Noncardiac inpatient has acute hypertension: Treat or not?

A retrospective study found more harm than benefit from treating elevated blood pressure in hospitalized noncardiac patients.

**PRACTICE CHANGER**

Manage blood pressure (BP) elevations conservatively in patients admitted for noncardiac diagnoses, as acute hypertension treatment may increase the risk for acute kidney injury (AKI) and myocardial injury.

**STRENGTH OF RECOMMENDATION**

C: Based on a single, large, retrospective cohort study.1


**ILLUSTRATIVE CASE**

A 48-year-old man is admitted to your family medicine service for cellulitis after failed outpatient therapy. He has presumed community-acquired methicillin-resistant *Staphylococcus aureus* infection of the left lower extremity and is receiving intravenous (IV) vancomycin. His BP this morning is 176/98 mm Hg, and the reading from the previous shift was 168/94 mm Hg. He is asymptomatic from this elevated BP. Based on protocol, his nurse is asking about treatment in response to the multiple elevated readings. How should you address the patient’s elevated BP, knowing that you will see him for a transition management appointment in 2 weeks?

Elevated BP is common in the adult inpatient setting. Prevalence estimates range from 25% to > 50%. Many factors can contribute to elevated BP in the acute illness setting, such as pain, anxiety, medication withdrawal, and volume status.2,3

Treatment of elevated BP in outpatients is well researched, with evidence-based guidelines for physicians. That is not the case for treatment of asymptomatic elevated BP in the inpatient setting. Most published guidance on inpatient management of acutely elevated BP recommends IV medications, such as hydralazine or labetalol, although there is limited evidence to support such recommendations. There is minimal evidence for outcomes-based benefit in treating acute elevations of inpatient BP, such as reduced myocardial injury or stroke; however, there is some evidence of adverse outcomes, such as hypotension and prolonged hospital stays.4-8

Although the possibility of intensifying antihypertensive therapy for those with known hypertension or those with presumed “new-onset” hypertension could theoretically lead to improved outcomes over the long term, there is little evidence to support this presumption. Rather, there is evidence that intensification of antihypertensive therapy at discharge is linked to short-term harms. This was demonstrated in a propensity-matched veteran cohort that included 4056 hospitalized older adults with hypertension (mean age, 77 years; 3961 men), equally split between those who received antihypertensive intensification at hospital discharge and those who did not. Within 30 days, patients receiving intensification had a higher risk of readmission (number needed to harm...
Acute treatment of elevated BP in noncardiac inpatients was not beneficial, and treatment intensification at discharge did not improve BP control over the following year.

**STUDY SUMMARY**

Treatment of acute hypertension was associated with end-organ injury

This retrospective, propensity score–matched cohort study (N = 22,834) evaluated the electronic health records of all adult patients (age > 18 years) admitted to a medicine service with a noncardiovascular diagnosis over a 1-year period at 10 Cleveland Clinic hospitals, with 1 year of follow-up data.

Exclusion criteria included hospitalization for a cardiovascular diagnosis; admission for a cerebrovascular event or acute coronary syndrome within the previous 30 days; pregnancy; length of stay of less than 2 days or more than 14 days; and lack of outpatient medication data. Patients were propensity-score matched using BP, demographic features, comorbidities, hospital shift, and time since admission. Exposure was defined as administration of IV antihypertensive medication or a new class of oral antihypertensive medication or a new class of oral antihypertensive medication.

Outcomes were defined as a temporal association between acute hypertension treatment and subsequent end-organ damage, such as AKI (serum creatinine increase ≥ 0.3 mg/dL or 1.5 × initial value [Acute Kidney Injury Network definition]), myocardial injury (elevated troponin: > 0.029 ng/mL for troponin T; > 0.045 ng/mL for troponin I), and/or stroke (indicated by discharge diagnosis, with confirmation by chart review). Monitored outcomes included stroke and myocardial infarction (MI) within 30 days of discharge and BP control up to 1 year later.

The 22,834 patients had a mean (SD) age of 65.6 (17.9) years; 12,993 (56.9%) were women, and 15,963 (69.9%) were White. Of the 17,821 (78%) who had at least 1 inpatient hypertensive systolic BP (SBP) episode, defined as an SBP ≥ 140 mm Hg, 5904 (33.1%) received a new treatment. Of those receiving a new treatment, 4378 (74.2%) received only oral treatment, and 1516 (25.7%) received at least 1 dose of IV medication with or without oral dosing.

Using the propensity-matched sample (4520 treated for elevated BP matched to 4520 who were not treated), treated patients had higher rates of AKI (10.3% vs 7.9%; \( P < .001 \)) and myocardial injury (1.2% vs 0.6%; \( P = .003 \)). When assessed by SBP, nontreatment of BP was still superior up to an SBP of 199 mm Hg. At an SBP of ≥ 200 mm Hg, there was no difference in rates of AKI or MI between the treatment and nontreatment groups. There was no difference in stroke in either cohort, although the overall numbers were quite low.

Patients with and without antihypertensive intensification at discharge had similar rates of MI (0.1% vs 0.2%; \( P > .99 \)) and stroke (0.5% vs 0.4%; \( P > .99 \)) in a matched cohort at 30 days post discharge. At 1 year, BP control in the intensification vs no-intensification groups was nearly the same: maximum SBP was 157.2 mm Hg vs 157.8 mm Hg, respectively (\( P = .54 \)) and maximum diastolic BP was 86.5 mm Hg vs 86.1 mm Hg, respectively (\( P = .49 \)).

**WHAT’S NEW**

Previous research is confirmed in a more diverse population

Whereas previous research showed no benefit to intensification of treatment among hospitalized older male patients, this large, retrospective, propensity score–matched cohort study demonstrated the short- and long-term effects of treating acute, asymptomatic BP elevations in a younger, more generalizable population that included women. Regardless of treatment modality, there appeared to be more harm than good from treating these BP elevations.

In addition, the study appears to corroborate previous research showing that intensification of BP treatment at discharge...
Impact of existing therapy could be underestimated

This study had several important limitations. First, 23% of treated participants were excluded from the propensity analysis without justification from the authors. Additionally, there was no reporting of missing data and how it was managed. The authors’ definition of treatment excluded dose intensification of existing antihypertensive therapy, which would undercount the number of treated patients. However, this could underestimate the actual harms of the acute antihypertensive therapy. The authors also included patients with atrial fibrillation and heart failure in the study population, even though they already may have been taking antihypertensive agents.

Potential delays in translating findings to patient care

Although several recent studies have shown the potential benefit of not treating asymptomatic acute BP elevations in inpatients, incorporating that information into electronic health record order sets or clinical decision support, and disseminating it to clinical end users, will take time. In the interim, despite these findings, patients may continue to receive IV or oral medications to treat acute, asymptomatic BP elevations while hospitalized for noncardiac diagnoses.

Caveats

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Challenges to implementation

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References