



Oregon
Perinatal
Collaborative

Long Acting Antihypertensive Medications in Management of Sustained Severe Hypertension

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Maternal Fetal Medicine

Oregon Perinatal Collaborative

Objectives

- Grounding in the “Why”
- Pharmacokinetics of antihypertensives
- Supporting literature
- Recommendations
- Example of protocols

Cause of Death in Preeclampsia Related Mortality: California

Stroke (n=33)

- Hemorrhagic (n=29)

- Ischemic (n=2)

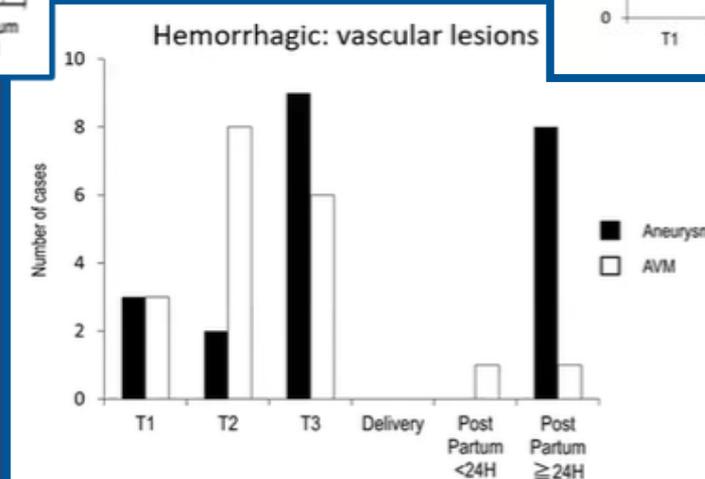
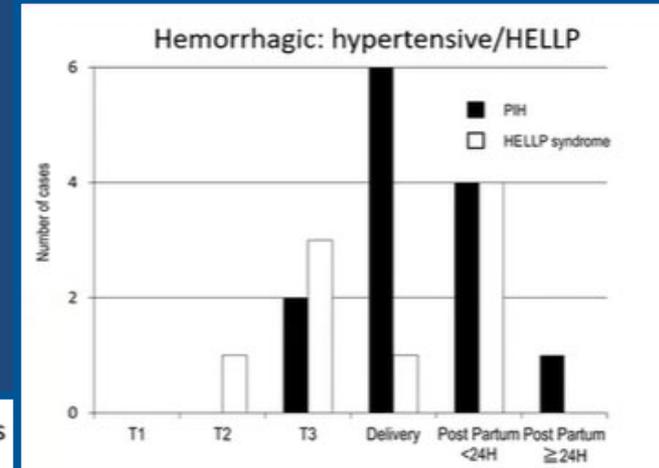
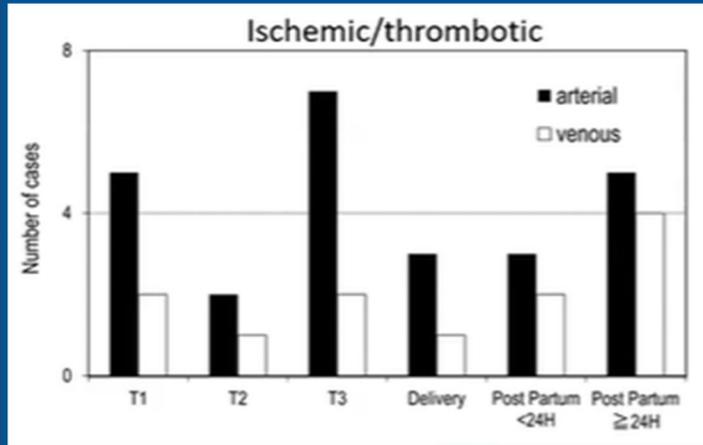
Organ Failure (n=15)

Pulmonary Edema (n=3)

Eclampsia (n=2)

Hemorrhage/DIC (n=1)

Risk of Hemorrhagic Stroke



Yoshida et al., *Stroke* 2017.

Antihypertensives: Acute Treatment

Acute Treatment	Onset of Action	Duration of Action
IV Labetalol	2-5 Minutes,	4 Hours
IV Hydralazine	5-30	2-4 Hours
PO Short Acting Nifedipine	Less than 20 minutes	4-6 Hours

Duration of Action for antihypertensives used for acute treatment is ***between 2 and 6 hours***

Antihypertensives: Maintenance

Maintenance Treatment	Onset of Action	Time to Maximum Effect	Duration of Action
PO Labetalol	----	2-4 hours	8-12 Hours
PO Hydralazine	20-30 minutes	1 hr	2-4 hours
PO Nifedipine XL	30 Minutes	6 hrs	24hrs

Maintenance antihypertensives reach peak effect as acute medications reach end of effect window

ORIGINAL ARTICLE

Trial of Intrapartum Extended-Release Nifedipine to Prevent Severe Hypertension Among Pregnant Individuals With Preeclampsia With Severe Features

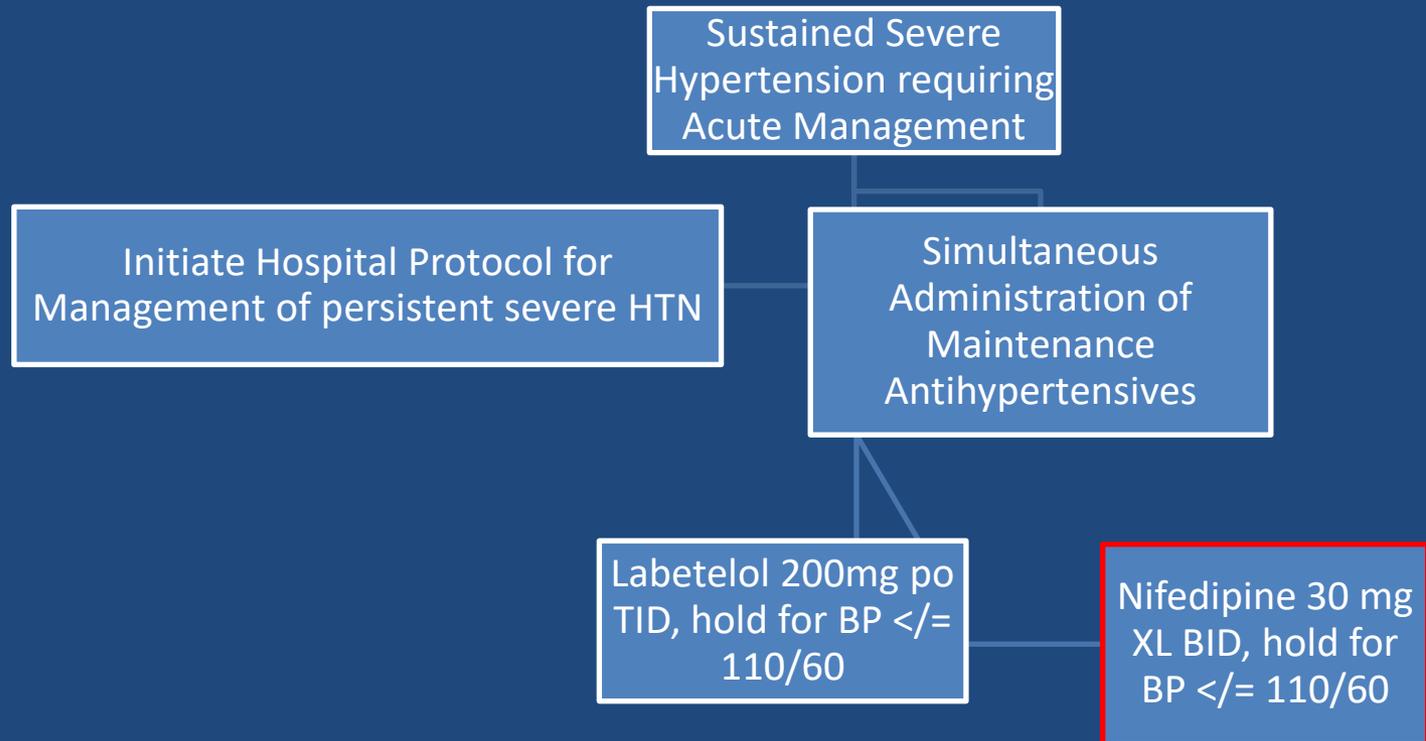
Erin M. Cleary¹, Nicholas W. Racchi², K. Grace Patton, Meghana Kudrimoti³, Maged M. Costantine⁴, Kara M. Rood

Intrapartum Treatment with PO Nifedipine XL at start of IOL :

Need for treatment of sustained severe hypertension

- 34.0% of individuals in nifedipine group
- 55.1% in placebo group
- Relative risk [RR] 0.62 [95% CI, 0.39–0.97]
- NNT to prevent receipt of acute treatment was 4.7 (95% CI, 2.5–44.3).

Antepartum OR Intrapartum Hypertensive Management



When sustained severe hypertension is confirmed IN ADDITION TO acute treatment, begin maintenance antihypertensives

Choice of Agent and Transition to Postpartum

OBSTETRICS

Risk of postpartum readmission after hypertensive disorder of pregnancy and variation by discharge antihypertensive medication prescription



Susanna D. Mitro, PhD; Monique Hedderson, PhD; Fei Xu, MS; Heather Forquer, MPH; Jennifer M. Baker, MPH; Michael W. Kuzniewicz, MD; Mara Greenberg, MD

TABLE 3

Associations between antihypertensive medication prescription at discharge and incidence of readmission within 6 weeks

Antihypertensive medication at discharge	n	Percentage readmitted	Unadjusted HR (95% CI)	Adjusted HR (95% CI)
No antihypertensive medication	49,295	2.5	Reference	Reference
Labetalol only	4288	7.6	3.14 (2.78–3.55)	1.63 (1.41–1.88)
Nifedipine only	2426	3.6	1.45 (1.17–1.80)	0.74 (0.59–0.93)
2 or more antihypertensive medications	1245	3.2	1.28 (0.94–1.76)	0.53 (0.38–0.74)

The models were adjusted for hypertensive diagnosis, last systolic and diastolic blood pressure, age, prepregnancy body mass index, mode of delivery, insurance type, race and ethnicity, facility, smoking, preterm delivery, parity, Neighborhood Deprivation Index, delivery year, and Comorbidity Point Score, version 2, at admission.

CI, confidence interval; HR, hazard ratio.

Mitro. Postpartum readmission after hypertensive disorder of pregnancy. *Am J Obstet Gynecol* 2024.

Original Research

Postpartum Readmission for Hypertension After Discharge on Labetalol or Nifedipine

Samantha C. Do, MD, Stephanie A. Leonard, PhD, Peiyi Kan, MS, Danielle M. Panelli, MD, Anna I. Girsan, MD, PhD, Deirdre J. Lyell, MD, Yasser Y. El-Sayed, MD, Maurice L. Druzin, MD, and Tiffany Herrero, MD

- Retrospective cohort from 2006 -2017
- Primary outcome:
 - Risk of postpartum re-admission for hypertension in patients with blood pressure disorders of pregnancy discharged on Nifedipine, Labetalol or combined
- Results:
 - Readmission for HTN
 - 2.1% (nifedipine) vs 4.5% (labetalol), and 3.1% (both medications)
 - **The odds of readmission for hypertension were significantly higher for patients on labetalol compared with nifedipine (adjusted odds ratio [aOR] 1.63, 95% CI 1.43–1.85).**

Encourage nifedipine XL as first line oral therapy for hypertension postpartum, unless there are contraindications

Original Article

OPEN

Postpartum medical management of hypertension and risk of readmission for hypertensive complications

Todd Lovgren^a, Brendan Connealy^a, Ruofan Yao^b, and Joshua D. Dahlke^a

TABLE 2. Risk of readmission by management at time of discharge

	Rate of readmission	P value	OR	95% CI	aOR	95% CI		
Antihypertensive Treatment(s)								
No treatment	165 (4.8)	<0.001			Reference			
Labetalol	28 (10.8)		2.40	1.57	3.66	1.66	1.06	2.61
Nifedipine	16 (2.3)		0.46	0.27	0.77	0.27	0.15	0.48
Labetalol+nifedipine	8 (3.0)		0.61	0.29	1.25	0.35	0.16	0.77

Adjusted for: gestational age of delivery, BMI, chronic hypertension, hypertension prior to discharge, multiple pregnancy, mode of delivery, type of pHTN. Bold indicates clinically significant final result. aOR, adjusted odds ratio; CI, confidence interval; OR, odds ratio.

Target BP during Inpatient Postpartum Stay

OBSTETRICS

Risk of postpartum readmission after hypertensive disorder of pregnancy and variation by discharge antihypertensive medication prescription



Susanna D. Mitro, PhD; Monique Hedderson, PhD; Fei Xu, MS; Heather Forquer, MPH; Jennifer M. Baker, MPH; Michael W. Kuzniewicz, MD; Mara Greenberg, MD

TABLE 1

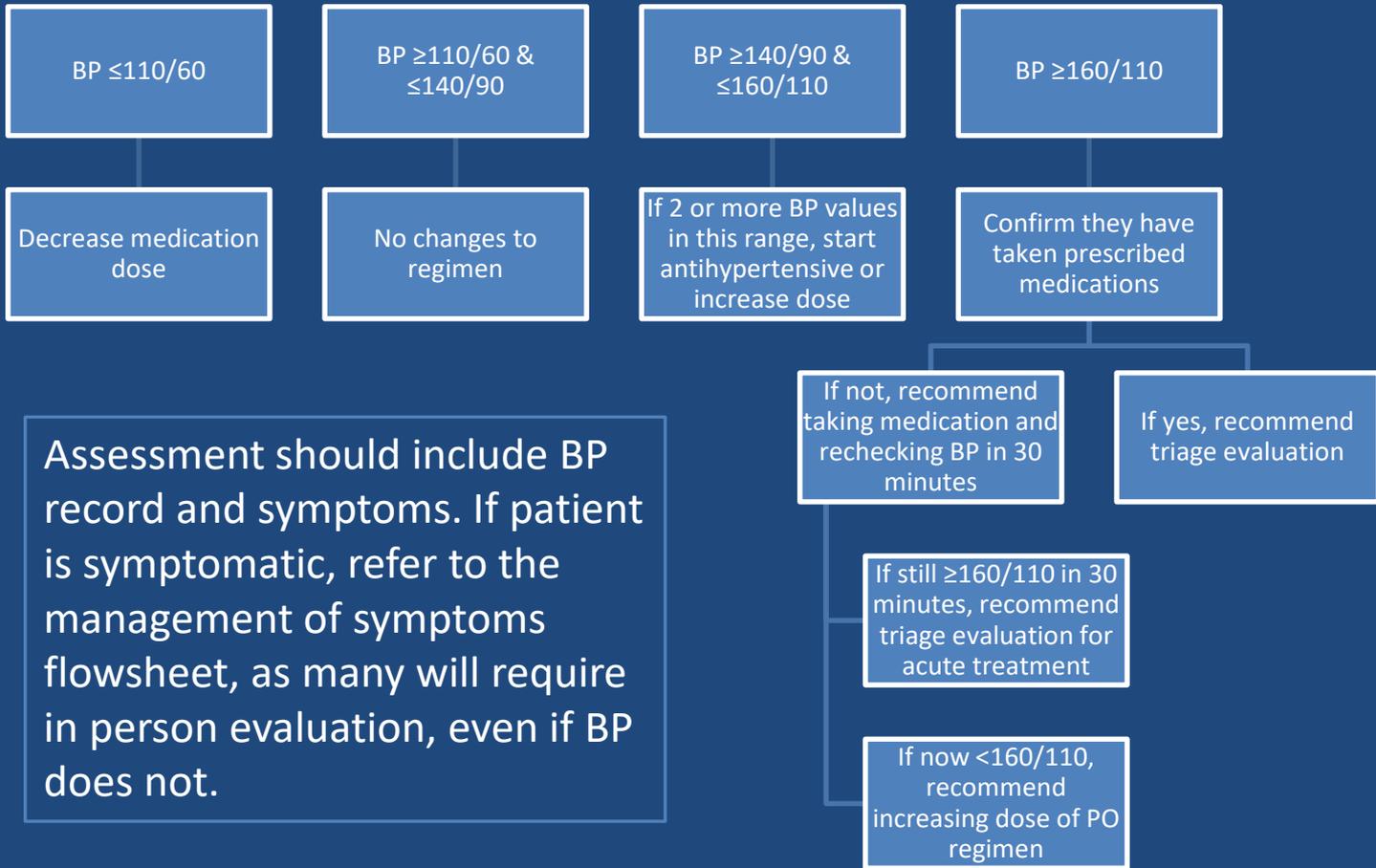
Demographic and clinical characteristics of patients with hypertensive disorders of pregnancy by postpartum readmission within 6 weeks after discharge (continued)

Characteristics	Overall (N=57,254)	Not readmitted (n=55,558 [97.0%])	Readmitted (n=1696 [3.0%])
Last inpatient systolic blood pressure (mm Hg)			
≤120	16,610 (29.0)	16,332 (29.4)	278 (16.4)
121–130	17,383 (30.4)	16,988 (30.6)	395 (23.3)
131–140	15,221 (26.6)	14,692 (26.4)	529 (31.2)
141–150	6529 (11.4)	6146 (11.1)	383 (22.6)
>150	1511 (2.6)	1400 (2.5)	111 (6.5)
Last inpatient diastolic blood pressure (mm Hg)			
>80	20,021 (35.0)	19,176 (34.5)	845 (49.8)

Guidelines for Inpatient Postpartum Anti-Hypertensive Management



Guidelines for Outpatient Follow Up of Pregnancy Associated Hypertension



APPENDIX

Blood Pressure by Time and Hypertension Type

Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health 31 (2023) 25-31

Contents lists available at ScienceDirect

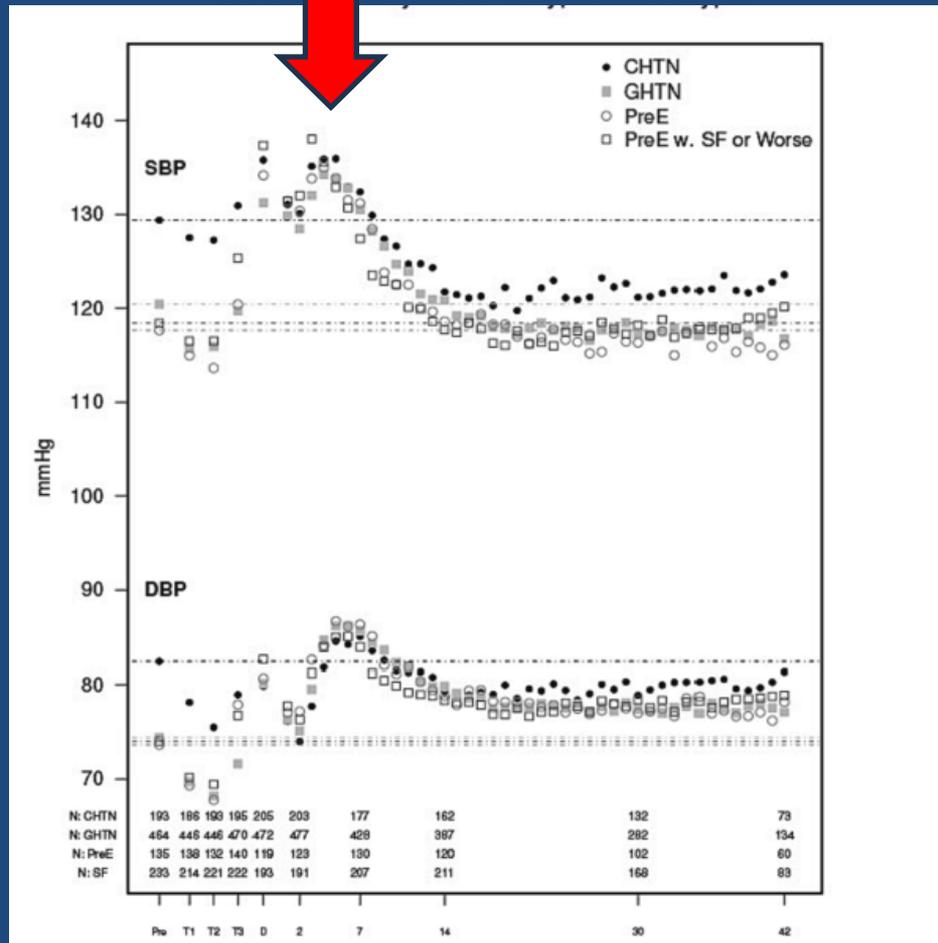
Pregnancy Hypertension: An International Journal of Women's Cardiovascular Health

journal homepage: www.elsevier.com/locate/preghy

Blood pressure changes in gestational hypertension, preeclampsia, and chronic hypertension from preconception to 42-day postpartum

Anna Palatnik^{1,2}, Narmin Mukhtarova³, Scott J. Hetzel¹, Kara K. Hoppe³

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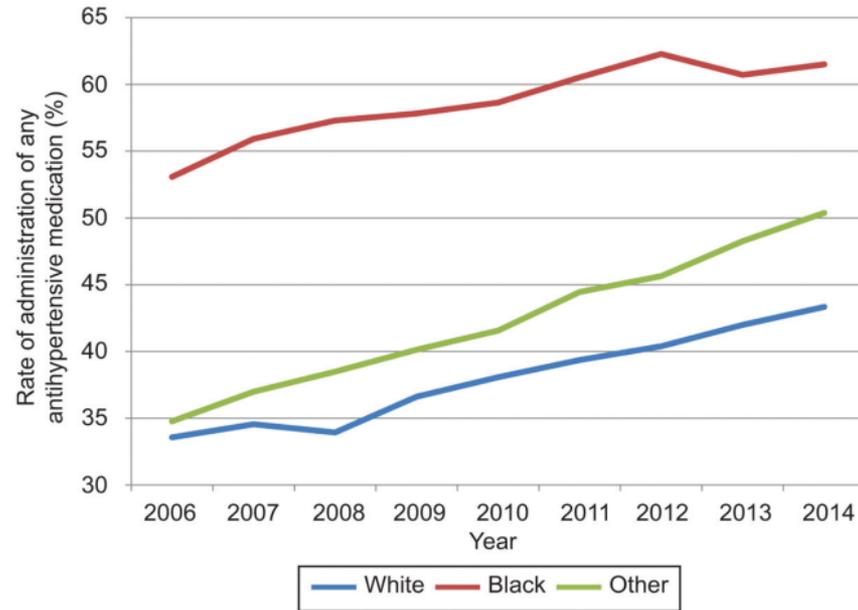


Figure 3.

Rates of administration of any antihypertensive medication (intravenous or oral labetalol, nifedipine, and hydralazine) for all patients with preeclampsia by year and race (white, black, other). Medication use from 2015 is not included as only a quarter of data is available for that year.

Cleary KL, Siddiq Z, Ananth CV, Wright JD, Too G, D'Alton ME, Friedman AM. Use of Antihypertensive Medications During Delivery Hospitalizations Complicated by Preeclampsia. *Obstet Gynecol.* 2018 Mar;131(3):441-450. doi: 10.1097/AOG.0000000000002479. PMID: 29420396; PMCID: PMC5823759.

Nifedipine XL (Procardia)

- Starting dose 30mg daily
- Available in 30, 60, 90mg tablets
- Increasing dose:
 - 30mg q 12 hours
 - Increase am and pm dose by 30mg at a time
- Maximum dose: 120mg in 24 hours

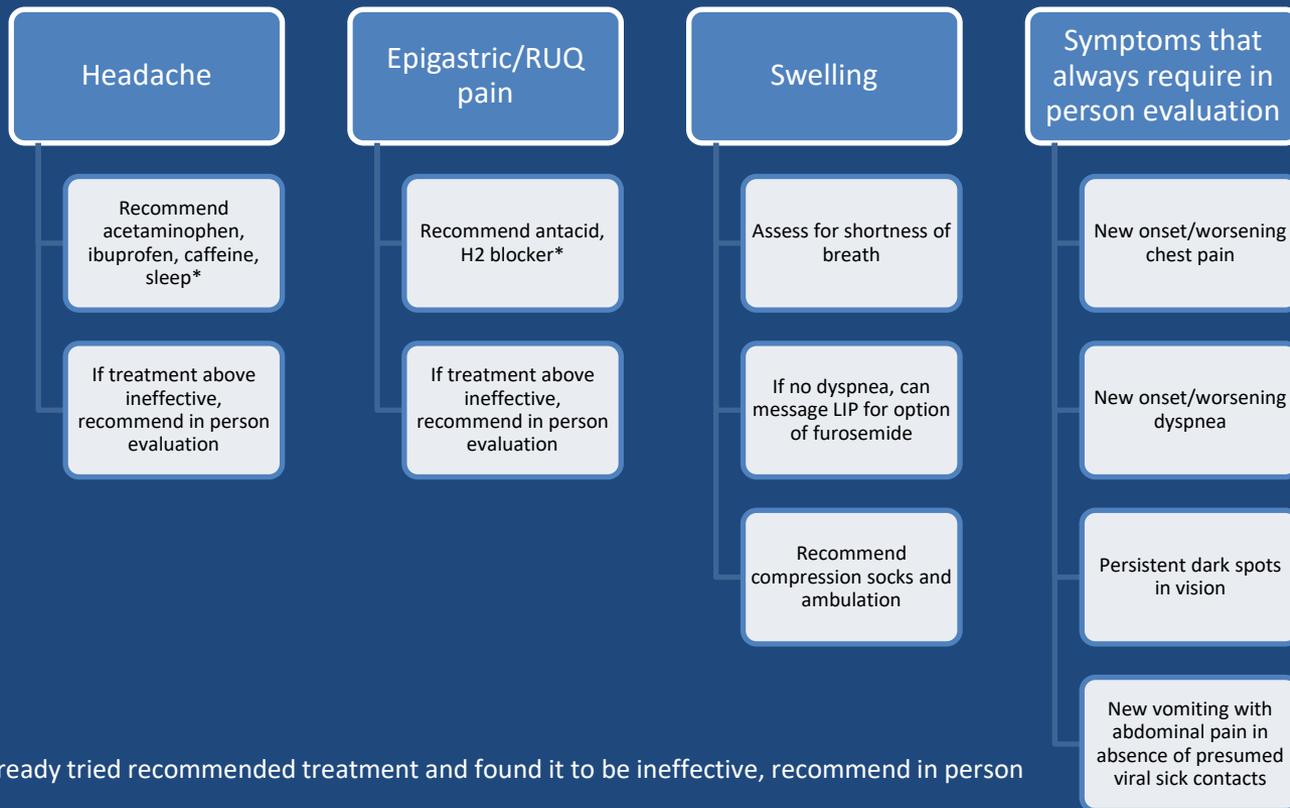
Labetalol

- Starting dose 200mg q 12 hours
- Available in 100, 200, 300mg scored tablets
- Increasing dose:
 - Increase to q 8 hours
 - Increase dose by 100mg, rarely 200mg
- Maximum dose: 2400mg in 24 hours

Contraindications

Nifedipine XL	Labetalol
Hypersensitivity	Overt cardiac failure
ST elevation MI	Asthma
Severe aortic stenosis	>1 st degree heart block
Unstable angina	Severe bradycardia
Severe hepatic impairment	Recent cocaine use

Management of Symptoms of Pregnancy Associated Hypertension



* If patient has already tried recommended treatment and found it to be ineffective, recommend in person evaluation

- Peterson JA, Band IC, Wang K, Bianco A. Daily versus Twice Daily Nifedipine for Blood Pressure Control in Pregnancy and Postpartum. *Am J Perinatol*. 2024 Dec 24. doi: 10.1055/a-2486-8840. Epub ahead of print. PMID: 39592106.