Hypertensive Emergencies; 
A Systematic Review

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May, 2010
Conflict of Interest

- I have no conflict of interest
- No specific/special $ for this SR or drug assessment
- Transparency in the description of findings*

* Published in Cochrane Library/ Journal of Human Hypertension 2008
**SBP ≥ 140 / DBP ≥ 90 = Hypertension**

<table>
<thead>
<tr>
<th>Status</th>
<th>BP</th>
<th>Symptoms</th>
</tr>
</thead>
<tbody>
<tr>
<td>High 3-4 grade</td>
<td>&gt; 180 / 110</td>
<td>No organ damage / asymptomatic</td>
</tr>
<tr>
<td>Urgency</td>
<td>&gt; 180 / 110</td>
<td>CV disease present / stable</td>
</tr>
<tr>
<td>Emergency</td>
<td>“Marked elevated”</td>
<td>Acute end organ damage</td>
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<tr>
<td>JNC VII – 2003</td>
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Hypertension:

• “High blood pressure: as that level where interventions have demonstrated more benefit than harm as compared to placebo or no treatment”.

Hypertensive Emergencies*:

- “Marked elevated blood pressure associated with acute end organ damage (e.g., acute myocardial infarction, unstable angina, aortic dissection, stroke, encephalopathy).”

* JNC VII – 2003
Pathophysiology: AMI

Coronary atherosclerosis/
Thrombous formation → obstruction
→ ischemia

Physiological changes:
HR (oxygen demand)
Vascular Resistances
DBP (coronary BF), SBP (wall tension)

Compensatory /physiologic mechanisms
-NO, bradykinin, histamin, thromboxane A2
-sympathetic activation, RAAS
Pathophysiology: Stroke

CBF = 50 ml / 100 g / min

CBF = Cerebral perfusion pressure (CPP) / cerebrovascular resistance (CVR)

CPP = MAP - ICP

If auto-reg is impaired and ICP is increased; small changes in MAP → CPP
Cochrane Systematic Review

• The application of scientific strategies that limit bias to the systematic assembly, critical appraisal, synthesis, analysis of all relevant studies on a specific topic.
Protocol: PICOS

HYPERTENSIVE EMERGENCIES

Level of BP:
- AMI (≥180/110)
- Stroke (≥180/110)

RCTs:
- An anti-hypertensive vs. placebo or no Rx
- An anti-hypertensive vs. other anti-htn
RCT Evidence?

- Important to the patient
- An outcome that it has the least risk of bias:
  (reporting, documenting, censoring)
- Measure the net health effect:
  (benefit-harm)

All-cause Mortality
Overview of Included Trials

15 RCTS (N=869)

Class of Drug

Number of RCTs
RCTs with mortality data

Hypertensive Emergencies:

- Sparse mortality data: it was reported only in 7 out of 15 trials and totaled 6 deaths.

- One death in a hydralazine. The group of the remaining deaths was not reported.
RCTs with morbidity data

Hypertensive Emergencies:

- Sparse morbidity data:
- MI: one placebo-control trial: NS
  3 H-H trials: NS (Nit vs. A1A or Diu)
- APE requiring intubation:
  3 H-H trials: NS (Nit vs. A1A or ACE-I)
- WDAE:
  1 H-H trials: NS (Nit vs. ACE-I)
Hypertensive Emergencies: hemodynamic changes

- Nitrates vs. dopamine agonist:
  decrease in SBP of 14 mm Hg

- CCB vs. ACE-I:
  decrease in DBP of 8 mm Hg
  increase in HR of 22 bpm.

- CCB vs. nitrates:
  increase in HR of 11 bpm
Conclusion of the Systematic Review

- There is no RCT evidence that anti-hypertensive drugs reduce mortality in patients with hypertensive emergencies.
- Not possible to determine which drug or class of drug renders greater benefit.
- Nitrates have been the most studied class of drug (+ BP), thus if they cannot be used as part of an RCT → reasonable choice of therapy.
Limitations

- Inherent bias of the original studies (eg. STFU)
- Publication bias (only +ve RCT published)
- SR: Used of arbitrary BP levels to define hypertensive emergencies.
Implication for Practice

- Use of anti-hypertensive drugs in patients with hypertensive emergencies remains at the discretion of the health practitioner.
- If patient is not part of an RCT, nitrates are a reasonable choice of therapy.
- How fast and how much remains unknown.
Implication for Research

• Help wanted!

• Future RCTs should have a long term follow-up and report all-cause mortality at different times (e.g., 2 days, 10 days, 30 days and 6 months)
THANK YOU