Online Repository

Appendices.

Appendix E1. This systematic review has been conducted according to the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines (4), employing PubMed, EMBASE, and Global Health databases. On these websites, we searched for articles from January 1st, 2009, to October 2019, using key terms related to asthma attacks in pediatric population.

1. Asthma
2. Acute asthma
3. Exacerbation
4. Attack
5. Flare up
6. Child
7. Children
8. Adolescent
9. 1 or 2 or 3 or 4 or 5
10. 6 and 7 and 8
11. Guideline/ or practice guideline/
12. Guidelines as topic/ or practice guidelines as topic/
13. (guideline* or algorithm* or standard*).ti.ab.
14. “best practice”.ti.ab.
15. 11 or 12 or 14
Appendix E2. AGREE II instrument domains
Domain 1 – Scope and Purpose

- The overall objective(s) of the guideline is (are) specifically described

- The health question(s) covered by the guideline is (are) specifically described

- The population (patients, public, etc.) to whom the guideline is meant to apply is specifically described

Domain 2 – Stakeholder Involvement

- The guideline development group includes individuals from all relevant professional groups

- The views and preferences of the target population (patients, public, etc.) have been sought

- The target users of the guideline are clearly defined

Domain 3 – Rigor of Development

- Systematic methods were used to search for evidence

- The criteria for selecting the evidence are clearly described

- The strengths and limitations of the body of evidence are clearly described

- The methods for formulating the recommendations are clearly described

- The health benefits, side effects and risks have been considered in formulating the recommendations

- There is an explicit link between the recommendations and the supporting evidence

- The guidance has been externally reviewed by experts prior to its publication

- A procedure for updating the guideline is provided

Domain 4 – Clarity of Presentation

- The recommendations are specific and unambiguous

- The different options for management of the condition or health issue are clearly presented
- Key recommendations are easily identifiable

Domain 5 – Applicability

- The guideline describes facilitators and barriers to its application
- The guideline provides advice and/or tools on how the recommendations can be put into practice
- The potential resource implications of applying the recommendations have been considered
- The guideline presents monitoring and/or auditing criteria

Domain 6 – Editorial Independence

- The views of the funding body have not influence the content of the guideline
- Competing interests of guideline development group members have been recorded and addressed
## Table E1. Definition of severity asthma exacerbation.

| Country/Region | Mild | Moderate | Severe |
|----------------|------|----------|--------|
| **Canadian GL* (2010)** | Mild | Moderate | Severe |
| **Not stated** | In accordance with clinical and objective assessment | Not specified | Not specified |
| **Latin America and Spain GL (2010)** | Mild | Moderate | Severe |
| **Not stated** | Not specified | Defined as at least one of the following occurring for at least two days without the need for systemic CS*: increasing asthma symptoms, worsening lung function, and/or increased rescue bronchodilator use. | Not specified |
| **ICON GL (2012)** | Mild | Moderate | Severe |
| **Not stated** | It’s just outside the normal range of variation for an individual patient | Moderate | Life-threatening |
| **South African GL (2013)** | Mild | Moderate | Severe |
| **Non-severe** | Not fulfilling the criteria for severe or life-threatening asthma | Not specified | severe |
| **Korean Asthma GL (2014)** | Non-severe | Moderate | Severe |
| **Indian GL (2015)** | Mild | Moderate | Severe |
| **Japanese GL (2017)** | Mild | Moderate | Severe |
| **New Zealand GL (2017)** | Mild | Moderate | Severe |
| **German GL (2017)** | Mild | Moderate | Severe |

**Mild**
- In accordance with clinical and objective assessment
- Not stated
- Defined as good asthma control achievable with medication of therapy level 1 (low ICS* dose) or level 2 (low ICS dose plus anti-LT)

**Moderate**
- In accordance with clinical and objective assessment
- Not specified
- Defined as good asthma control achievable with medication of therapy level 3 (medium ICS dose) or level 4 (medium ICS dose plus LABA* plus SABA* or high ICS dose plus LABA plus SABA)

**Severe**
- In accordance with clinical and objective assessment
- Not specified
- Not well-controlled asthma under high-dose ICS-LABA therapy or loss of asthma control when reducing this high dose ICS-LABA therapy; need of therapy level 5 (biologic drugs)

**Very severe**
- Acute severe
- Severe asthma unresponsive to

**Respiratory failure**
repeated courses of β2-agonist therapy

**Near-fatal**

Acute severe asthma associated with a respiratory arrest or hypercarbia

|                |                |                | Not specified |
|----------------|----------------|----------------|--------------|
|                |                |                |              |

|                     | Spanish GL (2018)       | Italian GL (2018)       | Swiss GL (2018)       | British and Scottish GL (2019) | GINA GL (2019)       | French GL (2019)       | Saudi Arabia GL (2019) |
|---------------------|-------------------------|-------------------------|-----------------------|-------------------------------|----------------------|------------------------|-------------------------|
| **Mild**            | In accordance with clinical and objective assessment | In accordance to clinical and objective assessment | Not stated | Mild | Mild | In accordance to clinical and objective assessment | In accordance to clinical and objective assessment | **Moderate** |
| **Moderate**        | In accordance with clinical and objective assessment | Moderate | Not specified | Moderate | Moderate | In accordance to clinical and objective assessment | Not stated | **Severe** |
| **Severe**          | In accordance with clinical and objective assessment | Severe | Not specified | Severe | Severe | In accordance to clinical and objective assessment | **Life-threatening** | **Life-threatening** |

*CS: corticosteroid; ED: emergency department; ICS: inhaled corticosteroid; LABA: long-acting beta-agonists; SABA: short-acting beta-agonists; anti-LT: anti-leukotrienes; PEF: Peak expiratory flow; PaO₂: Partial Pressure of Oxygen; SpO₂: Oxygen saturation.*
Table E2. Risk factors for asthma exacerbations.

| Risk Factor                                                                 | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|----------------------------------------------------------------------------|---------------------|-----------------------------------|----------------|-------------------------|-------------------------|------------------|---------------------|-----------------------|
| Allergen exposure                                                         | Yes                 | Yes                               | Yes            | Not stated              | Not stated             | Yes              | Yes                 | Not stated             |
| Environmental tobacco                                                    | Yes                 | Not stated                        | Yes            | Not stated              | Not stated             | Yes              | Yes                 | No                    |
| Air pollution                                                            | Yes                 | Yes                               | Yes            | Not stated              | Not stated             | Yes              | Yes                 | Not stated             |
| Diet                                                                     | Yes                 | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Not stated             |
| No Vaccination                                                           | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | No               | Not stated           | Not stated             |
| Comorbidities                                                            | Yes                 | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Cold air                                                                 | Yes                 | Yes                               | Not stated     | Not stated              | Not stated             | Not stated       | Yes                 | Not stated             |
| Extreme emotional arousal                                                | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Yes              | Not stated           | Not stated             |
| Physical exercise                                                        | Yes                 | Not stated                        | Not stated     | Not stated              | Not stated             | Yes              | Not stated           | Not stated             |
| Aspirin and other nonsteroidal anti-inflammatory drugs                    | Yes                 | Not stated                        | Not stated     | Not stated              | Not stated             | Yes              | Yes                 | Not stated             |
| Beta-blockers                                                            | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Yes              | Not stated           | Not stated             |
| Poor asthma control                                                      | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Hospitalization or emergency department visit for asthma in the last year | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Extreme inhaled bronchodilator use                                      | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Intensive care admission or intubation                                   | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Requirement for long-term oral CS*                                       | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated           | Yes                   |
| Poor inhaler technique | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|------------------------|---------------------|-----------------------------------|-----------------|-------------------------|------------------------|-----------------|-------------------|---------------------|
| Yes                    | Not stated           | Not stated                         | Not stated      | Not stated              | Not stated             | Not stated      | Yes               |                     |
| Underuse or poor adherence to treatment | Yes | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Discontinuous medical care | Yes | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Socioeconomic disadvantage | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Obesity                | Not stated           | Not stated                         | Not stated      | Not stated              | Not stated             | Not stated      | Not stated        | Not stated          |
| Alternative therapies  | Not stated           | Not stated                         | Not stated      | Not stated              | Not stated             | Not stated      | Not stated        | Not stated          |
| Hypoxemia at initial management | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Sputum or blood eosinophilia | Not stated | Not stated | Not stated | Yes                   | Not stated             | Not stated      | Not stated        | Not stated          |
| Psychological factors  | Not stated           | Not stated                         | Not stated      | Not stated              | Not stated             | Not stated      | Yes               | Not stated          |

*Continued*

| Allergen exposure | German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|-------------------|------------------|-------------------|-------------------|-----------------|-----------------------------|----------------|-----------------|------------------------|
| Yes               | Yes              | Not stated         | Yes               | Yes             | Yes                         | Yes            | Yes             | Yes                    |
| Environmental tobacco | Yes | Yes | Not stated | Yes | Yes | Yes | Yes | Yes |
| Air pollution     | Yes              | Yes               | Not stated         | Yes             | Yes                         | Not stated      | Not stated        | Yes                    |
| Diet              | Yes              | Not stated         | Not stated         | Not stated      | Yes                         | Not stated      | Not stated        | Not stated             |
| No Vaccination    | Yes              | No                | Not stated         | Not stated      | Not stated                   | Not stated      | Not stated        | Not stated             |
| Comorbidities     | Yes              | Yes               | Not stated         | Yes             | Yes                         | Yes            | Not stated        | Not stated             |
|                          | Cold air | Extreme emotional arousal | Physical exercise | Aspirin and other nonsteroidal anti-inflammatory drugs | Beta-blockers | Poor asthma control | Hospitalization or emergency department visit for asthma in the last year | Extreme inhaled bronchodilator use | Intensive care admission or intubation | Requirement for long-term oral CS | Poor inhaler technique | Underuse or poor adherence to treatment | Discontinuous medical care | Socioeconomic disadvantage | Obesity | Alternative therapies | Hypoxemia at initial management | Sputum or blood |
|--------------------------|----------|---------------------------|-------------------|--------------------------------------------------------|--------------|---------------------|--------------------------------------------------------------------------|----------------------------------|-------------------------------------|-----------------------------------|---------------------|-------------------------------------|-----------------------------|-------------------------------|---------|---------------------|--------------------------|------------------|
|                          | Not stated | Not stated                | Not stated        | Not stated                                              | Not stated   | Not stated           | Not stated                                                                | Not stated                       | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Extreme emotional arousal| Yes       | Not stated                | Not stated        | Not stated                                              | Not stated   | Not stated           | Not stated                                                                | Not stated                       | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Physical exercise        | Yes       | Not stated                | Not stated        | Not stated                                              | Not stated   | Not stated           | Yes                                                                      | Not stated                       | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Aspirin and other nonsteroidal anti-inflammatory drugs | Yes | Yes | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Beta-blockers            | Yes       | Not stated                | Not stated        | Not stated                                              | Not stated   | Not stated           | Yes                                                                      | Yes                              | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Poor asthma control      | Yes       | Yes                       | Not stated        | Not stated                                              | Not stated   | Yes                 | Yes                                                                      | Yes                              | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Hospitalization or emergency department visit for asthma in the last year | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Extreme inhaled bronchodilator use | Yes | Yes | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Intensive care admission or intubation | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Requirement for long-term oral CS | Yes | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Poor inhaler technique   | Yes       | Not stated                | Not stated        | Not stated                                              | Not stated   | Yes                 | Not stated                                                                | Not stated                       | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Underuse or poor adherence to treatment | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Discontinuous medical care | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Socioeconomic disadvantage | Not stated | Yes | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Obesity                  | Yes       | Not stated                | Not stated        | Not stated                                              | Yes          | Yes                 | Yes                                                                      | Yes                              | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Alternative therapies    | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Hypoxemia at initial management | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Not stated | Not stated | Not stated | Yes | Not stated | Yes | Yes |
| Sputum or blood          | Yes       | Yes                       | Not stated        | Not stated                                              | Yes          | Not stated | Not stated                                                                | Not stated                       | Not stated                          | Yes                                | Yes                 | Not stated                         | Not stated                  | Not stated                 | Yes     | Not stated          | Yes                      | Yes              |
| Psychological factors | Yes | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
|-----------------------|-----|------------|------------|------------|------------|------------|------------|------------|

*GL: guideline; CS: corticosteroid.
Table E3. Assessment of asthma exacerbation.

| Clinical signs                                      | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) |
|----------------------------------------------------|---------------------|----------------------------------|----------------|-------------------------|-------------------------|----------------|-------------------|
| Pulse rate                                         | Not stated          | Yes                              | Not stated     | Yes                     | Yes                     | Not stated      | Yes                |
| Respiratory rate and degree of breathlessness      | Not stated          | Yes                              | Not stated     | Yes                     | Yes                     | Not stated      | Yes                |
| Use of accessory muscles of respiration/Dyspnea     | Not stated          | Yes                              | Not stated     | Yes                     | Yes                     | Not stated      | Yes                |
| Amount of wheezing                                  | Not stated          | Yes                              | Not stated     | Yes                     | Yes                     | Not stated      | Yes                |
| Degree of agitation and level of consciousness     | Not stated          | Not stated                       | Not stated     | Yes                     | Yes                     | Not stated      | Yes                |
| Heart Rate                                         | Not stated          | Yes                              | Not stated     | Yes                     | Yes                     | Not stated      | Not stated         |
| Investigations                                     |                     |                                  |                |                         |                         |                |                   |
| Pulse oximetry                                     | Not stated          | Yes                              | Not stated     | SpO₂ <92                | SpO₂ <90                | SpO₂ <92       | Yes                |
| PaCO₂*                                             | Not stated          | Not stated                       | Not stated     | Not stated              | Not stated              | Not stated      | Yes                |
| PEF*                                               | Not stated          | Not stated                       | Not stated     | <50% of predicted or best | <60% of predicted or best | Yes           | Yes                |
| Chest X-ray                                        | Not stated          | Not stated                       | Not stated     | No                      | Not stated              | Yes, if clinically indicated | Not stated |
| Arterial blood gas                                 | Not stated          | Not stated                       | Not stated     | Yes                     | Not stated              | Yes, if SpO₂ <92 or PEF does not improve to 40% to 45% of predicted or personal best or who worsen during or after treatment. | Yes      |
| Electrocardiogram and/or echocardiogram            | Not stated          | Not stated                       | Not stated     | Not stated              | Not stated              | Yes, if clinically indicated | Not stated |
| Blood examinations                                 | Not stated          | Not stated                       | Not stated     | Not stated              | Not stated              | Yes, if clinically indicated | Not stated |
Continued

| Clinical signs                                      | New Zealand GL (2017) | German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|----------------------------------------------------|-----------------------|------------------|-------------------|-------------------|----------------|-------------------------------|----------------|------------------|------------------------|
| **Pulse rate**                                      | Yes                   | Yes              | Yes               | Yes               | Yes            | Yes                           | Yes            | No               | Yes                     |
| **Respiratory rate and degree of breathlessness**   | Yes                   | Yes              | Yes               | Yes               | Yes            | Yes                           | Yes            | No               | Yes                     |
| **Use of accessory muscles of respiration/Dyspnea** | Yes                   | Yes              | Yes               | Yes               | Yes            | Yes                           | Yes            | No               | Yes                     |
| **Amount of wheezing**                              | Not stated            | Not stated       | Yes               | Yes               | Yes            | Not stated                    | No             | Yes              | Yes                     |
| **Degree of agitation and level of consciousness**  | Yes                   | Yes              | Yes               | Yes               | Yes            | Yes                           | Yes            | No               | Yes                     |
| **Heart Rate**                                      | Not stated            | Yes              | Yes               | Yes               | Yes            | Not stated                    | No             | Yes              |                         |
| **Investigations**                                  |                       |                  |                   |                   |                |                               |                |                  |                         |
| **Pulse oximetry**                                  | Not stated            | Yes              | Yes               | Yes               | SpO₂ <92       | Yes                           | Yes            | Not stated        | SpO₂ <92               |
| **PaCO₂**                                           | Not stated            | Yes              | Yes               | Yes               | Not stated     | Not stated                    | Not stated     | Yes              | No                      |
| **PEF**                                             | Not stated            | Yes              | Yes               | Yes               | < 50% predicted| < 50% predicted               | Yes            | Not stated        | No                      |
| **Chest X-ray**                                     | Not stated            | Not stated       | Not stated        | Not stated        | Yes, if complications | Yes, if complications | Not stated       | Yes, if complications | No                      |
| **Arterial blood gas**                              | Not stated            | Yes              | Not stated        | Not stated        | Yes, if complications | Not stated        | Yes, for severe exacerbation or exacerbations that fail to | Yes, if complications |
Table E4. Treatment of asthma exacerbation in accordance with severity disease.

| Canadian GL* (2010) | Latin America and Spain GL (2012) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|---------------------|----------------------------------|----------------|-------------------------|-------------------------|-----------------|-------------------|---------------------|
| Salbutamol Recommended | Salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended |
| Terbutaline Recommended | Formoterol Recommended, only in children older than 12 yrs* | Inhaled formoterol Recommended | Inhaled salbutamol Recommended | Oral prednisone Recommended | Oral prednisone Recommended | Oral prednisone Recommended | Oral prednisone Recommended |
| Hydrocortisone Not stated | Inhaled ipatropium bromide Recommended | ICS Not Recommended | ICS Not Recommended | ICS Not Recommended | ICS Not Recommended | ICS Not Recommended | ICS Not Recommended |
| Prednisolone Recommended | Budesonide Recommended | Inhaled Salbutamol Recommended | Inhaled salbutamol Recommended | Oral prednisone Recommended | Oral prednisone Recommended | Oral prednisone Recommended | Oral prednisone Recommended |
| Budesonide Recommended | Mild | Moderate | Moderate | Moderate | Moderate | Moderate | Moderate |
| Oxygen supplementation: (SpO₂ <92%) Recommended | Oxygen supplementation: (SpO₂ >95%) Recommended | Oxygen supplementation: (SpO₂ >95%) Recommended | Oxygen supplementation: (SpO₂ <95%) Recommended | Oxygen supplementation: (SpO₂ >95%) Recommended | Oxygen supplementation: (SpO₂ >93%) Recommended | Oxygen supplementation: (SpO₂ >95%) Recommended | Oxygen supplementation: (SpO₂ >95%) Recommended |
| Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended | Oral prednisolone Recommended |

*GL: guideline; PaCO₂: partial pressure of carbon dioxide; PEF: Peak expiratory flow.
| Condition | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|-----------|---------------------|----------------------------------|----------------|-------------------------|-------------------------|-----------------|-------------------|-----------------------|
| Inhaled ipratropium bromide | Salbutamol+ ipratropium bromide | Recommended | Salbutamol+ ipratropium bromide | Recommended | Salbutamol+ ipratropium bromide | Recommended | Salbutamol+ ipratropium bromide | Recommended |
| Theophylline | IV CS (Hydrocortisone, Methylprednisolone or Prednisone) | Recommended | IV CS (Hydrocortisone, Methylprednisolone or Prednisone) | Recommended | IV CS (Hydrocortisone, Methylprednisolone, Betamethasone or dexamethasone) | Recommended | Aminophylline | Recommended with caution |
| Aminophylline | Not stated | Severe | Inhaled salbutamol Recommended | Severe | Inhaled salbutamol + Oxygen supplementation Recommended | Severe | Severe | Severe |
| Oxygen supplementation: \( \text{SpO}_2^* \ < 92\% \) | IV β-2 agonists | Recommended | IV aminophylline | Recommended | Oral prednisone | Recommended | Oxygen supplementation | Severe |
| Inhaled salbutamol | Recommended | Severe | IV magnesium sulfate | Recommended | Inhaled ipratropium bromide | Recommended | Oxygen should be used only in hypoxaemic patients | Severe |
| Salbutamol+ ipratropium bromide | Recommended | Severe | Theophylline | Recommended | Theophylline | Recommended | Inhaled | Severe |
| IV CS (Hydrocortisone, Methylprednisolone or Prednisone) | Recommended | Severe | IV aminophylline, Recommended | Severe | IV hydrocortisone | Recommended | Salbutamol+ ipratropium bromide | Recommended |
| IV salbutamol | Consider | Severe | IV magnesium sulfate | Recommended | Salbutamol+ ipratropium bromide | Recommended | IV β2-agonists and theophylline | Recommended |
| IV magnesium sulphate | Consider | Severe | Helium–oxygen mixture | Recommended | IV β2-agonists and theophylline | Recommended if inhaled medications are ineffective | IV hydrocortisone | Severe |
| Intravenous fluids | Not Recommended | Severe | Helium–oxygen mixture | Recommended | IV hydrocortisone | Recommended if inhaled medications are ineffective | Systemic CS (Prednisolone, Dexamethasone, Methylprednisolone, Hydrocortisone) | Recommended |
| Adrenaline | Recommended | Severe | Intravenous fluids | Not Recommended | IV or inhaled magnesium sulphate | Recommended | IV or inhaled magnesium sulphate | Recommended |
| IV magnesium sulphate | Consider | Severe | Intravenous fluids | Not Recommended | Adrenaline | Recommended, in an | IV or inhaled magnesium sulphate | Recommended |

* GL: Guidelines | **: Preferred treatment | \( \text{SpO}_2^* \): Oxygen saturation | IV: Intravenous
| Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|---------------------|---------------------------------|----------------|------------------------|-------------------------|-----------------|-------------------|---------------------|
|                     |                                 |                | emergency situation    |                         |                 |                   | Recommended if severe asthma not responding to a combination of inhaled β2-agonist, anticholinergic and systemic CS |
|                     |                                 |                | where inhaled therapy is not available |                         |                 |                   | NIV* Recommended but it should be judiciously used |
|                     |                                 |                | Antibiotics            |                         |                 |                   | Heliox Recommended but it should be not routinely used |
|                     |                                 |                | Not Recommended        |                         |                 |                   |                     |
| German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|------------------|-------------------|-------------------|-----------------|-----------------------------|----------------|-----------------|-------------------|
| **Mild**         |                   |                   |                 |                             |                |                 |                   |
| Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended | Inhaled salbutamol Recommended |
| Oral prednisolone Recommended | Oral CS Recommended | Oral ICS Recommended | Oral prednisolone Recommended | Inhaled ipratropium bromide Recommended | Oral prednisone Recommended | Oral prednisone Recommended | Inhaled salbutamol Recommended |
| **Moderate**     |                   |                   |                 |                             |                |                 |                   |
| Inhaled salbutamol Recommended | Oral prednisolone Recommended | Inhaled ipratropium bromide Recommended | Inhaled salbutamol | Inhaled salbutamol Recommended | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol |
| Oral prednisolone Recommended | Oral CS Recommended | Inhaled CS Recommended | Oral CS Recommended | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol |
| **Severe**       |                   |                   |                 |                             |                |                 |                   |
| Inhaled salbutamol+ Oxygen supplementation Recommended | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol |
| Oral prednisolone Recommended | Oral CS Recommended | Inhaled CS Recommended | Oral prednisone Recommended | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol |
| Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <95%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended | Oxygen supplementation (SpO₂ <94%) Recommended |
| Severe life-threatening asthma | Antibiotics | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol | Inhaled salbutamol |
| IV prednisone Recommended | Inhaled ipratropium bromide Recommended | Oral prednisone Recommended | IV magnesium sulphate Recommended | IV Terbutalin Recommended | IV Reoproterol Recommended | IV bicarbonate in case of acidosis (pH<7.2) |
|---------------------------|----------------------------------------|-----------------------------|----------------------------------|--------------------------|---------------------------|------------------------------------------|
| Recommended               | Inhaled ipratropium bromide Recommended | Oral CS Recommended         | IV magnesium sulphate Recommended | IV salbutamol Recommended | IV aminophylline Recommended |
| Severe                    | Oxygen supplementation (SpO₂ <93%)     | Oral prednisolone or IV methylprednisolone Recommended | IV magnesium sulphate Recommended | IV aminophylline Recommended |     |
|                           | Recommended                             | IV magnesium sulphate Recommended | IV aminophylline Recommended | IV hydrocortisone Recommended | IV leukotriene receptor antagonists Not Recommended |
|                           | Severe                                  | IV salbutamol Recommended   | Inhaled ipratropium bromide Recommended | Oral CS Recommended | IV aminophylline Recommended when asthma unresponsive to maximal doses of bronchodilators and CS |
|                           |                                         | Oral CS Recommended         | Inhaled ipratropium bromide Recommended | Oxygen supplementation Recommended | Other therapies (Heliox, ketamine, |
|                           |                                         | IV magnesium sulphate Recommended | IV aminophylline Recommended | IV hydrocortisone Recommended | conventional treatments fail |
|                           |                                         | NIV No specific recommendations | IV aminophylline Recommended | IV hydrocortisone Recommended | High-flow nasal oxygen Not Recommended |
|                           |                                         | Antibiotics Not Recommended  | IV aminophylline Recommended | IV hydrocortisone Recommended | Ketamine and halogenated Not Recommended |
|                           |                                         |                               | IV aminophylline Recommended | IV hydrocortisone Recommended | Helium Not Recommended |
|                           |                                         |                               | IV aminophylline Recommended | IV hydrocortisone Recommended | ECMO* Recommended in the case of respiratory acidosis and/or severe hypoxemia refractory to optimal medical treatment and to well-conducted mechanical ventilation |
|                           |                                         |                               | IV aminophylline Recommended | IV hydrocortisone Recommended | IV hydrocortisone Recommended |

*ECMO: Extracorporeal Membrane Oxygenation
| GL: guideline; CS: corticosteroid; ICS: inhaled corticosteroid; SpO2: Oxygen saturation; IV: intravenous; NIV: non invasive ventilation; ECMO: extracorporeal membrane oxygenation | sevoflurane, ECMO, recombinant human deoxyribonuclease, NIV | Not Recommended |
Table E5. Drug dosage according to each included guideline

| Inhaled β2-agonists | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|----------------------|---------------------|-----------------------------------|----------------|------------------------|------------------------|-----------------|-------------------|----------------------|
| Salbutamol           | Not stated           | Salbutamol from 2 to 4 puffs (200–1000 lg), every 20 minutes for the first three hours OR Salbutamol 2 puffs (200–1000 lg), every 10 minutes for the first three hours given via MDI*-spacer (nebulized also possible). | Salbutamol 2 to 10 puffs every 20 minutes, given via MDI*-spacer. Nebulised salbutamol 2.5 - 5 mg or 0.5-1 mg fenoterol + saline to make nebuliser volume up to 4 ml IB 250 μg/dose to 2.5-5.0 mg of salbutamol or 0.5-1mg fenoterol, every 20-30 minutes initially then 4-6h | Not stated | Salbutamol: 4-6 puffs of 100 μg salbutamol every 30 Minutes Continuous nebulisation: 2.5 mg every 15 minutes, or >4 nebulisation/h Intermittent nebulisation: 2.5 mg every 20 minutes, or <3 nebulisation/h The subsequent dose should be 2.5 mg every 2-4h IB: 500 μg once, then 250 μg q4-6h | Salbutamol or Procatelerol: 0.1-0.3 mL to infants or 0.3-0.5 mL to school children or adolescents Disodium cromoglycate inhalant solution: 1 ampule = 2 mL |
| Salbutamol           | Salbutamol: Bolus dose only: 15 μg/kg over 10 minutes Continuous infusion: load 1-2 μg/kg/min of 200 μg/ml solution | Not stated | Salbutamol: Bolus dose only: 15 μg/kg over 10 minutes Continuous infusion: load 5-10 μg/kg/min of 1 mg/ml solution at 0.3 - 0.6 ml/kg/h for 1 hour, then salbutamol infusion 1-5 μg/kg/min of a 1mg/ml solution at 0.06 -0.3 ml/kg/h | Not stated | Not stated | Not stated | Not stated | Salbutamol: 6 x 100 μg via MDI and spacer or 2.5-5.0 mg via nebulization up to 3 times over 1st hour IB: 4 x 200 μg via MDI and spacer or 2.5 mg via nebulization |

| IV* β2-agonists      | Not stated           | Salbutamol: Bolus dose only: 15 μg/kg over 10 minutes Continuous infusion: load 1-2 μg/kg/min of 200 μg/ml solution | Not stated | Salbutamol: Bolus dose only: 15 μg/kg over 10 minutes Continuous infusion: load 5-10 μg/kg/min of 1 mg/ml solution at 0.3 - 0.6 ml/kg/h for 1 hour, then salbutamol infusion 1-5 μg/kg/min of a 1mg/ml solution at 0.06 -0.3 ml/kg/h | Not stated | Not stated | Not stated | Not stated |

| Inhaled CS*           | Not stated           | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |

| Oral CS               | Prednisone 1-2 mg/kg for 3-5 days | Prednisone 1 mg/kg | Prednisolone 1-2mg/kg/24h for 3–5 days | Prednisone or prednisolone 1-2 mg/kg (Recommended dose 20 mg for children aged 2-5 yrs and 30-40 mg) | Prednisolone 1 mg/kg, maximum 50 mg/24h | Prednisone 30-40 mg/day for 5-7 days | Prednisolone 0.5-1.0 mg/kg/day | Prednisone 1-2 mg/kg (to a maximum of 40 mgs)/24h for 3–5 days |
| IV CS          | Not stated | Hydrocortisone 4 mg/kg 12h | Not stated | Methylprednisolone 2 mg/kg 8h | Prednisone 30-40 mg/day for 5-7 days | Not stated | Hydrocortisone 5-7 mg/kg | Not stated | Hydrocortisone 4 mg/kg (max 100 mg) |
|---------------|------------|-----------------------------|------------|-------------------------------|----------------------------------|------------|--------------------------|------------|-------------------------------|
| Oxygen         | Not stated | Aims at SaO2 > 95%          | Aims at SaO2 > 92% | Aims at SaO2 > 93-95%         | Aims at SaO2 > 93-95%            | Aims at SaO2 > 95% | Aims at SaO2 > 92%          | Not stated | Not stated                     |
| NIV*           | Not stated | Not stated                  | Not stated | A 5 mg/kg loading dose should be given over 20 minutes under continuous ECG* monitoring, followed by a continuous infusion at 0.5 - 1 mg/kg/h* | Not stated | Not stated | Not stated | Not stated | Not stated |
| IV Magnesium   | Not stated | A single dose at 25-75 mg/kg | Not stated | A single dose at 25-75 mg/kg (recommended dose 50 mg/kg, maximum dose 2 g) given over 20 minutes | Not stated | Not stated | Not stated | Not stated | Not stated |
| Magnesium      | Not stated | Not stated                  | Not stated | 0.4 ml 50%                    | Not stated | Single dose of 2 g over 20 minutes | Not stated | Not stated | Not stated |
| Epinephrine    | Not stated | Not stated                  | Not stated | Not stated                    | Not stated | Not stated | Not stated | Not stated | Not stated |
| Helium-oxygen  | Not stated | Not stated                  | Not stated | Not stated                    | Not stated | Not stated | Not stated | Not stated | Not stated |
| NIV*           | Not stated | Not stated                  | Not stated | Not stated                    | Not stated | Not stated | Not stated | Not stated | Not stated |
### Inhaled β2-agonists

| German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|------------------|--------------------|-------------------|-----------------|-------------------------------|---------------|-----------------|---------------------|
| **Inhaled β2-agonists** | | | | | | | |
| Salbutamol | Salbutamol | Salbutamol: | Salbutamol: | Salbutamol: | Salbutamol: | Salbutamol: | Salbutamol: |
| 2 to 4 puffs every 10-15 minutes, given via MDI-spacer. | 2 to 10 puffs every 20 minutes, given via MDI-spacer. | 200–400 µg/dose (2–4 puffs/dose up to 3 times every 20–30 min within the first hour, via MDI with spacer | 4–10 puffs every 20 min for the first hour via MDI with spacer | via nebulizer (preferably oxygen-driven), 2.5 to 5 mg or, if nebuliser not available via spacer | 4–10 puffs every 20 min for the first hour via MDI with spacer | IB: 0.5mg dose every 8 h in children over 6 years of age, and a 0.25-mg dose every 8 h in children under 6 years of age |
| 10-20 drops in 1ml NaCl via nebulization every 20 minutes | 0.15 mg x kg (max 5 mg) via nebulization every 20 minutes up to 3 times | 2.5 to 5 mg via nebulization | IB: 125–250 µg/dose (in children <4 years of age) to 250–500 µg/dose (in children ≥ 4 years of age), in combination with nebulized salbutamol. It should be administered frequently, up to 3 times every 20–30 min, within the 1st h | 0.25 mg every 20 minutes for 1–2h | |
| IB: 0.5 mg via nebulization | IB: 250 µg <30Kg or 500 µg >30Kg via nebulization | | IB: 0.25 mg every 20 minutes for 1–2h | | |
| 80 µg via MDI and spacer | 40-80 µg via MDI and spacer | | | | |

### IV* or SC* β2-agonists

| German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|------------------|--------------------|-------------------|-----------------|-------------------------------|---------------|-----------------|---------------------|
| **IV* or SC* β2-agonists** | | | | | | | |
| Terbutaline: | Not stated | Salbutamol: | Not stated | Salbutamol: | Not stated | Not stated | Not stated |
| 0.25-0.5mg sc over 4 hours | | single bolus of 15 µg/kg over 10 min**, followed by continuous infusion of 0.2 µg/kg/min. Higher doses (1–2 | | Bolus IV 15ug/kg | | |
| Reproterol: | | | | Continuous infusion 1–5 | | | |

**Note:**
- **Δ**: Difference in practices
- **IV**: Intravenous
- **SC**: Subcutaneous
- **MDI**: Metered dose inhaler
- **IB**: Inhaled bronchodilator
- ****: Indicates additional information or notes

**Continued**
| Inhaled CS* | Not stated | Not stated | ICS should not be used | Not stated | Not stated | Not stated | Not stated | Not stated |
| Oral CS | Prednisone | 1–2 mg/kg every 4–6 hours | Prednisone or dexamethasone or prednisolone: single or 2-dose over 5-days | Prednisone: 40–50 mg/day for 5–7 days | Prednisone: 30–40 mg/day for 3–5 days | Prednisone 1–2 mg/kg (to a maximum of 40 mg) | Not stated | Prednisolone: 1 mg/kg/day to maximum of 50 mg |
| IV CS | Prednisone | 1–2 mg/kg every 4–6 hours | Prednisone or dexamethasone or prednisolone: single or 2-dose over 5-days | Methylprednisolone: Dosage not stated | Hydrocortisone 4 mg/kg | Not stated | Methylprednisolone: 2 mg/kg of maximum 80 mg per day | Hydrocortisone: 200 mg |
| Oxygen supplementation | Aims at SaO2> 92% | Aims at SaO2> 94% | Not stated | Aims at SaO2> 93% | Aims at SaO2> 94% | Aims at SaO2> 94% | Aims at SaO2> 94% |
| IV Aminophylline | Not stated | Not stated | Not stated | Not stated | 5 mg/kg loading dose over 20 minutes (omit in those receiving oral theophyllines) followed by continuous infusion 1 mg/kg/hour | Not stated | Not stated | 1–2 g over 20 min |
| IV Magnesium sulphate | 2g/20 minutes | Not stated | Not stated | Not stated | 40 mg/kg (max 2 g) over 20 minutes | Not stated | Not stated | Not stated |
| Inhaled Magnesium sulphate | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| IV Bicarbonates | Not specified | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Epinephrine | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Helium-oxygen | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| NIV* | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| conventional treatments fail |

| MDI: Metered Dose Inhaler; IB: ipatropium bromure; IV: intravenous; SC: subcutaneous; SpO2: partial oxygen saturation. |

# The loading dose should be omitted in children receiving maintenance oral theophylline; ## dilution: 200 μg/mL for central iv line; 10–20 μg/mL for peripheral iv line
Table E6. Criteria hospitalization for asthma exacerbation.

|                                  | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|----------------------------------|---------------------|-----------------------------------|----------------|-------------------------|------------------------|------------------|---------------------|-----------------------|
| Silent Chest                     | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Cyanosis                         | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Poor respiratory effort          | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Hypotension, bradycardia         | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Exhaustion                       | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Confusion or drowsiness          | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Unable to complete sentences in one breath; too breathless to talk or feed | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Agitation                        | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Accessory muscle use             | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Tachycardia                      | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Tachypnea                        | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| SpO₂ <92%                        | Not stated          | Yes                               | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| PEF <50% predicted               | Not stated          | Yes                               | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Not stated            |
| Moderately severe asthma not responding to β2-agonist therapy | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Yes                   |
| Home circumstances which do not allow safe or reliable treatment | Not stated          | Not stated                        | Not stated     | Yes                     | Not stated             | Not stated       | Not stated          | Yes                   |
| Complications                    | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Not stated          | Yes                   |
| Severe exacerbation and respiratory failure | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Yes                 | Yes                   |
| Moderate exacerbation with past history of severe exacerbation or not improved by ambulatory treatment for about 2 hours | Not stated          | Not stated                        | Not stated     | Not stated              | Not stated             | Not stated       | Yes                 | Not stated            |
| Age | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated |
| Presentation at night | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| History of previous severe life-threatening asthma episodes | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated | Not stated |

Continued

| Silent Chest | German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
| Cyanosis | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Poor respiratory effort | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Hypotension, bradycardia | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Exhaustion | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Confusion or drowsiness | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Yes |
| Unable to complete sentences in one breath; too breathless to talk or feed | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Agitation | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Accessory muscle use | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Tachycardia | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes |
| Tachypnea | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| SpO2 <92% | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated | Yes |
| PEF <50% predicted | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated | Not stated |
| Moderately severe asthma not responding to β2-agonist therapy | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| Home circumstances which do not allow safe or reliable treatment | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated |
| Complications | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated | Not stated |
| Severe exacerbation | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated | Not stated |
and respiratory failure

| Moderate exacerbation with past history of severe exacerbation or not improved by ambulatory treatment for about 2 hours | Not stated | Not stated | Yes | Not stated | Not stated | Yes | Not stated | Not stated |
|---|---|---|---|---|---|---|---|---|
| Age | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated |
| Presentation at night | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| History of previous severe life-threatening asthma episodes | Not stated | Not stated | Yes | Not stated | Not stated | Yes | Yes | Yes |

GL: guideline; SpO₂: Oxygen saturation; PEF: Peak expiratory flow.

**Table E7. Discharge criteria for asthma exacerbation.**

| | Canadian GL* (2010) | Latin America and Spain GL (2010) | ICON GL (2012) | South African GL (2013) | Korean Asthma GL (2014) | Indian GL (2015) | Japanese GL (2017) | New Zealand GL (2017) |
|---|---|---|---|---|---|---|---|---|
| Stable on 3 - 4-hourly inhaled bronchodilators that | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated |
| Normal breath rate | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated |
| No chest wall indrawing | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated |
| SpO₂* >94% in room air | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated |
| PEF* and/or FEV1* should be >75% of best or predicted | Not stated | Not stated | Not stated | Yes | Not stated | Not stated | Not stated | Not stated |
| Appropriate care | Not stated | Not stated | Not stated | Yes | Yes | Not stated | Not stated | Yes |
| can be provided at home |
|------------------------|
| Written asthma action plan |
| Stable for at least 24 hours |

| | Written asthma action plan | Stable for at least 24 hours |
|----------------------------|-----------------------------|-----------------------------|
| German GL (2017) | Not stated | Not stated |
| Spanish GL (2018) | Not stated | Not stated |
| Italian GL (2018) | Not stated | Not stated |
| Swiss GL (2018) | Not stated | Not stated |
| British and Scottish GL (2019) | Not stated | Not stated |
| GINA GL (2019) | Yes | Not stated |
| French GL (2019) | Not stated | Not stated |
| Saudi Arabia GL (2019) | Yes | Not stated |

Continued

| | German GL (2017) | Spanish GL (2018) | Italian GL (2018) | Swiss GL (2018) | British and Scottish GL (2019) | GINA GL (2019) | French GL (2019) | Saudi Arabia GL (2019) |
|------------------|------------------|-------------------|-----------------|----------------|-------------------------------|----------------|-----------------|----------------------|
| Stable on 3-4-hourly inhaled bronchodilators | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated |
| Normal breath rate | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| No chest wall indrawing | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |
| SpO2 >94% in room air | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated |
| PEF and/or FEV1 should be >75% of best or predicted | Not stated | Not stated | Not stated | Not stated | Not stated | Yes | Not stated | Not stated |
| Appropriate care can be provided at home | Not stated | Not stated | Not stated | Yes | Yes | Yes | Not stated | Yes |
| Written asthma action plan | Not stated | Not stated | Not stated | Yes | Yes | Yes | Not stated | Yes |
| Stable for at least 24 hours | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated | Not stated |

*GL: Guideline; SpO2: oxygen saturation; PEF: peak expiration flow; FEV1: Forced expiratory volume in 1 second.