

PEER REVIEWED

# Interprofessional Coordination of a Patient with Hypertension

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## **Abstract**

*Hypertension is a highly prevalent chronic condition worldwide. Optometrists are regularly involved in the diagnosis, treatment and management of hypertensive retinopathy, but they should also participate in the holistic care of patients with acute or chronic hypertension to mitigate potentially lethal systemic complications. This case report describes one patient's experience navigating the healthcare system, involving visits with numerous healthcare providers in varying disciplines, to achieve blood pressure control. We emphasize the complexities involved for this patient in managing one medical condition and the interprofessional collaboration needed to facilitate care.*

**Key Words:** *interprofessional collaboration, hypertension, public health*

## **Background**

Hypertension (HTN) is a common systemic condition affecting more than 70 million people in the United States with a global age-standard prevalence of approximately 30%.<sup>1</sup> Left untreated, this condition is responsible for significant cardiovascular disease (CVD) and premature death as a result of end organ damage.<sup>1</sup> The increasing complexity of patient care and health system fragmentation make interprofessional collaboration more important than ever.

## **Case Description**

A 55-year-old male presented to a community health center clinic with complaints of gradual onset, bilateral blur at near with and without correction over the past several months. He had been using +2.50 over-the-counter reading glasses, which previously helped but no longer did. He had no visual complaints at distance. He was not experiencing diplopia, flashes, floaters, burning, itching, redness or tearing.

The patient's last eye exam was three years ago in Haiti, and he had no history of ocular trauma or surgery. His last medical exam was approximately two months prior, and he was a newly established patient to the health center, having recently moved from Florida. His medical history was positive for HTN, although he was unsure how long he had the disease. He was seen by his primary care physician (PCP) two months prior to the eye exam and was restarted on hydrochlorothiazide (HCTZ) 25 mg once a day (QD). According to the patient's medical record, his PCP was considering adding amlodipine if his blood pressure (BP) was not well-controlled on HCTZ alone. At the time of the eye exam, the patient had not taken his medication for the past two weeks because he was on vacation.

The patient had no known drug allergies. His social history was remarkable for former smoking (quit 20 years ago) and drinking alcohol regularly. He was drinking approximately four drinks per day, down from six per day. He was trying to cut down on his own, with a goal of one per day.

His entering uncorrected distance visual acuities were 20/80 OD and 20/100 OS. Entering corrected near visual acuities were 20/50 OD and 20/63 OS. Pupils, extraocular muscles and confrontation visual fields were unremarkable. Manifest refraction findings were +1.75-0.50x090 OD and +2.00-0.50x090 OS, with best-corrected distance visual acuities of 20/25+2 OD and 20/20 OS. His near ADD was +2.25 with 20/20 OU near visual acuity.

Anterior segment findings revealed corneal arcus 360 degrees OU. All other anterior segment findings were unremarkable OU. Intraocular pressures were 19 mmHg OD and 20 mmHg OS with Goldmann applanation tonometry.

Dilated posterior segment findings revealed trace nuclear sclerotic cataracts OU with additional 1+ anterior cortical cataracts with spoking into the visual axis in the right eye. Optic nerves appeared pink, round and healthy with 0.4 cupping OU. The maculae were flat and there was mild arteriolar attenuation OU, indicating stage one hypertensive retinopathy. The peripheral retina OU was flat and intact with no holes or tears.

Knowing the patient had not been taking his HTN medications, we checked his BP in-office. The BP reading (right arm, sitting) was 218/135 mmHg. Because the eye clinic is in a multidisciplinary health center, we contacted Urgent Care to speak with a medical provider and, subsequently, walked the patient down to the Urgent Care department to expedite his care. All healthcare providers at the health center share the electronic health record, Epic, and are able to see each other's records. They also regularly message each other directly through Epic to discuss patient care, ask questions or make requests regarding shared patients. There are also instances when providers may walk to another clinic to have a face-to-face discussion about a patient, but that did not occur in this case. Because the patient faced frequent challenges managing his medication regimen, having access to his health records allowed the providers to obtain a clearer picture of his medication changes and fluctuating BP measurements, which proved helpful in managing his ocular health.

Urgent Care gave the patient clonidine 0.1 mg in-office and restarted him on HCTZ 25 mg PO QD. They also started him on amlodipine 2.5 mg PO QD. Patient education included discussion of diet, exercise and alcohol restriction.



Table 1. [Click to enlarge](#)

The patient was advised to return to the eye clinic in one year to monitor his retinopathy because, although he was currently in a hypertensive crisis, his level of retinopathy was mild and indicative of chronic, rather than acute, HTN. He was educated that if he noticed any changes in his vision within the next year, including new onset blur, to return to the eye clinic right away for evaluation. The patient was also educated regarding the presence of cataracts OU with a slight impact on vision in the right eye compared with the left and advised to wear ultraviolet-protective eyewear when outdoors. He was given the glasses prescription found that day and educated regarding potential adaptation to the new prescription because it was his first pair of prescription eyewear.

Following the visit to Urgent Care, the patient saw his PCP two times for adjustment of his HTN medications. Losartan was added, and amlodipine was discontinued. However, one month later the patient was seen in the dental clinic with elevated BP again. The patient was sent to Urgent Care, and his BP at that time was 190/110. At Urgent Care, it was discovered that there was a misunderstanding at the last PCP appointment, which led the patient to discontinue both the HCTZ and amlodipine instead of only the amlodipine. Medications were reviewed, and he was educated to take both the HCTZ and losartan. The provider in Urgent Care also discussed the link between alcohol consumption, BP and end organ damage.

Over the next 10 months, the patient was prescribed HCTZ, losartan, amlodipine and diltiazem in varying dosages and followed closely by his PCP, who adjusted the medications until sufficient BP control was achieved. A summary of patient visits can be found in **Table 1**.

Six months after his initial eyecare visit, the patient was seen in the dental clinic with elevated BP again. The patient was sent to Urgent Care, and his BP at that time was 160/101. He had been taking the HCTZ and losartan, but thought he was supposed to stop the diltiazem. He was restarted on the diltiazem at that time. Eventually, BP control was achieved with the following medications: HCTZ 25 mg QD, losartan 100 mg QD and diltiazem HCl 300 mg QD.

One year after the initial eyecare visit, the patient presented for his yearly eye exam. Exam findings were stable from the previous exam. Best-corrected visual acuity remained 20/25+2 OD and 20/20 OS, and the cataract did not progress into the visual axis any further OD. There was no worsening of the hypertensive retinopathy. The patient's BP was well-controlled, and he was continuing to work on reducing his alcohol intake. He was currently consuming approximately one beer per day.

## Education Guidelines

### *Key concepts*

1. Optometrists can be part of interprofessional collaboration in the management of chronic diseases such as HTN
2. Optometrists are obligated to keep up with changing practice guidelines for ocular and systemic conditions
3. Discussions regarding lifestyle and/or medication management of HTN can take place in the optometrist's office
4. All optometrists should know the clinical manifestations and treatment and management options of hypertensive retinopathy
5. Analysis of optical coherence tomography angiography (OCT-A) can be used to detect retinal microvascular changes associated with HTN

### *Learning objectives*

At the conclusion of this case report, readers should be able to:

1. Research updated HTN management guidelines with evidence-based medicine and differentiate between previous and current BP guidelines
2. Articulate retinal microvascular changes in patients with HTN without significant retinopathy
3. List the risk factors for the progression of hypertensive retinopathy
4. Define and explain interprofessional collaboration
5. Identify pertinent eye exam findings to be communicated to a patient's managing physician
6. Communicate with healthcare providers outside of eye care regarding a patient's systemic health status

### *Discussion questions*

1. What are examples of end organ damage that have been identified as a result of uncontrolled HTN?
2. How can HTN impact ocular health and function?
3. What potentially lethal systemic complications are associated with hypertensive retinopathy?
4. How does the World Health Organization define HTN?
5. What factors impact the reliability of automatic and manual BP measurement?
6. How can OCT be applied in the diagnosis and management of hypertensive retinopathy?

7. What is optometry's role in the multidisciplinary approach to patient care?
8. Why is communication such an important feature of interprofessional collaboration and what barriers/challenges to collaboration exist?
9. How did interprofessional collaboration help aid in the care of this patient?
10. What are some factors that impact medication adherence for patients with HTN and which factors did this patient experience?

### *Learning assessment*

Students may be:

- Broken into small groups and tasked with finding current and past BP guidelines (A discussion can then be facilitated to identify the differences in diagnostic criteria and treatment recommendations)
- Broken into small groups and tasked with researching various opinions, cautions and recommendations regarding potential overtreatment of HTN and factors that might mitigate or exacerbate such incidents
- Assigned to research journal articles on the topic of OCT-A and its use in assessing hypertensive retinopathy
- Tasked with writing a letter to a patient's PCP or an Urgent Care physician explaining the ocular exam results and in-office BP findings
- Assigned roles as patient and doctor and role-play a scenario in which the doctor obtains details related to medication adherence from the patient utilizing the factors in Table 2

### **Discussion**

Anatomical changes that occur as a result of hypertensive end organ damage have been identified in the heart, brain, kidneys and retina.<sup>2</sup> The pathology observed in each of these organs shares a common mechanism of arterial damage and atherosclerosis, which means the clinical appearance of the ocular fundus vasculature as a result of HTN likely mimics the changes taking place throughout the rest of the body.<sup>2</sup>

Currently, the pathophysiology of HTN is widely understood under a "mosaic theory" model due to the multifactorial nature of the condition.<sup>3</sup> Several modifiable risk factors, such as high sodium intake, low potassium intake, excessive alcohol intake and obesity, have been found to have a causal relationship with elevated BP.<sup>1</sup> While African and Hispanic Americans have a significantly higher age-standardized prevalence of HTN, there is no evidence to support that this disparity is a result of genetic factors.<sup>1</sup> A growing body of evidence also shows that systemic HTN does not often occur in isolation and is typically accompanied by other diseases such as diabetes.<sup>3</sup> Because HTN is such a complex and multivariate process, it is often impossible to point to one specific etiology for each patient who develops this condition. Regardless of how HTN developed in an individual patient, lowering BP with oral medication is the mainstay for decreasing the risk of premature death from end organ damage.

Optometrists are understandably most concerned with the eye as it represents end organ damage from HTN. Long-term uncontrolled elevated BP leads to vasospasm of the retinal arterioles as well as progressive intimal thickening, hyperplasia of the medial wall and hyaline degeneration,<sup>4</sup> which the clinician observes as arteriolar narrowing and artery-vein nicking. If BP remains high for a long enough period of time, the blood-retinal barrier breaks down, which leads to exudation, retinal ischemia and optic nerve head elevation. Current therapeutic strategies involve addressing the underlying pathologically increased BP, and oral anti-hypertensive medications are almost always prescribed by PCPs.

However, the role of the eyecare provider does not end with the ocular manifestations of HTN. In patients with minimal hypertensive retinopathy, the early detection of uncontrolled HTN is even more

important to prevent other end organ damage because the microvascular changes the optometrist observes in the retinal vasculature likely mirrors the microvascular changes that take place throughout the body. The American Heart Association identifies CVD, heart failure and stroke as the most significant sequelae of this damage.<sup>5</sup> Increasing evidence suggests that the presence of hypertensive retinopathy is an independent risk factor for cardiovascular dysfunction.<sup>6</sup> Additionally, the presence of hypertensive retinopathy has been associated with an increased risk of potentially lethal complications of ST-segment elevation myocardial infarction (STEMI) thrombolysis.<sup>7</sup> Furthermore, one study of 2,907 participants showed a significant association between hypertensive retinopathy and stroke.<sup>8</sup> These correlations of hypertensive retinopathy with potentially lethal systemic complications underscore the importance of ensuring that the patient's BP is under control, in addition to not adversely affecting their ocular health.

### *In-office blood pressure measurement*

To adequately address the potential implications of hypertensive retinopathy for the patient, a holistic approach is indicated. For the eyecare provider, this means checking systolic and diastolic BP in-office. The World Health Organization defines HTN as a systolic BP of greater than 140 mmHg and/or a diastolic BP of greater than 90 mmHg.<sup>9</sup> A manual or automatic wrist cuff may be used as a screening tool in-office to obtain reliable results. Despite anecdotal claims that automatic wrist cuffs overestimate BP, a meta-analysis in 2019 concluded that when used appropriately, automatic BP measurements conducted in-office are actually more accurate and repeatable than manual BP measurements in identifying patients with possible HTN.<sup>10</sup> However, this accuracy is predicated on proper measurement conditions, and the most reliable results are obtained when the patient is sitting with their legs uncrossed and arm supported at heart level.<sup>11</sup> Several studies have also emphasized the importance of cuff size, as cuffs that are too small tend to overestimate BP regardless of whether manual or automatic measurements are taken.<sup>3</sup>

The Joint National Committee (JNC) developed one of the most widely cited set of guidelines for the management of HTN. However, there is no paucity of recommendations, as the American Heart Association acknowledges nine other hypertensive treatment recommendations in addition to the JNC 8.<sup>5</sup> While this abundance of guidelines may make it difficult for eyecare providers to gauge whether their patient's HTN is "controlled," these guidelines generally follow the trend of aiming for a BP less than 140/80, with more aggressive goals aimed at patients with diabetes and chronic kidney disease.

### *Ancillary testing*

OCT is a useful tool for monitoring the progression of hypertensive retinopathy and is especially valuable in its ability to detect the presence of macular edema. Intra-retinal fluid and subretinal fluid may be observed and indicate the presence of severe hypertensive retinopathy.<sup>12</sup> This fluid typically accumulates around the optic nerve head or around arterioles, but may extend further if BP is elevated beyond a systolic reading of 240.<sup>12</sup> Changes from HTN may also be visualized in the choroid, and OCT with enhanced-depth imaging has revealed a substantial increase in choroidal thickness in eyes as a result of systemic HTN.<sup>12</sup>

More recently, OCT-A has been used to detect and follow microvascular changes in the retina. OCT-A has the ability to detect minute changes in vessel density and the superficial retinal microvasculature.<sup>13</sup> Preliminary research has revealed that patients with HTN show changes in these parameters, which may be a more objective and measurable way to follow these patients over time.<sup>14</sup> As our understanding of this technology progresses, OCT-A could be used to supplement systemic medical management with the potential to spare patients the complications of more severe organ damage. For example, one study found a significant association between retinal vessel diameter and coronary artery stenosis.<sup>12</sup> These findings indicate the potential of OCT-A to aid in the risk calculation for myocardial infarction. OCT-A was not available in the clinic where this patient was seen, but as the technology becomes more widely

available it will be a consideration in the management of patients with HTN.

### *Interprofessional collaboration*

The terminology related to interprofessional collaboration is variable. For purposes of this discussion, interprofessional collaborative care will be defined as “the provision of comprehensive health services to patients by multiple caregivers from different professions who work collaboratively to deliver quality care within and across settings.”<sup>15</sup> For this case study, the manner in which clinicians worked to meet the needs of this patient was as a multidisciplinary team. This has been defined as “situations where several different professionals work on the same project but independently or in parallel.”<sup>16</sup>

In addition to the ocular health care of the patient, this case has several aspects that can and should be elaborated. First, the number of visits to healthcare providers during a 14-month period to address a single healthcare issue is voluminous. The summary of visits provided in this case study is not exhaustive, meaning that this patient had even more healthcare visits during the period covered. Second, an interprofessional group of clinicians was involved in the identification, treatment and management of this patient’s HTN. Third, adherence to the treatment regimen recommended to this patient was difficult, and several factors contributed to this. Lastly, optometrists are part of the healthcare system and should participate in facilitating care on behalf of their patients.

The triple aim in healthcare refers to addressing the patient experience, population health and healthcare costs.<sup>17</sup> As such, the integration and coordination of care has become a growing area of focus. Improved patient care outcomes, particularly for chronic diseases such as BP control for HTN, and adherence to medication regimens have been fostered through interprofessional collaboration.<sup>15</sup>

Being co-located in the same building, the optometry and dental clinicians were able to facilitate timely care through referrals to Urgent Care when the patient presented in hypertensive crisis. Urgent Care clinicians managed the patient’s acute needs and the PCP and nurse collaborated for chronic care. One study would classify this multidisciplinary approach as collaboration via referral and counter-referral.<sup>18</sup> While optometrists can be valuable members of a multidisciplinary team communicating in real time, according to a 2017 survey by the American Optometric Association, only 14% of respondents practiced in a multidisciplinary setting.<sup>19</sup> This increases the likelihood that collaboration via referral and counter-referral is more likely for practicing optometrists in siloed environments. This emphasizes the importance of developing and maintaining healthy referral relationships with other healthcare practitioners.

Other team approaches to care include those which are interdisciplinary and transdisciplinary, indicating elevating levels of coordination and shared decision-making. One study identified themes related to interprofessional collaboration including communication and clinical interaction, shared philosophy, power and hierarchy, physical environment and financial considerations.<sup>20</sup> Barriers to collaboration are also related to these themes. Lack of understanding of the roles and responsibilities of other health professionals, entrenched perception of hierarchy and power dynamics, lack of trust related to perceptions of competency, physical separation impeding the ability to communicate, and lack of time to facilitate collaboration have all been reported as barriers.<sup>21–23</sup>

### *Interprofessional communication*

Interprofessional communication is a specific area of concern for interprofessional collaboration. In addition to having an underlying understanding of provider roles and a shared vision or philosophy, the general approach to patient care may vary.<sup>21–25</sup> For example, a holistic approach rooted in emotional intelligence taught in nursing school is more likely to differ from an objective, structured, succinct approach taught in medical schools.<sup>24</sup> It is, therefore, important to understand one’s audience and adjust accordingly when communicating patient findings. However, there is less coverage in the published

literature on how other clinicians, such as optometrists, dentists, pharmacists, etc., are taught and what their preferences are regarding communication. Additional studies in this area would be beneficial.

### Medication adherence



Table 2. [Click to enlarge](#)

The patient in this case study had difficulty adhering to the medication regimen because of frequent changes, running out of refills and difficulty obtaining a medication due to insurance issues. Five categories have been identified as factors that may impact medication adherence.<sup>26</sup> These categories of factors include sociodemographics, healthcare team/healthcare system, therapy-related, condition-related and patient-related (**Table 2**).<sup>26,27</sup> Of the factors impacting this patient, those that were therapy-related included the complex medication regimens and treatment changes, while those involving the healthcare system were access to and cost of care, and those involving sociodemographics were unstable housing and lower income. While these are factors we may be aware of, there are many factors listed in the table, notably those in the healthcare system column and patient-related column, that could be significantly impacting our patients' perceptions of care. It is important for the clinician to keep the many challenges to adherence in mind when interacting with patients, counseling/educating patients on their medications, and/or troubleshooting barriers to care.

### Conclusion

A significant amount of interprofessional collaboration was required to coordinate the management of this patient's BP and overall health status. Monitoring of the patient's BP, timely verbal communication between staff and providers, and prompt referrals between clinics facilitated necessary and appropriate care. Each provider played a vital role in delivering a consistent message regarding the importance of medication adherence, balanced diet, exercise and reduced alcohol consumption via verbal and written patient education at each visit. Eventually, this collective effort resulted in effective stabilization of this patient's BP. This case highlights the important role optometrists can and should play in caring for the whole patient in addition to caring for their ocular health.

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