If RESPIRATORY ARREST IMMINENT-
Triage and Initiate care in resuscitation room

Exclusion Criteria:
bronchiolitis, cystic fibrosis, tracheostomy patients, neuromuscular diseases, immunodeficiency & cardiac patients (unless ordered), and other chronic lung disease (unless ordered)

EMERGENCY DEPARTMENT
Entry Assessment for **ASTHMA PATHWAY**

Inclusion Criteria:
Patients 2-18 years of age with acute asthma exacerbation

Albuterol to MDI w/ Spacer Puff Conversions

5 mg neb = 8 puffs
10 mg neb= 16 puffs
Q3 hours= 5 puffs Q1 hour x3
Continuous= 5 puffs Q20min. X3
15 mg neb= 24 puffs
Q3 hours= 8 puffs Q1 hour x3
Continuous= 8 puffs Q20min. X3

1st HOUR

- Supplemental Oxygen should be administered to maintain SaO2 >90%
- Initial PAS score done at triage and on room placement
NOTE: CXR and Blood Gas are not recommended for Routine Asthma Exacerbation

PAS 1-2 Mild

- Albuterol 5 mg Neb
- Repeat per clinician discretion
- Consider Steroids in some cases- consult with physician

PAS 3-5 Moderate

- Albuterol Neb over 1 hour
<20 kg: Albuterol 10 mg / ≥ 20 kg: Albuterol 15 mg
• Ipratropium 1 mg via neb- in conjunction with Albuterol
• Dexamethasone 0.6 mg/kg (max 16 mg) PO/IM or
  - for severe exacerbations Methylprednisolone 1mg/kg (max 30mg) IV for PO intolerant
  - for dexamethasone allergy/intolerance: Prednisolone 1 mg/kg (max: 20 mg/dose) PO

PAS 6-10 – Moderate to Severe

- Albuterol Neb over 1 hour
<20 kg: Albuterol 10 mg / ≥ 20 kg: Albuterol 15 mg
• Ipratropium 1 mg via neb- in conjunction with Albuterol
• Dexamethasone 0.6 mg/kg (max 16 mg) PO/IM or
  - for severe exacerbations Methylprednisolone 1mg/kg (max 30mg) IV for PO intolerant
  - for dexamethasone allergy/intolerance: Prednisolone 1 mg/kg (max: 20 mg/dose) PO
**Consider early adjunctive therapy

2nd HOUR

*Reassess PAS Score (1)

PAS 0-2 Mild
Discharge to HOME
☐ Asthma Action Plan
☐ Schedule PCP Follow-up
☐ Asthma Education to include Smoking Cessation referral if indicated
☐ Re-label Albuterol
☐ Script for Controller Meds, if applicable
☐ Script for Dexamethasone Dose #2- 0.6 mg/kg (max 16 mg) PO x 1 to be given 24-36 hours after 1st dose, if applicable

PAS 3-5 Moderate

- Albuterol Neb over 1 hour
<20 kg: Albuterol 10 mg
≥20 kg: Albuterol 15 mg

PAS 6-7 Moderate to Severe

- Albuterol Neb over 1 hour
<20 kg: Albuterol 10 mg
≥20 kg: Albuterol 15 mg

**Consider adjunctive therapy

PAS 8-10 Severe
POOR RESPONDER

- Albuterol Neb over 1 hour (continuous) as necessary
<20 kg: Albuterol 10 mg/ ≥ 20 kg: Albuterol 15 mg

**Administer adjunctive therapy if not already done
Contact PICU for Admission if Terbutaline used in 2nd hour

3rd HOUR

*Reassess PAS Score (1)

PAS 0-2 Mild
Discharge to HOME

See above recommendations

PAS 3-5 Moderate
Admit to Acute Care Unit

<20 kg: Albuterol 10 mg Neb Q2h
≥20 kg: Albuterol 15 mg Neb Q2h

PAS 6-7 Moderate to Severe
Admit to Acute Care Unit
(see Addendum 5 for Acute Care Unit exclusion criteria, Consider IMC admission)
<20 kg: Albuterol 10 mg Neb over 1 hour
≥20 kg: Albuterol 15 mg Neb over 1 hour
**Consider adjunctive therapy

PAS 8-10 Severe
POOR RESPONDER- **Admit to PICU**

<20 kg: Albuterol 15 mg Neb over 1 hour/Continuous
≥20 kg: Albuterol 20 mg Neb over 1 hour/Continuous

**Administer adjunctive therapy if not already given

***Reassess PAS Score-** *If completing a continuous neb and considering discharge home it is RECOMMENDED that you observe the patient for at least 60 minutes after the completion of the neb, then rescore the patient for discharge readiness.* **1**

	Assessment	0	1	2
RR	Respiratory Rate (Obtain over 30 seconds and multiply x2)			
	2-3 years old	≤34	35-39	≥40
	4-5 years old	≤30	31-35	≥36
	6-12 years old	≤26	27-30	≥31
	>12 years old	≤23	24-27	≥28
O2	Oxygen Requirement *(RA for 2min- return O2 if Sats <90)*	>95% RA	90-95% RA	<90% RA
A	Auscultation	BBS clear to End exp. wheeze	Expiratory Wheezes	Insp. & Exp. wheeze or Diminished BS
WOB	Work of Breathing- *nasal flaring, suprasternal, intercostal or subcostal muscle use*	≤1 accessory muscle	2 accessory muscles	≥3 accessory muscles
D	Dyspnea	speaks full sentences, playful, babbles	Speaks partial sentences, short cry	Speaks short phrases, single words, grunting

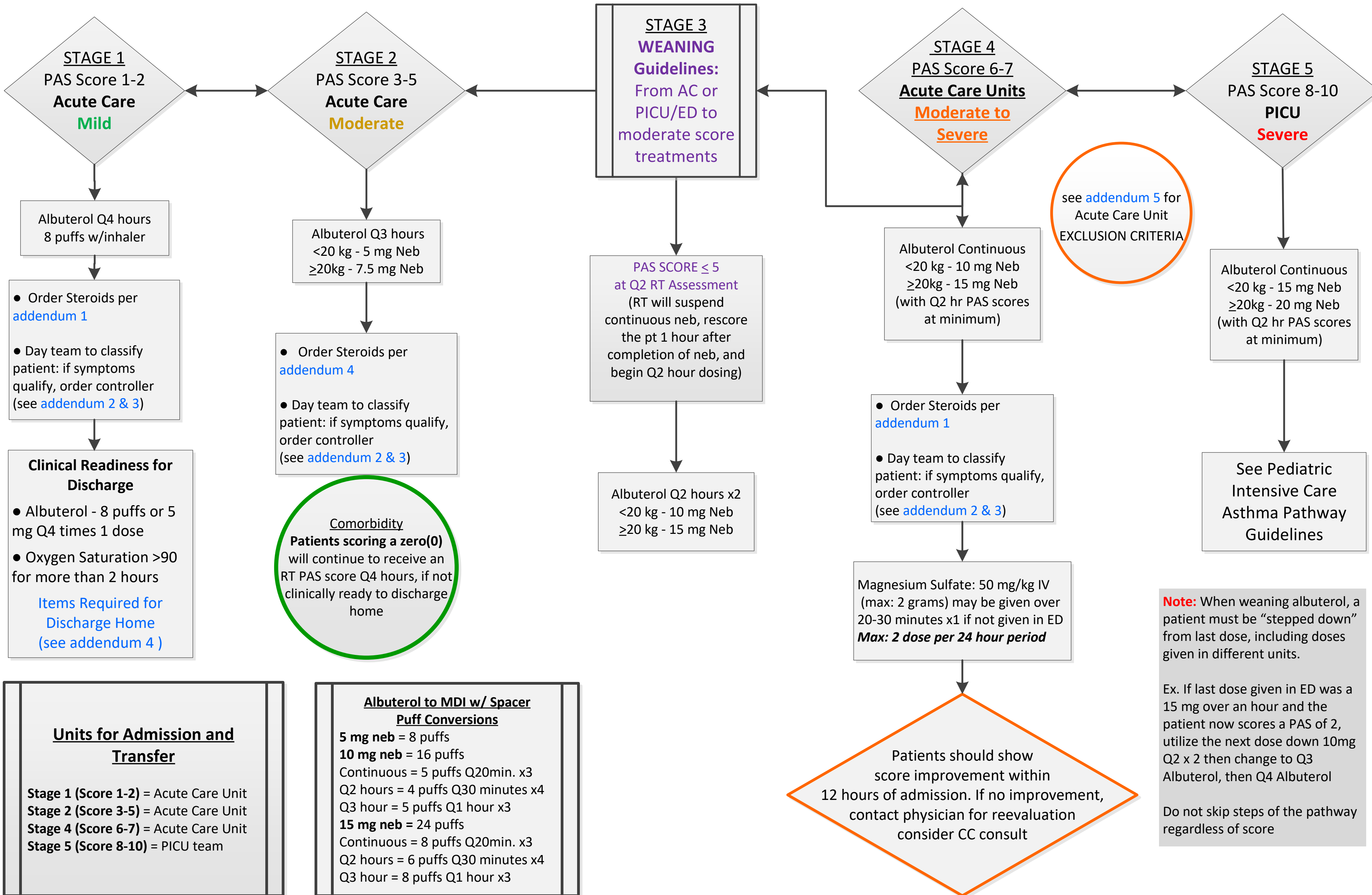
PAS (Quereshi, et al) Pediatric Asthma Score – modified version (for patients >2yrs of age)

ADJUNCTIVE THERAPY OPTIONS

- **IV NS bolus** (20 mL/kg, max 1L)
- **Magnesium Sulfate** 50 mg/kg IV (max 2 g) over 20-30 min. x1
  Strongly consider NS bolus if not already given
- **Terbutaline** 10 mcg/kg SQ (Max 250 mcg = 0.25 ml) X1 for child in extremis (can be given Q20 minutes x3 doses until IV established)
- If considering IV Terbutaline
  - **Must be ordered in concert with STAT PICU consult**
  - Recommended starting dose:
    - 10 mcg/kg (max 250 mcg) IV load over 15 minutes, followed by: Terbutaline continuous IV drip 0.4 mcg/kg/min
  - STAT call to Pharmacy for IV drip Terbutaline

Inpatient Asthma Pathway Guidelines

● Reassess PAS score with every treatment ● Supplemental O2 to maintain SaO2 >90% ● Smoking cessation counseling when indicated



dell children's Ascension

Last updated: June 2024

Ascension Texas

Austin, TX 78723

Patient Label

Pediatric Asthma Albuterol Titration Protocol Severity Score Sheet

Year:	Date (month, day):								
	Time:								
	Initials:								
	Credentials (example: RN, RT):								
	Pre or Post Score? RT ONLY:								
Circle the appropriate assessment score below.									
Respiratory	Enter Respiratory Rate (If obtained over 30 seconds, multiply by 2)	Rate	Rate	Rate	Rate	Rate	Rate	Rate	Rate
	2-3 yrs: 34 or Less Breaths per Minute 4-5 yrs: 30 or Less Breaths per Minute 6-12 yrs: 26 or Less Breaths per Minute >12 yrs: 23 or Less Breaths per Minute	0	0	0	0	0	0	0	0
	2-3 yrs: 35-39 Breaths per Minute 4-5 yrs: 31-35 Breaths per Minute 6-12 yrs: 27-30 Breaths per Minute >12 yrs: 24-27 Breaths per Minute	1	1	1	1	1	1	1	1
	2-3 yrs: 40 or More Breaths per Minute 4-5 yrs: 36 or More Breaths per Minute 6-12 yrs: 31 or More Breaths per Minute >12 yrs: 28 or More Breaths per Minute	2	2	2	2	2	2	2	2
Room Air Oxygen Saturation	Room Air O2 Sat. More Than 95%	0	0	0	0	0	0	0	0
	Room Air O2 Sat. 90-95% RA SpO2	1	1	1	1	1	1	1	1
	Room Air O2 Sat. Less than 90%	2	2	2	2	2	2	2	2
Auscultation	Clear BS or End Expiratory Wheezes	0	0	0	0	0	0	0	0
	Expiratory Wheezes	1	1	1	1	1	1	1	1
	Inspiratory & Expiratory Wheezes or Diminished Breath Sounds	2	2	2	2	2	2	2	2
Work of Breathing	Use of 0-1 Accessory Muscles	0	0	0	0	0	0	0	0
	Use of 2 Accessory Muscles	1	1	1	1	1	1	1	1
	Use of 3 or More Accessory Muscles	2	2	2	2	2	2	2	2
Dyspnea (Speaks in)	Full Sentences, Playful, Babbles	0	0	0	0	0	0	0	0
	Partial Sentences, Short Cry	1	1	1	1	1	1	1	1
	Short Phrases, Single Words, Grunting	2	2	2	2	2	2	2	2
Total Asthma Severity Score (0-10)									
Asthma Protocol Stage RT ONLY									
Albuterol Dose Given (mg) RT ONLY									
Next Assessment Time									
Signature, Initials:		Signature, Initials:							
Signature, Initials:		Signature, Initials:							

Pediatric Intensive Care Asthma Pathway Guidelines

Inclusion criteria:

- Patients 2-18 years of age with acute asthma exacerbation
- Poor responders to treatment
- Patients in Extremis
- Patients Scoring 8 or higher on the PAS
- Patients not showing improvement within 6 hours of admission to the Acute Care Unit

Standards of Care (care every patient will receive)

□ Albuterol Continuous Nebulizer:

PAS 8-10= < 20 kg = 15 mg/hr or ≥ 20 kg = 20 mg/hr

PAS 6-7= < 20 kg = 10 mg/hr or ≥ 20 kg = 15 mg/hr once patient is weaned from terbutaline & magnesium sulfate drip
Respiratory Therapy will score the patient, at a minimum, every two hours
Respiratory Therapy will contact the Physician/ Mid-level / Resident for weaning orders

Please see Inpatient Asthma Pathway Guidelines for dosing once patient is deemed ready to be off continuous nebs

□ Methylprednisolone: 0.5 mg/kg IV Q6 hours x 24 hours (max: 30 mg per dose)
(see Addendum 1 for methylprednisolone management and weaning guidelines)

□ Ipratropium: < 20 kg - 0.25 mg or > 20 kg - 0.5 mg inhaled Q6 hours x 24 hours

□ Magnesium Sulfate: 50 mg/kg IV (2 grams max) over 20-30 minutes (if not given in ED or Acute Care Unit)

Medications for Refractory Treatment

□ Ipratropium: < 20 kg - 0.25 mg or ≥ 20 kg - 0.5 mg inhaled Q6 hours, may continue per physician discretion if necessary

□ Terbutaline: Loading dose 10 mcg/kg (max: 250 mcg) over 15 minutes followed by continuous IV infusion 0.4 mcg/kg/minute

Terbutaline infusion should be weaned to off before weaning continuous Albuterol

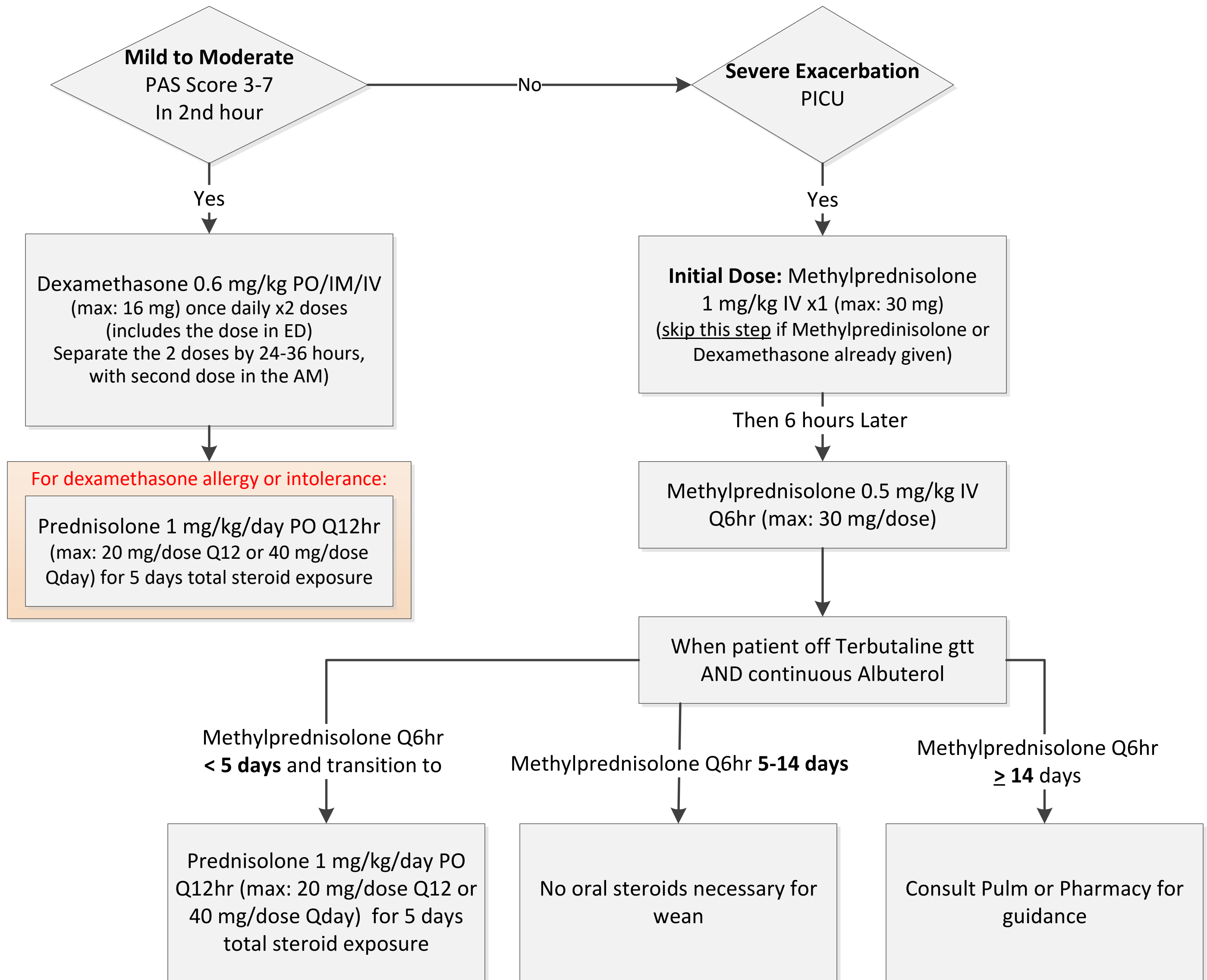
□ Magnesium Sulfate : < 30 kg - 25 mg/kg/hr or ≥ 30 kg - 20 mg/kg/hr continuous IV infusion (max: 2 g per hour)
Check serum magnesium 2 hours after the infusion is started then Q8 hours (serum magnesium target = 3-5 mg/dL)
Titrate by 5 mg/kg/hr based on serum levels

□ Ketamine : 5 mcg/kg/minute continuous IV infusion
Titrate per protocol to meet sedation needs

Recommendations for Discharge or Transfer out of the Pediatric Intensive Care Unit

- **DISCHARGE HOME**
  PAS 1-2 (ready for discharge home) - See Addendum 4 for Discharge Readiness Criteria and Requirements
- **ADMIT TO ACUTE CARE UNIT**
  PAS 1-2 (NOT ready for discharge home)
  PAS 3-5
- **ADMIT TO IMC**
  PAS 6-7 (not exhibiting steady improvement, but no longer requiring PICU care)

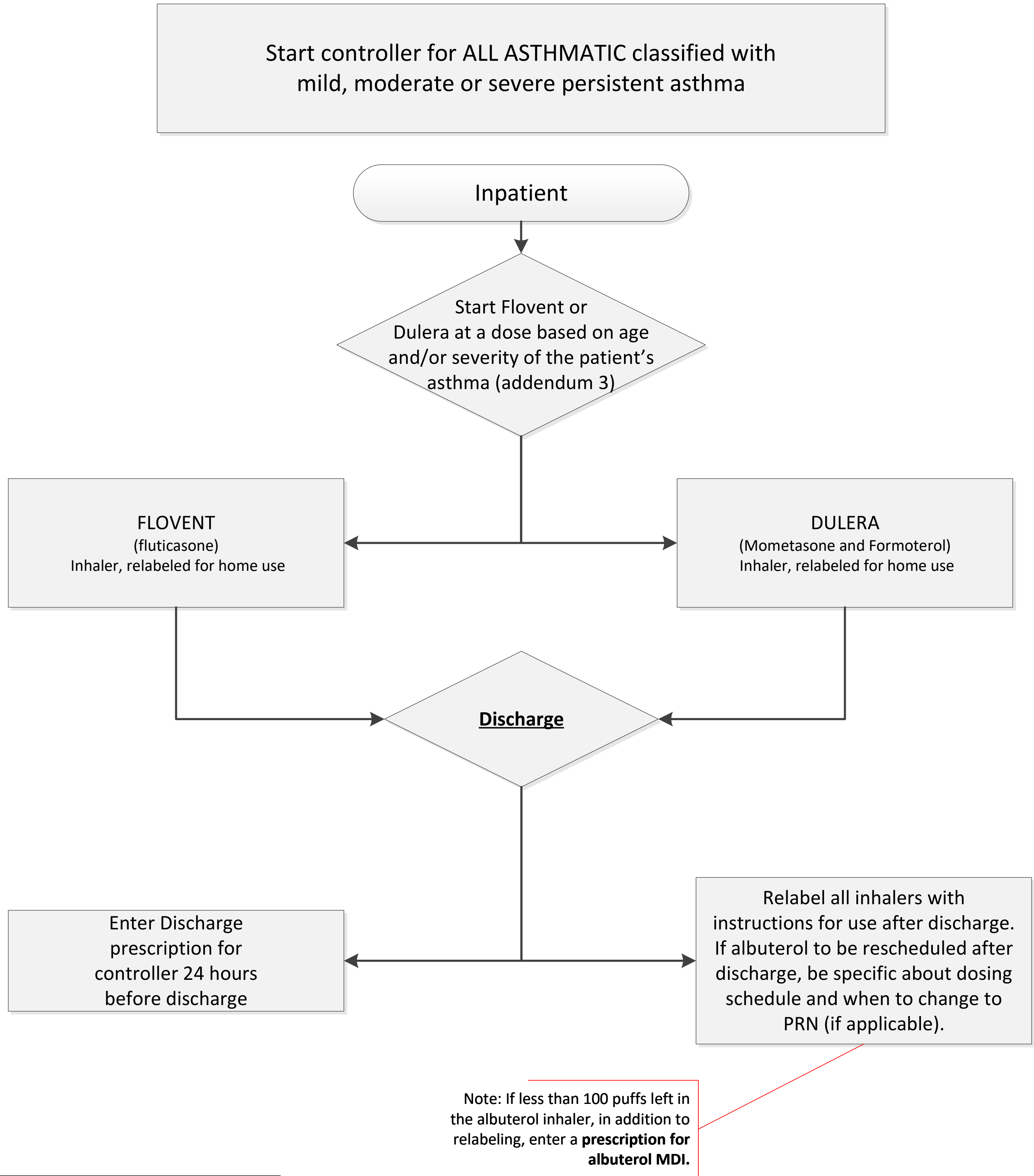
ADDENDUM 1: Ordering and Weaning Instructions for Steroid Management in Asthma



Patients started on methylprednisolone (Solumedrol) should complete their steroid course with prednisolone (Orapred).

Exception:
If patient has received only one dose of methylprednisolone then they can receive the 2 doses of dexamethasone (Decadron) as is outlined in the ED and Inpatient Pathways.

ADDENDUM 2: Ordering Instructions for Inhalers at Discharge



HOW TO FIND INSURANCE INFORMATION IN COMPASS

1. Open patient's electronic chart
2. Go to patient information band on left hand side
3. Choose face sheet tab
4. Scroll down for **insurance information**

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Addendum 3

Inhaled Corticosteroids for Asthma

Generic Name	Brand Name	Low Daily Dose (mcg)			Medium Daily Dose (mcg)			High Daily Dose (mcg)		
		0-4 yr	5-11 yr	≥ 12 yr	0-4 yr	5-11 yr	≥ 12 yr	0-4 yr	5-11 yr	≥ 12 yr
Beclomethasone HFA 40 or 80 mcg/puff	**Qvar, Qvar RediHaler**	N/A	40-80	80-240	N/A	160	240-480	N/A	320	> 480
Budesonide DPI 90,180,200 mcg/inh	**Pulmicort Flexhaler**	N/A	100-200	200-400	N/A	200-400	400-800	N/A	>400	>800
Budesonide neb 0.25mg/2ml, 0.5mg/2ml	**Pulmicort**	0.5mg	0.25-0.5mg	N/A	0.5-1mg	0.5-1mg	N/A	> 1mg	2mg	N/A
Budesonide/Formoterol **HFA**: 80/4.5, 160/4.6	**Symbicort**	N/A	160	160	N/A	320	320	N/A	320	640
Ciclesonide HFA 80, 160 mcg/puff	**Alvesco**	N/A	80	80-160	N/A	160	160-320	N/A	320	320-640
Fluticasone HFA 44,110,220 mcg/puff	**Flovent**	176 (mask)	88-176	88-220	176-440 (mask)	220-440	440	> 440 (mask)	880	880
Fluticasone/Salmeterol **HFA**: 45/21,115/21,230/21	**Advair**	180 (mask)	90-180	90-230	460 (mask)	230-460	460	920 (mask)	920	920
Fluticasone/Salmeterol **Disk**: 100/50,250/50,500/50	**Advair**	N/A	200	200	N/A	500	500	N/A	1000	1000
Mometasone DPI 110,220 mcg/inh	**Asmanex**	N/A	110	110-200	N/A	220-440	220-440	N/A	> 440	>440
Mometasone/Formoterol **HFA**: 50/5, 100/5, 200/5	**Dulera**	N/A	100	200	N/A	100	400	N/A	200	800

N/A = Dosing not available in this age group, MDI = metered dose inhaler, HFA = hydrofluoroalkane inhaler, DPI = dry powder inhaler

Addendum 4

Asthma Discharge Checklist

Clinical Readiness for Discharge

□ Albuterol - 8 puffs or 5 mg Q4 times 1 dose

□ Oxygen Saturation >90 for more than 2 hours

Items Required for Discharge Home

□ Asthma **Action Plan**

□ Asthma **Education**

□ **Influenza Vaccine** per hospital protocol if not already received for the year
(not applicable in ED- refer to primary provider)

□ Order **Albuterol MDI** and re-label for home use with applicable home instructions

- Relabel Albuterol inhaler with instructions for use after discharge. If albuterol to be rescheduled after discharge, be specific about dosing schedule and when to change to PRN (if applicable).
- Note: If less than 100 puffs left in the albuterol inhaler, in addition to relabeling, enter a **prescription for albuterol MDI**.

□ Prescription for **Controller** (addendum 2)

□ **Steroids**: Dexamethasone script for dose #2- 0.6 mg/kg PO x1 (max: 16mg rounded to nearest 1 **or** 4mg tab) if second dose was not received in the hospital

Family education/ prescription instructions:
Give 24-36 hours after the initial dose, with the 2nd dose preferably in the morning.
Crush and mix in a small bite of food or a teaspoon of liquid that the child prefers.

If the patient received methylprednisolone (Solumedrol) or prednisolone (Orapred), see addendum 1 for steroid management and write an applicable prescription to finish the course of treatment.

□ **Smoking Cessation**, if indicated

Addendum 5:
Acute Care Unit Exclusion Criteria

The exclusion criterion to be applied to potential Acute Care Unit (asthma high-acuity) admissions does not supersede clinician decision-making. Should the clinician feel that the child's placement would be better-suited in a higher level of care despite the presence of exclusion criteria; the clinician's decision should be honored. **None of the below criteria should delay disposition per agreed time criteria between ED/PCRS/ICU.**

- Level of Consciousness
  - o If there is any question of altered mental status being present, the child is no longer appropriate for high-acuity unit placement.
- Blood Pressure
  - o Common blood pressure side-effects from bronchodilators are **increased** systolic and **decreased** diastolic pressures. NS bolus should be considered once BP fall below normal range.
  - o Should the child's diastolic blood pressure fall **below normal standards (*not critical low value)*** without improvement after **<u>ONE</u>** NS bolus, the child is excluded.
  - o Should the child report chest pain in the context of low diastolic blood pressure, then the child is excluded regardless of NS bolus administration.

VITAL SIGNS REFERENCE CARDS
2011

	AGE GROUPS FROM COMPASS	NORMAL RANGE	CRITICAL LOW	CRITICAL HIGH
SYSTOLIC BLOOD PRESSURE	0 – 8 days	65-95	60	100
	9 – 28 days	65-95	60	100
	29d – 12m	75-95	70	100
	13m – 3yr	80-95	75	110
	4 – 6yr	85-110	80	120
	7 – 13yr	95-130	90	140
	14 – 18yr	95-140	90	150
	>18yrs	92-170	90	180
DIASTOLIC BLOOD PRESSURE	0 – 8days	35-71	30	
	9 – 28days	35-69	30	
	29d – 12mo	35-73	30	
	13mo – 3yr	35-73	30	
	4 – 6yr	45-73	40	
	7 – 13yr	45-81	40	
	14 – 18yr	45-84	40	
	>18yrs	70-100	50	110

- Pulmonary Insufficiency
  - o Oxygen use alone is not a reason to exclude from admission.
  - o After beta-agonist Rx has been applied and 15-20 minutes have passed to allow for equilibration of V/Q mismatch, if the child has **new onset need for** oxygen of greater than 50% FiO_2 then the patient is excluded.

Any patient in an acute care unit scoring an 8 or more should be under the care of the PICU team.

PEDIATRIC EBOC EVIDENCE BASED OUTCOMES CENTER

Addendum 6:
Dexamethasone (Oral) for the Treatment of Asthma

Administration Information

Children with asthma exacerbation and a Pediatric Asthma Score (PAS) of 3 or more will be given steroids within 1 hour of arriving in the emergency department. When possible, oral dexamethasone (Decadron) will be given at a dose of 0.6 mg/kg (Max 16 mg) x 1 dose.

If the patient cannot swallow tablets, the dexamethasone tabs can be crushed up and mixed with 3-5 ml of Syrpalta (grape syrup) or a bite of applesauce/pudding/ice cream.

For ease of dosing, consider rounding the dexamethasone to the nearest 4mg tab using these weight ranges:

- 8 to 10.9 kg = 6 mg
- 11 to 15.9 kg = 8 mg
- 16 to 23.9 kg = 12 mg
- 24 kg and above = 16 mg

Based on these ranges, the 4 mg tab(s) can be used for all patients and crushed for those too young to swallow it.

One dose of dexamethasone (dosed as mentioned above) will provide anti-inflammatory treatment for 1-2 days. Most patients will not need another dose for at least 24 hours and patients with mild asthma exacerbation may not need another dose. Those with moderate exacerbation will need 2 doses separated by 24-36 hours. More than 2 doses of dexamethasone has not been studied for the treatment of asthma exacerbation.

Outpatient prescriptions for dexamethasone should be written using the 4 mg tabs and rounding to the nearest whole tab (using the weight ranges and doses above) x 1 dose po to be given 24 hrs following the ED or hospital time of administration. Pediatricians should write for a total of 2 doses to be given, separated by 24-36 hours with the first dose given as soon as possible. Additionally, there should be a sentence that states “crush tab(s) between two metal spoons and mix with 1 tsp of juice or 1 bite of food”. All outpatient pharmacies carry the 4 mg tabs.

Best Practice Points to Remember

- To meet the 1 hour metric for corticosteroids, it is best to have the 4 mg tabs loaded in your Omnicell.
- Tabs are the best dosage form for dexamethasone because the commercially available dexamethasone elixir is 30% alcohol and associated with a high rate of emesis.
- Parents should be counseled to give the second dose with food, in the morning, 24-36 hrs after the first dose (due to the common side effect of insomnia/hyperactivity).

Approved by the Pediatric Asthma Evidence-Based Outcomes Center Team

Revision History
Date Approved: June 11, 2014
Revision Date: March 2019, November 2022, June 2024
June 2024 - Full Review. Pharm Steroid Med updates, Change reference to "floor" and "Pulm Unit" to Acute Care Unit, Update Addendum 1 (inpatient wean algorithm updated), Addendum 2 (added Dulera), Addendum 3 (removed Triamcinolone, updated Mometasone/Formoterol dosing), replaced old with new Ascension Texas Pediatric Asthma Albuterol Titration Protocol Severity Score Sheet.

Next Full Review: June 2028

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Recommendations

Practice recommendations were directed by the existing evidence and consensus amongst the content experts. Patient and family preferences were included when possible.

Approval Process

EBOC guidelines are reviewed by DCMC content experts, the EBOC committee, and are subject to a hospital-wide review prior to implementation. Recommendations are reviewed and adjusted based on local expertise.

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