agonists given in high doses act quickly to relieve bronchospasm with few side effects. There is no evidence for any difference in efficacy between salbutamol and terbutaline. Nebulised adrenaline (epinephrine), a non-selective β₂ agonist, does not have significant benefit over salbutamol or terbutaline.” (BTS/SIGN 2014)

In acute asthma without life threatening features, “β₂ agonists can be administered by repeated activations of a pressurised metered dose inhaler (pMDI) via an appropriate large volume spacer or by wet nebulisation driven by oxygen, if available. Inhaled β₂ agonists are as efficacious and preferable to intravenous β₂ agonists (meta-analysis has excluded subcutaneous trials) in adult acute asthma in the majority of cases. Metered dose inhalers with spacers can be used for patients with attacks of asthma other than life threatening” (BTS/SIGN 2014). The bronchodilator therapy delivered via metered-dose inhaler pMDI, ideally with a spacer, produces at least an equivalent improvement in lung function as the same dose delivered via nebulizer. This route of delivery is the most cost effective, provided patients are able to use an pMDI with spacer assistance.

Mild/Moderate attacks: give up to 12 puffs via spacer, one at a time and inhaled separately. Assess after 10-20 minutes. Repeat as necessary (3 doses in total). No additional medication is necessary if the rapid-acting inhaled β₂ agonist produces a complete response (FEV₁ or PEF returns to greater than 80% of predicted or personal best) and the response lasts for 3 to 4 hours.

“Oxygen-driven nebulisers are preferred for nebulising β₂ agonist bronchodilators because of the risk of oxygen desaturation while using air-driven compressors”.
Level of evidence 1++ (BTS/SIGN 2014).

Emergency oxygen should be available in hospitals, ambulances and primary care.

“A flow rate of 6 litres/min is required to drive most nebulisers. Where oxygen cylinders are used, a high flow regulator must be fitted.”
Level of evidence 4 (BTS/SIGN 2014)

“The absence of supplemental oxygen should not prevent nebulised therapy from being administered when appropriate”.
Level of evidence 4 (BTS/SIGN 2014)

“Repeat doses of β₂ agonists at 15-30 minute intervals or give continuous nebulisation of salbutamol at 5-10 mg/hour (requires appropriate nebuliser) if there is an inadequate response to initial treatment.” (BTS/SIGN 2014)
“Parenteral \( \beta_2 \) agonists, in addition to inhaled \( \beta_2 \) agonists, may have a role in ventilated patients or those in extremis; however there is limited evidence to support this”. (BTS/SIGN 2014)

“Most cases of acute asthma will respond adequately to bolus nebulisation of \( \beta_2 \) agonists. Continuous nebulisation of \( \beta_2 \) agonists with an appropriate nebuliser may be more effective than bolus nebulisation in relieving acute asthma for patients with a poor response to initial therapy”. Level of evidence 1+ (BTS/SIGN 2014)

“In acute asthma without life threatening features, \( \beta_2 \) agonists can be administered by repeated activations of a pMDI via an appropriate large volume spacer or by wet nebulisation driven by oxygen, if available. Inhaled \( \beta_2 \) agonists are as efficacious and preferable to intravenous \( \beta_2 \) agonists (meta-analysis has excluded subcutaneous trials) in adult acute asthma in the majority of cases”.

Level of evidence: 1 ++ (BTS/SIGN 2014)

“Metered dose inhalers with spacers can be used for patients with attacks of asthma other than life threatening.”

Level of evidence 1++ (BTS/SIGN 2014)

Responsibility recommendation 11: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians and nursing staff

Recommendation 11: Adults with mild and moderate exacerbations of asthma should be treated by pMDI + spacer with doses titrated according to clinical response.

Grade: A

Responsibility recommendation 12: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 12: (see oxygen recommendation) In hospital, pre-hospital emergency care and primary care, nebulised \( \beta_2 \)agonist bronchodilators should preferably be driven by oxygen.

Grade: A

Responsibility recommendation 13: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 13: (see oxygen recommendation) Consider continuous nebulisation in patients with severe asthma who respond poorly to an initial bolus dose of \( \beta_2 \) agonist, using an appropriate nebuliser.

Grade: A

Responsibility recommendation 14: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

Recommendation 14: In acute asthma with life threatening features the nebulised route (oxygen-driven) is recommended.

Grade: A
Responsibility recommendation 15: General Practitioners, pre-hospital emergency care practitioners, ED/AMU physicians, asthma specialists and nursing staff

**Recommendation 15:** Use high dose inhaled $\beta_2$ agonists as first line agents in acute asthma and administer as early as possible. Reserve intravenous $\beta_2$ agonists for those patients in whom inhaled therapy cannot be used reliably.

*Grade: A*

### Steroids (Glucocorticosteroids)

“Steroids reduce mortality, relapses, potential hospital admission and requirement for $\beta_2$ agonist therapy. The earlier they are given in the acute attack the better the outcome”.

*Level of evidence 1++ (BTS/SIGN 2014)*

Oral steroids (0.5 to 1 mg of prednisolone/kg or equivalent during a 24-hour period) should be used to treat an attack, especially if they develop after instituting other short-term treatment options recommended for loss of control. If the patient fails to respond to bronchodilator therapy, as indicated by persistent airflow obstruction, prompt transfer to an acute care setting is recommended, especially if they are in a high-risk group. Response to treatment may take time. Patients should be closely monitored using clinical and objective measures. Response to treatment should continue until measurements of lung function (FEV$_1$ or PEF) return ideally to previous best or plateau. Patients who can be safely discharged will have responded within the first few hours.

“Steroid tablets are as effective as injected steroids, provided they can be swallowed and retained. Oral prednisolone 40-50 mg daily or parenteral (IV) hydrocortisone 400 mg daily (100 mg six-hourly) is as effective as higher doses. For convenience, steroid tablets may be given as 2 x 25 mg tablets daily rather than 8 - 10 x 5 mg tablets. Where necessary soluble prednisolone (sodium phosphate) 5 mg tablets can be used. In cases where oral treatment may be a problem consider intramuscular (IM) methylprednisolone 160 mg as an alternative to a course of oral prednisolone (this is likely to be a large 4mls injection).”

*Level of evidence: 1++ (BTS/SIGN 2014)*

“Following recovery from the acute attack steroids can be stopped abruptly. Good practice indicates that doses do not need tapering provided the patient receives inhaled steroids (caution is required for patients on maintenance steroid treatment or rare instances where steroids are required for three or more weeks)”.

*Level of evidence 1+ (BTS/SIGN 2014)*

In addition to systemic (oral, IV, or IM) steroids, inhaled steroids should be continued (or started if not already prescribed) and commence the chronic asthma management plan.

*Level of evidence 1+ (BTS/SIGN 2014)*

Responsibility recommendation 16: Clinicians

**Recommendation 16:** Give steroids in adequate doses in all cases of acute asthma

*Grade: A*

### Good practice point

√ Continue oral prednisolone 40mg daily for at least 5 days or until recovery.

### Ipratropium bromide

“Combining nebulised ipratropium bromide with a nebulised $\beta_2$ agonist produces significantly greater bronchodilation than a $\beta_2$ agonist alone, leading to a faster recovery and shorter dura-
tion of admission. Anticholinergic treatment is not necessary and may not be beneficial in milder attacks of asthma or after stabilisation”.

Level of evidence 1++ (BTS/SIGN 2014)

Responsibility recommendation 17: Clinicians

**Recommendation 17:** Add nebulised ipratropium bromide (0.5 mg 4-6 hourly) to β₂ agonist treatment for patients with acute severe or life threatening asthma or those with poor initial response to β₂ agonist therapy.

**Grade:** B

**Magnesium sulphate**

“There is some evidence that, in adults, magnesium sulphate has bronchodilator effects.” (BTS/SIGN 2014). Experience suggests that magnesium is safe when given by the intravenous (IV) or nebulised route. Trials comparing these routes of administration are awaited. Studies report the safe use of nebulised magnesium sulphate, in a dose of 135 mg - 1152 mg, in combination with β₂ agonists, with a trend towards benefit in hospital admission. “A single dose of IV magnesium sulphate is safe and may improve lung function in patients with acute severe asthma” (BTS/SIGN 2014).

Level of evidence 1++ (BTS/SIGN 2014)

“The safety and efficacy of repeated IV doses has not been assessed. Repeated doses could cause hypermagnesaemia with muscle weakness and respiratory failure.” (BTS/SIGN 2014) More studies are needed to determine the optimal route, frequency and dose of magnesium sulphate therapy.

Responsibility recommendation 18: Asthma specialists

**Recommendation 18:** Consider giving a single dose of IV magnesium sulphate for patients with:

- Acute severe asthma who have not had a good initial response to inhaled bronchodilator therapy
- Life threatening or near fatal asthma.

**Grade:** B

**Good practice point**

IV magnesium sulphate (1.2 - 2g IV infusion over 20 minutes) should only be used following consultation with senior medical staff.

**Intravenous (IV) aminophylline**

This drug is generally not for routine use as it may potentially increase morbidity and delay anaesthetic review.

Good practice indicates that it should only be given on the advice of a senior physician.

However, in acute asthma, “IV aminophylline is not likely to result in any additional bronchodilation compared to standard care with inhaled bronchodilators and steroids. Side effects such as arrhythmias and vomiting are increased if IV aminophylline is used.”

Level of evidence 1++ (BTS/SIGN 2014)

“Some patients with near-fatal asthma or life threatening asthma with a poor response to initial therapy may gain additional benefit from IV aminophylline (5 mg/kg loading dose over 20 minutes unless on maintenance oral therapy, then infusion of 0.5-0.7 mg/kg/hr). Such patients are probably rare and could not be identified in a meta-analysis of trials. If IV aminophylline is given to patients on oral aminophylline or theophylline, blood levels should be checked on
admission. Levels should be checked daily for all patients on aminophylline infusions.” (BTS/SIGN 2014)

**Leukotriene receptor agonist**
There is some emerging evidence to suggest a possible role of montelukast (singulair) in acute asthma but is insufficient currently to make a recommendation of its use in the management of acute asthma.

**Antibiotics**
Antibiotics should not be given automatically unless there is strong suspicion of bacterial infection, elevated temperature, raised white cell count, infiltrate on chest x-ray or copious green phlegm and should be guided by local microbiology guidelines.

“When an infection precipitates an asthma attack it is likely to be viral. The role of bacterial infection in an attack has been overestimated.”

Level of evidence 1++ (BTS/SIGN 2014)

Routine prescription of antibiotics is not indicated for acute asthma.

**Responsibility recommendation 19: Clinicians and community pharmacists**

**Recommendation 19:** Routine prescription of antibiotics is not indicted for acute asthma

**Grade:** B

**Intravenous fluids**
There are no controlled trials, observational or cohort studies of IV fluid regimes in acute asthma.

**Good practice point**
√ Some patients with acute asthma require rehydration and correction of electrolyte imbalance. Hypokalaemia can be caused or exacerbated by β₂ agonist and/or steroid treatment and must be corrected. (BTS/SIGN 2014)

**Heliox**
“The use of heliox, (helium/oxygen mixture in a ratio of 80:20 or 70:30), either as a driving gas for nebulisers, as a breathing gas, or for artificial ventilation in adults with acute asthma is not supported on the basis of present evidence. A systematic review of ten trials (554 patients), including patients with acute asthma, found no improvement in pulmonary function or other outcomes in adults treated with heliox, although the possibility of benefit in patients with more severe obstruction exists. Heliox requires the use of specifically designed or modified breathing circuits and ventilators.”

Level of evidence 1++, 1+ (BTS/SIGN 2014)

**Responsibility recommendation 20: Clinicians and nursing staff**

**Recommendation 20:** Heliox is not recommended for use in acute asthma outside a clinical trial setting

**Nebulized furosemide**
“Although theoretically furosemide may produce bronchodilation, a review of three small trials failed to show any significant benefit of treatment with nebulised furosemide compared to β₂ agonists”.

Level of evidence; 1+ (BTS/SIGN 2014)
ICU/HDU

“Indications for admission to intensive care or high-dependency units include patients requiring ventilator support and those with severe acute or life threatening asthma who are failing to respond to therapy, as evidenced by:

- deteriorating PEF
- persisting or worsening hypoxia
- hypercapnea
- arterial blood gas analysis showing fall in pH or rising H+ concentration
- exhaustion, feeble respiration
- drowsiness, confusion, altered conscious state
- respiratory arrest.

Not all patients admitted to the Intensive Care Unit (ICU) need ventilation, but those with worsening hypoxia or hypercapnea, drowsiness or unconsciousness and those who have had a respiratory arrest require intermittent positive pressure ventilation. Intubation in such patients is very difficult and should ideally be performed by an anaesthetist or ICU consultant” (BTS/SIGN 2014). Treatment has to be adjusted periodically in response to worsening control, which may be recognised by the minor recurrence or worsening of symptoms following treatment for an attack, maintenance treatment can be resumed at previous levels unless the attack was associated with a gradual loss of control suggesting chronic under treatment.

Level of evidence; 2+ (BTS/SIGN 2014)

Responsibility recommendation 21: Clinicians

**Recommendation 21**: Refer to the ICU any patient:
- Requiring ventilator support
- With acute severe or life threatening asthma, failing to respond to initial therapy, evidenced by:
  - Deteriorating PEF
  - Persisting or worsening hypoxia
  - Hypercapnea
  - ABG analysis showing ↓ pH or ↑ H+
  - Exhaustion, feeble respiration
  - Drowsiness, confusion, altered conscious state
  - Respiratory arrest

_Grade:_ B

Responsibility recommendation 22: Clinicians and nursing staff

**Recommendation 22**: All patients transferred to intensive care units should be accompanied by a doctor suitably equipped and skilled to intubate if necessary

_Grade:_ C

*Good practice point*

√ Patients with acute asthma should not be sedated unless this is to allow anaesthetic or intensive care procedures
Non invasive ventilation
“A Cochrane review found only one trial, with 30 patients, on NIV which showed improvement in hospitalisation rates, discharge from emergency departments and lung function. Larger RCTs are needed to determine the role of NIV in treating patients with acute asthma”.  
Level of evidence: 1++ (BTS/SIGN 2014)

<table>
<thead>
<tr>
<th>Good practice point</th>
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<tbody>
<tr>
<td>✓ NIV for acute asthma should only be considered in an ICU or equivalent clinical setting.</td>
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Structured proforma
“The use of structured proformas facilitates improvements in the process of care in emergency departments and hospital wards and improves patient outcomes. The use of this type of documentation can assist data collection aimed at determining quality of care and outcomes”.  
Level of evidence: 2 + (BTS/SIGN 2014)

What is best practice management of an acute asthma attack in pregnancy?
“The management of acute asthma in pregnancy may be affected by concerns about harmful effects of medications on the fetus” (BTS/SIGN 2014). However the maternal and fetal risks of uncontrolled asthma are much greater than the risks from conventional asthma medications and acute asthma remains an important cause of maternal mortality. The Confidential Enquiry into Maternal Deaths 2006-2008 reported 5 maternal deaths from asthma.

The ultimate goal of asthma therapy in pregnancy is maintaining adequate oxygenation of the fetus by preventing hypoxic episodes in the mother. It should be emphasised that it is safer for pregnant women with asthma to be treated with medications than it is for them to have ongoing asthma symptoms and attacks. Pregnant women with asthma should be counselled regarding the importance of compliance with treatment during pregnancy to ensure good asthma control. Inhaled corticosteroids are first-line controller therapy for persistent asthma during pregnancy.

“Prednisolone is extensively metabolised in the placenta such that only 10% reaches the fetus” (BTS/SIGN 2014). Steroid therapy in the first trimester may be associated with an increased risk of oral clefts in the fetus. However, women should be advised that if required, the benefits of treatment with oral steroids for asthma attacks outweigh the risks thereof.

It is important that treatment with steroids should not be withheld if indicated for the management of an asthma attack because of pregnancy.

The inhaled short acting β₂ agonist, salbutamol, is recommended rescue therapy for pregnant women with asthma. No significant association has been demonstrated between major congenital malformations or perinatal outcomes and exposure to short acting β₂ agonists.

2.2.3 Management of acute asthma in pregnancy
1. Patients presenting to the Emergency Room in a Maternity Hospital with an acute asthma attack should be assessed according to acute adult asthma guidelines.
2. Pregnancy should not alter the standard management of an acute asthma attack.
3. Patients presenting to the Emergency Room in a Maternity Hospital with an acute LIFE THREATENING ASTHMA attack should be given salbutamol via oxygen driven nebuliser and immediately referred to a General Hospital or service with respiratory medicine expertise and ICU facilities.
4. Consider intensive care medicine consult with senior anaesthetist and need for possible intubation and ventilation for those patients with deteriorating condition.

5. Continuous fetal monitoring is recommended in cases of severe or life threatening acute asthma presentation.

6. If a patient with LIFE THREATENING ASTHMA requires delivery this should be performed by an obstetric team in a general hospital with ICU and respiratory physician back up.

7. A patient with a SEVERE/MODERATE asthma attack not improved by initial nebulizer and oxygen treatment should be immediately transferred to a general hospital with ICU facilities.

8. CXR*/ECG/ABG should be performed in patients presenting with acute asthma attack (except where the presentation is MILD).

   * use abdominal shielding and defer unless deemed urgent in the first trimester.

9. Respiratory physician input should be sought regarding the ongoing management of pregnant patients admitted to a maternity hospital with an asthma attack. A consultation with a respiratory physician to advise on further treatment options and follow up on discharge.

10. Patients presenting with an acute asthma attack in pregnancy should be followed up on discharge with the respiratory service to reduce incidence of further attack in pregnancy.

11. Consideration for other pathologies should be given for women presenting in pregnancy with respiratory symptoms similar to acute asthma including those who do not have a history of asthma. Pulmonary embolism, pulmonary oedema secondary to pre-eclampsia, puerperal cardiomyopathy, pneumonia, ischemic or valvular heart disease may also present with shortness of breath, hypoxia or respiratory wheeze.

Responsibility recommendation 23: Clinicians and nursing staff

**Recommendation 23:** Give drug therapy for acute asthma as for the non-pregnant patient including systemic steroids and magnesium sulphate

*Grade: C*

Responsibility recommendation 24: Clinicians and nursing staff

**Recommendation 24:** Deliver high flow oxygen immediately to maintain oxygen saturation between 94-98%

*Grade: D*

2.2.4 Discharge and follow-up

**What discharge and follow-up planning is required for patients with an acute asthma attack?**

People with a life threatening/severe asthma attack should be admitted for at least 24 hours and should be reviewed by senior physician/respiratory consultant before discharge. Patients whose peak flow is greater than 75% best or predicted one hour after initial treatment may be discharged from ED unless they meet any of the following criteria when admission may be appropriate:

- Still have significant symptoms
- Previous near-fatal or brittle asthma
- Had an attack despite adequate dose steroid tablets pre-presentation
- Presentation at night
- Pregnancy.
What role can patient education play in asthma management following an acute asthma attack?
“Following discharge from hospital or emergency departments, a proportion of patients re-attend. International data has shown that more than 15% re-attended within two weeks. Some repeat attenders need emergency care, but many delay seeking help, and are under-treated and/or under-monitored”.

Level of evidence 2+ (BTS/SIGN 2014)

“Prior to discharge, trained staff should give asthma education. This should include education on inhaler technique and PEF performance and record keeping. A written PEF and symptom-based action plan should be provided allowing the patient to adjust their therapy within agreed parameters. These measures have been shown to reduce morbidity after the attack and reduce relapse rates”.

Level of evidence 1++ (BTS/SIGN 2014)

“There is some experience of a discrete population of patients who use emergency departments rather than primary care services for their asthma care. Education has been shown to reduce subsequent hospital admission and improve scheduled appointments and self management techniques but does not improve re-attendance at emergency departments”. (BTS/SIGN 2014)

“For the above groups there is a role for a trained asthma liaison nurse based in, or associated with, the emergency department.”

Level of evidence 1++ (BTS/SIGN 2014)

All patients following an asthma attack should be educated in the management of their condition which can be provided by healthcare professionals trained in asthma management. This should include;

• Awareness of triggers and symptoms of onset of attack
• Medications compliance
• Peak flow technique and diary recording
• Asthma Management Plan (see Appendix 2.5)

People requiring further supports prior to discharge should be referred to appropriate services. Such patients include:

• Those who live alone or are socially isolated
• Those who have behavioral or psychological problems
• Substance misuse
• Those who have a physical disability or learning difficulties
• Those who are currently on sedatives or psychiatric medication

“Prior to discharge, trained staff should give asthma education. This should include education on inhaler technique and PEF performance and record keeping. A written PEF and symptom-based action plan should be provided allowing the patient to adjust their therapy within agreed parameters. These measures have been shown to reduce morbidity after the attack and reduce relapse rates”.

Level of evidence 1++ (BTS/SIGN 2014)

“There is some experience of a discrete population of patients who use emergency departments rather than primary care services for their asthma care. Education has been shown to reduce subsequent hospital admission and improve scheduled appointments and self management techniques but does not improve re-attendance at emergency departments.” (BTS/SIGN 2014)
“For the above groups there is a role for a trained asthma liaison nurse based in, or associated with, the emergency department.”

Level of evidence 1++ (BTS/SIGN 2014)

**What should the follow up process be after an acute asthma attack?**

“A careful history should elicit the reasons for the attack and explore possible actions the patient should take to prevent future emergency presentations. Medication should be altered depending upon the assessment and the patient should be provided with an asthma action plan aimed at preventing relapse, optimising treatment and preventing delay in seeking assistance in the future.” (BTS/SIGN 2014).

It is recommended that follow up be arranged prior to discharge with the patient’s general practitioner or asthma nurse / hospital specialist asthma/respiratory service as follows:

- The appropriate General Practice should be informed and receive appropriate discharge summary by fax / email within 24 hours of the patient’s discharge
- Before discharge the patient should be instructed to arrange an appointment with their GP or practice nurse within 2 working days of discharge.
- A requisition for a follow-up appointment with a hospital asthma / respiratory service should be made within 4 weeks of the episode.

“Assisting patients in making appointments while being treated for acute asthma in emergency departments may improve subsequent attendance at primary care centres.”

Level of evidence 1+ (BTS/SIGN 2014)

**Discharge bundle following an acute adult asthma attack**

A sample discharge bundle can be found in Appendix 2.2.

**Discharge letter/fax/email template following an acute adult asthma attack**

A sample discharge letter/fax/email template can be found in Appendix 2.3. A copy of the discharge letter should be provided to each of the following:

- the patient with asthma attack or their carer
- the patient’s named GP /practice nurse
- care home/community nurse (where appropriate)

Discharge from hospital or ED should be a planned, supervised event which includes self-management planning. It may safely take place as soon as clinical improvement is apparent.

- Prior to discharge, in patients should receive written personalised action plans, given by clinicians with expertise in asthma management.
- Prescribe inhalers only after the patient has received training in the use of the device and has demonstrated satisfactory technique.
- All people attending hospital with acute attack of asthma should be reviewed by a clinician with particular expertise in asthma management, preferably within 30 days.

**Responsibility recommendation 25: All healthcare staff**

**Recommendation 25:** Discharge from hospital or ED should be a planned, supervised event which includes self-management planning. It may safely take place as soon as clinical improvement is apparent and sustained

**Grade:** A
Responsibility recommendation 26: Clinicians and nursing staff

**Recommendation 26:**
Prior to discharge, in patients should receive written personalised action plans, given by clinicians with expertise in asthma management.

**Grade:** A

Responsibility recommendation 27: Clinicians

**Recommendation 27:**
Prescribe inhalers only after the patient has received training in the use of the device and has demonstrated satisfactory technique.

**Grade:** B

Responsibility recommendation 28: Clinicians

**Recommendation 28:**
All people attending hospital with acute exacerbations of asthma should be reviewed by a clinician with particular expertise in asthma management, preferably within 30 days.

**Grade:** A
3.1. Aim of National Clinical Guideline

The aim of the National Clinical Guideline is to assist health care professionals in all healthcare settings, (pre-hospital emergency care, primary care and secondary care including ED/AMU and specialist services including maternity, mental health, disability and specialised orthopaedic centres) in assessing and making decisions on the management of acute asthma in adults by outlining evidence based treatment protocols. It also aims to assist policy makers and those planning acute services for adult asthma patients.

3.2. Methodology and literature review

A systematic evidence review of literature was undertaken in formulating this guideline. A research team from the Dublin City University (DCU) School of Nursing and Human Sciences, led by Dr Veronica Lambert, was commissioned by the National Clinical Effectiveness Committee (Department of Health) to carry out the review. The sub-sections below outline at a high level the work that was carried out. A comprehensive account of the review is set out in the appendices of the full version of the National Clinical Guideline No 14 for the Management of an Acute Asthma Attack in Adults.

3.2.1. Background

The goal of the review was to assist the development of a National Clinical Guideline (NCG) for the Management of an Acute Asthma Attack in Adults to support the Model of Care for the HSE National Clinical Programme for Asthma in Ireland, and be quality assured by the National Clinical Effectiveness Committee (NCEC). A systematic review of clinical guidelines used in primary and secondary care contexts, including general practice, paramedic services, emergency departments and acute adult hospital contexts, for the assessment and management of the acute adult asthma patient was conducted.

3.2.2. Objectives

The following three objectives were addressed in the systematic review;

1. Identification of developed evidence based clinical guidelines related to the management of acute asthma for adult patients through the conduct of a systematic search over a specified period (2011-2015) in line with the ADAPTE process
2. Co-ordination of a quality assessment of the retrieved clinical guidelines using the AGREE II tool
3. Analysis of the recommendations of the retrieved clinical guidelines and their applicability to the decisions for inclusion of the recommendations in the Irish National Clinical Guideline for the management of acute asthma attacks in adult patients

3.2.3. Method

The methodology for the review followed the ADAPTE process as outlined in the Guideline Adaptation Resource Toolkit (The ADAPTE Collaboration 2009) and the National Clinical Effectiveness Committee (NCEC) Guideline Development Manual of 2013 with regard to considering clinical guideline evidence for the review; search methods; guideline selection and assessment and decisions around adaptation of guideline recommendations. Assessment of guideline quality was guided by the AGREE II (Appraisal of Guidelines for Research and Evaluation) Instrument. A synopsis follows but further details are available in Appendices 3-15 of the full guideline.
Using a systematic approach to searching, screening and appraisal, the review identified a number of evidence-based recommendations for the Guideline Development Group to consider in relation to the management of an acute asthma attack in adults. These recommendations were drawn from two guidelines BTS/SIGN and GINA. The total recommendations extracted from both guidelines were in excess of 50 and spanned all grades of evidence A-D including good practice points based on clinical experience/panel consensus judgment. The findings of the review were considered, cognisent of the following limitations. The possibility that the search did not identify all relevant clinical guidelines cannot be excluded and inclusion of guidelines only in the English language may have introduced a degree of bias as a consequence of the exclusion of guidelines from different cultural contexts. These limitations were somewhat offset, however, by the use of explicit inclusion criteria, PICO’s and a broad search strategy, inclusive of grey literature, guideline databases, guideline developer websites and a large cross-section of asthma, thoracic and lung associations. The fact that all searches and screening, conducted independently by at least 3 reviewers, consistently arrived at both the BTS/SIGN and GINA clinical guidelines increased confidence that all relevant and current guidelines were identified for the review specified time period of 2011-2015. In relation to the appraisal process, the appraisal of both the BTS/SIGN and GINA guidelines was based solely on the “reporting” within the guidelines and thus might not accurately reflect the actual guideline development process; however, due to available timelines, the authors/guideline developers were not contacted for additional clarification of unclear/missing information in relation to methodological processes. The consensus of the guideline appraisal group was that they would recommend both the BTS/SIGN and GINA guideline for use with an overall quality judgment rating of 7 and 6 attributed to the BTS/SIGN and GINA guideline respectively (where a rating of 1 represents ‘lowest possible quality’ whereas a rating of 7 represents ‘highest possible quality’).

3.3. Financial Impact of acute asthma

The guideline provides clear guidance for the assessment and treatment of acute asthma in general practice, by paramedic services, the Emergency Department (ED) and in the acute hospital for adults. The estimated annual cost of care for acute asthma attacks in the Republic of Ireland is of the order of €6.5 million and much of this cost relates to adult admissions. Hospitalisation accounts for between 20 and 25% of the overall cost. International research has identified that the majority of hospital admissions for asthma are emergency admissions of which 70% may have been preventable with appropriate early intervention. An acute attack can result in death or require hospital attention at the Emergency Department (ED) or in-patient care and represents a serious failure of asthma control. In that situation, patients will need to have access to local, easily accessible and competent services in an emergency, which may be their GP practice, GP out-of-hours/urgent care services (GPOOH), ED or in-hospital care. About 15% of patients relapse following an asthma attack, especially if seen in an ED: so standardized follow-up is required, by attending GP within 2 working days of discharge, for ongoing asthma management. International best practice recommends that all patients admitted to hospital should be followed up on discharge from hospital in a medical specialist clinic for 1 year (in conjunction with their GP) until stable.

The cost impact analysis, led by Ms. M O’Neill of HIQA, focuses on two costing areas which are detailed in Appendix 17 of the full guideline.

Staff training:
The main costs for guideline implementation are the costs associated with structured training for clinical staff in hospital and GPOOH settings on acute asthma guideline managed care. It is critical that medical staff involved with acute asthma patients have the knowledge and training to manage these patients appropriately. It is estimated that the overall cost of training relevant HSE staff would be €193,104, but these costs are mostly opportunity costs.
Possible additional cost implications arising from implementing the guidelines:

Additional costs that have been reviewed but are essentially either cost neutral or are associated with the implementation of an overall Asthma Model of Care Chronic Disease Management Programme for primary care linked to specialist care include the following:

- Recommendation that a spacer device is used with a pressurised multidose inhaler (pMDI) inhaler in mild-moderate asthma attacks rather than wet nebulisation for salbutamol bronchodilation where possible
- Recommendations on medications e.g. inhaled steroids and oral steroids in acute asthma attacks
- Recommendation of follow up with a GP within 2 working days of discharge from ED
- Recommendations on follow up in the medical specialist/nurse led OPD clinic for 1 year for patients admitted to hospital with acute asthma following discharge
- Recommendation that all patients have a peak flow meter reading on assessment by a paramedic and on admission to GPOOH, ED and Hospital.

In relation to the above, it is estimated that there are possible annual savings of €179,978 from reducing the use of nebulisers in the ED. Additionally, better management by specialist/asthma nurse led clinics following discharge, leading to non-attendances at ED and GPOOH and reduced admissions by 20%, could result in estimated annual savings of €1,380,000.

3.4. External review

The GDG sought the assistance of an international asthma advisor to review the draft guideline document - Prof. Mark Fitzgerald, Professor of Medicine, Head, University of British Columbia and Vancouver General Hospital Divisions of Respiratory Medicine, Director, Centre for Lung Health, The Lung Centre, Vancouver, Canada and Chairman of Scientific Committee GINA. Prof. Mark Fitzgerald was selected due to his expertise in asthma care and for his broad international experience in asthma guideline development and guideline implementation in Canada. The guideline was reviewed in draft form by Prof. Fitzgerald, who was asked to comment primarily on the comprehensiveness and accuracy of interpretation of the evidence base supporting the guideline and recommendations. Prof. Fitzgerald agreed with the guideline contents without significant changes. Prof. Fitzgerald’s most recent declarations of interest are available on www.ginasthma.org.

3.5. Procedure for update of National Clinical Guideline

This guideline was published in November 2015 and will be reviewed in 3 years by the NCPA. Surveillance of the literature base will be carried out periodically by the NCPA so that the guideline will maintain its relevance and currency. Any updates to the guideline in the interim period or as a result of three year review will be subject to the NCEC approval process and noted in the guidelines section of the NCPA and NCEC websites.

3.6. Implementation of National Clinical Guideline

The implementation of the guideline will take multiple routes and will be a phased approach over a two to three year period. Further details are available in the full guideline.

All hospitals admitting asthma attacks should adopt this standard treatment protocol for the management of the asthma patient. The treatment care bundles, presented in Appendix 2, should be held in the patients chart and are key to the evaluation and audit of asthma care process. A local implementation team with a local lead acting as champion in each hospital site will facilitate implementation of the programme and this guideline. Whilst this group is not active in each site currently, the NCPA will undertake to engage with each site to support the establishment and ongoing activities of this group. General Practitioners managing acute
asthma attacks in primary care should adopt the standard treatment protocols and bundles for the management of the asthma patient.

To facilitate the implementation of the guideline, an asthma education programme has been developed and is available online (www.asthmasociety.ie and www.hse.ie). In addition a half day training workshop is provided by respiratory Clinical Nurse Specialists. The training workshop has received Category 1 approval from the Nursing and Midwifery Board of Ireland (NMBI). Medical/nursing training, undergraduate, post graduate and continuous professional development courses will be updated regularly in line with guidelines. Further training initiatives are underway in primary care for the implementation of national ICGP Quality in Practice Committee asthma guidelines. The eLearning programme has been approved for CPD credits by ICGP. The ICGP have developed additional online asthma modules to complement the NCPA programme. This is recommended for all primary care physicians and physicians-in-training.

3.7. Roles and responsibilities

3.7.1. Local hospital services

The CEO/General Manager, the Clinical Director and the Director of Nursing of the hospital have corporate responsibility for the implementation of this National Clinical Guideline and to ensure that all relevant staff are appropriately supported and trained to implement the guideline.

All clinical staff with responsibility for the care of patients with asthma are expected to:
- Comply with this National Clinical Guideline and any related procedures or protocols,
- Adhere to their code of conduct and professional scope of practice as appropriate to their role and responsibilities, and
- Maintain their competency for the management and treatment of patients with asthma.

3.7.2. Primary care services

Acute asthma care for each patient in primary care is generally the responsibility of the patient’s GP, and when required, to link to the out of hours services in primary care (local on-call or the GPOOH services) and to the acute hospital ED services when appropriate.

The roles and responsibilities of all stakeholders involved in the lifecycle of the guideline are detailed in the table below (this is not an exhaustive list).
Table 2: Roles and Responsibilities

<table>
<thead>
<tr>
<th>Process</th>
<th>Applying</th>
<th>Auditing Use</th>
<th>Developing/Updating</th>
<th>Reviewing</th>
</tr>
</thead>
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<tr>
<td>General Practitioners</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practice Nurses</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Out of Hours Staff</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pharmacist</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Pre-Hospital emergency care practitioners</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED/AMU Physicians</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ED/AMU Nursing Staff</td>
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<tr>
<td>Clinical Audit Services</td>
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</tr>
<tr>
<td>Pre-Hospital Emergency Care Council</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>Patient Organisation (Asthma Society of Ireland)</td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>

3.8. Audit criteria

To ensure that this guideline positively impacts on patient care, it is important that implementation is audited. Audit is recommended to support continuous quality improvement in relation to the implementation of the National Clinical Guideline. As the process of implementation continues the National Clinical Programme for Asthma will endeavour to expand the audit criteria. At a local level, audit of the use of the treatment protocols will be carried out by Emergency / Acute Medicine / Respiratory teams. The ED, AMU, Medical ward will retain a copy of the treatment bundle administered on file and make a copy available to assist them with audit. This will serve a dual function:

1) Notification of the patient to the Respiratory Service for follow-up;
2) Audit of the treatment and education supplied to the patient prior to discharge.

The following Key Performance Indicators will be used to evaluate the implementation of the guideline:

- Percentage of nurses in primary and secondary care who are trained by the National Asthma Programme
- Number of deaths caused by asthma annually
4 Appendices and references

Appendix 1: Guideline Development Group

Appendix 1.1 Terms of reference
To develop a national evidence-based clinical guideline for the management of acute adult asthma attacks

Appendix 1.2. Membership of Guideline Development Group

<table>
<thead>
<tr>
<th>National Clinical Programme Lead</th>
<th>Prof. Pat Manning, Respiratory Consultant, Midland Regional Hospital, Mullingar</th>
</tr>
</thead>
<tbody>
<tr>
<td>ICGP Lead</td>
<td>Dr Dermot Nolan, General Practitioner, Tramore Medical Clinic, Waterford</td>
</tr>
<tr>
<td>Public Health Specialist</td>
<td>Dr Ina Kelly, Consultant in Public Health, HSE, Tullamore</td>
</tr>
<tr>
<td>Patient Organisation</td>
<td>Dr Jean Holohan, CEO Asthma Society of Ireland (2006-2012)</td>
</tr>
<tr>
<td></td>
<td>Sharon Cosgrove, CEO Asthma Society of Ireland (2012-date)</td>
</tr>
<tr>
<td>Clinical Nurse Specialist (Adult)</td>
<td>Ann Tooher, Midland Regional Hospital, Mullingar</td>
</tr>
<tr>
<td>Clinical Nurse Specialist (Children)</td>
<td>Niamh O’Regan, Mullingar Midland Hospital, Mullingar (2010-2013)</td>
</tr>
<tr>
<td>Advanced Nurse Practitioner Asthma (Children)</td>
<td>Mary McDonald, Tallaght Hospital, Dublin</td>
</tr>
<tr>
<td>Professional Development Coordinator for Practice</td>
<td>Rhonda Forsythe, Practice Nurse Development Coordinator, HSE</td>
</tr>
<tr>
<td>Nursing Service Planner</td>
<td>Marian Wyer, HSE, Tullamore</td>
</tr>
<tr>
<td>Respiratory Scientists</td>
<td>Maria McNeill, Respiratory Scientist, Midland Regional Hospital, Mullingar (2010-2012)</td>
</tr>
<tr>
<td></td>
<td>Tom Kelly, Respiratory Scientist, Mater Misericordiae Hospital, Chair of IARS (2012-2014)</td>
</tr>
<tr>
<td></td>
<td>Geraldine Nolan, Respiratory Scientist, St Vincent’s University Hospital, Dublin 4</td>
</tr>
<tr>
<td>Therapy Professions Representative</td>
<td>Joanne Dowds, Clinical Specialist Physiotherapist, St. James Hospital, Dublin 8</td>
</tr>
</tbody>
</table>
### Programme Managers

- Vanessa Colgan, Clinical Strategy and Programmes Directorate, HSE (2010-2013)
- Noreen Curtin, Clinical Strategy and Programmes Directorate, HSE (2013-2014)
- Linda Kearns, Clinical Strategy and Programmes Directorate

### Health Intelligence Unit

- Davida DeLaHarpe, Head Health Intelligence Unit, HSE QCCD
- Anne O’Farrell, Health Intelligence Unit, HSE QCCD

### Irish Pharmacy Union

- Pamela Logan, Director Pharmacy Service, IPU

### Pharmacist

- Kathleen Niamh Buckley, Trinity College Dublin and St James’s Hospital, Dublin 8

### Contributors and Consultation Participants

<table>
<thead>
<tr>
<th>Role</th>
<th>Participants</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regional Lead DNE</td>
<td>Dr John Faul, Respiratory Consultant, Connolly Hospital, Dublin</td>
</tr>
<tr>
<td>Regional Lead DML</td>
<td>Prof Stephen Lane, Respiratory Consultant, Tallaght Hospital, Dublin 24</td>
</tr>
<tr>
<td>Regional Lead South</td>
<td>Dr Terry O’Connor, Respiratory Consultant, Mercy University Hospital, Cork</td>
</tr>
</tbody>
</table>
| Regional Lead West | Dr Robert Rutherford, Respiratory Consultant, Merlin Park Hospital, Galway (up to March 2012)  
Prof. Anthony O’Regan, University Hospital Galway (March 2012 to date) |
| RCPI / ITS Clinical Advisory Group | Regional Leads and the following RCPI/ITS Nominees  
Dr Aidan O’Brien, Respiratory Consultant, Mid Western Regional Hospital Limerick  
Dr Barry Linnane, Respiratory Consultant, Mid Western Regional Hospital Limerick  
Dr Basil Elnazir, Paediatric Respiratory Consultant, Tallaght Hospital, Dublin 24  
Dr Des Murphy, Respiratory Consultant, Cork University Hospital |

### Conflicts of Interest Statement

Professor Pat Manning, National Clinical Programme Lead and Chair of the GDG, is a member of the GINA International Assembly as the Irish representative. Prof Manning’s role is advisory and non-remunerated or supported and does not involve reviewing or making recommendations on the guidelines content; this is the role of Scientific Committee and Board. No conflicts of interest were declared by the GDG members.
### Guideline National Consultative Groups

<table>
<thead>
<tr>
<th>Programme</th>
<th>Chairperson</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Emergency Medicine Programme</td>
<td>Dr Una Geary, ED Programme Lead, Consultant in Emergency Medicine, St. James Hospital, Dublin 8</td>
</tr>
<tr>
<td></td>
<td>Prof. Ronan O’Sullivan, Head of Paediatrics, School of Medicine &amp; Medical Science, UCD, Consultant in Paediatric Emergency Medicine Our Lady’s Children’s Hospital Crumlin, Dublin 8</td>
</tr>
<tr>
<td>National Acute Medicine Programme</td>
<td>Dr Garry Courtney, Acute Medicine Programme Lead, Clinical Director, St Luke’s Hospital Kilkenny</td>
</tr>
<tr>
<td></td>
<td>Prof Shane O’Neill, Acute Medicine Programme Lead, Respiratory Consultant, Beaumont Hospital, Dublin 7</td>
</tr>
<tr>
<td>National Paediatric Programme</td>
<td>Prof Alf Nicholson, Consultant Paediatrician, Children’s University Hospital, Temple Street, Dublin</td>
</tr>
<tr>
<td>Pre-Hospital Emergency Care Council</td>
<td>Dr Geoff King, Director, Pre-Hospital Emergency Care Council (R.I.P)</td>
</tr>
<tr>
<td></td>
<td>Brian Power, Pre-Hospital Emergency Care Council</td>
</tr>
<tr>
<td>National Critical Care Programme</td>
<td>Dr Michael Power, National Clinical Lead</td>
</tr>
<tr>
<td>Irish College of General Practitioners (ICGP)</td>
<td>Quality in Clinical Practice Committee</td>
</tr>
<tr>
<td>Pre-Hospital Emergency Care Council</td>
<td></td>
</tr>
<tr>
<td>External Reviewer</td>
<td>Prof Mark Fitzgerald, Professor of Medicine, Head, UBC and VGH Divisions of Respiratory Medicine, Director, Centre for Lung Health, The Lung Centre, Vancouver, Canada</td>
</tr>
<tr>
<td>Chairman of Scientific Committee GINA</td>
<td></td>
</tr>
<tr>
<td>DCU School of Nursing and Human Sciences Faculty of Science and Health</td>
<td>Dr Veronica Lambert, Deputy Head of School and Senior Lecturer in Nursing</td>
</tr>
<tr>
<td></td>
<td>Professor Anne Matthews, Head of School and Associate Professor in Health Sciences</td>
</tr>
<tr>
<td></td>
<td>Ms Jessica Collins, Lecturer in General Nursing</td>
</tr>
<tr>
<td></td>
<td>Ms Catherine Walshe, Research Assistant</td>
</tr>
</tbody>
</table>
Appendix 1.3. Consultation process

As part of the guideline development process the draft guideline was circulated to key stakeholders for feedback. A summary of the feedback provided during the consultation process is presented below:

<table>
<thead>
<tr>
<th>Feedback Submitted by:</th>
<th>Feedback Provided:</th>
<th>Incorporation of Feedback:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical Care Programme, Obstetrics and Gynaecology</td>
<td>• Dr Carmen Regan contributed text for the management of acute asthma exacerbation in pregnancy section</td>
<td>• Contribution gratefully received and incorporated into the guideline</td>
</tr>
<tr>
<td>Irish Thoracic Society</td>
<td>• ITS supportive of the development of acute asthma guidelines</td>
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<tr>
<td>Irish College of General Practitioners (ICGP)</td>
<td>• ICGP supportive of the development of acute asthma guidelines</td>
<td></td>
</tr>
<tr>
<td>Pre-Hospital Emergency Care Council (PHECC)</td>
<td>• Inclusion of ‘PHECC’ in Glossary</td>
<td>• PHECC inserted in glossary</td>
</tr>
<tr>
<td></td>
<td>• Inclusion of Pre-Hospital emergency care practitioners and PHECC in table 4 Roles and responsibilities of stakeholders</td>
<td>• Table 4 updated</td>
</tr>
<tr>
<td>Emergency Medicine Programme</td>
<td>• Asked to consider dosage of IM methylprednisolone</td>
<td>• 160mg recommended by BTS/SIGN guideline and agreed by NCPA CAG members</td>
</tr>
<tr>
<td></td>
<td>• Advised that early clinical input by Critical Care teams, particularly consultation with Critical Care Programme before the patient needs intubation, be included</td>
<td>• Feedback incorporated into the guideline</td>
</tr>
<tr>
<td></td>
<td>• Suggested that people requiring further supports prior to discharge should also include those with a history of substance misuse</td>
<td>• Feedback incorporated into the guideline</td>
</tr>
<tr>
<td></td>
<td>• Suggested that follow up after discharge takes place ‘within 4 weeks of the episode’</td>
<td>• Feedback incorporated into the guideline</td>
</tr>
<tr>
<td></td>
<td>• Suggested inclusion of ‘treatment protocols will be carried out by Emergency/Acute Medicine/Respiratory teams.’</td>
<td>• Feedback incorporated into the guideline</td>
</tr>
</tbody>
</table>
Appendix 2: Summary of tools to assist in implementation of National Clinical Guideline

The following tools are presented in Appendix 2:

2.1. Emergency Treatment Protocols for Management of Acute Adult Asthma
Emergency treatment protocols are standardised flow of treatment to be applied to the acute asthmatic
- Management of Acute Adult Asthma in ED, AMU & In hospital
- PHECC clinical practice guidelines (CPGs)

2.2. Emergency Treatment Care Bundles for Management of Acute Adult Asthma
- Management of asthma attack in general practice care bundle
- Life Threatening Asthma Attack Care bundle
- Severe/Moderate Asthma Attack Care Bundle
- Asthma Patient Discharge Care Bundle

2.3. Discharge Letter, Fax, Email Template for Management of Acute Adult Asthma

2.4. Audit Form for Emergency Asthma Care

2.5. Asthma Management Plans

2.6. Peak flow Measurements

2.7. Medications in Acute Asthma
Appendix 2.1 Emergency treatment protocols for management of acute adult asthma

### Management of Acute Adult Asthma in ED, AMU and in Hospital

**Initial Assessment**

<table>
<thead>
<tr>
<th>Life Threatening Asthma Features:</th>
<th>PEF &lt; 33% best or predicted SpO₂ &lt;92% OR any one of the</th>
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<tbody>
<tr>
<td>Silent chest, cyanosis, poor respiratory effort</td>
<td></td>
</tr>
<tr>
<td>Bradycardia, arrhythmia, Check BP for hypotension</td>
<td></td>
</tr>
<tr>
<td>Exhaustion, confusion, coma</td>
<td></td>
</tr>
</tbody>
</table>

**Management of acute adult asthma in ED, AMU & In Hospital**

**PEF > 75 %**
- best or predicted
**SpO₂ >92%**
- Mild
  - Can lie down
  - Talks in sentences
  - Mild-Mod wheeze
  - PR<110 Beats/ min
  - RR<25 Breaths/ min
  - BP Normal

**PEF 33–50 %**
- best or predicted
**SpO₂ >92%**
- Moderate
  - Loud wheeze
  - Prefer to sit
  - Talks in phrases
  - PR<110 Beats/ min
  - RR<25 Breaths/ min
  - BP Normal

**PEF 10-15 mins**
- Give salbutamol 5 mg plus ipratropium 0.5 mg via oxygen-driven nebuliser
- AND prednisolone 40-50mg orally or IV hydrocortisone 100 mg or 125mg of methylprednisolone

**PEF <50%**
- Repeat salbutamol via inhaler/nebulizer 5mg at 15-30 min intervals

**PEF < 33 %**
- best or predicted
**SpO₂ <92%**
- Severe
  - Respiration >25 breaths/min
  - Pulse > 110 beats/min
  - Cannot complete sentence in one breath
  - BP Normal

**OR any one of the Life Threatening Asthma Features:**
- Silent chest, cyanosis, poor respiratory effort
- Bradycardia, arrhythmia
- Check BP for hypotension
- Exhaustion, confusion, coma

**Give salbutamol up to 12 puffs via spacer or oxygen driven nebuliser**

**Obtain Senior/ICU/ Specialist help now if any life threatening asthma features are present**

**IMMEDIATE MANAGEMENT**

- High concentration oxygen (>60% if possible – goal to maintain sats at 84%)
- Give salbutamol 5 mg plus ipratropium 0.5 mg via oxygen-driven nebuliser
- AND prednisolone 40-50mg orally or IV hydrocortisone 100 mg or 125mg of methylprednisolone

**Measure arterial blood gases**

- Markers of severity:
  - Normal or raised PaCO₂ (Pa CO₂ =4.6kPa)
  - Severe hypoxia (Pa O₂<8 kPa)
  - Low pH (or high H⁺)

- Chest X-ray
- 12-Lead ECG
- Give/repeat salbutamol 5 mg with ipratropium 0.5 mg by oxygen-driven nebuliser after 15 minutes
- Consider continuous salbutamol nebuliser 5-10 mg/hr.
- Consider IV magnesium sulphate 2g over 20 minutes
- Correct fluid/electrolytes, especially K⁺ disturbances

**ADMIT for minimum of 24 hours**

- Patient should be accompanied by a nurse or doctor at all times

**DISCHARGE PLAN**

- In all patients who received nebulised β2 agonists prior to presentation, consider an extended observation period prior to discharge
- If PEF<50% on presentation, prescribe prednisolone 40-50mg/day for 5 days. Ensure all patients have a treatment supply
- In all patients ensure treatment supply of inhaled steroid and β2 agonist as a minimum and check inhaler technique
- PEF meter instruction and written asthma management plan
- Consider psycho-social factors before discharge
- GP follow up within 2 working days post presentation advised for moderate/severe life-threatening exacerbation (2 weeks – mild)
- Fax Or email discharge letter to GP and copy to patient
- Refer to Asthma/ Respiratory Service for follow up within 4 weeks
- Complete Asthma Discharge Plan
- Consider delay in discharge to 8 am if after midnight

---

**Peak expiratory flow in normal adults**

<table>
<thead>
<tr>
<th>Peak Flow (L/min)</th>
<th>Height (cm)</th>
<th>Age (yrs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>650</td>
<td>190-210</td>
<td>Men</td>
</tr>
<tr>
<td>600</td>
<td>170-190</td>
<td>Women</td>
</tr>
<tr>
<td>550</td>
<td>150-170</td>
<td></td>
</tr>
<tr>
<td>500</td>
<td>130-150</td>
<td></td>
</tr>
<tr>
<td>450</td>
<td>110-130</td>
<td></td>
</tr>
<tr>
<td>400</td>
<td>90-110</td>
<td></td>
</tr>
<tr>
<td>350</td>
<td>70-90</td>
<td></td>
</tr>
</tbody>
</table>

---

**Based on GINA and BTS Guideline on the Management of Asthma 2008**
A National Clinical Guideline – Summary

Management of an Acute Asthma Attack in Adults
(aged 16 years and older)

PHECC Clinical Practice Guideline

Asthma – Adult

Assess and maintain airway

Respiratory assessment

Salbutamol, 5 mg, NEB

OR

Salbutamol (0.1 mg) metered aerosol

Resolved/ improved

Yes

ECG & SpO2 monitoring

Oxygen therapy

Request

ALS

Salbutamol, 5 mg, NEB

OR

Ipratropium bromide 0.5 mg NEB & salbutamol 5 mg NEB mixed

Resolved/ improved

Yes

Resolved/ improved

Yes

Hydrocortisone, 100 mg slow IV (infusion in 100 mL NaCl)

Salbutamol, 5 mg, NEB

Consider

Magnesium Sulphate 2 g IV (infusion in 100 mL NaCl)

Salbutamol, 5 mg, NEB

Every 5 minutes prn

Mild Asthma

Moderate Asthma

Severe Asthma

Life-threatening Asthma

If no improvement Salbutamol aerosol, 0.1 mg may be repeated up to 5 times as required

### Adult Asthma Acute Management in General Practice and Primary Care out of hours settings

**Assess and Record:** Peak expiratory flow; Symptoms and response to self treatment; Heart and respiratory rates; Oxygen Saturation (by pulse oximetry, if available)

**Caution:** Patients with severe or life threatening attacks may not be distressed and may not have all the abnormalities listed below. The presence of any should alert the doctor

Regard each emergency asthma consultation as for acute life threatening/severe asthma until it is shown otherwise

<table>
<thead>
<tr>
<th>Date (of review): _________________ Time: _________________</th>
<th>Time Processed Nurse/Physician Initials/Comments</th>
</tr>
</thead>
</table>

- Give Oxygen via face mask if available, 40 – 60%

**If Moderate asthma attack (PEF 50-75%):**
- Give $\beta_2$ agonist via spacer up to 12 puffs (given one at a time and inhaled separately) at intervals of 15 - 30 minutes

**If Severe/ Life threatening (< 50%):**
- Administer salbutamol 5mg or terbutaline 10mg via oxygen driven nebuliser

**If PEF 50-75% predicated/best:**
- Administer prednisolone 40 - 50mg orally or
- IV hydrocortisone 100mg

All patients who received nebulised $\beta_2$ agonist, require extended observation period

- Assess response to treatment in 15 minutes post administration of $\beta_2$ agonist, continually observing symptoms

**If NO response arrange immediate admission to Hospital ED /AMU**
- Dial 112 OR 999
- Administer High Dose $\beta_2$ agonist and ipratropium 0.5mg via nebuliser
- Stay with patient until ambulance arrives
- Send documentation assessment and referral to hospital
- Ensure patient is given high dose $\beta_2$ agonist via oxygen driven nebuliser in ambulance

**If GOOD response, the patient’s symptoms improve**
- Continue step up of usual treatment and continue course of oral prednisolone
- Ensure the patient has a prescription for $\beta_2$ agonist and inhaled steroid (if not already on inhaled steroids) prior to discharge
- Commence PEF diary and encourage charting symptoms in the asthma management plan
- Check technique of use inhaler and peak flow meter
- Demonstrate inhaler technique and peak flow use to new patients and carer as appropriate.
- Arrange GP follow up within 2 working days
**Attack of Life Threatening Asthma (Adult) in ED/ AMU Management Bundle**

**Life Threatening Asthma**
PEF<33% best or predicted OR any one of the life threatening asthma features:
- 
  SpO₂ < 92%, silent chest, cyanosis, poor respiratory effort, bradycardia, arrhythmia, hypotension, exhaustion, confusion, coma. **Patient should be monitored continuously.**

<table>
<thead>
<tr>
<th>Date: ___________________</th>
<th>Time: ___________________________</th>
<th>Time Processed Nurse/Physician Initials/Comments</th>
</tr>
</thead>
</table>

Give high concentration Oxygen (60%) to maintain SpO₂ greater than 94%

Administer Salbutamol 5mg + Ipratropium 0.5mg by oxygen driven (6-8L/min) nebulizer (within 5 mins of arrival) and repeat every 15mins until improvement from above.

Prednisolone 40-50 mg PO or IV hydrocortisone 100mg or 125mg methylprednisolone

Cardiac monitor, pulse oximetry and Insert IV line

ABG – Measure arterial blood gases

Markers of severity:
- Normal or raised PaCO₂ (Pa CO₂ > 4.6kPa)
- Severe hypoxia (Pa O₂ < 8 kPa)
- Low pH (or high H+)

Assess need for intubation and ventilation, if yes contact anaesthetist/Critical care team

If poor or no response (following consultation with senior physician)
- Magnesium sulphate 2g IV in 50ml Normal Saline over 20 minutes

Chest X-Ray

12-lead ECG

FBC, electrolytes, BUN, SCr, blood glucose

Decision to Admit to ICU/HDU

Physician Signature      Printed Name
_________________________    ___________________________

---

**Table for Approved Medications Administration**

<table>
<thead>
<tr>
<th>Medication</th>
<th>Nurse</th>
<th>Nurse Prescriber</th>
<th>Physician</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oxygen</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Salbutamol</td>
<td>√</td>
<td>√</td>
<td>√</td>
</tr>
<tr>
<td>Ipratropium</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
<tr>
<td>Prednisolone /Methylprednisolone</td>
<td>√</td>
<td>√</td>
<td></td>
</tr>
</tbody>
</table>

Affix Patient Label Here
### Asthma Discharge Checklist from ED and AMU

Review each of the steps and incorporate into your discharge planning process for an Asthma Patient

<table>
<thead>
<tr>
<th>Date (of discharge):________________________</th>
<th>Time________________________</th>
<th>Time Processed Nurse/Physician Initials/Comments</th>
</tr>
</thead>
</table>

- Consider psycho-social factors in discharge and refer to MDT or agency if required
- Consider delay in discharge to 8am if after midnight
- If patient received nebulised $\beta_2$ agonists prior to presentation to ED/AMU consider an extended observation period (more than 4 hours) prior to discharge
- If PEF < 50% on presentation, prescribe oral prednisolone 40-50 mg/day for 5 days
- Ensure prescription for oral (if required) and inhaled steroid $\beta_2$ agonist is supplied to patient on discharge (GMS patient go to GP for medical card prescription)
- Check inhaler technique
- Implement written asthma management plan and diary
- Purchase own PEF meter from Asthma Society of Ireland (ASI) or pharmacy
- Advise patient to arrange GP follow up for within 2 working days of presentation for moderate/ severe/ life-threatening asthma (within 2 weeks – mild)
- Fax or email discharge letter to GP
- Copy to Asthma nurse/respiratory service

**Physician Signature**

_________________________

**Printed Name**

_________________________

Affix patient Label here
Appendix 2.3. Discharge letter, fax, email template for management of acute adult asthma

Discharge Letter following acute asthma attack to Emergency Department / Hospital

Hospital Name

Patient Name: _______________________________ DOB: __________________________

Address _____________________________________________________________________________________________

Date /time ___________________________________

Dear (GP’s Name) _____________________________________________________________

Age: ___________________________ Height: ___________________________ Predicted Peak Flow: ___________________________

<table>
<thead>
<tr>
<th>Initial assessment</th>
<th>On discharge</th>
</tr>
</thead>
<tbody>
<tr>
<td>PEF</td>
<td></td>
</tr>
<tr>
<td>SpO₂</td>
<td></td>
</tr>
<tr>
<td>Pulse</td>
<td></td>
</tr>
<tr>
<td>Respiratory rate</td>
<td></td>
</tr>
</tbody>
</table>

We have discussed
☑ Inhaler use / technique with (type) .................................................................................................
☑ Medicines including side effects ...........................................................................................................
☑ Trigger avoidance ...................................................................................................................................
☑ Smoking cessation .................................................................................................................................
☑ How to recognise worsening asthma and what to do in asthma attack: ............................................

Was given a leaflet detailing a simple management plan (copy enclosed) ..............................................

Other important issues discussed:

1 ...........................................................................................................................................................
2 ...........................................................................................................................................................
3 ...........................................................................................................................................................

They have been given written information about asthma management

They have been referred to:
Asthma Nurse Specialist ............................................................................................................................
Respiratory Consultant .............................................................................................................................
Other .........................................................................................................................................................

For follow up appointments.

They have been discharged on the following medications:

Contact Details:       Emergency Department
Signature:   Hospital
Name: violations
Title: violations
Bleep:
## Appendix 2.4. Audit form for emergency asthma care

### Audit Form for Emergency Asthma Care

<table>
<thead>
<tr>
<th>Patient Name: ……………………………………………………………………</th>
<th>DOB: ……………………………………</th>
<th>Date/Time: ……………………………………</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>No.</th>
<th>Item</th>
<th>Yes</th>
<th>No</th>
<th>N/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>PEF on admission and after treatment (in anyone over 5 years)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>Pulse rate, respiratory rate and SpO₂. Where SpO₂&lt; 92% check arterial blood gases and give oxygen as appropriate</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Inhaler technique checked and recorded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Relevant past medical history recorded (asthma and atopy in particular)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Triggers identified and avoidance discussed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Current medicines recorded, including dose, frequency (or their absence) recorded</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Concordance issues addressed</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Psycho-social or other risk factors</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Stable on four hourly treatment or when PEF &gt;75% of best or predicted</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Steroid tablets given as appropriate, as per GINA guidelines</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11.</td>
<td>Provided written information and action plan</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.</td>
<td>Follow-up with GP within 2 working days of discharge advised for moderate/severe/life-threatening asthma (2 weeks – mild) and discharge letter sent</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where you have ticked N/A (not applicable) please explain here e.g. No Peak flow as under 5...
### Appendix 2.5. Asthma Management Plan

**A National Clinical Guideline – Summary**

**Management of an Acute Asthma Attack in Adults** (aged 16 years and older)

### HOW TO USE YOUR PEAK FLOW METER

1. Measure your peak flow morning and evening before taking your inhalers.
2. Sit up straight.
3. Push the pointer on the peak flow meter to base/zero.
4. Take a deep breath in.
5. Grill the mouthpiece with your teeth and seal with your lips. Take care not to cover or block the pointer with your finger.
6. Blow as hard and fast as you can. (Short, sharp blast)
7. Do this 3 times and record the highest reading.

If you are unsure of how to use your peak flow meter go to the Asthma Society of Ireland website [www.asthmasociety.ie](http://www.asthmasociety.ie) for a video demonstration.

### WHAT TO DO IN AN ASTHMA ATTACK

**THE FIVE MINUTE RULE**

1. Ensure the reliever is taken immediately. This is usually blue and opens up narrowed airways.
2. Sit down and loosen tight clothing.
3. Attacks may be frightening and it is important to stay calm.
4. If no immediate improvement during an attack, continue to take the reliever every minute for five minutes or until symptoms improve: two puffs of MDI/evohaler or one puff of turbohaler.
5. If your symptoms do not improve in five minutes, or if you are in doubt, call 999 or 112 or a doctor urgently. Continue to take reliever until help arrives or symptoms improve. Use a spacer device if possible for maximum benefit.

### Peak Flow Diary

<table>
<thead>
<tr>
<th>Date and Signature of Health Care Professional</th>
</tr>
</thead>
</table>

**THese instructions are Guidelines**, regardless of the advice in the plan, if you are unhappy about your condition seek medical help.

- **Name:**
- **Address:**
- **Phone:**
- **Emergency Contact:**
- **Relationship:**
- **Mobile Phone:**
- **Home Phone:**
- **GP:**
- **GP Contact Number:**
- **In Emergency Go To:**
- **Phone:**

### Asthma Self Management Plan

- **Allergic Triggers**
- **Nasal Congestion / Medication**
- **Exercise**
- **Emergency Home Steroids**
- **Smoking Cessation**
- **Flu Vaccine (administered by)**
- **Inhaler Technique**
- **Relievers & Controllers**
- **Peak Flow Measuring / Recording**
- **Asthma Self Management Plan**

---

**Asthma Society of Ireland**

Tel (01) 817 8886
Fax: (01) 817 8878
Asthma Advice Line 1850 44 54 64
Email: office@asthmasociety.ie
www.asthmasociety.ie

**Health Service Executive**

[Image: Healthcare logos and contact information]

---

**Image 41x34 to 518x709**

**Image of a page with a table and diagram regarding asthma management plan.**
### ASTHMA MANAGEMENT PLAN

**Date you started this Diary:**

<table>
<thead>
<tr>
<th>Day</th>
<th>AM</th>
<th>PM</th>
<th>AM</th>
<th>PM</th>
<th>AM</th>
<th>PM</th>
<th>AM</th>
<th>PM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Symptoms during the day:**

1. Have you had any asthma symptoms: coughing, wheezing, tight chest or feeling breathless?
2. Has your asthma interfered with your usual activities (e.g., housework, climbing stairs, work or school, exercise)?
3. Have you had difficulty sleeping because of your asthma symptoms (including coughing)?
4. Have you needed to use your reliever inhaler more than twice a week?
5. Have you had nasal symptoms (e.g., nasal congestion, sneezing, post nasal drip)?

#### Green Zone: Asthma under Control

**Peak Flow:**

- Daytime symptoms less than twice/week
- No limitation of exercise
- No waking at night due to symptoms
- Reliever medication used less than twice per week
- Peak flow between ___ and ___%

**Your Regular Treatment: Each day take:**

1. **Reliever:**
2. **Controller:**
3. 
4. 
5. **Before Exercise take:**

**Best:**

- **Peak flow between ___ and ___%**

#### Blue Zone: Asthma getting worse

**Peak Flow:**

- Daytime symptoms more than twice/week?
- Getting chesty cough?
- Waking at night with cough or wheeze?
- New or increased daytime cough or wheeze?
- Symptoms after activity or exercise?
- Using reliever med more than twice per week?
- Peak flow between ___ and ___%

**If you answered ‘yes’ to 3 or more of these questions, your asthma is uncontrolled and you may need to step up your treatment.**

**Step up your treatment as follows:**

1. Increase your reliever to ____________.
2. Take ____________.
3. ____________.

**Best:**

- **Peak flow between ___ and ___%**

**Call your doctor/clinic: Phone No. ____________ and get immediate advice.**

**Take the following medication:**

1. Increase your reliever to ____________.
2. ____________.
3. Take ___ mg of ____________ (oral steroid) if prescribed.

**Out of hours contact: ___________________________________________________________**

**Use a spacer device if possible for maximum benefit.**

#### Orange Zone: Asthma becoming severe

**Peak Flow:**

- Symptoms becoming more severe
- Becoming breathless at rest
- Chest tightness
- Reliever medication has poor or short lived effect
- Peak flow between ___ and ___%

**Call your doctor/clinic: Phone No. ____________ and get immediate advice.**

**Take the following medication:**

1. Increase your reliever to ____________.
2. ____________.
3. Take ___ mg of ____________ (oral steroid) if prescribed.

**Out of hours contact: ___________________________________________________________**

**Use a spacer device if possible for maximum benefit.**

#### Red Zone: Emergency

**Peak Flow:**

- Shortness of breath
- Can only speak in short sentences
- Trouble walking
- Lips are blue
- Short lived response to reliever
- Peak flow is less than ___%

**Get medical help immediately.**

- **Go to:**
- **Out of hours:**
- Take 2 to 4 puffs of your reliever inhaler
- Take ___ mg of ____________ (oral steroid) if prescribed.

**Continue to take 2 puffs of reliever every minute until symptoms improve or help arrives.**

**Use a spacer device if possible for maximum benefit.**
### Appendix 2.6. Peak Flow Measurements

#### ADULT MALE NORMAL VALUES

**Peak Expiratory Flow Rate**

For use with EU/EN13826 scale PEF meters only

<table>
<thead>
<tr>
<th>AGE in yrs</th>
<th>1.6m 5'3&quot;</th>
<th>1.67m 5'6&quot;</th>
<th>1.75m 5'9&quot;</th>
<th>1.83m 6'</th>
<th>1.90m 6'3&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>485</td>
<td>498</td>
<td>511</td>
<td>524</td>
<td>533</td>
</tr>
<tr>
<td>20</td>
<td>540</td>
<td>555</td>
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<td>25</td>
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<td>624</td>
<td>637</td>
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<td>575</td>
<td>591</td>
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<td>536</td>
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<td>552</td>
<td>453</td>
<td>465</td>
<td>477</td>
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<tr>
<td>85</td>
<td>418</td>
<td>429</td>
<td>440</td>
<td>451</td>
<td>460</td>
</tr>
</tbody>
</table>

#### ADULT FEMALE NORMAL VALUES

**Peak Expiratory Flow Rate**

For use with EU/EN13826 scale PEF meters only

<table>
<thead>
<tr>
<th>AGE in yrs</th>
<th>1.52m 5'3&quot;</th>
<th>1.6m 5'6&quot;</th>
<th>1.67m 5'9&quot;</th>
<th>1.75m 5'9&quot;</th>
<th>1.83m 6'</th>
</tr>
</thead>
<tbody>
<tr>
<td>15</td>
<td>385</td>
<td>394</td>
<td>402</td>
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Adapted by Clement Clarke for use with EN13826 / EU scale peak flow meters from Nunn AJ Gregg I, Br Med J 1989:298;1068-70
### Appendix 2.7. Medications in acute asthma

<table>
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<tr>
<th>Medicine Class/Generic Name</th>
<th>Adult Dose</th>
<th>Comments</th>
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<tbody>
<tr>
<td>Oxygen</td>
<td>High Flow</td>
<td>Adults with severe asthma are hypoxaemic and should be given high flow oxygen to maintain oxygen saturation at 92% or above</td>
</tr>
<tr>
<td>β₂ agonist bronchodilators/salbutamol, terbutaline</td>
<td>Ideally salbutamol 5mg or terbutaline 10mg via oxygen driven nebuliser or up to 12 puffs via spacer. Repeat doses should be given at 15-30 minute intervals or continuous nebulisation of salbutamol at 5-10mg/hour if inadequate response to initial treatment.</td>
<td>These act quickly to relieve bronchospasm and have few side effects. They should be administered as early as possible in an asthma attack. pMDI + spacer is preferable method of delivery. 12 PUFFS VIA SPACER IS JUST AS EFFECTIVE AS NEBULISER UNLESS FEATURES OF LIFE-THREATENING ASTHMA ATTACK</td>
</tr>
<tr>
<td>Bronchodilators/Ipratropium</td>
<td>0.5mg 4-6 hourly mixed with nebulised β₂ agonist in severe or life threatening asthma or those with a poor initial response to β₂ agonist therapy</td>
<td></td>
</tr>
<tr>
<td>Steroids/Prednisolone</td>
<td>40-50mg daily for 3 to 7 days or until recovery</td>
<td>Steroid tablets reduce mortality, relapses and hospital admissions. The earlier they are given in an attack the better the outcome. Following recovery steroid tablets can be dropped abruptly and do not need tapering provided that the patient is receiving inhaled steroids (apart from those patients on maintenance steroid tablets or where steroid tablets are needed for more than three weeks).</td>
</tr>
<tr>
<td>Steroids/Hydrocortisone</td>
<td>IV (100mg, 6 hourly)</td>
<td>ONLY USE IV IF COMATOSE OR VOMITING AS ORAL PREDNISOLONE IS JUST AS EFFECTIVE</td>
</tr>
<tr>
<td>IV Magnesium Sulphate</td>
<td>1.2 – 2g IV infusion over 20 minutes but should only be used following consultation with senior medical staff</td>
<td>Consider giving single IV dose for patients with severe asthma who have not had a good initial response to inhaled bronchodilator therapy or for life threatening or near fatal asthma attacks</td>
</tr>
<tr>
<td>IV Aminophylline</td>
<td>Use only after consultation with senior medical staff</td>
<td></td>
</tr>
<tr>
<td>Antibiotics</td>
<td></td>
<td>Routine prescription of antibiotics is not indicated for asthma. Infection often triggers an episode but is more likely to be viral rather than bacterial in type</td>
</tr>
</tbody>
</table>
# Appendix 3: Glossary of Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>ABG</td>
<td>Arterial blood gas</td>
</tr>
<tr>
<td>AGREE 11</td>
<td>Appraisal of Guidelines for Research and Evaluation</td>
</tr>
<tr>
<td>AMU</td>
<td>Acute Medical Unit</td>
</tr>
<tr>
<td>AMAU</td>
<td>Acute Medical Assessment Unit</td>
</tr>
<tr>
<td>ASI</td>
<td>Asthma Society of Ireland</td>
</tr>
<tr>
<td>BP</td>
<td>Blood Pressure</td>
</tr>
<tr>
<td>BTS</td>
<td>British Thoracic Society</td>
</tr>
<tr>
<td>BUN</td>
<td>Blood Urea Nitrogen</td>
</tr>
<tr>
<td>BVM</td>
<td>Bag Valve Mask</td>
</tr>
<tr>
<td>CAG</td>
<td>Clinical Advisory Group</td>
</tr>
<tr>
<td>CCM</td>
<td>Chronic Care Model</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CEU</td>
<td>Clinical Effectiveness Unit</td>
</tr>
<tr>
<td>CF</td>
<td>Cystic Fibrosis</td>
</tr>
<tr>
<td>CMO</td>
<td>Chief Medical Officer</td>
</tr>
<tr>
<td>CNS</td>
<td>Clinical Nurse Specialist in Respiratory care</td>
</tr>
<tr>
<td>COAX</td>
<td>Cost of Asthma Exacerbations</td>
</tr>
<tr>
<td>COPD</td>
<td>Chronic Obstructive Pulmonary Disease</td>
</tr>
<tr>
<td>CO₂</td>
<td>Carbon Dioxide</td>
</tr>
<tr>
<td>CPI</td>
<td>Consumer Price Index</td>
</tr>
<tr>
<td>CPG</td>
<td>Clinical Practice Guidance</td>
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<tr>
<td>CPD</td>
<td>Continuous Professional Development</td>
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<tr>
<td>CSO</td>
<td>Central Statistics Office</td>
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<tr>
<td>CXR</td>
<td>Chest X-ray</td>
</tr>
<tr>
<td>DALY</td>
<td>Disability Adjusted Life year</td>
</tr>
<tr>
<td>DARE</td>
<td>Database of Abstracts of Reviews and Effects</td>
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<tr>
<td>DCU</td>
<td>Dublin City University</td>
</tr>
<tr>
<td>DML</td>
<td>Dublin Mid Leinster</td>
</tr>
<tr>
<td>DMP</td>
<td>Disease Management Programme</td>
</tr>
<tr>
<td>DNE</td>
<td>Dublin North East</td>
</tr>
<tr>
<td>DOB</td>
<td>Date of Birth</td>
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<tr>
<td>DOH</td>
<td>Department of Health</td>
</tr>
<tr>
<td>DPS</td>
<td>Drug Payment Scheme</td>
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<tr>
<td>EBP</td>
<td>Evidence Based Practice</td>
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<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
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<tr>
<td>ED</td>
<td>Emergency Department</td>
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<tr>
<td>EFR</td>
<td>Emergency First Response</td>
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<tr>
<td>EU/EN 13826</td>
<td>European Union Scale (for peak flow meters)</td>
</tr>
<tr>
<td>FBC</td>
<td>Full Blood Count</td>
</tr>
<tr>
<td>FEV₁</td>
<td>Forced Expired Volume in one second</td>
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<tr>
<td>GDG</td>
<td>Guideline Development Group</td>
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<tr>
<td>GINA</td>
<td>Global Initiative for Asthma</td>
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<tr>
<td>GMS</td>
<td>General Medical Services</td>
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<tr>
<td>GP</td>
<td>General Practitioner</td>
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<tr>
<td>GPOOH</td>
<td>GP Out of Hours</td>
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<tr>
<td>H⁺</td>
<td>Hydrogen acid</td>
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<td>HDU</td>
<td>High Dependecy Unit</td>
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<td>HIPE</td>
<td>Hospital In-patient Enquiry</td>
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<td>HSE</td>
<td>Health Service Executive</td>
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<tr>
<td>IARS</td>
<td>Irish Association of Respiratory Scientists</td>
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<td>ICER</td>
<td>Incremental Cost Effectiveness Ratio</td>
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<td>ICGP</td>
<td>Irish College of General Practitioners</td>
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