Angiotensin-Converting Enzyme Inhibitors - Lowering Blood Pressure in the Postpartum Patient

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Background

- An estimated 10% of deaths are attributed to hypertensive disorders of pregnancy postpartum; optimal treatment of postpartum hypertension to prevent sequelae such as stroke is unknown
- Relative efficacy of angiotensin-converting enzyme inhibitors (ACEIs) compared to other anithypertensives for reducing blood pressure (BP) postpartum is unknown
- ACEIs are contraindicated in pregnancy; preliminary data suggests that captopril, enalapril, quinapril and ramipril are suitable in breastfeeding
- Other antihypertensive agents considered suitable during lactation include nifedipine, labetalol and methyldopa
- Current pre-printed orders recommend captopril 6.25 mg PO or nifedipine 5 mg PO as STAT therapy at both BC Women's Hospital (BCWH) and Surrey Memorial Hospital (SMH)
- Current pre-printed orders recommend antihypertensive medication used antenatally (BCWH), nifedipine XL PO (both sites) and/or labetalol PO (SMH) for maintenance therapy
- Target BP change with a STAT dose is a 10 mmHg reduction in diastolic BP and target maintenance BP is < 140/90 mmHg or < 130/80 mmHg if Type I or II Diabetes

Methods

- **Design**: Retrospective chart review
- **Inclusion**: Women admitted to the Family Birthing Unit at SMH or BCWH with postpartum hypertension that received at least one dose of ACEI from January 1, 2009 to December 31, 2014
- **Primary objective**: To characterize ACEIs in lowering BP in hospitalized postpartum patients
- **Secondary objectives**:
  - To characterize antihypertensive medications used prior to ACEI initiation and/or with ACEI therapy
  - To calculate the number of doses of ACEIs used and the length of treatment in hospital with ACEIs
  - To characterize drug interactions between ACEIs and typical postpartum medications
  - To describe documented adverse events during ACEI therapy

	SMH (n=16)	BCWH (n=80)
Median Age* (Years)	35.5 (33.75,38.25)	35 (31,38)
Median Time Postpartum to First Dose of ACEI* (Days)	3.5 (1.75,6.25)	3 (1,4)
Number of Patients Re-admitted After Delivery for Hypertension	5	19
Median Time Postpartum to First Dose of ACEI in Patients Re-admitted* (Days)	7 (7,12)	6 (4,9)
Breastfeeding† (%)		
Exclusive	0	5
Partial	31.3	27.5
None	12.5	7.5
Data Unavailable	56.3	60
Median Duration of Treatment with ACEI* (Days)	3.5 (2,4.5)	3 (2,5)
Median Number of Doses of ACEI per Patient*	4 (2,8.25)	5 (2,9)
Median Length of Hospital Stay* (Days)	8 (5,12.25)	7 (4.75,11)

Table 1: Patient Characteristics
*** Median (25th percentile,75th percentile)**
† Breastfeeding status not recorded routinely

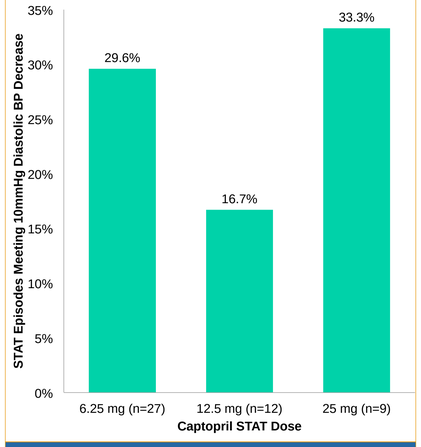

Figure 1: BP 30-90 Minutes After STAT Captopril Doses

Antihypertensive	Prior to ACEI	With ACEI	Antihypertensive	Prior to ACEI	With ACEI
Labetalol + nifedipine XL	26	26	Labetalol + nifedipine XL + hydralazine	1	0
None	20	15	Hydrochlorothiazide (HCTZ)	0	1
Nifedipine XL	14	20	Felodipine	0	1
Labetalol	14	10	Hydralazine	0	1
Nifedipine XL + methyldopa	2	2	Nifedipine XL + hydralazine	0	1
Labetalol + methyldopa	2	0	Labetalol + amlodipine	0	1
Metoprolol	1	1	Labetalol + HCTZ	0	1
Felodipine + methyldopa	1	0	Labetalol + nifedipine XL/ amlodipine + HCTZ	0	1
Labetalol + nifedipine XL/ amlodipine*	1	0	Labetalol + nifedipine XL + HCTZ	0	1

Table 2: Other Maintenance Antihypertensives Prior to and With Maintenance ACEI
*** Amlodipine automatic substitution x 1 day**

Interacting Drug	Number of Women
Magnesium sulfate	9
NSAID*	45
Magnesium sulfate + NSAID	11
NSAID + gentamicin	1
Total	**66**

Table 3: Potential Drug Interactions with ACEIs (no documented sequelae)
*** Non-steroidal anti-inflammatory drug (i.e. diclofenac, ibuprofen, naproxen)**

Adverse Event	Number of Women
Dry cough*	7
Hyperkalemia	6
Dizziness/lightheadedness	5
Hypotension	4
Increased serum creatinine	1
Minor skin reaction	1
Cramps/bloating	1
Total	**25**

Table 4: Documented Adverse Events
*** 4 subjects had explanations for cough (present prior to ACEI, pre-existing asthma + smoker, post-viral bronchitis, became sputum-producing cough)**

Results

- Average BP during initial 24 hours of ACEI maintenance therapy was 145/84 mmHg and 138/84 mmHg during final 24 hours of ACEI maintenance therapy. This corresponds to a 7/0.1 mmHg decrease in BP on ACEI therapy.

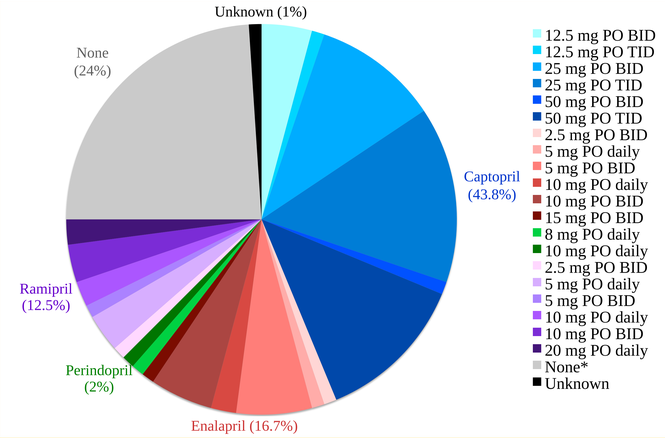

Figure 2: ACEI at Discharge
*** 14 subjects (14.6%) only received STAT doses**

Limitations

- Small, retrospective chart review
- ACEIs rarely used as sole antihypertensive agent, often added as third or fourth line therapy
- Inconsistent monitoring and reporting of BPs
- Differing protocols and doses for antihypertensive therapy and monitoring at participating sites
- ACEI doses used may have been suboptimal
- Difficult to assess cause of adverse events

Conclusions

- ACEIs were often associated with little or no reduction in BP when used for postpartum hypertension
- The use of ACEIs in this patient population is not without potential risks for drug interactions and adverse effects
- Further studies are needed to evaluate the role of ACEIs in treating hypertension during the postpartum period; information on how these agents impact morbidity and mortality would be most beneficial

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