Pediatric ED Asthma Pathway – Pathway Goals, Criteria, & Asthma Score

PED Pathway Goals:

- Consistent Use of PED Asthma careset
- Steroid use in 100% of asthma exacerbations
- Administration of bronchodilator & steroids within 15 min of arrival
- ↓ admission rate & LOS (overall & ED)

Inclusion Criteria:

- >2 yo with Dx of asthma or recurrent wheezing that improves with Albuterol
- Current exacerbation

Exclusion Criteria:

- Chronic lung disease (Cystic fibrosis)
- Cardiac disease requiring baseline medication
- Airway issues (Tracheostomy)
- Sickle Cell Anemia
- Medically complex

Pediatric Asthma Score

Variable		0 points	1 point	2 points	3 points
RR **2-3 years** **4-5 years** **6-12 years** **>12 years**		 ≤ 30 ≤ 25 ≤ 22 ≤ 18	 31-34 26-30 23-26 19-23	 35-39 31-35 27-30 24-27	 ≥ 40 ≥ 36 ≥ 31 ≥ 28
O2 sat on RA* **Or** **Level of respiratory Support**		≥ 93%	89-92% Or <2L NC	85-88% Or 2-4L NC	< 85% Or On HFNC/Bipap
Breath Sounds		Normal w/ good aeration	End expiratory wheezes	Diffuse expiratory wheezing	Biphasic wheezing **or** ↓ air movement
Retraction Sites: **Subcostal** **Intercostal** **Supraclavicular**		None	1 site	2 sites	3 sites or 2 + nasal flaring
Dyspnea/General appearance	< 4 years	Normal feeding, vocalization, & play	1 of the following: Irritable Tachypnea w/ activity ↓ activity ↓PO	2 of the following: Irritable Tachypnea w/ activity ↓ activity ↓ PO	3 of the following: Irritable Tachypnea w/ activity ↓ activity ↓ PO
	≥ 4 years Counts to	>9 in 1 breath	7-9 in 1 breath	4-6 in 1 breath	< 4 in 1 breath

Total Score = 0 - 15

*RA score preferred if safe for patient to be checked on RA. If not, adjust score per level of respiratory support

Pediatric ED Asthma Pathway – Management

1st PAS Assessment
Place on O_2 if sat < 90

1st hour

PAS 0-4
- PO Dexamethasone
- Albuterol MDI 4-8 puffs

PAS 5-12
- **SWARM for PAS ≥ 8**
- PO Dexamethasone
- Nebs: Albuterol & Ipratropium x 3
- Consider IV Magnesium Sulfate for initial PAS ≥ 10

PAS > 12 or AMS
- SWARM, PEDRU pg, start Tx below, & proceed to next page
- Nebs: Albuterol & Ipratropium x 3
- IV Magnesium sulfate
- IV Dexamethasone

2nd PAS Assessment 15 min after last neb/HFA dose.
If ill-appearing or worsening, rescore & move to 2nd hr treatment

2nd hour

PAS 0-4
- 1st hr PAS ≤ 4 → discharge if criteria met
- 1st hr PAS 5-9 → observe 1 hr
- 1st hr PAS > 9 → observe 2 hrs

PAS 5-7
- Neb: Albuterol 5 mg q15 min (up to 3)

PAS 8-12
- 3 Albuterol nebs
- Consider IV Magnesium sulfate

PAS > 12 or AMS
- SWARM, PEDRU pg, start Tx below, & proceed to next page
- Same treatments in "1st hour" for PAS > 12
- Exclude Ipratropium, Magnesium, & steroids if already given

3rd PAS Assessment 15 min after last neb/HFA dose.
If ill-appearing or worsening, rescore & move to 3rd hr treatment

3rd hour

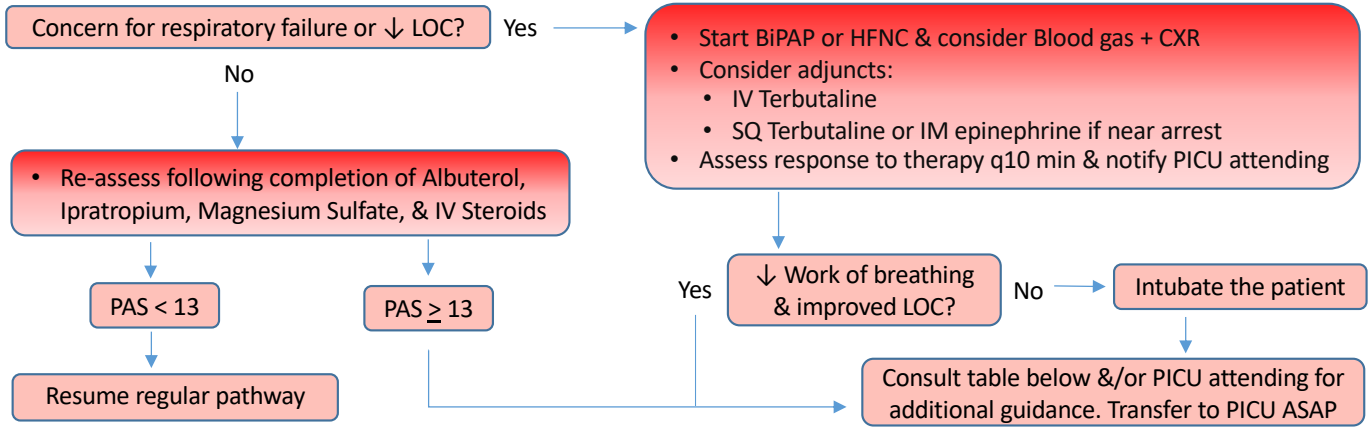
PAS 0-4
Discharge if observation period complete & criteria met

Discharge Criteria
- O2 > 89% with no retractions
- MDI spacer teaching complete
- Steroids prescribed or completed
- 24-48 hr follow up arranged

If PAS > 4 or DC criteria not met:
- **ADMIT**
- **Use current PAS score to determine the inpatient "STEP" (treatment pathway) & initial neb frequency →**

PAS	Severity	Admit STEP	Neb frequency
13-15	SEVERE	PICU	Continuous
10-12		STEP A	Continuous
8-9	MODERATE	STEP B	Q2
5-7		STEP C	Q3
0-4	MILD	STEP D	Q4

APPROACH TO THE ACUTELY SEVERE ASTHMATIC PATIENT (PAS >12)



Therapeutic Options for patients with insufficient initial response

Agent	Recommended dosages &/or usage
Albuterol	0.5-1 mg/kg/hr. Suggested continuous albuterol dose ranges per wt: If < 20 kg → 10-20 mg/hr; 20-30 kg → 20-30 mg/hr, > 30 kg → 20-45 mg/hr (> 30 mg/hr rarely needed). Monitor for hypokalemia.
Ipratropium	May consider use as an adjunct given q4 in patients on continuous albuterol.
IV Magnesium	If poor response to bolus dose, consider infusions in dosing table. Mg level ≈ 4 mg/dL. Watch for hypotension
HFNC/BiPAP	Titrate flows PRN. Start w/Bipap if LOC ↓. Bipap w/ Precedex is an option if child is HDS. Give 1 mcg/kg over 10 min (may repeat x 1), followed by drip of 0.5 – 1 mcg/kg/min. Titrate PRN by 0.1 - 0.2 mcg/kg/min (**MAX of 2 mcg/kg/hr**)
Terbutaline	Refer to dosing table. IV preferred but SQ may be used. Monitor HR & BP closely, and potassium q12-24 hrs
Epinephrine	IM 0.01 mg/kg (max 0.3 mg) q 5 min PRN.
Ketamine	Bolus dose is 0.5 – 1 mg/kg. Infusion is 5–20 mcg/kg/min. Titrate to effect. Be ready to intubate if needed.
Aminophylline	Bolus: 6 mg/kg over 30 min. infusion: 0.5–1.2 mg/kg/h. Check level 30 min after infusion & then q12 h. **Therapeutic range 10–20 mcg/mL**

Asthma Intubation Guideline

Must be supervised by airway physician from PICU, Anesthesia, PED, or main ED

Step	Recommendation
Pre-intubation	Pre-oxygenate, NS bolus, review airway checklist, notify PICU attending
Induction meds	Induction: Ketamine 1.5-2 mg/kg followed by Rocuronium 1.2-1.5 mg/kg
Initial Ventilation	Initially hand-ventilate patient with a slow rate. Watch for hyperinflation, HD instability, & Pneumothorax
Ventilator Settings	Mode: PC TV: start with 6-8, up to 10ml/kg Initial rate: 6-12 breaths per min Inspiratory time: 1-1.5 sec Expiratory time: 4-9 sec I:E ratio 1:3-5 PEEP: 5 PIP goal: 25-30 (max of 45 cm H20) Plateau pressure: < 30 cm H20
Ongoing Sedation & Analgesia	Ketamine at 1-2 mg/kg/hr +/- midazolam 0.1-0.2 mg/kg/hr Analgesia: Fentanyl 2 mcg/kg/hr If continuing NM blockade (not > 48 hrs): Cisatracurium 0.1-0.15 mg/kg q 30-60 min
Monitoring post intubation	Permissive hypercapnia Plateau Pressures < 30 cm H20 ABG q 1-2 hrs Adequate sedation + analgesia Watch for breath stacking

Pediatric ED Asthma Pathway – General Dosing & Terbutaline Titration Example

ASTHMA GENERAL DOSING TABLE

Albuterol

Kg	Individual Nebs	MDI	Continuous Neb (see below**)
0-10	2.5 mg (0.5mL)	4 puffs	10 mg/hr
> 10	5 mg (1 mL)	8 puffs	20mg/hr

****Continuous solution takes time, Combine single doses until it arrives**

Ipratropium

0-10 kg	250 mcg neb
> 10 kg	500 mcg neb

Steroid Options

Dexamethasone	0.6 mg/kg	PO/IV	**MAX 16 mg**
Methylprednisolone	1-2 mg/kg/day	IV	**MAX 60 mg/day**
Prednisone/Prednisolone	1-2 mg/kg/day	PO	**MAX 60 mg/day**

IV Magnesium Sulfate

Bolus: 50 mg/kg (**MAX 2 grams**) over 20 min with 20 ml/kg NS **(MAX 1 L)**

Optional Infusion (PICU/ED only): If persistently severe after bolus dose, may give an infusion of 50 mg/kg over 1hr (**MAX 2 gram/hr**) up to 3 times.

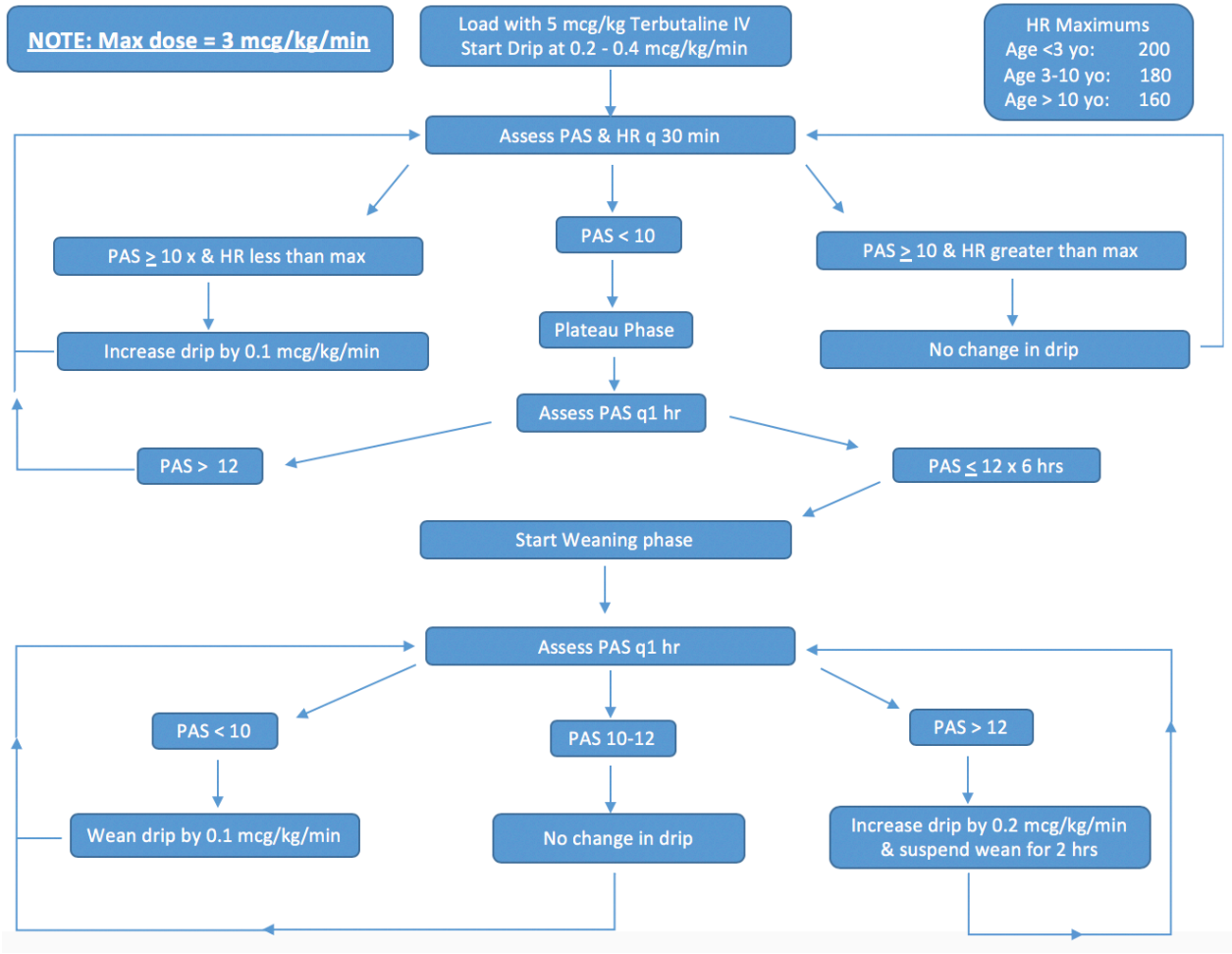
Terbutaline

SQ	10 mcg/kg q20 min x 3 doses	**MAX 250 mcg = 0.25 mL**
IV	4-10 mcg/kg load over 15 min	**MAX 750 mcg** then infusion
Infusion	0.4 mcg/kg/min, then ↑ by 0.1-0.2 mcg/kg/min PRN q 30 min **MAX 3 mcg/kg/min**	

IM Epinephrine

< 30 kg	0.15 mg q 5 min as needed
30 kg or >	0.3 mg q 5 min as needed

Terbutaline Titration Protocol Example



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Scoring Tool Modified Quereshi PAS (adapted from tool currently in use on Pediatric Service)

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