Retrospective analysis of falls in 2015 and 2016 in patients taking antihypertensive medications

Ridha Hassoun, Pharm.D. Candidate 2018, Marina Barsoum, Pharm.D. Candidate 2018, Mary Gayed, Pharm.D. Candidate 2018, Kanak Parmar, Pharm.D. Candidate 2019, Nicole M. Maisch, Pharm.D., Maha Saad, Pharm.D. BCPS BCGP

St. John's University College of Pharmacy and Health Sciences, Queens, NY

Introduction

- Falls are a significant public health problem, especially among the elderly. Falls are not only associated with morbidity and mortality in patients but can lead to a decrease in independence and early admission to long-term care facilities. Effective fall prevention can reduce injuries, emergency room visits, hospitalizations, and functional decline. Therefore, preventing and reducing the risk of falls is important.[1]
- There are numerous risk factors associated with falls, including age, comorbidities and medications, specifically anti-hypertensives. Anti-hypertensive agents are used to treat conditions including heart failure and chronic kidney disease, making their use prevalent.
- According to JNC 8, patients aged 60 years and older should be treated if their systolic blood pressure is ≥ 150mmHg or diastolic blood pressure is ≥ 90mmHg.[2] Management of hypertension in older patients should include an evaluation for orthostatic hypotension.[3]
- When following the proper guidelines and following clinical judgement, antihypertensive medications become a modifiable risk factor for falls that pharmacists can play a role in addressing.

Objectives

- To determine whether there is an association between the number of anti-hypertensives a patient is on and the occurrence of a fall
- To examine the systolic blood pressures of elderly patients who are on anti-hypertensives, and whether there was adherence to the current blood pressure management guidelines
- To determine whether there is an association between a patient's fall and their systolic blood pressures before and after the fall

Methods

Literature Research
- After consultation of the 2015 Beer's Criteria along with a thorough literature search, a list of high "fall risk" medications was compiled. This list was then divided into its respective drug classes, which totaled 9 drug classes. We focused on the list of anti-hypertensive medications.

Inclusion and Exclusion Criteria
- Adult patients were included if they were admitted to Long Island Jewish Medical Center from January 2015 to December 2016, experienced one or more reported falls during admission, and were given at least one anti-hypertensive agent.
- Patients who were under the age of 18, experienced a fall in the emergency department or outpatient clinic, were not given an antihypertensive, or fell on a wet surface were excluded from the chart review.

Chart Review
- Information such as patient age, number of anti-hypertensive medications the patient was on, where medications were started, and patient's blood pressure before and after the fall were analyzed from patient electronic medical records.
- During review of patient charts, medications that were given within 48-hours of the reported fall event were stratified, and the duration between medication administration and fall events were recorded.
- The JNC 8 guidelines for treatment of hypertension in adults was used to evaluate proper management of hypertension.

Results

Demographics and Age Stratifications (n = 174)

Table 1: Demographics

Age	69 ± 15 years	Fall Risk Assessed and Documented (%)	171 (99%)
Gender (%) Male Female	91 (52%) 83 (48%)	Fall Risk Present (%)	161 (93%)
Mean number of anti-hypertensive drugs per patient	2.2 ± 1.2	Mean time to fall after anti-hypertensive administration	4.2 ± 3.8 hr

Table 2: Age Stratification

Age	Total patients
Less than 60	39 (22%)
60 - 70	43 (25%)
70 - 80	49 (28%)
≥ 80	43 (25%)

Mean Time To or From Fall for Mean Systolic Blood Pressure

Figure 1

SBP 136 ± 23   2.71 hr   SBP 135 ± 26   1.49 hr
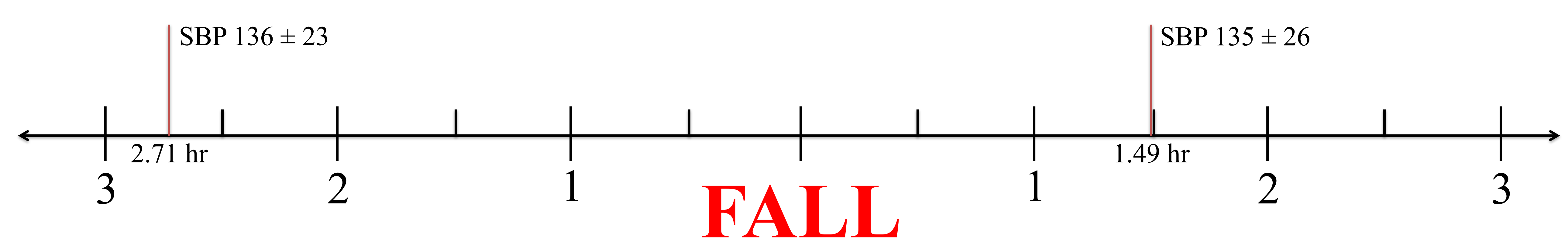
FALL

Mean Systolic Blood Pressures

Figure 2

Before Fall / After Fall
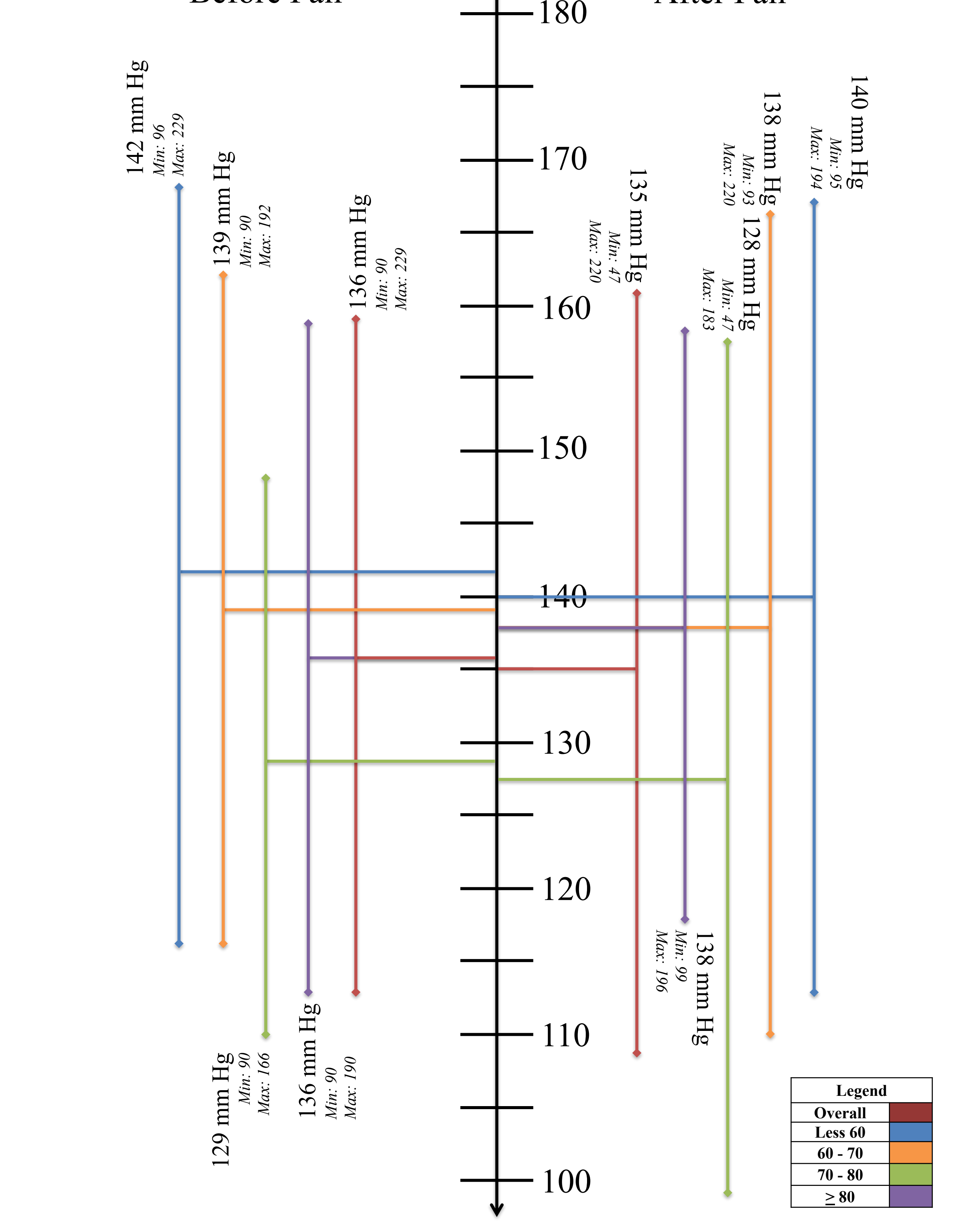
Age and Blood Pressure Stratification

Table 3

	Age			
Before Fall Systolic Blood Pressure (mm Hg)	Less than 60	60 - 70	70 – 80	≥ 80
< 100	1 (3%)	1 (2%)	3 (6%)	1 (2%)
100 - 110	1 (3%)	4 (9%)	5 (10%)	6 (14%)
110 - 120	5 (13%)	4 (9%)	12 (26%)	6 (14%)
120 - 130	5 (13%)	4 (9%)	3 (6%)	5 (11%)
130 - 140	6 (15%)	9 (21%)	8 (16%)	8 (19%)
140 - 150	9 (23%)	8 (19%)	9 (18%)	8 (19%)
≥ 150	12 (30%)	13 (31%)	9 (18%)	9 (21%)
After Fall Systolic Blood Pressure (mm Hg)				
< 100	2 (5%)	3 (7%)	6 (12%)	1 (2%)
100 - 110	3 (8%)	5 (11%)	4 (8%)	1 (2%)
110 - 120	5 (13%)	3 (7%)	9 (18%)	8 (19%)
120 - 130	3 (8%)	6 (14%)	6 (12%)	5 (11%)
130 - 140	8 (21%)	6 (14%)	7 (14%)	9 (21%)
140 - 150	4 (10%)	7 (16%)	5 (10%)	6 (14%)
≥ 150	14 (35%)	13 (31%)	12 (26%)	13 (31%)

Results

Four hundred and fifty-six patient charts were reviewed, and 174 patients met the inclusion criteria. A little more than half of patients were male, and were about 69 years old. A quarter of patients who both fell and were on anti-hypertensives were 80 years old or greater. The average number of antihypertensive medications a patient was taking is 2.2. Systolic blood pressures before and after a fall were approximately the same, with a reading of 135.5 mm Hg. Blood pressure was taken on average 2.69 hours (± 2.09) before a fall, and 1.47 hours (± 2.06) after a fall. Among patients 60 years of age and older, 78% had a systolic blood pressure less than 150 mmHg before a fall, of those 52% had a systolic blood pressures less than 130 mmHg before a fall. After a fall, 73% had a systolic blood pressure less than 150 mmHg. Of those, 59% had a systolic blood pressure less than 130 mmHg. Prior to a fall, 43% of patients 60 and older had a systolic blood pressure less than 110 mm Hg, with the lowest being 90 mm Hg. After the fall, 42% of patients 60 and older had a systolic blood pressure of less than 110 mm HG, with the lowest being 47 mm Hg.

Conclusion

Following analysis of blood pressure readings before and after falls in two years of admissions, it is unclear if anti-hypertensive medications played a role in patient falls. According to current hypertension management guidelines, we cannot with certainty evaluate whether patients' high blood pressures were being properly managed. We cannot conclude that the cause of the falls studied was anti-hypertensive medications. However, this study does not discount the need for pharmacist review of anti-hypertensive medication regimens and patient counseling, as the risk of hypotension and subsequent fall is still present. In addition, it highlights the variability of when blood pressure checks are done after a fall and the need for evaluation of orthostatic hypotension performed on patients on anti-hypertensive medications. Ultimately, long-term studies need to be done.

References

1. Panel on Prevention of Falls in Older Persons, American Geriatrics Society and British Geriatrics Society. Summary of the Updated American Geriatrics Society/British Geriatric Society clinical practice guideline for prevention of falls in olderpersons. *J Am Geriatr Soc*. 2011; 59(1):148-57.
2. James PA, Oparil S, Carter BL, et al. 2014 evidence-based guideline for the management of high blood pressure in adults: report from the panel members appointed to the Eighth Joint National Committee (JNC 8). JAMA. 2014;311(5):507-20.
3. Dickerson LM, Gibson MV. Management of hypertension in older persons. Am Fam Physician. 2005;71(3):469-76.

Disclosures

Authors of this presentation have the following to disclose concerning possible financial or personal relationships with commercial entities that may have a direct or indirect interest in the subject matter of this presentation.

Ridha Hassoun: Nothing to disclose
Marina Barsoum: Nothing to disclose
Mary Gayed: Nothing to disclose
Kanak Parmar: Nothing to disclose
Dr. Nicole M. Maisch: Nothing to disclose
Dr. Maha Saad: Nothing to disclose