PARENTERAL ANTIHYPERTENSIVES FOR HYPERTENSIVE EMERGENCIES

Hypertension affects millions of Americans, and of those, hypertensive crises occur in an estimated 500,000 each year. Hypertensive crises, including urgencies or emergencies, are a major concern. Emergencies are differentiated as those crises that involve end-organ damage and are associated with severe blood pressure elevations (systolic > 180 mm Hg or diastolic > 120 mm Hg). The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure (JNC-7) lists nicardipine, nitroprusside, fenoldopam, nitroglycerin, enalaprilat, hydralazine, labetalol, esmolol, and phentolamine as recommended therapy for hypertensive emergency.

This issue of CLIPS briefly summarizes an article that discusses intravenous therapies for hypertensive emergencies and how drug selection can be tailored to each patient. If you need further information, please contact the Samford University Drug Information Service at (205) 726-2659.


Goals of Therapy:
- The goal of i.v. therapy is the reduction of BP in a consistent, controlled and predictable way, while at the same time identifying how adverse effects from each drug might affect a particular patient.
- Hypertensive emergencies are typically treated by ICU admission, uninterrupted monitoring of blood pressure and IV therapy with antihypertensives.
- The general goal of therapy is for mean arterial pressure (MAP) to decrease by 20-25% within 60 minutes without causing an excess decrease in blood pressure (BP) that could lead to ischemia.
- If the patient is stable, the goal for systolic is < 160 mm Hg and diastolic BP is < 100-110 mm Hg over 2 to 6 hours.
- As long as the patient is stable, restoring a “normal baseline” BP gradually over the next 24-48 hours is the ultimate goal while monitoring for signs and symptoms of ischemia and end-organ dysfunction.

Patient and Drug Specific Factors:
- Drug specific factors must be considered, such as pharmacokinetics, adverse reactions and cost-effectiveness.
  - Protecting against “overshoot” and resulting hypotension is a concern makes arterial blood pressure monitoring necessary in some patients.
  - Some drugs lower BP without affecting heart rate. Others affect both arterial and venous smooth muscle, reducing preload and afterload.
  - Safety concerns vary widely between agents, so careful risk/benefit analyses should be done for each patient.
- Important patient specific factors to consider include age, race, pregnancy, volume status, and the presence of comorbidities or end-organ disease.
  - Antihypertensives tend to evoke a greater response in the elderly population, so lower starting doses should be used.
  - Populations such as African-Americans, who traditionally have lower renin levels, might experience a diminished response to enalaprilat, whereas patients with higher than normal renin levels might have an exaggerated response.
  - Hepatic and renal function are critical determining factors in drug selection for hypertensive emergencies.

The tables on the following pages provide key characteristics of IV agents used for hypertensive emergencies.

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### Calcium Channel Blockers, Nitric Oxide Dilators, and B-Type Natriuretic Peptides:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Calcium-Channel Blocker</th>
<th>Nitric Oxide Dilators</th>
<th>B-Type Natriuretic Peptides</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraindications</td>
<td>Nicardipine</td>
<td>Clevidipine</td>
<td>Sodium Nitroprusside</td>
</tr>
<tr>
<td>Caution/Warning</td>
<td>Advanced aortic stenosis</td>
<td>Soy or egg allergy, poor lipid metabolism, aortic stenosis</td>
<td>Hypertensive encephalopathy, post-CVA, compensatory HTN.</td>
</tr>
<tr>
<td>Adverse Effects</td>
<td>Headache, hypotension, nausea, vomiting</td>
<td>Headache, tachycardia</td>
<td>Headache</td>
</tr>
<tr>
<td>Special Considerations</td>
<td>Easy dosage adjustment, steady state at 24-48 hrs.</td>
<td>Independent of renal or hepatic issues. No tolerance within 72 hr. Monitor rebound hypertension for 8 hrs after infusion.</td>
<td>Cyanide toxicity possible. Invasive arterial BP required. Close monitoring required. Used only in specific patient populations.</td>
</tr>
</tbody>
</table>

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### Receptor Agonists or Antagonists and ACE Inhibitors:

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Adrenergic Receptor Agonists and Antagonists</th>
<th>Dopaminergic Agonist</th>
<th>ACE Inhibitor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contraindications</td>
<td>Phenotamine</td>
<td>Labetalol</td>
<td>Enalaprilat</td>
</tr>
<tr>
<td>Caution/Warning</td>
<td>MI, coronary insufficiency, angina, signs of CAD</td>
<td>Sinus bradycardia, heart block &gt;first degree, cardiogenic shock, overt HF</td>
<td>RAD or COPD, first degree AV block, Avoid in stimulation caused by cocaine or methamphetamine</td>
</tr>
<tr>
<td>Adverse Effects</td>
<td>Bradycardia and patients with RAD must be monitored</td>
<td>Caution in CHF, bronchospasm and bradycardia</td>
<td>Caution or avoid in glaucoma</td>
</tr>
<tr>
<td>Special Considerations</td>
<td>Manage reflex tachycardia with β-blocker i.v.</td>
<td>Fatigue, nausea, tingling in scalp or skin</td>
<td>Headache, flushing, tachycardia, dizziness, increased IOP (dose related)</td>
</tr>
</tbody>
</table>

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CAD=coronary artery disease; HF=heart failure; RAD=reactive airway disease; COPD=chronic obstructive pulmonary disease; AV=arteriovenous; IOP=intraocular pressure; MI=myocardial infarction; CHF=congestive heart failure; BP=blood pressure; ANG=angiotensin

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