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Rehospitalization rates in hypertensive emergency: a wakeup call for clinicians, researchers, and hospital administrators

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Severe asymptomatic hypertension, defined as systolic blood pressure (BP) \geq 180 mmHg or diastolic BP \geq 120 mmHg is hypertensive urgency, but when accompanied by acute ongoing target organ damage--involving the heart, the kidneys, or the brain-- is called hypertensive emergency (1). Although a rare cause of visit to the emergency department, the rate of hypertensive emergency visits is increasing. In 2006, hypertensive emergency was the cause of 677 per million adult emergency department visits; in 2013 it increased to 1670 per million-- about a 2.5 fold increase over 7 years (2).

The rules for treating hypertensive emergency are nuanced. Due to concern of triggering organ ischemia, BP is generally lowered gradually over a period of 24 hours; over these 24 hours, no more than 25% reduction in initial BP is targeted (1). However, there are some notable exceptions. For example, among patients with acute aortic dissection or those with hemorrhagic strokes BP is lowered more rapidly whereas among those with acute ischemic strokes a much higher BP is tolerated.

More important than the acute management of hypertension is the provision of follow up care for at least four reasons. First, patients with hypertensive emergencies may have this condition in the first place because they are not adherent to their medications. Simplifying the drug regimen and prescribing combination therapy once daily may improve adherence and therefore BP control rates (3). Follow up after discharge from hospital will allow monitoring of BP and hopefully reduce the risk the rehospitalization especially hospitalization from heart failure. Second, follow up will allow for educating the patient about low sodium diet and home BP monitoring that may improve hypertension control (4); these interventions may not be possible while in the hospital. Third, medications may not be enough to improve BP. As an example, among those with end-stage renal disease (ESRD) maintenance dialysis may be needed and dry-weight probed to control volume to achieve

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hypertension control (5). Fourth, some patients with acute hypertensive emergencies will have a secondary cause for hypertension; investigation into these causes is needed.

Who gets a hypertensive emergency? The stereotype for hypertensive emergency, in the United States, is a young man without insurance, abusing street drugs, and leaving the hospital against medical advice. In this issue of *Hypertension*, Kumar et al show that the average age of the patient with hypertensive emergency in the United States is 66 years, more than half are women, only 5% abuse drugs and less than 2% sign out against medical advice (6). The vast majority of the patients with hypertensive emergency have health insurance and the disease is costly. More than 75% of the patients had Medicare or Medicaid as insurance, and in 2013, the cost of initial hospitalization alone for those are admitted with acute hypertensive emergency was nearly \$2.8 billion. Further adding to the cost is the cost of ongoing care. More than half the patients required ongoing care; for example, 22% of the patients were discharged to a skilled nursing facility and 19% were provided home health care. And it gets even more costly when one considers rehospitalizations.

What is remarkable is the percent of patients with initial hospitalization for acute hypertensive emergency who were hospitalized again within 30 days of the index admission--17.8%. Given that the only 1.1% of all hospitalizations were due to acute hypertensive emergency initially but 17.8% of those who had the initial hospitalization for acute hypertensive emergency were rehospitalized, illustrates that the risk of readmission is remarkably increased when the patient is hospitalized with an episode of acute hypertensive emergency.

How does the readmission rate after hypertensive emergency compare with other diseases? Some comparative statistics regarding readmissions are available. The 30-day readmission rate among Medicare fee-for-service beneficiaries is 19.6% overall (2003-2004 claims data) (7). Among Medicare fee-for-service beneficiaries hospitalized for heart failure, acute myocardial infarction, or pneumonia, 30-day readmissions were 24.8%, 19.9% and 18.3% respectively (2007-2009 claims data) (8). After linking payment to quality in 2012, this percent was reported to be slightly lower at 17.5-18% (2013-2014 claims data) (9). Thus, hospital readmission rate of 17.8% noted with an acute hypertensive emergency is in line with the rates of readmission within 30 days for the diseases that are observed in Medicare fee-for-service beneficiaries.

What are the risk factors for readmission? Kumar et al report many risk factors for readmission such as younger age (<65 years) and longer hospitalizations were associated with a greater risk for readmission (6). Although the risk of rehospitalization varies across the country for conditions such as acute heart failure and were not reported such variations probably exist even for acute hypertensive emergency. For example, when the income of the ZIP code was examined as a risk factor for rehospitalization, Kumar et al found that those in the higher income brackets had a lower risk of hospitalization. Thus, socioeconomic factors undoubtedly play a role in rehospitalization risk following the treatment of acute hypertensive emergency. These need further exploration. For example, we do not know whether it is the access to healthcare, restricted availability of low sodium foods in the ZIP code, or other social determinants of health that are responsible for readmission at 30 days

following an acute hypertensive emergency. If the plausible social determinants are understood, effective interventions can be explored.

Two risk factors at the time of index admission -- both highly prevalent and associated with high adjusted odds ratio for rehospitalization-- were notable (6). These included acute heart failure and chronic kidney disease (CKD). Nearly two-thirds of those admitted to the hospital with hypertensive emergency had acute heart failure, most likely heart failure with preserved ejection fraction (HFPEF). Furthermore, more than half had either CKD or end-stage renal disease. These two diseases are important domains of unmet need. The so-called cardiorenal syndrome gives us a false sense of understanding of the relationships of the heart and the kidney; our understanding of the relationships between the heart and kidney are preliminary at best. Few evidence-based preventive therapies exist for HFPEF and we still do not understand how best to manage acute hypertensive emergency in the setting of CKD. Research that investigates the relationships of acute hypertensive emergencies with both HFPEF and CKD including ESRD are urgently needed.

While we await further research, hospital administrators need to take note of this study because it may be important to the fiscal health of their hospitals. The Affordable Care Act enacted in 2010 in an effort to link payment to quality required the Secretary of Department of Health and Human Services to implement the Hospital Readmission Reduction Program (HRRP). Under HRRP are monitored 6 separate conditions for 30-day readmissions: congestive heart failure, acute myocardial infarction, coronary artery bypass graft surgery, chronic obstructive pulmonary disease, pneumonia, and elective primary total knee and hip arthroplasty procedures. Although acute hypertensive emergency is not part of the mix, given that two-thirds of the patients admitted with acute hypertensive emergency had congestive heart failure it is quite likely that hospitals that have a high burden of acute hypertensive emergency and excess readmission ratio incur a percent reduction in hospital payment for all the charges for hospitalizations among Medicare beneficiaries no matter what the nature of hospitalization. Accordingly, measures to reduce the excess readmission ratio may improve both the hospital's fiscal health as well as the outcomes of those with hypertensive emergency.

Kumar et al tell us that hypertensive emergency is common, costly, and frequently results in rehospitalization (6). Clinicians, researchers and hospital administrators can all work together to reduce this common, costly, and morbid condition we call hypertensive emergency (Figure 1).

Acknowledgments

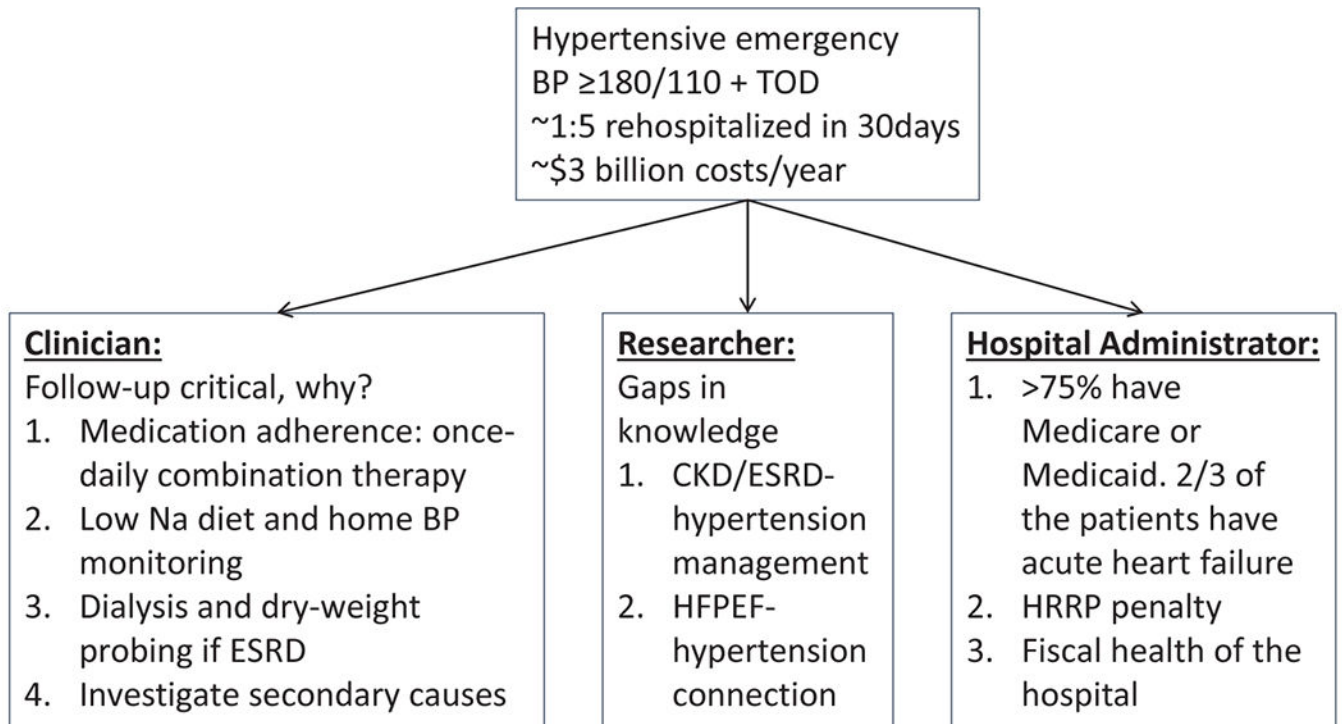
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**Figure.**

What can clinicians, researchers and hospital administrators do to address the costs and morbidity of hypertensive emergency? Abbreviations used: CKD = chronic kidney disease, ESRD = end-stage renal disease, HFPEF = heart failure with preserved ejection fraction, HRRP = Hospital Readmission Reduction Program. See text for details