

**Critical Review Form  
Prognosis**

Masood S, Austin PC, Atzema CL. A Population-Based Analysis of Outcomes in Patients With a Primary Diagnosis of Hypertension in the Emergency Department. *Ann Emerg Med.* 2016 Sep;68(3):258-267.

**Objectives:** "to understand the epidemiology, patient characteristics, and short- and long-term outcomes of ED patients with a primary diagnosis of hypertension." (p. 259)

**Methods:** This retrospective cohort study was conducted using patients identified from the Canadian Institutes of Health Information [National Ambulatory Care Reporting System](#). All ED visits in Ontario, Canada by adult patients (age 18 to 105 years old) with a final, primary ED diagnosis of hypertension made between April 1, 2002 and March 31, 2012 were included.

The primary outcome was the annual number of ED visits for hypertension during the study period. Secondary outcomes included:

1. Frequency of hospitalization at the completion of each ED visit
2. Mortality at 7, 30, 90, and 365 days, and at 2 years following the ED visit
3. Frequency of subsequent hospitalizations for a potential complication of hypertension at 7, 30, 90, and 365 days, and at 2 years following the ED visit.

During the study period, there were 206,147 ED visits with a primary diagnosis of hypertension at 180 EDs. This represented 0.55% of all ED visits. The median age of patients was 64.0 years and 60.2% were female. The majority of patients (81.4%) had a history of hypertension.

Guide		Comments
<b>I.</b>	<b>Are the results valid?</b>	
A.	<p><b>Was the sample of patients representative?</b> <i>In other words, how were subjects selected and did they pass through some sort of "filtering" system which could bias your results based on a non-representative sample. Also, were objective criteria used to diagnose the patients with the disorder?</i></p>	<p>No. In this study, only patients with a primary diagnosis of hypertension were included in the analysis. Patients with asymptomatic elevated blood pressure presenting for unrelated complaint may not have been included, and neither would patients with evidence of end-organ damage (such as hypertensive encephalopathy) whose primary diagnosis would more likely have been related to the end-organ damage.</p> <p>The authors did NOT use objective criteria, as inclusion was based solely on diagnostic codes, and such a diagnosis may not have been consistent with guidelines in all cases.</p>

B.	<p><b>Were the patients sufficiently homogeneous with respect to prognostic risk?</b>  <i>In other words, did all patients share a similar risk from during the study period or was one group expected to begin with a higher morbidity or mortality risk?</i></p>	<p>Uncertain. There was likely a wide spectrum of disease in these patients, with some having only borderline elevated blood pressures and others with significant elevations. Such differences would likely affect the probability of being diagnosed with hypertension in the outpatient setting and would have a significant impact on the risk of having an adverse outcome (e.g. CVA, MI).</p>
C.	<p><b>Was follow-up sufficiently complete?</b>  <i>In other words, were the investigators able to follow-up on subjects as planned or were a significant number lost to follow-up?</i></p>	<p>Yes. As data was obtained from a large provincial database that should (theoretically) contain all information pertaining to hospital visits within the province, it is unlikely that a significant proportion of outcome data was missed. It is possible that some patients suffered adverse outcomes that did not result in hospital presentation (either due to death or due to refusal of care) and that some outcomes occurred outside of Ontario and hence would not have been captured in this database, but it seems likely that this would not represent a substantial number of patients.</p>
D.	<p><b>Were objective and unbiased outcome criteria used?</b>  Investigators should clearly specify and define their target outcomes before the study and whenever possible they should base their criteria on objective measures.</p>	<p>Mostly yes. The outcomes included the frequency of ED visits for hypertension, frequency of hospitalization at the completion of each ED visit, the frequency of subsequent hospitalization for a potential complication of hypertension, and mortality. Of these, subsequent hospitalization for a potential complication of hypertension is somewhat subjective, although the authors do list specific disease entities (such as CVA and heart failure) felt to be a potential complication of hypertension.</p>
<b>II. What are the results?</b>		
A.	<p><b>How likely are the outcomes over time?</b>  <i>For the defined follow-up period, how likely were subjects to have the outcome of interest.</i></p>	<ul style="list-style-type: none"> <li>• There were 206,147 ED visits with a primary diagnosis of hypertension, representing 0.55% of all ED visits. <ul style="list-style-type: none"> <li>○ There was an annual average increase in the number of ED visits of 6.2% (95% CI 5.5% to 7.0%).</li> </ul> </li> <li>• Hospital admission from the ED occurred in 7.8% of visits.</li> <li>• Mortality was 0.17% within 7 days, 0.43% at 30 days, 0.85% at 90 days, 2.5% at one year, and 4.4% at 2 years. <ul style="list-style-type: none"> <li>○ Mortality rates were significantly higher among patients admitted to the hospital from the ED compared to those who were discharged home.</li> </ul> </li> <li>• The proportion of patients requiring a subsequent hospitalization after the ED visit for</li> </ul>

		a potential complication of hypertension was 0.35% at 7 days, 0.73% at 30 days, 1.4% at 90 days, 3.4% at 1 year, and 5.4% at 2 years.
B.	<b>How precise are the estimates of likelihood?</b> <i>In other words, what are the confidence intervals for the given outcome likelihoods?</i>	See above (where appropriate).
<b>III.</b>	<b>How can I apply the results to patient care?</b>	
A.	<b>Were the study patients and their management similar to those in my practice?</b>	Likely yes, though not in all respects. This study included patients with a primary ED diagnosis of hypertension in Ontario, Canada. While these patients are likely similar to ours in terms of medical comorbidities, the racial make-up in our institution likely has a higher proportion of black and Hispanic patients. Additionally, many patients we see lack insurance and are unable to afford medications, while patients in Canada benefit from universal healthcare. Specifically, it is important to note that this study included patients with symptomatology possibly related to hypertension, as well as those with potential for end-organ damage.
B.	<b>Was the follow-up sufficiently long?</b>	Yes. Patients were followed out to 2 years, which is more than adequate to assess the risk of complications. From an ED perspective, short-term outcomes (i.e. out to 30-90 days) are likely more important in terms of understanding the risks following discharge home.
C.	<b>Can I use the results in the management of patients in my practice?</b>	Yes. This study demonstrates a very low rate of complications requiring subsequent hospital admission among patients discharged from the ED with a primary diagnosis of hypertension. While the data is somewhat limited by the retrospective nature of the study and the potential for missing patients with elevated blood pressure by looking only at primary diagnosis, the results should be robust enough to justify disposition decisions in patients without signs of end-organ damage.

### **Limitations:**

- 1. This was a retrospective study based on information in a database and patients were enrolled by primary diagnosis. This may result in a skewed sample that**

**excludes patients whose primary diagnosis was based on a complaint unrelated to hypertension or those with complications of hypertension.**

- 2. The authors did not search death records for potential complications that occurred but resulted in death rather than a repeat hospital visit.**
- 3. Generalizing these results to our patient population may be problematic given lack of universal healthcare in the US ([external validity](#)). Lack of health insurance and lack of access to primary care may result in worse outcomes in our setting.**
- 4. This study was not designed to evaluate the utility of ED testing or treatment in the management of asymptomatic hypertension, and any recommendations for this patient population are purely speculative.**

### **Objectives:**

**This large, retrospective analysis of Canadian patients seen in the ED with a primary diagnosis of hypertension demonstrated low rates of short-term mortality and need for hospital readmission among those discharged from the ED. While this suggests that discharge in these patients is safe, the study does not examine the effects of testing or treatment, initiated in the ED, among these patients, nor does it examine the effects of early follow-up on outcomes.**