# Triage & Assessments

**Inclusion:** Age ≥ 16 years old and one of the following: history of asthma; or previous episode of wheezing requiring treatment; or asthma and pregnancy; or COPD with asthma

**Exclusion:** COPD without asthma; or CHF; or ED visit for prescription refill only

**Triage and Assessments:** History, physical examination (auscultation, use of accessory muscles, heart rate, respiratory rate), frequent reassessment with objective measures (FEV₁ or PEF), frequent or continuous SpO₂ monitoring and other tests as indicated

## Diagnosis & Quality Assurance

### Mild Asthma (CTAS 3)

| Nurse Assessment < 30 minutes; 1st Bronchodilator < 30 minutes; MD Assessment < 30 minutes |
|---|---|---|
| • Exertional dyspnea/cough | • Increased use of β₂ agonist | • FEV₁ or PEF > 60% predicted |
| • +/- Nocturnal symptoms | • Good response to β₂ agonist | • O₂ saturation > 95% |

### Moderate Asthma (CTAS 3)

| Nurse Assessment < 30 minutes; 1st Bronchodilator < 30 minutes; MD Assessment < 30 minutes |
|---|---|---|
| • Dyspnea at rest, cough, congestion, chest tightness | • Partial relief from β₂ agonist or required more often than q4 hours | • FEV₁ or PEF 40 to 60% predicted |
| • Nocturnal symptoms | | • O₂ saturation > 95% |

### Severe Asthma (CTAS 2)

| Nurse Assessment - Immediate; 1st Bronchodilator < 10 minutes; MD Assessment < 15 minutes |
|---|---|---|
| • Laboured respirations | • Difficulty speaking | • FEV₁ or PEF - unable to do or < 40% predicted |
| • Tachycardic | • No relief from β₂ agonist | • O₂ saturation 90 to 95% |
| • Agitated, diaphoretic | | |

### Potentially Fatal Asthma (CTAS 1)

| Nurse Assessment - Immediate; 1st Bronchodilator - Immediate; MD Assessment - Immediate |
|---|---|---|
| • Exhausted, confused | • Silent chest | • FEV₁ or PEF - unable to do |
| • Diaphoretic, cyanotic | • Decreased respiratory effort | • O₂ saturation < 90% |
| • Falling heart rate | | |

*Quality Assurance - as per Canadian Triage and Acuity Scale (CTAS) Guidelines “Times to Assessment” are operating objectives, not established standards of care. Facilities without on-site physician coverage may meet assessment objectives using delegated protocols and remote communication.*
Initial Treatment

Mild & Moderate Asthma (CTAS 3)

Supplemental oxygen to keep SpO₂ ≥ 92%
Frequent reassessment with objective measures (FEV₁ or PEF)

Frequent/continuous β₂-agonist
• Salbutamol pMDI + spacer (100 mcg/puff): 4 to 8 puffs, q 15 to 20 minutes x 3 is usual; OR
• Salbutamol nebulizer (5 mg/mL): 5 mg (1 mL) in 3 mL 0.9% sodium chloride, q 15 to 20 minutes x 3 is usual; OR
• Salbutamol continuous nebulizer as necessary

Anticholinergic
• Ipratropium bromide pMDI + spacer (20 mcg/puff): 4 to 8 puffs, q 15 to 20 minutes x 3 is usual; OR
• Ipratropium bromide nebulizer (250 mcg/mL): 250 to 500 mcg (1 to 2 mL) in 3 mL 0.9% sodium chloride q 15 to 20 minutes x 3 is usual; OR
• Ipratropium bromide continuous nebulizer as necessary

All patients with FEV₁ or PEF < 60% predicted OR with moderate/severe dyspnea:

Corticosteroid
• Prednisone PO: 50 mg tablet x 1 dose; OR
• IV methylprednisolone: 40 to 125 mg; dilute in 50 mL D5W or 0.9% sodium chloride x 1 dose over 15 to 30 minutes, if there is concern about reliability of the oral route

Consider
• In addition to systemic corticosteroid, consider high-dose inhaled fluticasone 500 mcg (or equivalent) q 10 minutes x 1 hour

If unresponsive to treatment, consider “Treatment of Severe Asthma”

Continue/Add

Treatment of Severe Asthma (CTAS 2)

MD/RN/RT supervision until clear signs of improvement

Frequent reassessment with objective measures (FEV₁ or PEF)
FEV₁ or PEF – unable to do OR < 40% consider:

Frequent/continuous β₂-agonist
• Increase salbutamol pMDI + spacer (100 mcg/puff): 1 puff q 30 to 60 seconds (4 to 20 puffs prn - within limits of patient’s tolerability) NOTE: notify physician if patient develops tremors or HR > 130; OR
• Salbutamol nebulizer (5 mg/mL): 5 mg (1 mL) in 3 mL 0.9% sodium chloride q 15 to 20 minutes as necessary; OR
• Salbutamol continuous nebulizer as necessary
**Anticholinergic**
- Increase ipratropium bromide pMDI + spacer (20 mcg/puff): 1 puff q 30 to 60 seconds (4 to 20 puffs prn - within limits of patient’s tolerability); OR
- Ipratropium bromide nebulizer (250 mcg/mL): 250 to 500 mcg (1 to 2 mL) in 3 mL 0.9% sodium chloride q 15 to 20 minutes as necessary; OR
- Ipratropium bromide continuous nebulizer as necessary

**IV Corticosteroid**
- IV methylprednisolone: 40 to 125 mg; dilute in 50 mL D5W or 0.9% sodium chloride x 1 dose over 15 to 30 minutes; OR
- IV hydrocortisone: 250 to 500 mg; dilute in 50 to 100 mL D5W or 0.9% sodium chloride x 1 dose over 15 to 30 minutes

**Consider:**
- IV magnesium sulfate (0.5 g/mL): usually 2 g (4 mL) in 100 mL D5W over 20 minutes x 1 dose
- Arterial or venous blood gases
  NOTE: normal or elevated PCO₂ may be a sign of impending respiratory failure

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**If unresponsive to treatment, consider “Treatment of Potentially Fatal Asthma”**

**Continue/Add**

**Treatment of Potentially Fatal Asthma (CTAS 1)**

Frequent reassessment with objective measures (FEV₁ or PEF) when patient able in order to assess degree of improvement

- High concentration O₂ (> 60% if possible) with continuous oximetry
- IV magnesium sulfate (0.5 g/mL): usually 2 g (4 mL) in 100 mL D5W over 20 minutes x 1 dose
- Epinephrine IM (1:1,000 solution = 1 mg/mL): 0.3 to 0.5 mg (0.3 to 0.5 mL) every 20 minutes as necessary
- Epinephrine IV injection: dilute 1 mL of 1:1,000 solution (1 mg/mL) with 9 mL of 0.9% sodium chloride (= 1:10,000 dilution) and give 0.1 mg (1 mL) IV over 5 to 10 minutes
- Epinephrine IV infusion: dilute 2 mL of 1:1,000 solution (1 mg/mL) in 250 mL of D5W (= 8 mcg/mL) and infuse at 1 to 4 mcg/min (= 7.5 to 30 mL/hour)

**Measure Arterial Blood Gases**
NOTE: normal or elevated PCO₂ may be a sign of impending respiratory failure
Rapid Sequence Intubation

For rapid sequence intubation, when available, consult a physician experienced in this procedure.

Assisted Ventilation

• Ventilatory management should be supervised by a physician experienced with this therapy in a critical care area.
• Intubated/ventilated patients may require ongoing sedation +/- paralysis.

Unresponsive: Rule out pneumothorax or upper airway obstruction; Consider alternative drugs: IV β₂-agonist, inhalational anaesthetic agent.

Prepare:

• Assemble equipment and verify functioning: suction, self-inflating bag & mask, oxygen source, laryngoscope, endotracheal tubes in varying sizes, stylet
• Ensure reliable IV access
• Assistant present

Preoxygenate:

• 100% oxygen and follow SpO₂%

Induction:

• ketamine 1.5 mg/kg IV (give as a bolus and may be an effective bronchodilator at doses of 2 - 3 mg/kg); OR
• propofol 2.0 - 2.5 mg/kg IV (start with 1.0 mg/kg); with or without midazolam 0.1 - 0.3 mg/kg IV

Paralysis:

• succinylcholine 1.5 mg/kg IV; OR
• rocuronium 1.0 mg/kg IV

Methylxanthine (e.g. aminophylline)

NOTE: Not recommended as bronchodilator in the first 4 hours of treatment
• Load: 3 to 6 mg/kg IV over 30 minutes (reduce dose by 50% if already taking aminophylline or theophylline)
• Infusion: 0.2 to 1 mg/kg/hour (follow levels)

If unresponsive to treatment, consider “Treatment of Refractory Cases”

Continue/Add

Treatment of Refractory Cases (CTAS 1)

Frequent reassessment with objective measures (FEV₁ or PEF) when patient able in order to assess degree of improvement.

Patients unresponsive to treatment may benefit from IV β₂-agonist, methylxanthine or inhalational anaesthetic agent. These forms of therapy may require consultation with Respirology, ICU, Anesthesiology and/or Internal Medicine.

Prepare:

• Assemble equipment and verify functioning: suction, self-inflating bag & mask, oxygen source, laryngoscope, endotracheal tubes in varying sizes, stylet
• Ensure reliable IV access
• Assistant present

Preoxygenate:

• 100% oxygen and follow SpO₂%

Induction:

• ketamine 1.5 mg/kg IV (give as a bolus and may be an effective bronchodilator at doses of 2 - 3 mg/kg); OR
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• Infusion: 0.2 to 1 mg/kg/hour (follow levels)
Re-Assessment

**Good Response**
- Physical exam: normal (HR & RR); no distress
- Clinically stable, response sustained after last treatment
- FEV₁ or PEF > 60% predicted
- SpO₂ > 98% on room air

**Incomplete Response**
- Physical exam: mild-moderate symptoms
- FEV₁ or PEF 40 to 60% predicted
- SpO₂ 95 to 98% on room air

**Poor Response**
- Physical exam: severe symptoms, drowsiness, confusion
- FEV₁ or PEF unable to do OR < 40% predicted
- SpO₂ < 95% on room air

**Discharge Home**

**Individualized Decision Re: Hospitalization**

**Consider Patients At Risk For Relapse**
- Poor response to treatment
- Previous near death episode
- Sudden attacks
- Recent ED visits
- Frequent hospitalizations
- Allergic/anaphylactic triggers
- Oral corticosteroid dependency or recent use
- Poor adherence or understanding
- Prolonged duration of recent attack
- Returning to same environmental triggers
- In all patients who received nebulized β₂ agonists, consider an extended observation period prior to discharge

**Discharge Home**
- Prior to discharge, review education checklist with patient and ensure proper inhaler technique
- Assess and assist as required with access to adequate supply of reliever (β₂ agonist) and controller (inhaled corticosteroid) medications
- All patients should receive prednisone: 30 to 60 mg once a day for 7 to 14 days, (tapering not generally required) and an inhaled corticosteroid
- Refer to local Asthma Education Centre (if available) or Asthma Action Helpline 1-800-668-7682
- Review discharge instructions with patient/family
- Arrange follow-up with primary health care professional within 7 days or as soon as possible
### Peak Expiratory Flow (PEF) in Normal Adults (L/min)

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| **FEMALES** |     |     |     |     |     |     |     |     |     |     |     |     |
| Age         |     |     |     |     |     |     |     |     |     |     |     |     |
| 20          | 447 | 454 | 460 | 465 | 471 | 476 | 481 | 486 | 490 | 495 | 499 | 503 |
| 25          | 458 | 465 | 471 | 477 | 482 | 488 | 493 | 497 | 502 | 506 | 511 | 515 |
| 30          | 462 | 469 | 475 | 481 | 486 | 492 | 497 | 502 | 506 | 511 | 515 | 519 |
| 35          | 461 | 468 | 474 | 480 | 485 | 491 | 496 | 501 | 505 | 510 | 514 | 518 |
| 40          | 457 | 463 | 469 | 475 | 481 | 486 | 491 | 496 | 500 | 505 | 509 | 513 |
| 45          | 449 | 456 | 462 | 468 | 473 | 478 | 483 | 488 | 493 | 497 | 501 | 505 |
| 50          | 440 | 447 | 453 | 458 | 464 | 469 | 474 | 478 | 483 | 487 | 491 | 495 |
| 55          | 430 | 436 | 442 | 447 | 453 | 458 | 462 | 467 | 471 | 475 | 479 | 483 |
| 60          | 418 | 424 | 430 | 435 | 440 | 445 | 450 | 454 | 458 | 462 | 466 | 470 |
| 65          | 406 | 412 | 417 | 422 | 427 | 432 | 437 | 441 | 445 | 449 | 453 | 456 |
| 70          | 393 | 399 | 404 | 409 | 414 | 419 | 423 | 427 | 431 | 435 | 438 | 442 |
| 75          | 380 | 385 | 391 | 395 | 400 | 404 | 409 | 413 | 416 | 420 | 424 | 427 |

*Adult Normal Range (2SD) = mean ± 80 L/min

Values calculated from Nunn and Gregg: BMJ 1989; 298: 1068-70

The above table is meant to be used only as a guide.

Normal standards will vary between racial and ethnic groups.