Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

****

**PAEDIATRIC WHEEZE PATHWAY**

Hospital admission presents a window of opportunity to review self-management skills and optimise or start preventer therapy.

* **National Asthma & COPD Audit Programme (NACAP):** This is a national programme of continuous clinical audit of the care and treatment outcomes in children and young people admitted to hospital with an asthma attack. Auditable parameters are marked with an asterisk (\*)
* No child should leave hospital without a written personalised action plan.

**This pathway should be used alongside the Wheeze Education Bundle, which should be given to each family at admission**

**SCOPE OF THE PATHWAY**

This guideline is based on the 2019 British Thoracic Society guidelines and 2021 NICE guidelines on the management of asthma with the intention of being used for all children with asthmawho present with an acute asthmatic episode, including first presentations. It can also be used for children over the age of 1 year presenting with viral induced wheeze (exercise caution whilst using steroids in the 1-4 year age group)

It is to be used in the Grange University Hospital in the following settings:

* Emergency Department
* CEAU
* Paediatric wards

The pathway should be terminated if the child is intubated and ventilated.

**ADMISSION HISTORY:** Date/Time:

Received oral steroids today: \* Yes ❑ No ❑ Date/Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Received bronchodilators today: \* Yes ❑ No ❑ Date/Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Birth history**

**Past medical history**

Diagnosis of asthma: Yes ❑ No ❑ Previous episode of viral induced wheeze? Yes ❑ No ❑

If yes, did they respond to bronchodilators Yes ❑ No ❑

If yes, did they receive steroids Yes ❑ No ❑

Have they previously been given an action plan: Yes ❑ No ❑

Was the action plan followed prior to admission: Yes ❑ No ❑

**PAST MEDICAL HISTORY:**

**PLEASE ENSURE PERSONALISED ACTION PLAN IS COMPLETED AND GIVEN TO PARENTS**

**Family history:**

Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Asthma | Eczema | Hay fever |
| Patient |  |  |  |
| Mother |  |  |  |
| Father |  |  |  |
| Siblings |  |  |  |

**Pets:**

**Allergies:**

**Smoking \*:** Ask children >11yrs about personal history of smoking

**Parent/Carer Smoking \***

**Assessment of symptom control: Please circle as appropriate**

Exercise cough: Yes No With a cold *How often­­­­­­­­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Night cough: Yes No With a cold *How often­\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Wheeze: Yes No With a cold *How often\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Breathlessness: Yes No With a cold *How often\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Chest tightness: Yes No With a cold *How often\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

Frequency of reliever use when well: <3x per week ≥3x per week Daily >1+ per day

Number of school days missed in last 6 months: \_\_\_\_\_\_\_\_

Number of courses of Prednisolone in last 12 months:\* \_\_\_\_\_\_\_\_

Number of GP attendances in last 12 months:\* \_\_\_\_\_\_\_\_

Number of A&E visits/admissions in last 12 months:\* \_\_\_\_\_\_\_\_

Previous PICU/HDU admissions: \_\_\_\_\_\_\_\_

**Medications: \***

|  |  |  |  |
| --- | --- | --- | --- |
| **Inhaler name** | **Strength** | **Dose** | **Spacer Device** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

|  |  |  |  |
| --- | --- | --- | --- |
| **Other medication** | **Dose** | **Route** | **Frequency** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**EXAMINATION:** Date: \*

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate\* | Sats\* | FiO2 or L/min\* | Heart rate\* | Temp |
|  |  |  |  |  |

**PEFR (>6yrs of age) if able to do\*:**

Best/Predicted PEFR:

Time of triage:\*

Time of assessment:

|  |
| --- |
| **LIFE THREATENING**  **Sp02** <**92% PLUS any one**   * Silent chest * Cyanosis * Poor Respiratory Effort * Exhaustion * Confusion * Hypotension |
| **ACUTE SEVERE**  Too breathless to talk or feed  Or cannot complete sentences  Use of accessory muscles  HR:  **>**125 bpm in children > 5 yrs  **>**140 bpm in children 1-5 yrs  Resp Rate:  **>**30 bpm in children >5 yrs  **>**40 bpm in children 1-5 yrs  **Sp02 <92%** |
| **MODERATE**  Able to talk in sentences  Moderate recession  HR:  ≤125 bpm in children >5 yrs  ≤140 bpm in children 1-5 yrs  Resp Rate:  ≤30 bpm in children >5 yrs  ≤40 bpm in children 1-5 yrs  **Sp02 ≥92%** |

**ASSESSMENT OF SEVERITY OF EPISODE:**

**Moderate** ❑

**Acute Severe** ❑

**Life-threatening** ❑

**GENERAL MANAGEMENT FOR ALL PATIENTS:**

**Prednisolone should be given within 1 hour of arrival to hospital.** Prescribe steroids with first dose of bronchodilators in the Emergency Department/CEAU.

**Most pre-school children with viral induced wheeze WON’T need steroids.** Considersteroids in children with pre-school wheeze only if they have **a)** Severe attack with sats <92% in air **b)** Recurrent wheezy episodes **c)** Poor response to initial treatment of wheeze **d)** If they are already on preventers.

**Majority of children will not require antibiotics or chest x-ray**

**PLAN:**

Name Designation Signature

**Name: Signature: Grade:**

**MODERATE**

**ACUTE SEVERE or LIFE THREATENING**

1. Salbutamol MDI via spacer: Up to 10 puffs
2. Prednisolone (except in pre-school wheeze)
3. Urgent Middle Grade review
4. IV access and bloods
5. 1st Line IV treatment: Salbutamol bolus
6. IV Hydrocortisone
7. Repeat Salbutamol + Ipratropium nebulised 3 times in an hour (Total 2 hours)
8. ALL children requiring intravenous bronchodilators should be admitted to HDU
9. CXR and blood gas
10. Maintenance IV fluids with Potassium (will require second IV access)
11. Prescribe 1 hourly Salbutamol and 6 hourly Ipratropium
12. Inform Paediatric Consultant

**1 Hour: Re-assess severity & response to treatment**

Add IV Aminophylline loading and infusion (**Omit** loading dose if on Theophyllines)

Monitor levels after 4-6 hours

Prescribe anti-emetics (Ondansetron)

IV Magnesium Sulphate bolus (if not given earlier)

**Review regularly in HDU while on 1 hourly Salbutamol**

**Step up to IV infusion treatments if consistent improvement is not seen within 4 hours**

Salbutamol MDI via spacer: Upto 10 puffs 1 to 4hrly

While on IV therapies, nebulised Salbutamol can be continued 3 hrly and Ipratropium 6hrly

Once the child improves, consider weaning and stopping IV therapies every 4-6 hours.

1. Salbutamol MDI via spacer: 10 puffs back to back 3 times in an hour
2. Prednisolone (except in pre-school wheeze)

Improvement: Follow

Moderate pathway

**Paediatric Wheeze Management Flowchart**

**SpO2** ≥ **92%**

**SpO2 < 92%**

Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

1. O2 via face mask/nasal prongs
2. Salbutamol + Ipratropium nebulised 3 times in the first hour
3. Prednisolone
4. If any life-threatening features are present - escalate to IV treatments immediately

2nd Line IV treatment: Magnesium Sulphate bolus

IV Salbutamol infusion (ECG monitoring & 12 hourly U&E with gas)

No improvement: Follow Severe pathway

**In case of poor response discuss with Paediatric Consultant**

**Request Anaesthetic review and discuss with WATCH team**

**DOSES OF DRUGS IN THE PATHWAY**

**(If case of discrepancy, please follow the BNFc doses)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **DRUG** | | **ROUTE** | **DOSE** | **SPECIAL CONSIDERATIONS** | |
|  | | | | | |
| **Salbutamol** | | MDI | Up to 10 puffs | Via spacer | |
|  | | Nebulised | 1-4 years: 2.5mg  ≥5 years: 5mg |  | |
|  | | IV Bolus | 12-23mth: 5mcg/kg over 5 mins  2-17yrs: 15mcg/kg over 5 mins  **(Maximum dose is 250 mcg)** |  | |
|  | | IV Infusion | 1 mcg/kg/min  **(Maximum 20mcg/min)** | 12hrly U&E and blood gas  Continuous ECG Monitoring | |
|  | | | | | |
| **Ipratropium** | | Nebulised | <12 years: 250mcg  ≥12 years: 500mcg | Every 20-30 minutes for first 2 hours; then every 4-6 hours | |
|  | | | | | |
| **Prednisolone** | | Oral | 1-11 years: 1-2mg/Kg daily (Max dose 40mg)  12-17 years: 40-50mg daily | Treatment for 3 days is usually sufficient. Longer course (5-7 days) should be considered in children who require HDU/PICU | |
|  | | | | | |
| **Dexamethasone** | Oral | | 0.6mg/kg single dose  **(Maximum dose: 16mg)** | | If Prednisolone is vomited, a single dose of Dexamethasone can be considered instead of Prednisolone for 3 days. |
|  | | | | | |
| **Hydrocortisone** | | IV | 4mg/kg 6 hourly  **(Maximum 100mg/dose)** | For children with a life threatening attack or in HDU | |
|  | | | | | |
| **Aminophylline** | | IV Bolus | 5mg/kg over 20 mins  **(Maximum dose: 500mg)** | NOT to be given if already on regular Theophylline | |
|  | | IV Infusion | Up to 11 years: 1mg/kg/hr  >12-17 years: 0.7mg/kg/hr | Plasma Theophylline: Send level after 4-6 hours of commencing infusion and 24hrly thereafter (Stop infusion for 15 mins before collecting the level)  Adjust dose according to plasma Theophylline level (Target 10-20mg/L or 55-110micromol/L) | |
|  | | | | | |
| **Magnesium Sulphate** | | IV bolus | 40mg/kg (**Maximum dose: 2g)** over 20 mins | Monitor BP and respiration | |
|  | | | | | |

Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

**INTRAVENOUS INFUSIONS**

**How to prepare Salbutamol**

**IV LOADING DOSE:**  For 1-23mth: 5micrograms/kg (0.1ml/kg) (**MAXIMUM 250 micrograms)**

For 2-17 years: 15 micrograms/kg (0.3ml/kg) (**MAXIMUM 250 micrograms)**

*Final concentration – 50 micrograms/ml Both peripheral and central line use*

Preparation: 1. Take 0.5ml (500 micrograms) of Salbutamol from a 5mg in 5 ml (1mg/ml) ampoule

2. Make up to 10ml by adding 9.5ml of Sodium Chloride 0.9% or Dextrose 5%

3. Run loading dose over 5 minutes under cardiac monitoring in HDU setting

**CONTINUOUS IV INFUSION:** *Final concentration – 200 micrograms/ml Both peripheral and central line use*

Preparation: 1. In a 50ml syringe, take 40ml of Sodium Chloride 0.9% or Dextrose 5%

2. Add 10ml (10mg) of Salbutamol 5mg in 5ml (1mg/ml) ampoule

Rate of infusion**:** 1 microgram/kg/min = 0.3ml/kg/hr **MAXIMUM 20 micrograms/min** (6ml/hour)

**Salbutamol infusion should be used in a HDU set up with continuous ECG monitoring**

**Monitor for signs of Salbutamol toxicity: U&Es and blood gas 12-hourly.**

**How to prepare Aminophylline**

**IV LOADING DOSE: DO NOT use this if the child is already on oral Theophylline**

*5mg/kg (****MAXIMUM 500mg)*** *over 20 mins*

**MAINTENANCE DOSE:** *Final concentration – 1mg/ml*

*Upto 11years: 1mg/kg/hr*

*12-17 years: 0.7mg/kg/hr*

Preparation: Add 11ml (275mg) of intravenous Aminophylline (250mg/10ml) to a 250ml **Baxte**r manufactured bag of Sodium chloride 0.9% or glucose 5% (accurate fill volume = 271ml) to make a final bag volume of 282ml

**Plasma Theophylline level should be measured 4-6 hrs after starting infusion. Stop infusion for 15 min before collecting level**

**How to prepare Magnesium Sulphate**

**DOSE***: 40mg/kg (0.4ml/kg of a 10% Magnesium Sulphate solution)*

**MAXIMUM 2 grams** (20ml of 10% solution)

The preferred solution is 10% Magnesium Sulphate (100mg/ml) as it can be used peripherally as well as centrally.

If 10% is not available, then use 50% solution.

To obtain 50ml of 10% solution using 50% strength: Draw up 10ml of 50% Magnesium Sulphate and dilute up to 50ml with Dextrose 5% **OR** Sodium Chloride 0.9% **OR** Dextrose 5% with Sodium Chloride 0.9%. This gives a 10% solution with 100mg/ml of Magnesium.

**1 HOUR Review** Date/Time:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate | Sats | FiO2 or L/min | Heart rate | Temp |
|  |  |  |  |  |

Tick if the following are present: Examination:

|  |  |
| --- | --- |
| Subcostal recessions |  |
| Intercostal recessions |  |
| Tracheal tug |  |
| Nasal flaring |  |

Impression: **Improving □ Not improving □** Step up treatment if there is no objective improvement

PLAN:

* Prescribe regular Salbutamol on regular side of drug chart at 1 to 4 hourly intervals based on assessment.

Time of next review: Name/Initials:

**DO NOT use this if the child is already on oral Theophylline**

**MEDICAL REVIEW** Date/Time:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate | Sats | FiO2 or L/min | Heart rate | Temp |
|  |  |  |  |  |

Tick if the following are present: Examination:

|  |  |
| --- | --- |
| Subcostal recessions |  |
| Intercostal recessions |  |
| Tracheal tug |  |
| Nasal flaring |  |

Impression: **Improving □ Not improving □** Step up treatment if there is no objective improvement

PLAN:

* Prescribe regular Salbutamol on regular side of drug chart at 1 to 4 hourly intervals based on assessment.

Time of next review: Name/Initials:

**Step up treatment if there is no objective improvement**

**Once the child is on 2hrly inhalers and improving**

* **Hand over to the nurses for Criteria led weaning.**
* **Cross off regular Salbutamol & prescribe as PRN on drug chart.**
* **Complete e-discharge, medications, and Education Bundle**

Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

**MEDICAL REVIEW** Date/Time:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate | Sats | FiO2 or L/min | Heart rate | Temp |
|  |  |  |  |  |

Tick if the following are present: Examination:

|  |  |
| --- | --- |
| Subcostal recessions |  |
| Intercostal recessions |  |
| Tracheal tug |  |
| Nasal flaring |  |

Impression: **Improving □ Not improving □** Step up treatment if there is no objective improvement

PLAN:

* Prescribe regular Salbutamol on regular side of drug chart at 1 to 4 hourly intervals based on assessment.

Time of next review: Name/Initials:

**MEDICAL REVIEW** Date/Time:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate | Sats | FiO2 or L/min | Heart rate | Temp |
|  |  |  |  |  |

Tick if the following are present: Examination:

|  |  |
| --- | --- |
| Subcostal recessions |  |
| Intercostal recessions |  |
| Tracheal tug |  |
| Nasal flaring |  |

Impression: **Improving □ Not improving □** Step up treatment if there is no objective improvement

PLAN:

* Prescribe regular Salbutamol on regular side of drug chart at 1 to 4 hourly intervals based on assessment.

Time of next review: Name/Initials:

**Step up treatment if there is no objective improvement**

**Once the child is on 2hrly inhalers and improving**

* **Hand over to the nurses for Criteria led weaning.**
* **Cross off regular Salbutamol & prescribe as PRN on drug chart.**
* **Complete e-discharge, medications, and Education Bundle**

**Guide for Criteria-led weaning of Salbutamol for Nurses**

**Assessment at handover for Criteria-led weaning** Date/Time

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Resp rate | Sats | FiO2 or L/min | Heart rate | Temp |
|  |  |  |  |  |

Improving trend of respiratory observations Yes ❑ No ❑

No evidence of severe work of breathing (tracheal tug, nasal flaring, head bobbing) Yes ❑ No ❑

Child has had 1-hour medical review Yes ❑ No ❑

Child requiring 2 hourly inhalers and in air Yes ❑ No ❑

Salbutamol prescribed on PRN side of prescription chart and crossed off regular side Yes ❑ No ❑

Agreement with medical staff that child is suitable for criteria-led weaning Yes ❑ No ❑

Continue with assessment as required (minimum before each inhaler)

Name/Initials:

**Assessed and stable on 2 hourly inhalers** Date: Time 2 Hours post inhaler:

Respiratory observations remain within white zone of PEWS chart Yes ❑ No ❑

Absence of or minimal increased work of breathing Yes ❑ No ❑

Is the child comfortable and able to talk in full sentences (if applicable) Yes ❑ No ❑

Parents happy with their child’s condition Yes ❑ No ❑

**If yes**: Stretch to 3 hourly inhalers

Ensure e-discharge, medications and wheeze education bundle are prepped

**If no**: Continue 2 hourly, refer to prescribed Salbutamol on PRN side and give 10 puffs via spacer

If concerns at any time, discuss with medical staff or request review

Review with next pre-inhaler PEWS

Name/Initials:

**Assessed and stable on 3 hourly inhalers** Date: Time 3 Hours post inhaler:

Respiratory observations remain within white zone of PEWS chart Yes ❑ No ❑

Absence of or minimal increased work of breathing Yes ❑ No ❑

Is the child comfortable and able to talk in full sentences (if applicable) Yes ❑ No ❑

Parents happy with their child’s condition Yes ❑ No ❑

**If yes**: Stretch to 4 hourly inhalers

Contact medical team to inform them that child is ready for discharge

**If no**: Continue 3 hourly, refer to prescribed Salbutamol on PRN side and give 10 puffs via spacer

If concerns at any time, discuss with medical staff or request review

Name/Initials:

**Weaning advice at discharge:**

**Salbutamol 10 puffs 4 hourly: For 24 hours**

**Salbutamol 6 puffs 4 hourly: For next 24 hours**

**Thereafter Salbutamol 2-10 puffs as needed**

**CONSULTANT REVIEW: Date/time:**

Name: Unit No:

Date of Birth:

Address:

*(Place addressograph here)*

**Named consultant:**

**Seen by:**

**Admission details:**

**Examination:**

**Plan:**

* **FOLLOW UP**

❑ **All asthma admissions require GP follow up within 2 working days of discharge**

❑ **General Paediatric follow-up (within 4 weeks):**

* All asthma admissions
* Children with pre-school wheeze being started on preventers

❑ **Respiratory Consultant referral: Use e-referral**

* HDU/PICU admissions
* Poorly controlled on 2 preventers

❑ **Asthma nurse referral via e-mail *ABB.PaedsRespiratoryNurse@wales.nhs.uk***

* Children needing HDU or PICU admission

❑ **Please discuss all PICU transfers with the respiratory team before discharge**

❑ Consider starting / stepping up preventer therapy

❑ Ensure appropriate follow up arranged\*

❑ Complete Wheeze education bundle

❑ Give Smoking Cessation advice

**Asthma**

For children admitted with an acute asthma attack, preventers should be started or stepped up prior to discharge.

**Preschool wheeze**

Discharge on inhaled corticosteroids if they have

* 2 or more admissions in 12 months
* HDU admission
* Interval symptoms
* Personal or family history of atopy

**PLEASE ENSURE PERSONALISED ACTION PLAN IS COMPLETED AND GIVEN TO PARENTS**

**PRINCIPLES OF MANAGEMENT**

Oxygen

* Aim to maintain saturations >92%. If needed, humidified oxygen should be given via face mask.
* If high flow oxygen is needed, please follow HDU policy for flow rates, escalation, and weaning.

Antibiotics

* Antibiotics should not be routinely prescribed in asthma, as most attacks are triggered by viruses.
* Consider antibiotics if the child is critically unwell or there are focal changes on CXR.

HDU care

* All patients requiring IV bronchodilators should be admitted to HDU. Please inform the HDU consultant if on site, or the Consultant on call out of hours.
* Continuous oxygen saturation and ECG monitoring
* Children with respiratory distress have poor fluid intake with high insensible losses. They should be started on full maintenance IV fluids. Fluids may be restricted if blood results show features of SIADH.
* Strict intake and output monitoring.

IV lines

* Children on IV Salbutamol should be prescribed IV fluids with potassium to prevent hypokalaemia. A second IV line will need to be inserted for this.
* IV Salbutamol is not compatible with IV Aminophylline.
* IV Aminophylline and IV fluids with potassium can be given via the same line.

**INVESTIGATIONS**

CXR is not recommended unless the child has

* Severe/life-threatening asthma not responding to treatment
* Persisting unilateral signs suggesting lobar collapse or consolidation or pneumothorax
* Subcutaneous emphysema

Blood gases are only indicated in children with a severe/life-threatening attack or on IV bronchodilators.

* Normal or raised PCO2 levels are indicative of worsening asthma.
* Lactic acidosis had been reported with intravenous and frequent doses of nebulised Salbutamol. This is a diagnosis of exclusion, and other causes such as sepsis and dehydration must be considered. Most cases resolve as the child improves and Salbutamol is weaned. If the child has severe bronchospasm, alternatives such as intravenous Aminophylline or Magnesium may need to be added so that Salbutamol can be decreased and stopped.

U&E should be done 12hrly in children on IV Salbutamol infusion to monitor for hypokalaemia.

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