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As vision subspecialties continue to grow, we can ensure that patients continue to get the care they deserve.

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Introduction to Neuroimaging in Eye Care

DENISE GOODWIN, OD, FAAO | NEURO-OPHTHALMIC DISEASE CLINIC

Optometrists are often the first people to evaluate patients with intraorbital or intracranial lesions. Therefore, it is important to have at least a basic understanding of neuroimaging. Having an understanding of neuroimaging will allow one to communicate with other professionals, guide neuro-radiologists in deciding what tests are necessary, and understand radiology findings. It is important to recognize the limitations of specific scans so lesions are not missed due to improper interpretation. Additionally, your combined knowledge of the clinical data and neuroanatomy may aid in evaluating and finding conditions that would otherwise be missed on neuroimaging.

Illustrative Case

A 23-year-old Hispanic male was referred to the Neuro-ophthalmic Disease Service due to

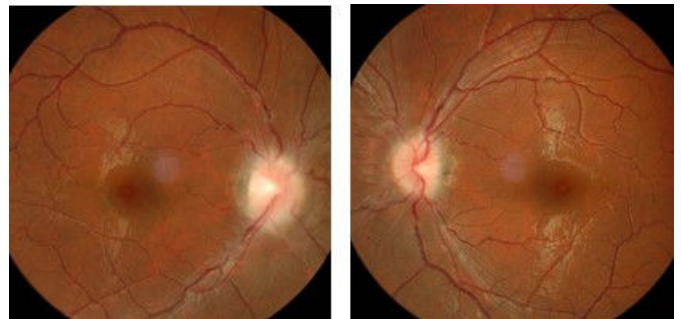


Figure 1: Bilateral disc edema seen on fundus examination.

bilateral optic nerve edema. The patient had recently visited the emergency department for severe, daily headaches that were worsening over the last year. Bilateral disc edema was seen on fundus exam (Figure 1) which prompted us to order an MRI with contrast. This study was reported as unremarkable. I obtained the images to evaluate them further based on my suspected differential diagnosis.

Neuroimaging (continued)

The MRI showed an empty sella turcica, tortuous optic nerves, and flattening of the posterior globes, consistent with increased intracranial pressure. Although the MRI findings were consistent with a diagnosis of idiopathic intracranial hypertension, the patient was thin and male, which is not the typical demographics associated with this diagnosis. Therefore, I evaluated the images again, looking more closely for other causes of increased intracranial pressure. On careful inspection I noted an asymmetric appearance of the jugular veins (Figure 2). After finding this, I consulted with the neuroradiologist who performed the initial read, and she agreed that this should be evaluated further because a clot in the jugular vein can cause increased intracranial pressure. She recommended an ultrasound as an alternative after the patient refused further evaluation of the veins with MR venography due to cost.

Discussion

This case emphasizes the importance of neuroimaging in the proper diagnosis of ophthalmic disorders. It is critical to evaluate your patient's neuroimaging results personally

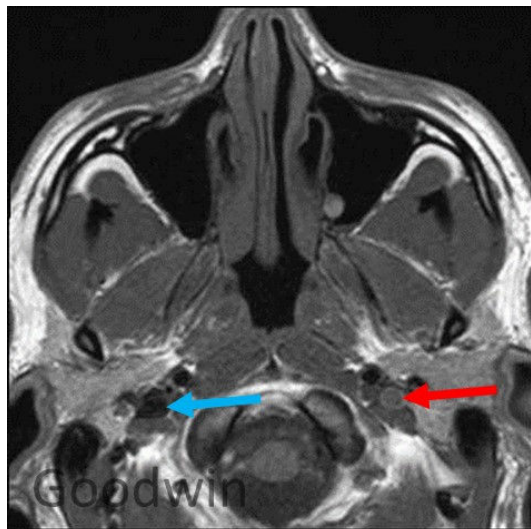


Figure 2: MRI showing occlusion of the left jugular vein (red arrow). Compare this to the normal jugular vein appearance on the right (blue arrow).

based on what you know about the case. If the neuroimaging report that you are given does not make sense with the clinical picture, reevaluate the images yourself looking for your differential diagnoses. Additionally, the neuroradiologist is a valuable member of the medical team and is generally available to consult and aid in case management. In order to fully communicate with the neuroradiologist, both before and after the order, it is critical that optometrists have a basic understanding of neuroimaging.

The use of neuroimaging techniques to view cross sectional images of neural anatomy is a relatively recent advancement. Computerized tomography (CT) wasn't used clinically until the early 1970's. Magnetic resonance imaging (MRI) came into use shortly thereafter in the late 1970's. Since that time, the quality and functionality of neuroimaging has improved drastically.

Neuroimaging is viewed on one of three planes (Figure 3). An axial cut is a horizontal slice that divides the body into caudal and rostral portions. A coronal cut involves vertical slices that divide the body into posterior and anterior portions. A sagittal cut refers to a vertical slice that divides the body into right and left sides.

Axial images are oriented as if you are standing at the feet and looking toward the head of an inclined person. Therefore, the right side of the body is on the left of the image and the left side of the body is on the right side of the image (Figure 3). With coronal images, the images are viewed as if you're standing in front of the person looking at them. The result is the same as with the axial images: the person's right side is on your left and their left is on your right (Figure 3).

Both CT and MRI technologies allow visualization of the brain. The main difference between CT and MRI is that CT uses x-ray beams while MRI employs radio waves to form images.

Neuroimaging (continued)

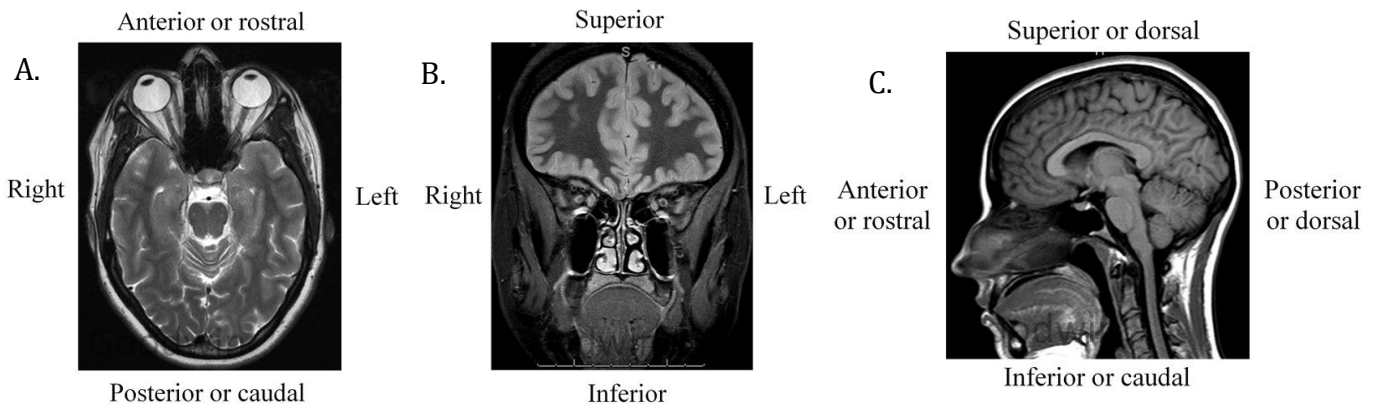


Figure 3: Orientation of neuroimaging. A. Axial T2 MRI. B. Coronal FLAIR MRI. C. Sagittal T1 MRI.

Both technologies can be adapted to look specifically at arteries and veins. Each of these technologies are discussed below.

-Computed Tomography

Computed tomography uses x-rays to measure relative densities of tissue (Figure 4). The x-ray beam is rotated around the patient. The data is acquired and then reconstructed by a computer to form the image. Material with

increased density, such as metal and bone, will appear white on CT images. Less dense structures, such as air and cerebral spinal fluid, appear black on CT images. Tissue with high water content appears dark gray, and substances with a high protein concentration will be lighter gray. Brain tissue has a light gray color. The terms hyperdense and hypodense are relative terms used to describe structures that are, respectively, lighter or darker than brain tissue. Something with similar intensity to the brain is described as isodense to brain tissue.

Intravenous contrast is used to improve visualization of areas where there is breakdown of the blood brain barrier. This can result from a tumor, infection, or inflammation. The contrast material used for CT scanning contains iodine.

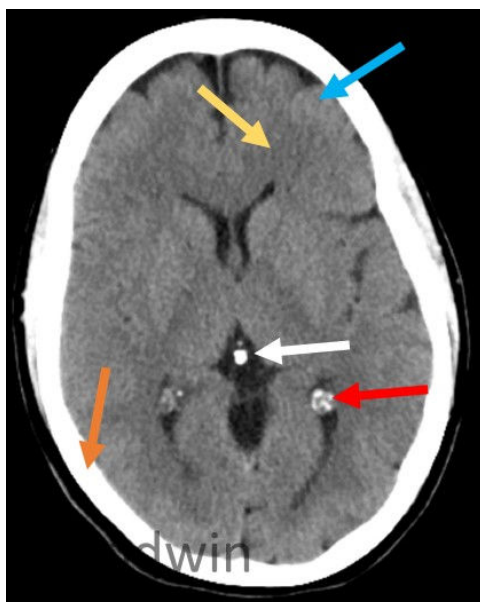


Figure 4: Axial CT image without contrast. Bone is bright white (orange arrow), and air is black. Gray matter (blue arrow) is slightly lighter than white matter (yellow arrow). Calcification, which is bright on CT, occurs normally in the choroidal plexus (red arrow) and adult pineal gland (white arrow).



Figure 5: Orbital fracture seen on a coronal CT image.

Neuroimaging (continued)

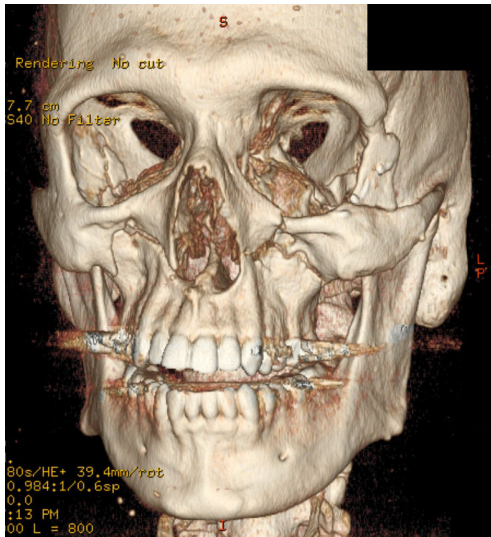


Figure 6: Three-dimensional CT following a motor vehicle accident. Multiple fractures are present, most notable surrounding the left orbit.

Because iodine is denser than brain, it will appear hyperdense to brain tissue. Contrast medium should not be used in patients with renal impairment or those allergic to iodine.

CT is the method of choice in emergent situations, when looking for fractures or other bone abnormalities, identifying acute intracranial hemorrhage, or evaluating sinus disease or lesions with calcification. With CT it is possible to see skull fractures with exquisite detail (Figure 5), and three-dimensional renderings (Figure 6) can be invaluable in determining proper treatment. Compared to MRI, CT is faster, cheaper, and more readily available. However, it can be difficult to distinguish small areas of soft tissue pathology with CT, particularly in areas with lots of bone. In these cases, the use of MRI is more appropriate.

Radiation is the main concern with CT, particularly in children. CT should be avoided in children

and pregnant women. Decreased slice thickness and increased number of slices cause increased radiation dose. With newer techniques acquisition time and radiation dose are reduced.

-Magnetic Resonance Imaging

Magnetic resonance imaging provides better resolution of nervous system anatomy compared with a CT scan. Because of this, an MRI is more appropriate when looking at soft tissue disease, such as tumors, multiple sclerosis, or inflammation. MRI is particularly useful in evaluating lesions of the pituitary and parasellar regions. However, MRI is more expensive and time intensive. In addition, MRI is not as good as a CT in evaluating fresh hemorrhage or bone. MRI is contraindicated in those with metal fragments in body, a pacemaker, or cochlear implants. The magnetic field may cause ferromagnetic components to become dislodged causing injury to blood vessels, nerves, or organs. Additionally, metal implants conduct electrical current within the MRI and can cause burns. Finally, electrical devices, such as pacemakers, can malfunction due to interference from the MRI. Those with severe claustrophobia may need to be sedated prior to the MRI examination.

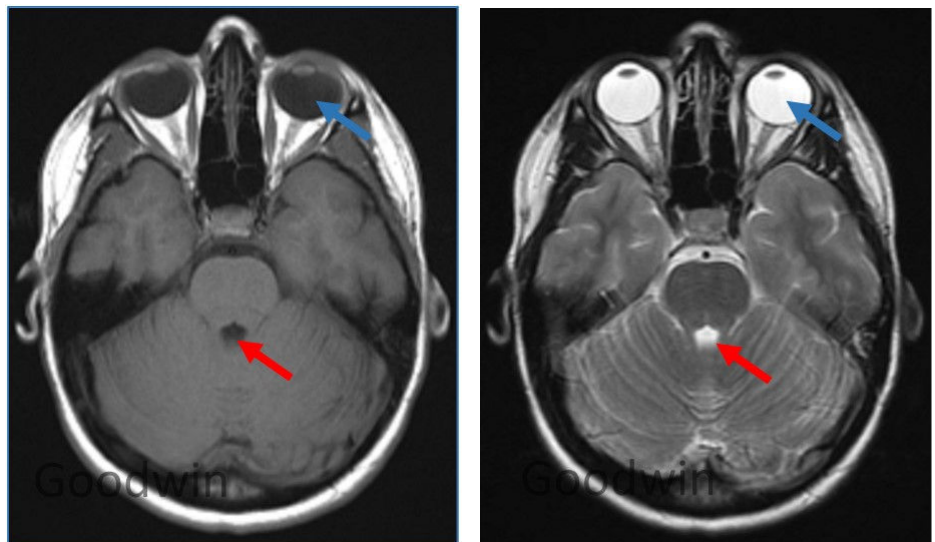


Figure 7: T1 axial MRI (left) and T2 axial MRI (right). Note that areas with pooled fluid, such as the cerebral spinal fluid in the fourth ventricle (red arrows) and the vitreous (blue arrows), are dark on a T1 MRI and bright on a T2 MRI.

Neuroimaging (continued)

Magnetic resonance imaging exposes a person to a strong magnetic field causing hydrogen protons in the tissue to align. Radiofrequency coils then convey electromagnetic energy to the tissue changing the alignment of the protons. Following the radiofrequency pulse, the protons return to their original position causing a change in electrical signal. The speed with which the protons return to the original position (relaxation time) depends upon the density and mobility of the molecules in the tissue. For example, hydrogen in water relaxes at a different rate than hydrogen in gray matter. This difference influences the contrast between various tissue in the MR image.

Manipulating the MRI scan parameters alters the proton relaxation time and, therefore, the appearance of tissue images. The most common sequences are T1-weighted and T2-weighted images, but other types of weightings are possible. T1 images have increased contrast between gray and white matter, making them especially valuable when looking at anatomical detail. Fluid, such as cerebral spinal fluid (CSF) and vitreous, are dark on T1 scans (Figure 7A). These fluids are bright on T2 scans (Figure 7B). Because fluid is bright on T2 scans, pathology is generally more evident on T2 scans compared to T1 scans.

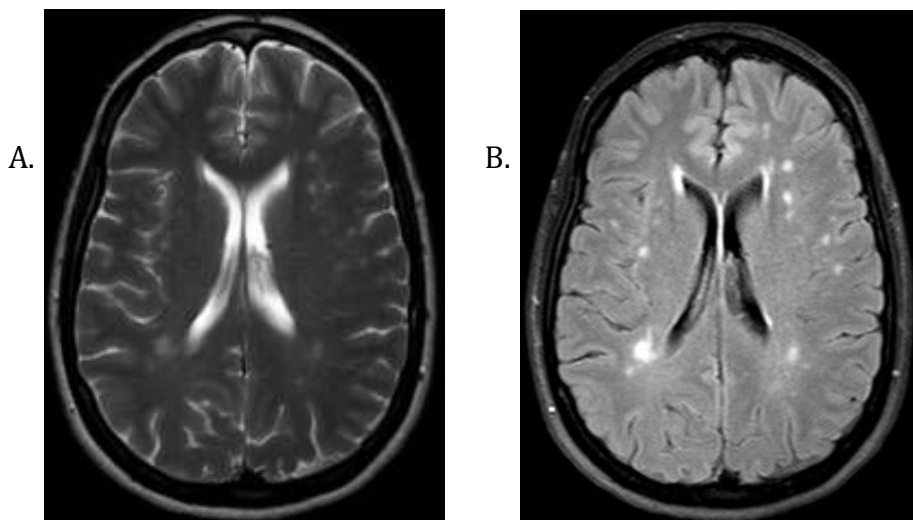


Figure 8: Axial T2 MRI (A) and axial FLAIR image (B) of the same person. Note that it is easier to differentiate lesions near the lateral ventricles with the FLAIR image.

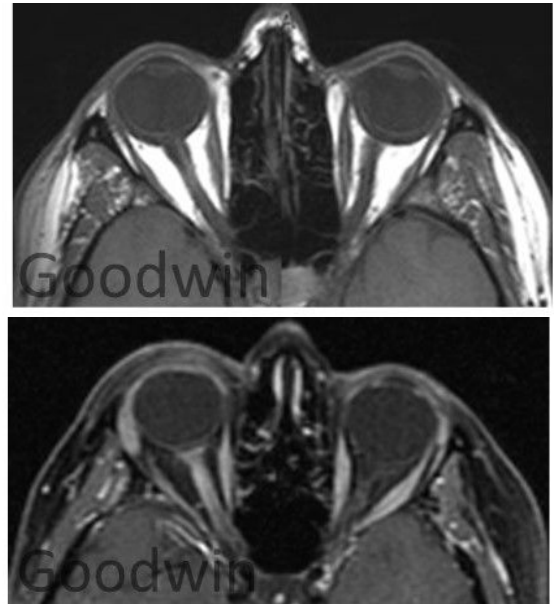


Figure 9: Orbital MRI with contrast, both without (A) and with (B) fat suppression, demonstrating right optic neuritis. Without fat suppression the optic neuritis is difficult to see. With fat suppression the optic neuritis involving the right nerve is much more obvious.

Fluid attenuated inversion recovery (FLAIR) images are a type of T2 image in which the signal from free water (as seen in CSF and vitreous) is suppressed. As with other T2 images, fluid found within pathologic tissue, such as that associated with edema, remains bright on FLAIR images making this an ideal scan to look for areas of edema of neural tissue. FLAIR images are particularly useful when looking for plaques associated with multiple sclerosis that are near the ventricles. The plaques show up on the T2 images, but they are much more obvious on FLAIR images (Figure 8). Also, subtler plaques surrounding the ventricles can be missed with T2 images since the CSF is bright in the ventricles and the plaques are bright directly adjacent to the ventricles. It is easy to mistake the plaques as

Neuroimaging (continued)

being a continuation of the ventricles themselves.

Fatty tissue, such as that seen within the orbit, is bright on T1 MRI scans. Similar to how the signal from free water is suppressed with FLAIR images, the bright signal created from fat can be attenuated by manipulating MRI parameters. Fat suppression can be particularly useful when imaging the orbit with a contrast enhanced T1 MRI because it eliminates the bright signal from the normal orbital fat so you can better visualize pathology that also has a bright signal (Figure 9). Diffusion weighted imaging (DWI) highlights areas of reduced water movement (Figure 10). These scans are particularly useful when

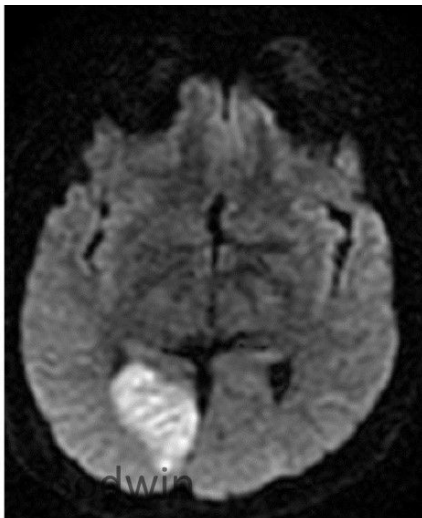


Figure 10: DWI scan showing ischemia in the right occipital lobe.

evaluating for ischemia but are also helpful in differentiating various lesions. Normally water is able to diffuse freely between cells. With ischemia, cells swell due to dysfunction of the sodium/potassium pump. This swelling decreases space between the cells which then restricts how easily water can diffuse around the cells. An infarction can be seen within minutes on DWI.

The terms isointense, hyperintense, and

hypointense are used to describe the relative brightness of MR images. The intensity of MR images depends on the presence of hydrogen protons. Because air (e.g. within sinuses) and calcified bone lack water, they appear hypointense to brain tissue on MR images. Relative appearances of common tissues are highlighted in Table 1. Larger blood vessels will appear dark on MRI. This occurs because the stimulated protons in flowing blood leave the area before the image can be obtained.

	T1	T2
CSF	dark	bright
Air	dark	dark
Dense bone	dark	dark
Calcium	dark	dark
White matter	Light gray	Darker gray
Gray matter	Dark gray	Lighter gray
Fat	bright	bright
Edema	dark	bright
Flowing blood	dark	dark

Similar to CT, the use of a contrast agent with MRI highlights areas of breakdown of the blood-brain barrier or increased vascularity. This can improve the contrast between normal and pathological tissue (Figure 11). Gadolinium is the intravenous contrast agent used in MR imaging. This is generally well tolerated. However, those with severe kidney disease can develop nephrogenic systemic fibrosis, a rare but serious complication of gadolinium-based contrast agents. Although less likely compared to iodinated contrast, anaphylaxis can occur. Contrast agents should be avoided during pregnancy.

-Neuroangiography

Three-dimensional reconstructions of the blood vessels can be obtained non-invasively using either MR or CT technology. CT angiography (CTA) or MR angiography (MRA) is helpful in screening for carotid stenosis, aneurysm, arteriovenous fistula, or arteriovenous

Neuroimaging (continued)

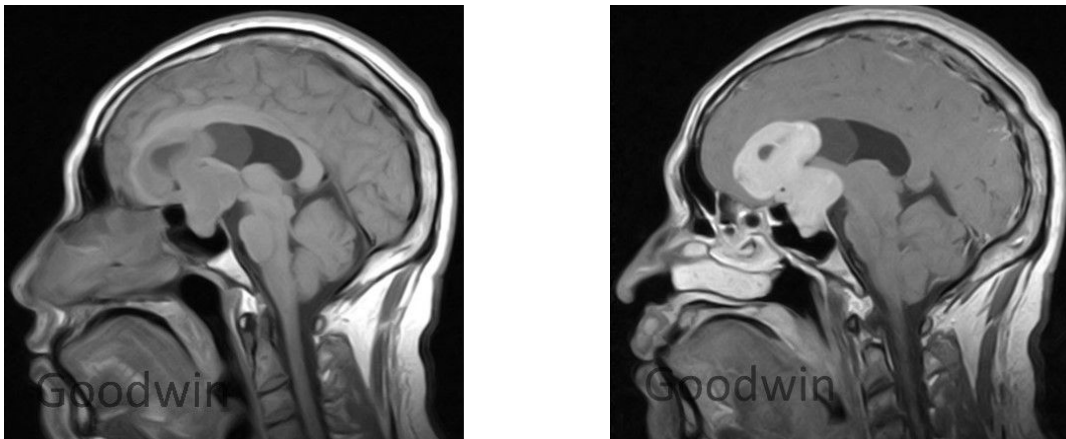


Figure 11: Sagittal T1 MRI without (A) and with (B) contrast in a patient with a pituitary macroadenoma. Note how much more evident the pituitary adenoma appears following the administration of contrast.

malformation (Figure 12). CT venography (CTV) or MR venography (MRV) can be helpful in determining the presence of cerebral sinus thrombosis, which puts the patient at significant risk for stroke and can cause papilledema. Conventional catheter angiography may still be necessary if the suspicion for a vascular lesion is high despite normal CTA or MRA. However, due to the risks associated with arterial catheterization, as well as the improved sensitivity of CTA and MRA, conventional angiography is rarely used as a first-line modality.

CTA is the study of choice for emergent neurovascular conditions. Here, the contrast agent is injected intravenously. Varying the time between the contrast injection and the start of the scan will allow imaging of either the arteries or veins.

MRA can be performed either with or without the injection of contrast material (gadolinium). MRA without contrast differentiates between flowing blood and stationary tissue. This method is useful when there is a concern with the use of gadolinium, including pregnancy or kidney dysfunction. When contrast dye is used, an image of the blood vessel lumen is created directly. Particularly with a 3 Tesla magnet, this method allows improved visibility of medium and small arteries.

Additionally, contrast enhanced MRA has shorter acquisition times and is less prone to motion and flow artifacts compared to non-contrast MRA techniques.

-Ordering Neuroimaging

Before sending a patient for neuroimaging, assure that the patient's condition is neurologic. These tests are expensive for the patient and

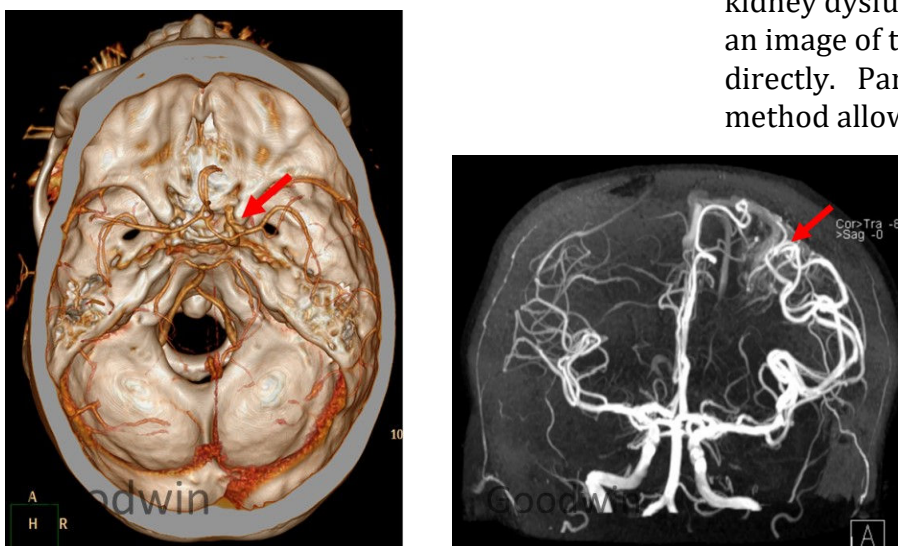


Figure 12: CTA of a patient with an internal carotid artery aneurysm causing severe headache and reduced ocular motility (A). MRA of a patient with an arteriovenous malformation causing papilledema (B).

Neuroimaging (continued)

healthcare system, and they are not without risk to the patient. Some ophthalmic conditions that may require neuroimaging include optic nerve edema, ophthalmoplegia, nystagmus, proptosis, vision loss associated with a relative afferent pupillary defect not explained with a careful ocular health examination, bilateral visual field loss that respects the vertical midline, and Horner syndrome.

After determining that the condition is neurologic, use your clinical data to determine the anatomical location of the lesion, as well as likely diagnoses. As a general rule, if you are able to localize the lesion anatomically prior to ordering neuroimaging, you are more likely to find the causative lesion. The localization and differential diagnoses will help determine the most appropriate scan, the area to be evaluated, and whether contrast should be used. If you are trying to visualize bone lesions, acute blood, or calcium deposits, a CT is generally the most appropriate scan to order. Most other conditions we deal with in eye care will require an MRI with contrast. However, some conditions, such as thyroid eye disease, do not require contrast. If a painful post-ganglionic Horner syndrome is suspected CT or MR angiography, with particularly emphasis on the internal carotid artery, should be performed. Consider an MRI of the orbits if you are looking for a lesion involving the anterior visual pathway. Pathology involving the optic radiations, occipital lobe, or cerebellum requires an MRI of the brain. Because of the increased vascularity of many of the lesions that affect the visual system, contrast is generally necessary. Be sure to specify that you want fat suppression with your contrast enhanced orbital MRI if you suspect an orbital lesion. Communicate with the neuroimaging center the type of scan you want, as well as the localization of the suspected lesion and the differential diagnoses. The more information

the neuroradiologist has, the more likely they are to find the abnormality. The imaging center can generally provide you with a standard order form. Otherwise, minimally, you should include the scan you need performed, whether contrast should be administered, and the condition(s) in which you are ruling out. Generally your staff will need to get prior authorization from the insurance company.

Once you receive the results from the neuroradiologist, assure that the information makes sense with your clinical data. If the results don't support your suspected diagnosis, review the original images based on your clinical data. Keep in mind that no one knows the case as well as you, and this gives you the ability to understand the images. Don't hesitate to communicate with the neuroradiologist if there is a mismatch between the clinical findings and the imaging report.

Conclusion

A basic understanding of neuroimaging techniques will help the optometrist order appropriate testing. Both CT and MRI have a place within eye care depending on the suspected diagnosis. Variation of each method may be used depending on the clinical situation. Despite imaging technology, it is critical that the clinician use their knowledge of neuroanatomy to accurately localize the process and determine likely differential diagnoses. Detailed communication with the neuroradiologist will aid in obtaining the most accurate and timely diagnosis.

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A Mentor's Mentor Retires

LORNE YUDCOVITCH, OD, MS, FAAO | MEDICAL EYE CARE SERVICE CHIEF

Dr. Carole Timpone, Associate Dean of Clinical Programs at Pacific University College of Optometry, recently announced that she will be retiring after nearly 35 years of service to Pacific University. A New York State native, Dr. Timpone completed her optometry degree at the State University of New York (SUNY). Her role soon evolved to Assistant Clinical Professor at SUNY. In 1983, Dr. Timpone moved across country to the west coast, where she accepted a position at Pacific University, developed the Ocular Disease and Special Testing Service, and would act as its first Chief of Service.

Many who graduated from Pacific remember Dr. Timpone's role as Clinic Director of the Portland Eye Clinic. Directing a large urban teaching clinic involves many complicated elements, and Dr. Timpone managed it all with kindness, professionalism, and gusto. During this time, she developed the popular Clinical Grand Rounds lunchtime education sessions for interns, which were later moved to an online clinical education format to allow participation of externs at preceptorship sites. While seeing her loyal patients in the Ocular Disease Service, she served on many university and optometry committees. Particularly valuable was her service for many years as Site Coordinator for the National Board of Examiners in Optometry. Her most notable University service was her leadership in the development, and service as founding Chair, of the University Faculty Senate, from 2006 – 2010.

Not to be constrained by one location and practice focus, Dr. Timpone developed the Pacific University Center for Sight, a multi-specialty practice in Beaverton. In more recent years, Dr. Timpone created the Interprofessional Diabetes Clinic in Hillsboro, where she serves as Founding Director and Liaison to Pacific University's other health disciplines. This unique teaching clinic cares for underserved patients with diabetes by integrating care from multiple professions, including optometry, dental hygiene, psychology, physical therapy, occupational therapy,



pharmacy, dietetics, audiology, and physician assistant disciplines.

Her clinical, instructional, and administrative service did not go unnoticed. Dr. Timpone has been presented with multiple prestigious awards, including the Oregon Optometric Association Young Optometrist of the Year Award in 1989, the President's Award for Excellence in Teaching at Pacific University in 2004, Distinguished University Professor at Pacific University in 2009, and National Academies of Practice, Distinguished Practitioner and Inducted Fellow in 2012.

In 2013, Dr. Timpone transitioned to her current role as Associate Dean of Clinical Programs, as well as Director of Residencies. She has taken on both of these responsibilities with savvy and grace, working closely with the Director of Clinical Operations, Clinic Directors, and Externships and Residency Management, to assure delivery of the highest quality patient care and student education. During her tenure as Associate Dean, she developed seven new optometry residencies. Dr. Timpone also oversaw the recent Forest Grove EyeClinic remodel, and secured acquisition of the latest technology that supports both clinical patient care and research, such as the Dry Eye Solutions specialty clinic in the Beaverton EyeClinic and the new Advanced Diagnostic Imaging Suite in the Forest Grove EyeClinic.

A Mentor's Mentor Retires (continued)

It would take many pages to fully list all the contributions Dr. Timpone has made to her students, fellow staff and faculty, the College of Optometry, and the profession. She has published numerous papers and book chapters, volunteered locally and overseas, received several awards and grants for worthy community vision and research projects, and lectured nationally and internationally. Her leadership roles in the College, University, and local, regional and national optometric organizations, is truly impressive.

When asked about memorable moments, Dr. Timpone recalls many—the excitement of students and staff when we moved to the new Portland clinic in 1988; the passage of TPA legislation allowing us, with our students, to treat our patients to the full scope of our optometric

education; the “aha” moments in clinic when you see in your students’ eyes or hear in their voices, that they do see or get it; and more recently, the honor and privilege of coating the new interns each year during White Coat Ceremony.

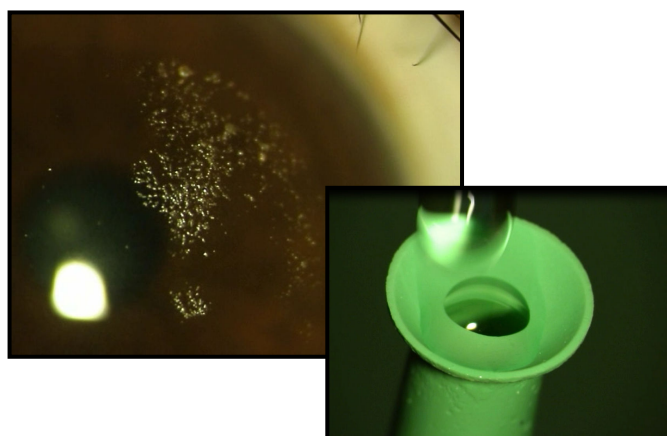
We at the College of Optometry are grateful for her past, present, and future endeavors. With the exceptional career and legacy that Dr. Carole Timpone has achieved, it is her humility and earnest support for optometry that shines through. In her words: “I guess what I would want to add, as a personal note, is that I support all aspects of full scope optometry practice and research, crucial to the continued growth and success of our profession.” Dr. Carole Timpone is truly a mentor’s mentor.

Managing Scleral Wettability

MATT LAMPA, OD, FAAO | CORNEA AND CONTACT LENS SERVICE CHIEF

As the utilization of today’s modern scleral lens increases, so do some of the unique clinical challenges they present. These lenses provide the patient several advantages, including crisp stable optics, moisture retention on the surface of the eye, and increased initial comfort compared to traditional gas permeable (GP) lenses. However, if the scleral lens surface does not maintain its wettability during the day, the comfort, as well as visual quality and consistency can dramatically lessen.

One of the strategies to combat decreased wettability includes ensuring the manufacturer plasma-treated the lens prior to shipment. This helps ensure a clean lens surface. Also consider GP specific cleaners such as Progent (Menicon) or Miraflo. These cleaners require the patient remove, clean, and thoroughly rinse the lens with saline prior to either disinfecting or conditioning the lens in preparation to for proper application.



One of the in-office, and potentially at-home, strategies that may aid in cleaning and reconditioning the scleral lens without lens removal requires the use of a DMV with a small hole in the center. The DMV is filled with GP conditioner and rubbed or “squeegeed” on the front of the scleral lens to regain that clean, wettable surface that helps the patient maintain clear comfortable vision.

‘Glisten’ to What Your Patient Says

LORNE YUDCOVITCH, OD, MS, FAAO | MEDICAL EYE CARE SERVICE CHIEF

An 80-year-old Caucasian male presented for an annual examination at our Forest Grove EyeClinic with a complaint of mild blur in both eyes at all distances, as well as night glare, over the last year. He had undergone cataract surgery in both eyes two years prior. Examination showed normal pupils, motilities, and screening visual fields. Well-positioned, posterior chamber intraocular lenses (IOLs) OU were noted. Posterior segment examination showed no abnormalities. Although the patient refracted to 20/20, he still noted mild blur at all distances in the exam room.

Closer examination of his IOLs revealed numerous diffuse microcysts scattered throughout the lens surface in each eye. A diagnosis of IOL glistening was made, which corresponded with his symptoms.

IOL glistening is relatively uncommon, resulting from material and manufacturing factors. It is associated with acrylic IOLs but can happen with any IOL material. Often the microcysts do not cause significant symptoms; however, in severe cases where glare is intolerable or acuity is reduced, an IOL exchange may be indicated.



IOL glistening seen as diffuse microcysts in the IOL.

Don't Forget to Blink

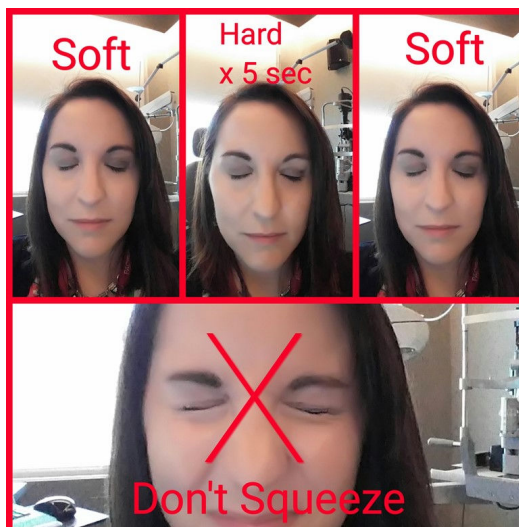
TRACY DOLL, OD, FAAO | PACIFIC DRY EYE SOLUTIONS COORDINATOR

Users of computerized devices (including smart phones and tablets) are at risk for dryness, as the blink rate can drop to one-fourth of normal during near visual tasks. In addition, complete blinking is necessary to replenish the lipid tear components and spread the tears evenly. Without regular, complete blinking, evaporative dryness occurs.

Purposeful blinking during computer-based activities prevents excess exposure. After 10 to 15 minutes of computer device use, take a “blink sandwich break.” This includes a soft, 1 second blink followed by a 5 second hard squeeze with just the eyelid muscles. Then finish with another 1 second soft blink.

Free computer apps can be installed to remind patients to blink. EyeLeo and WorkRave are available for computers. The EyeWinq app is free for Android devices, and the Dr. Korb Blink Training app is available for all smart phones.

Pacific Dry Eye Solutions offers blink analysis with the LipiView II. This technology measures the percentage of complete blinks and displays how the blink impacts the lipid-layer. If your computer-using patients need dry eye care and education, please call to schedule a specialty consult at 503-352-1699. Don't forget to blink!



Leaving A Positive Legacy

HANNU LAUKKANEN, OD, MEd, FAAO, FCOVD-A | VISION THERAPY SERVICE CHIEF

I am both excited and pleased to welcome Dr. Paula Luke as our new incoming College of Optometry Chief of Vision Therapy Services. Next semester I will be transitioning from full-time clinical professor status to part-time instructor in our new Vision Science program.

It is also with a tinge of melancholy that I write this last column for Eye on Pacific Clinic Newsletter. It has truly been a rewarding journey for me to have served several decades as our clinical vision therapy chief.

If you will indulge me, I would like to share a little bit of my personal journey, along with some recollections.

I need to name at least a few names from the many remarkable professors and clinical doctors that have helped shape our wonderful clinical program and contributed to my personal growth.

My personal journey began on a small dairy farm in the upper left corner of Oregon, as the youngest child of European immigrants displaced by WWII. That journey of 60-years and 60-miles from the farm has been a phenomenal personal and professional growth ride. When I first started as a Pacific student, we had just earned diagnostic privileges; therapeutics seemed an unobtainable goal on the horizon. Our Vision Therapy Service then consisted of a long basement room divided into small stalls. The well-worn hard floors with loose tiles and stained walls bathed in flickering fluorescent light was unattractive. Despite the shop-worn physical appearance, we were blessed with some amazingly clinicians, teachers, and staff. They cared, not only about just didactic and clinical education, but about the well-being and growth of each student intern.

Most all Pacific alums certainly remember many



Hannu Laukkanen (center) teaching in the 1990's

of those special individuals and characters. I arrived on the scene after the era of “Lady Jane” Carmichael and Charlie Margach, and I received an outstanding VT education at Pacific from Paul Kohl, Bill Ludlam, Harold Haynes, Rocky Kaplan, and many notable others. Paul Kohl still holds a special place in our hearts because he was a “teacher’s” teacher, who inspired us all with his masterful use of language and his skills in working with children of all ages. Bill Ludlam and Harold Haynes not only co-taught strabismus and amblyopia, they were clinical attending doctors in VT clinic for decades and important mentors to me.

Bill was a clinical, dynamic, entertaining, whip-smart, and in-your-face raging bull in the academic china shop. Harold, on the other hand, was always theory-based, academically brilliant, and the consummate polite Southern gentleman who eschewed making generalizations from a limited number of data points. I wish I had the words to capture how entertaining and enlightening their disagreements really were, but each indelibly influenced so many students. Harold revealed the beauty of mathematics in

A Positive Legacy (continued)

functional care, and how statistical means could be harnessed to support what we were doing in both the exam and therapy rooms. Bill instilled me with an unshakable confidence that therapy works, a fierce pride in being a vision therapy provider, and boldness to unapologetically confront ignorant opposition.

Another important step in my education was being selected for SUNY's VT internship program in New York. I saw tons of VT patients, had lectures, and got to interact with all the VT rock-stars such as Marti Birnbaum, Arnie Sherman, Harold Solan, Irwin Suchoff, Ken Ciuffreda, Sydney Groffman, Jeff Cooper, etc., etc. What I learned was that my Pacific VT education had prepared me very well beforehand, but the SUNY internship added depth to my understanding and opened doors for me later. During the small lectures at SUNY, I was able to fully develop one of my most educationally beneficial behavioral traits—one quite irritating to my interns. "Question the question, question the source, and question the potential implications." I have endeavored to try to pass on this very annoying trait to my students.

Our Vision Therapy Services have leaped forward with the acquisition of top notch diagnostic and therapeutic vision therapy hardware and software. Thanks to our administrative team Jenny, Carole, and Fraser for having been supportive of our needs. Although we have pleasingly remodeled both of our downtown and Forest Grove VT Services, what I am most proud of is that we are now a very busy service with a long patient waitlist.

When I started, vision therapy patients were few, far between, and shared by many "green" interns. Our service now enjoys many referrals, not only from our own profession, but from a wide variety of medical health professions and providers. Our interns now work in teams that pair novice 3rd year interns with more experienced 4th year clinicians who have chosen to "enhance" VT patient care. This has resulted

in better VT care delivery, more satisfied patients, and families who tell others. Because of our reputation patients sometimes travel great distances to be seen in our Service. As just one example, a life-long resident on the East Coast sold her home a few months ago and moved to our area exclusively so we would treat her brain injury-related vision problems in our VT Service.

This is not an isolated example but is due to our outstanding VT attending doctors: Scott Cooper, Graham Erickson, Bernard Conway, James Kundart, JP Lowery, and Paula Luke. A special salute is extended to Bradley Coffey who hired me to do VT right after I graduated and later championed the concept of enhanced team VT care. We worked together in VT for over 30-years before his retirement last year. Bradley inspired us all to be better doctors.

Our steadfast and wonderful VT coordinators, Irene Arroyo and Megan Chapman-Rexford, as well as the supportive clinic front office staff have greatly contributed to our outflow of happy patients outcomes and clinical successes. Sadly, space limitations here prevent me listing everyone who deserves a pat on the back, but each knows how much we appreciated their efforts. We are very grateful to you also, plus all of our supportive colleagues who have trusted us with their patients.

As my career winds down, I can only hope that I have played a meaningful role in improving and changing lives of both of patients and students and that the judgement will be that I left the service in better shape than I originally found it. Recently, I was encouraged to see three former patients from my VT service named as high school valedictorians in our community. There is always a special joy in my heart when students excel and spread their clinical wings. It is always a happy day when we hear that a former student is providing quality vision therapy and improving the lives patients—some of whom I would never have guessed.

A Positive Legacy (continued)

In a broader sense, one of my cherished educational goals has been to help facilitate a passion for self-improvement and life-long learning with a trajectory towards patient care distinction. Former students include brilliant optometrists, neurologists, neuro-ophthalmologists, some who have gone on to earn PhDs, and many who have earned leadership roles. This, I believe, is consistent with the Chinese proverb that states: “a teacher whose students do not exceed his/her own abilities is not a successful teacher.” I wish you continued personal and professional success.

Thank you all for a good run.



Community Low Vision Education

CHRISTI CLOSSON, OD, FAAO | LOW VISION SERVICE CHIEF

Dr. Christi Closson and the Lions Low Vision Clinic at the Washington State School for the Blind (WSSB) recently hosted students from the Rachel Carson Middle School in Beaverton. Each Tuesday in February these middle schoolers arrived at the beautiful WSSB campus to receive education on low vision and blindness. Students, staff, and parents heard from some outstanding guest speakers who are visually impaired or blind. They shared their experiences, answered questions, and broke down barriers surrounding what it means to be blind or visually impaired.

Students experienced what it would be like to be blind by donning blindfolds in the one-of-a-kind Sensory Safari. Students wore vision simulators which demonstrated the top four acquired vision conditions: cataract, diabetic retinopathy, glaucoma, and macular degeneration. Then using their vision simulators they were challenged to use magnifiers, electronic video magnifiers, telescopes, and non-optical aids.



The students had a wonderful experience! Tammy Schraeder, a teacher at Rachel Carson Middle School, said, “this was the most impactful site visit my students have experienced.” This was a fantastic opportunity to educate young minds with information about low vision and blindness.

Vision Screenings Get Some Teeth

JP LOWERY, OD, MEd, FAAO | PEDIATRIC SERVICE CHIEF

In 2014, a new law was passed in Oregon requiring all children have a comprehensive vision exam or a vision screening prior to entering a public school setting in Oregon. This was a big step forward, but the law failed to provide any funding to pay for vision screenings or care for those children who might not have access to such services. The Oregon Lions Foundation, Pacific University College of Optometry, and Casey Eye Institute have been providing the majority of vision screenings throughout the state as a part of their outreach programs. Covering the cost of running such large school screening programs has proven challenging, particularly for the Lions who screen the bulk of the children and go out to schools in every corner of the state. This year, the Lions went back to the state legislature to push through a new bill that would appropriate money (\$1,000,000 per year) to help pay for vision screenings.

In order to make sure that the money is used to pay for quality screenings, a rule-making process was conducted this last fall in order to determine the specific criteria for school vision screenings and which organizations would be allowed to conduct screenings. This provided a unique opportunity for Oregon Optometric Physicians Association (OOPA) to bring expertise to the process and ensure that vision screenings conducted on Oregon students follow current evidence-based practices. Our highest priority was to eliminate stand-alone distance acuity as an option for school screenings. We worked collaboratively with the Lions Foundation, School Nurses Association, and other stakeholders to forge new rules that will guide any organization that wants to provide vision screenings under the new law. The new rules now require organizations to detect high prevalence refractive and binocular vision conditions that can affect academic performance or cause life-long loss of visual function.



Specifically, organizations “must use a vision screening method that is designed to detect the following conditions: hyperopia, astigmatism, myopia, anisometropia, strabismus and amblyopia.” OOPA recommended screening for convergence insufficiency in all students 4th grade and older. This was met with resistance by screening organizations primarily due to perceived challenges implementing a simple screening that would yield appropriate sensitivity and specificity with lay people performing the screening procedures. In the end, screening for convergence insufficiency was left out of the final rules, but we will continue to work with the Lions Foundation to develop and test a protocol for running a near point of convergence test on older students.

Overall, development of the new screening rules was an outstanding success and should serve to provide uniform, high quality vision screening for all children in the state of Oregon. We continue to advocate for comprehensive vision care for all children, but a robust screening program is an important public health safety net to find those children who are most in need of care. It was a pleasure to contribute to the process along with other OOPA colleagues working under Executive Director Janet Baker’s excellent legislative leadership.

Practice Management Tips

CHRISTINE OLIVOS FERRIS | CLINICAL BILLING & CODING SPECIALIST

Qualified Medicare Beneficiary Billing Issues

The Centers for Medicare & Medicaid Services (CMS) recognize many healthcare providers and practices face confusion with requirements and implications for Qualified Medicare Beneficiary (QMB) billing. Despite CMS efforts to provide outreach and education for all entities on QMB billing rules, improper billing still persists.

Let's review QMB. The QMB Program is a state Medicaid program that exists to help qualified Medicare beneficiaries cover the cost of Medicare premiums, deductibles and co-payments. In order to qualify for QMB an individual must be enrolled as a Medicare beneficiary and have met low-income status. They are then eligible to enroll in the QMB program.

CMS describes the lack of awareness and identifying QMB status as significant factors contributing to inaccurate billing. These factors have caused QMB patients to pay improper charges, and in some cases, be sent to collections.

To prevent QMB patients from receiving unnecessary charges, CMS implemented new QMB-specific Remittance Advise Remark Codes (RARC). The new codes are N781 for the deductible amounts, N782 for the coinsurance amounts, and N783 for no co-payment may be collected. All codes specify the patient is in the QMB program and cannot be charged.

As Medicare providers, we must accept Medicare and Medicaid payment (if any) as "payment in full" for services given to individuals enrolled in the QMB program. Medicare providers who disregard these billing restrictions are violating their Medicare provider agreements and may be subject to sanctions.

In summary, the following are actions and links recommended by CMS to promote compliance with QMB billing rules:

1. Establish a process to identify the QMB status of patients.
2. Contact the Medicare Advantage plan(s) and learn how to identify the QMB status of those plan members.
3. Ask beneficiaries for their most recent Medicare Summary Notice (MSN) to verify QMB status.

The following CMS links have been provided for reference and guidance on QMB billing:

www.cms.gov/Outreach-and-Education/Outreach/NPC/Downloads/2017-09-19-QMB-FAQ.pdf

www.integratedcareresourcecenter.com/PDFs/ICRC_Prevent_Improper_Billing.pdf

The Noridian Medicare website:

<https://med.noridianmedicare.com/web/ifb/education/training-events> provides free, web-based workshops for providers and staff. Sharing these resources within your practice will advance awareness and understanding on CMS billing regulations.

CE Opportunities

April 2018:

-Coeur d'Alene CE; Coeur d'Alene, ID; April 27-28.

May 2018:

-24th Annual Blockbuster CE Program (Teplick); Hotel de Luxe, Portland, OR; May 5.

-Oregon's Meeting (OOPA); Mt. Bachelor Village Resort, Bend, OR; May 31-June 3.

June 2018:

-Northwest Residents Conference; Jefferson Hall, Forest Grove, OR; June 8-9.

July 2018:

-Victoria Conference; Hotel Grand Pacific, Victoria, British Columbia; July 12-15.

Referral Service Contact Numbers

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