VersantHealth®

The medical advantage of an annual eye exam

Dr. Mark Ruchman, Chief Medical Officer, Versant Health

Bringing you

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We all appreciate the importance of good vision. In fact, blindness ranks as one of the top fears of aging Americans, along with stroke, Alzheimer's disease, diabetes, and heart disease.[1-2]

While most people recognize the importance of a routine annual physical to either prevent or detect many of these conditions, far appreciate that an annual eye exam plays a critical role in the early diagnosis of these disorders, as well as the leading causes of blindness.

Whether someone is eight or 80, routine eye exams are critical for not just vision and eye health, but a myriad of other health conditions, ranging from cognitive function and inflammation to heart health and diabetes. In fact, when a patient receives an eye exam, the doctor actually gets a non-invasive look INSIDE the body, giving the physician a chance to detect many of today's most feared health conditions, oftentimes long before symptoms appear.

And you thought it was just about glasses!

Annual eye exams = a lifetime of vision

More than 40 million Americans are affected by some type of vision loss. For some, this may mean vision issues ranging from farsightedness and nearsightedness to presbyopia, all of which necessitate glasses or contacts.

On the medical side, conditions such as glaucoma, cataracts, macular degeneration, and diabetic retinopathy can range from mildly annoying to downright devastating. It can keep someone from activities they love, threaten their independence, and profoundly impact the quality of their lives and the lives of their loved ones.

Fortunately, during a routine eye exam, eye doctors look for a lot more than just vision correction. They are also looking for medical eye concerns, so patients can benefit from early detection of certain diseases.

> "First and foremost, we are concerned with the health of the patient. Period. We are very thoughtful and very knowledgeable about the way eye care fits into overall health. That's why we believe that vision care is really about supporting overall health with early detection AND making eye care more affordable."
>
> – Kirk Rothrock, CEO Versant Health

The aging eye

While vision issues can (and do) affect people of every age, this paper will focus on vision and health in those people age 50 older. There are many reasons for this.

First, eyesight often starts to decline in the early 40s. There are several reasons for this:

- The human lens loses elasticity, making it difficult to adjust to darkness or glare. This is known as presbyopia and can result in trouble reading small print, reduced clarity in dim light, and trouble driving at night.
- The normally clear lens may become cloudy, making vision blurry, even with glasses. This is called an age-related change cataract.
- Peripheral vision begins to decline. By age 70, it can decrease by 20 percent. This may compromise common daily activities such as walking up and down stairs and crossing a busy street.
- The cells in the retina become less sensitive, making colors appear less bright.
- The muscles that work to dilate the pupil begin to weaken. By the time someone reaches age 60, they will likely need three times more ambient light than they did at age 20.

Second, many of the health conditions that plague older Americans—including diabetes and heart disease—not only contribute to failing vision, but can also be detected with a routine eye exam.

When detected early and treated aggressively, diabetic retinopathy can be slowed, if not stopped.

Leading causes of blindness

There are four leading causes of vision impairment and blindness in the United States: cataracts, glaucoma, macular degeneration, and diabetic retinopathy.

1 Cataracts are the leading form of blindness. A cataract is a clouding of the normally clear lens of the eye. The number one cause of cataracts is age. Other risk factors include:

- Family history,
- Ocular inflammation,
- Eye injury,
- Diabetes,
- Smoking,
- Excessive exposure to sunlight,
- Corticosteroid therapy, and/or
- Radiation.

2 The second most common cause of blindness is due to glaucoma, an eye condition marked by damage to the optic nerve, often associated with elevations in the pressure inside the eye (intraocular pressure). There are four types of glaucoma:

- Open-angle glaucoma,
- Angle-closure glaucoma,
- Congenital glaucoma, and
- Glaucoma due to other ocular diseases.

Open-angle glaucoma is the most common form of the disease. In its early stages, patients are unaware of the slowly progressive optic nerve damage what can later result in permanent vision loss. It tends to run in the family. African-Americans, Latinx, and diabetics are particularly at risk.

Angle-closure is the opposite. It is a condition of rapidly progressing pain and blurred vision due to sudden increases in intraocular pressure. Patients often experience nausea and vomiting, and notice rainbows or haloes around lights. Acute angle-closure glaucoma is a medical emergency requiring prompt reduction in pressure, typically with eye drops or laser therapy.

Congenital glaucoma is, as the name implies, a condition in infants. It may be inherited and is caused by abnormal eye development. Symptoms can include cloudiness, red eyes, tearing, enlargement of one or both eyes, and/or sensitivity to light.

Glaucoma may also develop as a consequence of another condition. These may include corticosteroid therapy and other similar medications, eye trauma, disease or the retinal vessels, or systemic diseases such as diabetes.

3 The third most common eye disease is age-related macular degeneration (also known as macular degeneration or AMD). AMD affects more 13 million men and women over age 50.

It is characterized by a dark spot in the middle of the macula, a yellow-hued spot in the middle of the retina that is responsible for central vision and allows one to see fine details. The macula also works to absorb excess blue and ultraviolet light, making it a natural sunblock, if you will, for the eyes.

A person suffering from AMD typically loses central vision, but maintains peripheral vision. For example, they would know that there was a clock on the wall, but they would not be able to tell the time. As such, someone with AMD may lose the ability to read and drive, a potentially devastating impairment.

There are two forms of AMD: dry and wet. In the dry form, tissues in the retina (particularly photoreceptors, i.e. rods and cones) begin to atrophy, resulting in vision loss. In the wet form, abnormal blood vessel growth causes leakage and bleeding below the macula. This results in scarring and rapid vision loss. While only 10 percent of people with AMD have the wet form, it is responsible for the vast majority of functional blindness due to the disease.

In its early stages, patients with AMD may have minimal visual blurring. A regular eye exam can diagnose when the disease is most responsive to treatment. This may prevent the later development of catastrophic visual loss when it is much more difficult to treat.

Risk factors for AMD include:

- Age,
- Family history,
- Race (being Caucasian),
- High blood pressure,
- High cholesterol,
- Obesity,
- Inflammation of the eye,
- Light or radiation damage to the retina,
- High fat intake,
- Smoking.

4 **The fourth most common eye disease** is diabetic retinopathy. When the amount of glucose in the blood is poorly controlled, the tiny blood vessels in the retina can react by breaking, swelling, leaking or growing abnormally. This is called diabetic retinopathy.

It progresses through four phases. Early on, balloon-like swelling occurs in the retina's tiny blood vessels. These are micro aneurysms. Progressively, vessels are blocked and the retina doesn't get the nourishment it needs, so it sends signals to grow more blood vessels.

These new blood vessels are more fragile. When they leak, vision loss and blindness can result. About 30 percent of people with either type 1 or type 2 diabetes have diabetic retinopathy, and nearly five percent are in the advanced stages when blindness is at the greatest risk.[3]

Patients with diabetic retinopathy experience blurred vision with the abnormal blood vessels in the retina leak fluid or blood. These changes may also occur in patients with poorly controlled blood pressure and is referred to as hypertensive retinopathy.

Inflammation and obesity can also increase the risk of developing diabetic retinopathy.[4] However, recent advances offer hope to those at risk from the devastating effects of blindness due to diabetic retinopathy. In fact, risk of developing diabetic retinopathy was reduced by 76 percent and progression slowed by 54 percent in response to intensive treatment in a study from the journal *Diabetes Care* in January 2014.[5]

As you can see, an underlying medical condition is often a risk factor for potentially blinding eye conditions. Additionally, many of the same risk factors for eye-related issues also affect the very diseases plaguing Americans, including smoking and obesity.

These should give you some idea why a routine eye exam not only detects vision and eye disease, but can also open a window into overall health as well.

> "Our team at Versant Health flags any signs of chronic disease that are detected and reported during a routine exam, often before the patient has even had a symptom. In this way, we are able to help them pre-emptively manage the disease with their primary care physician long before they've had an episode of care."
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> – Elizabeth Klunk, Vice President, Medical Management, Versant Health

An inside look at health

There's no question annual eye exams are critical for vision and eye health, but their benefits go well beyond ocular health. A routine exam is not only an "early detection" strategy for eye health, but overall health as well.

Research shows that a regular eye exam can identify a number of medical conditions, often before the patient even knows they have the disease. In fact, one study found that a routine eye exam found signs of chronic disease long before any other health professional had noted the condition.[6] Specifically, they found signs of high cholesterol 65 percent of the time, high blood pressure 30 percent of the time, and diabetes 20 percent of the time.[6]

In other words, one can learn a lot about your health from a routine eye exam **before** there are symptoms of bodily damage. This leads to improved quality of life for patients and much lower costs for payers. Talk about preventative care.

The secret lies in the exam itself. When an eye doctor performs an exam, they not only test visual acuity, eye movement, and side vision, but they also check eye pressure, the topography of the eye, and your retina and optic nerve. In doing so, an ophthalmologist or optometrist can see characteristic changes of damage to the retinal blood vessels that reflect system-wide abnormalities affecting the brain, heart, and more.

Eye exams and brain health

Not surprisingly, both vision and cognition decline with age. Given this, many researchers questioned if there was a link. And, sure enough, there is.

Eye function has been linked to a number of brain functions, most notably cognitive function and dyslexia. In the case of cognitive function, a 2017 study found that seniors with visual impairment were up to 2.8 times more likely to have cognitive dysfunction or dementia.[7]

In the study, researchers looked at two different nationally representative samples of the U.S. population—the National Health and Nutrition Examination Survey (NHANES), 1999-2002, and the National Health and Aging Trends Study (NHATS), 2011-2015. The NHANES sample included 2,975 participants age 60 years or older who had cognitive performance measurements. The NHATS sample included 30, 202 participants aged 65 years and older, who had received dementia status assessments. Both groups had self-report status, with NHANES also having distance and near vision measured.

Researchers found that approximately 25 percent of the groups studied had cognitive impairment. Additionally, 30 percent of the NHANES group

considered their eyesight fair to poor, while 10 percent of the NHATS group noted visual impairment.

When researchers assessed these results, they found that visual impairment was associated with the worse cognitive impairment scores. Moreover, those people with near vision impairment were 3.1 times more likely to have cognitive dysfunction, even when other factors such as diabetes, heart disease, smoking, etc. were taken into consideration.[7]

Researchers concluded that there was a clear connection between vision impairment and poor cognitive performance. More specifically, they found that "self-reported [visual impairment] was associated with 1.9-fold to 2.6-fold increased odds of dementia."[7]

Similarly, a 2018 study found that eye doctors can detect small alterations in retinal blood vessels that are known to be a biomarker for Alzheimer's disease years before it begins to affect memory.[8] By using a non-invasive technique known as optical coherence tomographic angiography (OCTA), doctors looked at a variety of retinal, macular, and foveal markers from people with known preclinical Alzheimer's and those without.

Researchers found that people in the very early stages of the disease consistently had changes to the retina. Given this, they concluded, "This study suggests that cognitively healthy individuals with preclinical AD have retinal microvascular abnormalities in addition to architectural alterations and that these changes occur at earlier stages of AD than has previously been demonstrated."[7] Though these findings are preliminary, they do offer hope that future research will suggest treatment to this debilitating disease.

On the other end of the spectrum, eye exams have also been able to detect dyslexia in both children and adults. We live in "The Information Age." The ability to read. The ability to comprehend the meanings and context of the written word are critical to success in our modern economy.

Dyslexia is a miswiring of the brain pathways that serve vision, reading and comprehension. This disorder is thought to exist at birth. Sadly, it is often only diagnosed in later childhood in the context of poor school performance, and its association with poor self-esteem and anti-social behavior.

Fortunately, an early eye examination is a critical component in the diagnosis and management of children with learning disorders. According to a 2017 study, people with "normal" reading ability have a dominant eye, while people with dyslexia do not.[8]

According to a 2017 study, people with "normal" reading ability have a dominant eye, while people with dyslexia do not.[8]

Researchers found that people with dyslexia tend to have symmetrical eyes, meaning that both their actual retinas and the way they transmit visual information to the brain is symmetrical. This differs greatly from people who read more comfortably. In these cases, not only are the retinas asymmetrical, often with one eye more dominant than the other, but the way visual cues are sent to the brain are also asymmetrical.

This is yet another way an eye exam can give us some clues into the whys and hows of the workings of the brain.

Eye exams and cardiovascular health

According to the Centers for Disease Control (CDC), cardiovascular disease accounts for nearly 800,000 American deaths per year. Many of these would be preventable with early detection. One component of early detection is an eye examination.

An eye examination is the only non-invasive means by which a physician can actually see your blood vessels. A cardiologist, a neurologist, or kidney specialist can go through their entire career and never actually see the blood vessels of the heart, brain, or kidney that factor so prominently in the diseases they treat.

Like glaucoma and macular degeneration, high blood pressure—early on—has no symptoms. Untreated hypertension has been explained to patients as a "ticking bomb" to their health, often first declaring itself with a catastrophic heart attack or stroke.

Chronically high blood pressure changes the appearance of the retinal blood vessels in characteristic ways. These changes are apparent during an eye examination. Doctors understand that if these changes are seen in the retina, they also would exist throughout the body, with special concern in the heart, brain, and kidneys.

Given this, it's no surprise that uncontrolled high blood pressure (hypertension) is a leading risk factor for heart disease and stroke. Yet, one in five people with the condition are not even aware that they have it.[10] In fact, research shows that many people first learn of their risk for hypertension, not from their cardiologist, but from their eye doctor.

In fact, one study from 2015 found that, in one optometric practice alone, 21 percent of patients tested were found to have high blood pressure.[11] Of these, 66.7 percent had no idea they had elevated levels.

Given the connection between hypertension and both heart attack and stroke, this is early detection at its best. And speaking of stroke...

A study from Singapore found that retinal microvascular measurements can predict risk of stroke.[12] Researchers looked at 3,189 patients who were followed for an average of 4.4 years. Of the nearly two percent who had a stroke event, researchers found that they retinopathy and larger retinal venular size was associated with stroke risk. In fact, they found that retinal imaging (as that done during an eye exam) improved the "discrimination and stratification" of stroke risk beyond the known and established risk factors.

Lastly, an eye exam can also detect elevated cholesterol levels. Elevated cholesterol is one of the leading causes of hardening of the arteries and coronary artery disease.

The hallmark of high cholesterol in the eyes is a retinal vein occlusion. In the same way elevated cholesterol can cause plaque to form in the arteries, it can also narrow the central retina artery, the main connection between the optic nerve and the brain.[13] When this retinal vein occlusion occurs, it can impede blood flow from the eye to the brain and back, resulting in sudden, yet painless, vision loss.

20% of people first learn that they are diabetic as a result of an eye exam.[6]

Eye exams and diabetes

More than 25 million Americans have diagnosed diabetes, and estimates suggest that, by 2050, one-third of ALL Americans will be diabetic.

Diabetes is generally understood by physicians to be one of two types. Type 1 diabetes typically requires insulin to control blood glucose levels. It can often be seen in younger patients. Type 2 diabetes is more common and may be responsive to a combination of exercise, weight loss, and medication.

Diabetes is the leading cause of PREVENTABLE blindness in adults. Early intervention is central to successful treatment of this disease. In its early stages, when treatment has the greatest likelihood of success, patients are typically asymptomatic. Thus, a regular eye exam is a critical component of any health and wellness program to reduce blindness from this disease.

During an eye exam, the eye doctor can examine the optic nerve, the retinal blood vessels, and the back of the eye. During this exam, the physician may notice leakages in the small capillaries in the retina, which often indicates diabetic retinopathy.

Even if diabetes has not been diagnosed, those telltale leakages are a sure sign that the patient has the disease. In fact, 20 percent of people first learn that they are diabetic as a result of an eye exam.[6]

And yet, even with the threat of blindness, research shows that many diabetics skip that annual eye exam.[14] In a 2017 study of 1,968 diabetics over the age of 40, researchers found that a mere 40 percent actually adhered to eye care recommendations. That means that despite the encouragement of doctors and health plans, 60 percent of known diabetics fail to get an annual eye examination.

Not surprisingly, those patients with the most severe diabetic retinopathy were the most likely to follow their eye exam schedule.[14] However, by getting routine eye exams every year, they likely could have detected issues earlier and started treating their condition sooner.

At Versant Health, we have a sophisticated program of community outreach overseen by our healthcare experts whose only responsibility is to reduce blindness due to diabetic eye disease.

As the data shows, routine eye exams not only protect you from devastating eye diseases like glaucoma and macular degeneration, but can also detect diseases years before symptoms. And not just any diseases, but the most feared, devastating, debilitating, and costly conditions plaguing Americans—Alzheimer's, stroke, diabetes, and heart disease.

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There's little doubt that everyone age 50 and older should be making routine eye exams a part of their routine, preventative, screening checkups. Not only could it save your life, but it can save you money as well!

Whether it's eye disease, stroke, diabetes, or Alzheimer's disease, early detection has been found to save money as well as lives.

Financial benefits of an annual eye exam

Disease not only takes its toll on your health, but on your wallet as well. This is especially true when it comes to debilitating diseases like stroke, diabetes, and Alzheimer's.

Stroke—the leading cause of long-term disability in the United States—alone costs the U.S. an average of $34 billion each year.[15] But that's a drop in the bucket compared to diabetes, which totals an estimated $327 billion annually, with $237 billion coming from direct medical costs and $90 billion coming from decreased productivity.[16]

And when you look at Medicare reimbursement, Alzheimer's leads the pack. Studies show that, in 2018, Medicare and Medicaid will spend $186 billion caring for someone with Alzheimer's/dementia.[17] In fact, one in every five Medicare dollars goes to someone with the disease.[17]

To put it even more succinctly, a senior without Alzheimer's has an annual Medicare spending of $7,415. A senior with Alzheimer's? A whopping $24,122 a year![17]

And while eye disease costs are relatively low comparatively, ophthalmology and optometry are the second highest cost specialty for Medicare expenditures.[18] Specifically, eye-related costs drive 7.2 percent of total Medicare expenses ($102 billion). In fact, eye care costs have been growing at a faster rate than total Medicare costs—three times as fast to be exact.

The answer? Early detection—every time. Whether it's eye disease, stroke, diabetes, or Alzheimer's disease, early detection has been found to save money as well as lives.

Windows to the soul—and health

At Versant Health, we truly believe that the eyes are the windows to health. We believe it because we see it... every day. Of course we care about your vision and eye health, but we also care about YOU.

We know that, while the idea of losing your vision is terrifying, so too are diseases and conditions such are Alzheimers, diabetes, heart disease, and stroke. And we also know that all of these concerns come at a price—not just to your health, but to your wallet as well.

But we also know that the research is clear: routine vision exams equal better health outcomes. And with better health comes greater savings on medical costs.

It's a win-win all the way around.

Interested in learning more about health plan services?
Visit us at **versanthealth.com**.

References:

1. Williams S. The 5 diseases Americans fear the most. The Motley Fool. 2013 Oct 15. https://www.fool.com/investing/general/2013/10/15/the-5-diseases-americans-fear-the-most.aspx.
2. Scott AW, et al. Public attitudes about eye and vision health. JAMA Ophthalmol. 2016;134(10):1111-8.
3. Health statistics. National Institute of Diabetes and Digestive and Kidney Diseases. http://diabetes.niddk.nih.gov/dm/pubs/statistics/#Blindness.
4. Tomic M, et al. Inflammation, haemostatic disturbance, and obesity: possible link to pathogenesis of diabetic retinopathy in type 2 diabetes. Mediators Inflamm. 2013;2013:818671.
5. Aiello LP; DCCT/EDIC Research Group. Diabetic Retinopathy and Other Ocular Findings in the Diabetes Control and Complications Trial/Epidemiology of Diabetes Interventions and Complications Study. Diabetes Care. 2014 Jan;37(1):17-23.
6. Schaneman J, et al. The role of comprehensive eye exams in the early detection of diabets and other chronic diseases in an employed population. Popul Health Manag. 2010 Aug;13(4):195-9.
7. Chen SP, et al. Association of vision loss wtih cognition in older adults. JAMA Ophthalmol. 2017;135(9):963-70.
8. O'Bryhim BE, et al. Association of preclinical Alzheimer disease with optical coherence tomographic angiography findings. JAMA Ophthalmol. 2018 Aug 23. [Epub ahead of print.]
9. Le Floch A and Ropars G. Left-right asymmetry of the Maxwell spot centroids in adults without and with dyslexia. Proc Biol Sci. 2017 Oct 25;284(1865).
10. Mozzafarian D, et al. Heart Disease and Stroke Statistics-2015 Update: a report from the American Heart Association. Circulation. 2015;e29-322.
11. AlAnazi SA, et al. Effectiveness of in-office blood pressure measurement by eye care practitioners in early detection and managemetn of hypertension. Int J Ophthalmol. 2015;8(3):612-21.
12. Cheung CY, et al. Retinal microvascular changes and risk of stroke. Stroke. 2013;44:2402-8.
13. O'Mahoney PR, et al. Retinal vein occlusion and traditional risk factors for atherosclerosis. Arch Ophthalmol. 2008 May;126(5):692-9.
14. Murchison AP, et al. Non-adherence to eye care in people with diabetes. BMJ Open Diabetes Res Care. 2017;5(1):e000333.
15. Benjamin EJ, et al. on behalf of the American Heart Association Statistics Committee and Stroke Statistics Subcommittee. Heart disease and stroke statistics—2017 update: a report from the American Heart Association. Circulation. 2017;135:e229-e445.
16. The cost of diabetes. American Diabetes Assocation. http://www.diabetes.org/advocacy/news-events/cost-of-diabetes.html.
17. Costs of Alzheimer's to Medicare and Medicaid. Alzheimer's Association. http://act.alz.org/site/DocServer/2012_Costs_Fact_Sheet_version_2.pdf?docID=7161.
18. CMS, Dept. of Health and Human Services Administration on Aging.

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