The Pediatric Ophthalmic Examination
Challenges and Strategies, Part I

Leprosy: Ocular Involvement of an Ancient Disease

Celebrating Diverse Roles of Pacific Island Ophthalmic Nurses and Technicians

Volume 42, Number 1
Winter 2017
2017 EyeQ Webinar Series
Basics & Innovations

Thyroid Eye Disease
Richard Cutler Allen, MD
Tuesday, February 21
4:30pm PT/7:30pm ET

Sterilization
Barbara Ann Harmer, MHA, BSN, RN
Tuesday, May 16
4:30pm PT/7:30pm ET

Zika Virus
William May, MD
Date TBD
4:30pm PT/7:30pm ET

Age Related Wet and Dry Macular Degeneration
Andrew N. Antoszyk, MD
Tuesday, October 3
5:00pm PT/8:00pm ET

Free for ASORN members!
Nonmembers $45
Keep checking our website for the latest information.
Registration opens on January 11!

Can't make the live webinar?
Register and watch the recording!

www.asorn.org/educational_programs/webinars
Leprosy: Ocular Involvement of an Ancient Disease

Tulay Cakiner-Egilmez, PhD, ANP, CRNO, COT

Celebrating the Diverse Roles of Pacific Island Ophthalmic Nurses and Technicians

Heather Machin, RN, MBA

A Vision for the Arts

Valley Fox, RN, CCRN, MA, AP
Kids are special, requiring special approaches to ophthalmology care.
Happy New Year!

THE BEGINNING OF EVERY YEAR is a special time when you can feel that there is a clean start and a fresh outlook. This is a good time to think about your chosen profession.

Why did you choose the work you do? What was the reason that you chose to be in a health care profession, more specifically, in ophthalmology? Was it because of the hours, salary, family tradition, job location or wanting to make a difference in someone’s life?

My personal philosophy is that you should take care of yourself before you can take care of others. This is difficult to do because our workplaces are getting more and more demanding. On a typical shift, there are ever-changing workloads and time pressures. New technologies and/or outdated equipment and instrumentation are all around us as we try to provide the best possible care that we can to our patients. Change is constant and for many of us that is in itself unnerving. We should find a good balance in our lives so that we can function the best we can in our delivery of care. Find what motivated you to become an ophthalmic health care professional, call upon it to sustain you. Be proactive and explore creative ideas for improving your work life! As you begin the New Year, ask yourself where you can affect change and where you need to accept things the way they are and, when necessary, disengage when you keep hitting the same wall.

Now is the time! Today is short-lived, tomorrow will be here in a matter of hours. Don’t be the same, be better! January is the time for resolutions. A New Year’s resolution is a tradition, an act that permits one to take stock and reflect upon self-improvement. Assess what matters most to you, it could be family, friends, work. Don’t be the last on your list! Find an outlet that will allow you to release tension, or angry thoughts. Perhaps talking with friends works for you, maybe a dance class, become a member of a sports team, exercise by yourself or with a group.

Make sure that you have enough rest time, time that is totally not related to work. Get replenished, play, laugh, have fun!

The more you remember a higher purpose for doing your work, and the more you notice every time you make a difference in someone’s life, the easier it will be to do your job. As we begin a New Year, get a fresh start, take care of yourself first and your patients will reap the benefits.

Barbara Ann Harmer, MHA, BSN, RN
ASORN President
MedAssist Consultants, Inc.
Gainesville, FL
consultmacinc@aol.com
What Does It Mean to Think Outside the Box?

First off, maybe it means rethinking our box. A box usually has a flat base, sides, and a lid, right? Well, thinking outside that means it’s time to change the shape of the box! Or to blow its lid off!!

Creativity

Thinking outside the box requires creativity. According to the website Creativity at Work (2014), “creativity is the act of turning new and imaginative ideas into reality.” Creativity is characterized by the ability to perceive the world in new ways, to find hidden patterns, to make connections between seemingly unrelated phenomena, and to generate solutions. Creativity involves two processes: thinking, then producing. If you have ideas but don’t act on them, you are imaginative but not creative.” If you have an idea and want to write about it, contact me or a member of the editorial board. We challenge you to be creative.

Innovation

Creativity is part of innovation. Being innovative means that you can envision the path that leads to an idea becoming a reality (Baumgartner, 2013). If you have an idea for bringing best practices to your organization and can outline its implementation, you are an innovative leader. The same is true when you write about your idea, submit it via Formstack to Insight, respond to reviewer comments, and finally, see your creativity and innovation published.

Lateral Thinking

When you think outside the box, you move creatively from one idea to another, new idea, which might not be immediately obvious. This is called “lateral thinking” (Lateral thinking, 2016). The Insight editorial board is continually moving laterally among creative ideas to enhance the scholarly presentation of the journal. In what direction are you moving?

Challenging Your Mind

Thinking outside the box challenges your mind. As you embark on a new year, 2017, you have set goals, some of which may be challenging because you have started to think outside the box. Studying, learning, reading, writing, drawing, turning the box inside out, working backwards, and asking questions all challenge your mind.

Reframing

Being creative and innovative takes time and effort. But in the end, you have reframed your thinking. Reframing brings a new perspective that can excite you, creating momentum for accomplishments and success. If you start thinking outside the box about publishing in Insight, your creativity, innovation, and engagement in strategies that challenge your mind will move you in the right direction.

Where is your thinking outside the box?

References


Leprosy, or Hansen’s disease, is a thousand-year-old communicable disease that, amazingly, has reached the 21st century, affecting many parts of the world. It is a puzzling disease because its pathophysiology is still not fully understood. One of the most feared diseases in human history, it has generated social stigma owing to devastating disfigurement and disability affecting the physical, psychological, social, and economic well-being of patients (Rafferty, 2005; Grzybowski, Nita, & Virmond, 2015; Talhari et al., 2010). Despite the low incidence of leprosy in the United States, it is still important to review all aspects of this ancient disease since it may still help us to understand some of the new infectious diseases today.

In 1873, Dr. Armauer Hansen, a physician from Norway, identified *Mycobacterium leprae* (*M. leprae*) from leprous material, astonishing the world by demonstrating that leprosy is an infectious disease, not a result of a sin, a punishment by God, or a hereditary transmission (Ghosh & Chaudhuri, 2015). His discovery led to a quick and steady decline in the leprosy burden in Norway, which at one time was the country with the highest number of leprosy patients in Europe. However, Dr. Hansen and other pioneer researchers were unable to culture the bacteria in artificial media (Ghosh & Chaudhuri, 2015).

Since *M. leprae* could not be cultured in laboratory media, some animal models were used. In the 1970s, nine-banded armadillos were used in leprosy lab research (Kirchheimer & Storrs, 1971). Genetic studies on the leprosy bacillus facilitated the sequencing of the *M. leprae* genome to help to determine the source of infection in either the human or the armadillo (Jensen, Rivest, Li, & Vissa, 2011; Jacobson & Krahenbuhl, 1999).

History

Comparative genomics research has suggested that leprosy originated in Eastern Africa or the Near East, later spreading to Europe and the rest of the world via immigrations (Monot et al., 2005; Robbins et al., 2009). The oldest documented skeletal evidence showed that leprosy was present in India by 2000 B.C.E., but proof of leprosy has also been demonstrated in ancient China and Egypt (Robbins et al., 2009). Historians speculate that the soldiers of Darius and Xerxes introduced the disease into Greece during the fourth century B.C.E., and the troops of Alexander the Great may have spread the disease from India to Egypt (Traitman, 1984; Robbins et al., 2009).
Leprosy: The Ocular Involvement of an Ancient Disease

Continued from page 5

Leprosy may have been introduced into Italy in 62 B.C.E. by Pompeian soldiers and then later into the rest of Europe by the Roman troops to Europe. The disease became prevalent in Europe between 1000 and 1400 A.D. but started to fade in this continent as a result of healthier lifestyle and improved hygiene and diet. Leprosy was brought to the Atlantic coast of the Americas by the sailors of Columbus and West Africans, and later by explorers and immigrants who continued into the rest of the Americas and the islands of the Pacific (Trantman, 1984).

Leprosy in the United States

According to the National Hansen’s Disease (Leprosy) Program (2016), the number of patients with leprosy in the United States currently is estimated at 6,500 persons. Most of these individuals have immigrated from endemic countries. The incidence of the disease is approximately 0.43 cases per 1 million in the United States, with 150 to 250 new cases diagnosed annually (HRSA, n.d.).

Leprosy in Louisiana (1894–1997)

In 1894, a few leprosy patients were placed in the Leper Home in Louisiana, which was later redesignated as “Carville.” The facility was established as a National Leprosarium in 1917 and sold in 1920 by the State of Louisiana to the U.S. federal government. Subsequently, the United States Public Health Service took operational control of the facility. The institution was renamed in 1986 as the Gillis W. Long Disease Center and served as a pioneer facility in leprosy research and treatment in the world (HRSA, n. d.).

The center initiated therapy with medications: dapsone and rifampin, to treat the infection, along with thalidomide to control leprosy reactions. Researchers at the center also demonstrated that the nine-banded armadillo was highly susceptible to developing leprosy disease after inoculation with M. leprae. Facility staff provided exceptional care for leprosy patients and conducted training programs for medical professionals around the world. The Gillis W. Long Disease Center served as a long-term care and rehabilitation center until it was closed in 1997 (Trantman, 1984).

Leprosy in Massachusetts (1905–1921)

Leprosy was unknown in Massachusetts until the end of the nineteenth century, when immigration brought patients from endemic countries. The State of Massachusetts decided to establish an isolated place for leprosy patients when the number of leprosy patients started to rise. The state purchased Penikese Island in Buzzard’s Bay, and this facility remained open for 16 years, caring for 36 leprosy patients. During that time, 15 patients died, seven patients were discharged, and 13 patients were sent to the leprosy hospital in Carville, Louisiana, in 1921 (Buckley, 1997).

Leprosy in Hawaii

European immigrants brought leprosy to Hawaii in the mid-1800s. Due to lack of immunity to the disease, many individuals were severely affected. Since there was no treatment for the disease at that time, strict isolation was required to prevent the rapid spread of the disease. The Hawaiian government made particular reference to leprosy in laws about marriage, divorce, estate and income taxes, claims against estates, employment rights, and pensions, which caused hardship for those affected with the disease. In 1865 King Kamehameha instituted a law, the Act to Prevent the Spread of Leprosy, to establish a place on the Kalaupapa Peninsula, Molokai, hosting thousands of leprosy patients (Crouch, 1998). Father Damien, a Belgian priest, volunteered to become a missionary in Molokai and help patients build homes, churches, and coffins, as well as arranging for medical services and needed funds from Honolulu. Unfortunately, he contracted leprosy, declined to leave the island, and died in 1889 at the age of 49. Although he expressed a desire to be buried among the graves of leprosy patients in Molokai, his remains were returned to his native country at the demand of the Belgian government. He was declared Venerable in 1977, beatified in 1995, and canonized by Pope Benedict XVI in 2009 (Crouch, 1998).

Hawaii’s Act to Prevent the Spread of Leprosy law remained in effect until 1969. Patients were allowed to leave the island after the ban was lifted, but many decided to stay in Kalaupapa because of their disabilities and the public stigma. Kalaupapa was declared a national historical park in 1980. Today, 16 patients with leprosy live in Kalaupapa as their permanent home (Senthilingam, 2015).

Epidemiology

Leprosy is caused by the slow-growing Mycobacterium leprae, which multiplies, on average, in 125 days. The incubation period is about five years, but it may extend up to 12 years in some cases (Rodrigues & Lockwood, 2011). The bacilli grow in cooler body areas, best at 27–30 degrees Fahrenheit (Sharma et al., 2013; Jacobson & Krahenbuhl, 1999).

It is widely accepted that about 95% of adults are not susceptible to leprosy. Among the remaining 5% of the population, those affected usually contract the disease from untreated leprosy patients.
patients through close household contacts. The mode of disease transmission is not clear, but it most likely occurs in humans by the respiratory route since nasal discharge from patients with untreated multibacillary leprosy contains a significant amount of bacilli. Direct invasion of bacilli through broken skin has also been reported (Rao, Karat, Kaliaperumal, & Karat, 1975; Walker & Lockwood, 2007; Jacobson & Krahenbuhl, 1999). Research has shown that armadillos and humans in the United States share one or two M. leprae genotype strains, which proves a transmission of the disease by the armadillo (Rao et al., 1975; Sharma et al., 2015; Sharma et al., 2013).

Studies have shown that the genome of the M. leprae has undergone reductive evolution. Approximately 40% of the genes in leprosy bacilli are inactivated, and 50% of genes of the last common ancestor of M. leprae and M. tuberculosis have disappeared. The observation of leprosy genomes throughout the world shows that they are identical, indicating that leprosy has originated from the single clonal strain (Singh & Cole, 2011; Jensen et al., 2011).

Leprosy bacilli invade cooler skin and peripheral nerves. The majority of individuals with leprosy heal spontaneously with the destruction of the bacilli by the body’s immune system. If the organism persists, the development of the lesion depends on the host immunity or lack of the response to the bacilli.

**Clinical Presentation of Leprosy**

The clinical presentation of the disease may vary from a few lesions to widespread lesions, requiring a different therapeutic approach to treatment with possible immunologic reactions. Leprosy primarily affects the peripheral nervous system, skin, mucosa of the mouth and upper respiratory tract, reticuloendothelial system, eyes, bones, mucous membranes, testes, and adrenal glands. Host immune response is accountable for the clinical presentation of the disease (Britton & Lockwood, 2004; Talhari et al., 2015).

Diagnosis of leprosy can be confirmed by three definitive findings, including (1) hypopigmented or reddish skin lesions showing loss of sensation, (2) damage to peripheral nerves resulting in nerve enlargement and disabilities, and (3) positive skin smear of M. leprae (Walker & Lockwood, 2007; Virmond & Grzybowski, 2015).

The dominant feature of leprosy is the involvement of peripheral nerves, resulting in loss of sensation along the nerve and affecting the flexibility of hands, feet, or face (Walker & Lockwood, 2007; Grimaud & Vallat, 2003). Leprosy diagnosis is confirmed with positive skin smears or in nasal mucosa (Talhari et al., 2015).

The patient’s immune response is responsible for the clinical characteristics of the disease. Symptoms can change from mild to severe, activated by both innate and acquired immune responses (Nath, Saini, & Valluri, 2015). CD4+ T helper cells demonstrate antigen-specific unresponsiveness to M. leprae. However, the tuberculoid form shows proper T-cell functions with an inadequate antibody response (Britton & Lockwood, 2004; Talhari et al., 2015).

**Classifications of Leprosy**

The Ridley-Jopling leprosy classification system, based on clinical features, histopathology, bacterial load, and degree of cell-mediated immune response (CMI), has been the most used classification in the world (Ridley & Jopling, 1962). Ridley Jobling classification was established 5 decades ago but still in use today to describe leprosy patients. This system classifies leprosy disease into a five-group spectrum that includes (1) tuberculoid leprosy (TL), (2) borderline tuberculoid leprosy (BT), (3) borderline borderline leprosy (BB), (4) borderline lepromatous leprosy (BL), and (5) lepromatous leprosy (LL). The tuberculoid end of the spectrum demonstrates strong immunity compared to lepromatous leprosy.

**Indeterminate leprosy (IL)**

The early signs of the disease are demonstrated with macular and hypopigmented lesions, usually seen in young children with insufficient cell-mediated immunity against M. leprae (Sehgal & Srivastava, 1987). A single lesion may heal spontaneously, or it may progress to the different stages of leprosy (Jacobson & Krahenbuhl, 1999).

The number of lesions manifested depends on host cellular immunity. Persons with strong cellular immunity but a limited humoral immune response to M. leprae usually present with few skin lesions. The lesions maybe lighter than the patient’s skin color, with normal sweating, body hair, and sensation. Patients with IL may develop tuberculoid (TL) or borderline tuberculoid (BT) leprosy if left untreated (Talhari et al., 2015).

**Tuberculoid leprosy (TL)**

Tuberculoid leprosy (TL or TT) is characterized by the presence of a few small papules or plaques with decreased sweating, loss of hair in the lesion, and no sensation. The lesions demonstrate raised borders (Talhari et al., 2015). Nerve enlargement may occur near the site of the lesion. Neuritis can be seen as the initial symptom (Grimaud & Vallat, 2003). Peripheral nerve involvement may cause severe disabilities. A skin smear from tuberculoid plaque often does not show M. leprae bacilli. Spontaneous healing has been reported (Ridley & Jopling, 1966; Talhari et al., 2015). Indeterminate leprosy may heal spontaneously or may continue on the next page
Leprosy: The Ocular Involvement of an Ancient Disease

Continued from page 7

progress to one of the leprosy classification depending on the patient’s cellular immunity.

Pure neural leprosy (PNL)
A rare form of leprosy is pure neural leprosy, defined by a single or multiple peripheral nerve enlargement(s), loss of sensation, loss of muscle strength, loss of sweating, and enlarged, painful nerves. A biopsy or electroneuromyography is helpful to diagnose this type of leprosy (Talhari et al., 2015; Iwata, 2011). This classification is not included in the one designated by Ridley and Jobling.

Lepromatous leprosy (LL)
Patients without adequate cellular immunity to bacilli may have an extensive invasion of the leprosy bacilli, with large numbers of lesions, known as lepromatous leprosy (LL). Patients without treatment may demonstrate peripheral nerve involvement and diffuse skin infiltration with erythema. Peripheral nerve damage can cause incapacitating disabilities in eyelids, hands, and feet (Ridley & Jopling, 1966; Jacobson & Krahenbuhl, 1999).

Hair loss is seen in areas infiltrated with M. leprae. Madarosis, or loss of eyebrows and eyelashes, may be the first sign of the disease. The progressive infiltration of the face creates skin folds, recognized as facies leonine. The bacillary index is very high in LL (Jacobson & Krahenbuhl, 1999).

Another uncommon clinical type seen in Mexico is Lucio-Latapi leprosy, which is characterized by diffuse, shiny skin infiltration. Lucio phenomenon, a necrotizing panvasculitis with extensive ulcerations, is observed in these patients (Magana, Fernandez-Diez, & Magana, 2008; Han et al., 2008; Talhari et al., 2015).

Eyes, liver, spleen, adrenals, and bone marrow may be affected by the hematogenous spread of M. leprae. In LL patients, the mucosal involvement of the upper respiratory tract induces sneezing, mucopurulent discharge, and epistaxis. Advanced LL cases may demonstrate the destruction of bones of the nose, face, hands, and feet. Testicular damage and gynecomastia may be seen (Talhari et al., 2015).

Borderline leprosy (BL)
Borderline leprosy (BL) manifests components of both tuberculoid and lepromatous leprosy. Ridely and Jobling (1962) describe this combined classification as borderline tuberculoid leprosy (BT), borderline leprosy (BB) and borderline lepromatous leprosy (BL). Cellular immunity may change during the course of leprosy treatment. The majority of BL patients present with severe nerve involvement (Grimaud, 2012). Patients have skin lesions similar to those of tuberculoid leprosy, but the number of lesions may increase to 10–20 lesions. Skin smears may be negative or positive, depending on whether the infection is on the tuberculoid (BT) or the lepromatous (BL) end of the borderline spectrum (Ridley & Jopling, 1966; Talhari et al., 2015).

BL is distinguished by the presence of infiltrated plaques of variable sizes with lesions distributed symmetrically, compared to the tuberculoid group. The lesions are hypopigmented but become erythematous and infiltrated as disease progresses. More skin areas are affected with different types of lesions, such as macules, plaques, papules, and nodules (Talhari et al., 2015).

Diagnosis and Treatment
Leprosy diagnosis includes physical examination, peripheral nerve examination, evaluation of the sensation in existing skin lesions, and skin smears and biopsy from the suspected areas. Skin smears can be taken from ears, elbows, and knees. Polymerase chain reaction (PCR) is useful for diagnosis (Talhari et al. 2015).

In 1982 the World Health Organization recommended a multidrug treatment (MDT) with dapsone, rifampin, and clofazimine (Kar & Gupta, 2015; Kumar, Girdhar, Chakma, & Girdhar, 2015), but minocycline, ofloxacin, and clarithromycin have also been used to treat leprosy.

Leprosy Reactions
Leprosy reactions are acute inflammatory episodes in tissues and peripheral nerves requiring immediate attention to prevent nerve damage and disability. All leprosy patients may experience leprosy reactions as a result of immunologically mediated episodes of acute and subacute inflammation (Jacobson & Krahenbuhl, 1999).

Two main clinical types of leprosy reactions are Type 1 (reversal, or RR) and Type 2 (erythema nodosum leprosum, or ENL). A Type 1 reaction is common in patients with BT, BB, and BL, and Type 2 reactions are common in patients with BL and LL (Ridley & Jopling, 1966; Jacobson & Krahenbuhl, 1999). In patients with a Type 1 reaction, a T-cell inflammatory response, lymphoproliferation, and release of proinflammatory cytokines are triggered in the presence of a M. leprae infection (Lal, Blutani, & Nath, 1985; Nath et al., 2015).
with adequate cell-mediated immunity, the infection may heal because bacilli invasion is limited, but the accompanying hypersensitivity may still induce severe Type 1 reaction with tissue/nerve damage (Grimaud, 2012).

The antigens of *M. leprae* stimulate antibody production, and the formation of immune complexes may be associated with an Type 2 ENL reaction. Antigen-specific T-cell activation, the release of interferon-gamma and interleukin-12, as well as the presence of CD3+ CD4+ T cells, have been found in patients with ENL. Some studies report increases in interleukins such as IL-4, IL-6, and IL-8, which are known to be chemotactic for neutrophils (Nath et al., 2015).

Lucio phenomenon is the third type of reaction associated with leprosy. It may occur as a result of necrosis of arterioles following the massive invasion of the cell walls by *M. leprae* (Magana et al., 2008). Leprosy reactions require immediate attention since they may cause irreversible nerve damage, resulting in severe disability. Leprosy treatment should not be stopped during leprosy reactions. The patient with nerve involvement should be given analgesics and prednisolone. Patients who are unresponsive to prednisolone can be treated with high-dose clofazimine or thalidomide under strict supervision.

**Ocular Involvement**

It is widely accepted that leprosy has the greatest incidence of eye involvement of any human bacterial infection (Brand & Ffyte, 1985). Leprosy-related eye involvement has been estimated at 70%–75%, with severe involvement (10%–50%) as well as blindness (5%) (Grzybowski et al., 2015). *M. leprae* often settles in the anterior segment since it is the coldest part of the eye (Malik, Morris, & Ffyte, 2011; Daniel et al., 2006a; Ffyte, 1981). The most common ocular complications are corneal diseases secondary to exposure, bacillary infiltration and nerve paralysis, and ocular inflammation (Ffyte, 1991; Brand & Ffyte, 1985).

**Ocular adnexa involvement**

Madarosis, or the loss of eyebrows and eyelashes, is caused by *M. leprae* invasion of hair follicles and can be the first sign of leprosy (Grzybowski et al., 2015). Trichiasis, or inward turning eyelashes (see Figure 1), is another common complication of leprosy, caused by loss of the supporting structure of the eyelash follicles and resulting in irritation of the cornea, punctate epithelial erosions, pannus, and even blindness in untreated patients (Grzybowski et al., 2015).

*M. leprae* infiltration may also induce entropion, or an inward turning of the lid. Lagophthalmos, the inability to close the eye, and ectropion, the outward turning of the eyelid, are common as a result of orbicularis oculi muscle weakness or paralysis of the zygomatic branch of cranial nerve VII (see Figure 2). Type 1 reactions may also induce lagophthalmos due to facial nerve palsy, especially after the first six months of multidrug therapy. Oral steroid therapy is essential to prevent permanent nerve damage in patients with a Type 1 reaction (Daniel et al., 2006a; Brand & Ffyte, 1985).

continued on the next page
Evaluation of corneal sensation using a cotton tip or Cochet and Bonnet aesthesiometer is critical in each visit (Grzybowski et al., 2015; Hogeweg & Keunen, 2005; Courtright et al., 2002). Patients with mild cases of lagophthalmos should be taught ocular muscle strengthening exercises and instructed to wear sunglasses or protective glasses to protect the exposed cornea. Frequent use of artificial tears and artificial tear ointments is essential. Protective night shields are extremely helpful. Patients with lagophthalmos and entropion may need oculoplastic surgeries such as lateral tarsorrhaphy, lateral tarsal strip, temporalis muscle transfer, lower eyelid spacer grafts, and lateral eyelid tightening to prevent blindness (Brand & Ffytche, 1985; Qian, Yan, & Zhang, 2004; Grzybowski et al., 2015).

**Leprosy of ocular surfaces**

An accumulation of large amounts of *M. leprae* in corneal nerves forms a microscopic lepromata, or “nerve beads,” in the corneal stroma. It typically exists in the superolateral part of the cornea under the upper eyelid in untreated patients. Corneal beads may leave micro-opacities after the completion of the leprosy treatment (Grzybowski et al., 2015). Lepromatous keratitis is seen as a result of vascularization and pannus, and advances to deeper corneal tissues when the disease progresses (see Figure 4). Systemic leprosy treatment is the only treatment to manage lepromatous keratitis. Conjunctival scarring following the direct bacillary invasion, scleritis, subepithelial keratitis, and chronic uveitis may also be seen. Corneal ulcerations are common in patients with infectious keratitis. Systemic steroids may be used to decrease corneal scarring. Patient education is critical to initiate preventive measures as well as to prevent blindness (Grzybowski et al., 2015; Brand & Ffytche, 1985).

Damage of the trigeminal nerve endings on the cornea results in loss of sensitivity (Karacorlu, Cakiner, & Saylan, 1991a). It usually presents in patients with chronic leprosy, as well as in patients with Type 1 immunologic reactions. Patients with lagophthalmos and loss of corneal sensation may demonstrate severe dryness, superficial exposure keratopathy, epithelial
defects, corneal opacification, and even blindness if left untreated (Hogeweg & Keunen, 2005) (see Figure 3).

**Involvement of intraocular tissue**

Lepromatous iridocyclitis occurs due to *M. leprae* infiltration of the iris and ciliary body or as an immunologic reaction to bacilli (see Figure 5). Redness in the eye, presence of keratic precipitates, flare and cells in the anterior chamber, synechia (see Figure 6), and pupil abnormalities are common in patients with iridocyclitis. Patients with lepromatous iridocyclitis may demonstrate iris pearls or nodules that consist of acid-fast bacilli and mononuclear cells (Grzybowski et al., 2015; Daniel et al., 2006b; Citirik et al., 2005) (see Figure 7).

The persistence of *M. leprae* infection in the iris and ciliary body causes chronic granulomatous iridocyclitis. The involvement of autonomic nerves in the iris results in neuroparalysis and atrophy in the iris muscle, leading to synechia, progressive miosis, and thinning of the iris stroma (Ffytche, 1981) (see Figure 8). The bacilli that persist in macrophages and possibly in smooth muscle cells may induce repeated eye reactions despite negative skin smears after systemic treatment (Daniel, Ebenezzer, & Job, 1997; Brand & Ffytche, 1985).

Granulomatous iridocyclitis as an antigen–antibody reaction is considered a Type 2 reaction in leprosy patients. Acute iritis, episcleritis, or sclerouveitis may be seen as the first sign of a systemic Type 2 reaction. The patient with acute iridocyclitis should be treated immediately using topical steroids and atropine. In severe, nonresponsive cases, systemic steroids, clofazimine, and thalidomide with strict regulations are often necessary (Brand & Ffytche, 1985).

Iris atrophy is common in patients with chronic iridocyclitis as a result of neuronal tissue involvement or advanced iris and ciliary inflammation (Ffytche, 1981) (see Figure 8). Long-standing cases may demonstrate polycoria, or more than one pupil. *M. leprae* invasion of the ciliary body induces atrophy and diminishes production of aqueous humor, causing low intraocular pressure and leading to phthisis as the disease progresses in advanced cases (Ffytche, 1981; Karacorlu, Cakiner, & Saylan, 1991b; Daniel, Rao, Ffytche, & Courtright, 2010; Grzybowski et al., 2015).

Pupil abnormalities may contribute to chronic posterior ciliary nerve destruction, leading to destruction of the smooth muscle as well. Some cases develop chronic iritis even long after completion of MDT (Daniel et al., 1997). The most common cause of leprosy-related blindness are lagophthalmos-induced corneal diseases and chronic iritis, but age-related cataract is the most common cause of blindness in persons with leprosy (Grzybowski et al., 2015) (see Figure 9). Regular ophthalmology follow-up appointments are essential to prevent complications. Cataract surgery is crucial to prevent blindness but can be extremely challenging in leprosy patients with high ocular complications (Daniel et al., 1997; Lewallen, Tungpakorn, Kim, & Courtright, 2000).

**Other manifestations of ocular leprosy**

Glaucoma is uncommon in leprosy patients due to low intraocular pressure caused by atrophy of the ciliary body (Grzybowski et al., 2015; Karacorlu et al., 1991b; Daniel et al., 2010). Dacryocystitis following direct bacilli involvement may be seen because of extensive intranasal damage and scarring. Surgical intervention is necessary in symptomatic patients (Khan et al., 2002; Grzybowski et al., 2015).

*continued on the next page*
Leprosy: The Ocular Involvement of an Ancient Disease
Continued from page 11

Disease Management
Leprosy patients require frequent follow-up by a leprosy expert due to the possibility of high complications and disability. The importance of the systemic leprosy treatment should be reviewed at each visit to prevent disease progression in eyes, hands, and feet. However, patients should be instructed that killing bacilli by multidrug therapy might not reverse nerve damage. Since early diagnosis and treatment of ocular conditions are critical to prevent blindness, education regarding the signs and symptoms of iritis, corneal symptoms, and lagophthalmos should be reiterated with patients. Protective sunglasses, artificial tears, and ointment, as well as eyelid surgeries, are necessary for patients with lagophthalmos and corneal involvement (Brand & Ffytche, 1985; Ffytche, 1991; Grzybowski et al., 2015).

Primary eye care training for nurses and technicians can be beneficial to manage the ocular symptoms in endemic areas when the ophthalmologist is not available. Leprosy programs including multiple health specialties are necessary to control this multidimensional disease. A social worker should be involved in patient care to reduce the burden of social stigma related to the disease. Since leprosy is still considered a public health problem in many countries, continuous efforts are required to eliminate this ancient disease from the world (Noriega, Chiacchio, Noriega, Pereira, & Vieira, 2016).

Tulay Cakiner-Egilmez, PhD, ANP, CRNO, COT, Boston Veterans Health Care, Boston, MA, tulaye@viercon.net

References


Act Now with EyeCareCE

CE tests for ASORN Insight Continuing Education activities are available online for a fee! To take the test for this activity and earn continuing education credits, visit www.EyeCareCE.org.

Browse EyeCareCE courses by profession (nurse, technician, etc) or by keyword. Once you’ve found a course you want to take, add it to your cart.

Login Instructions: Login will be required to checkout.

- If you were ever an ASORN member before July 1, 2014 your username is the email address* you have on file with ASORN and your password is your first initial last name, all lowercase, no spaces.
- If you joined ASORN after July 1, 2014 your username is the email address* you have on file with ASORN and your password is “ASORNuserid” (example: ASORN34562).
- If you’re not an ASORN member and have never used EyeCareCE before, you will Create a New Account.

*If you are an ASORN member but do not have an email address on file with ASORN you will not have an EyeCareCE login. Please contact ASORN.

Trouble logging in? Contact JCAHPO (800) 284-3937.

Course materials will be available after checkout (the article, followed by an evaluation, then the post-test). Test results are revealed immediately upon completion of the post-test. If the test is passed you should immediately retrieve and print your certificate of credits. This will be your official transcript of credits from the course. If the test is not passed, an opportunity to try again is offered.

Successful Completion:

Review the post-test questions and practice before you login to take the test. Successful completion of this activity includes: purchasing the course, reading the article, completing the evaluation, taking the online post-test, and achieving a passing rate of 80% or higher. This activity has an expiration date that is stated in the course description listed on EyeCareCE. This post-test may not be available immediately. An email will be sent when the test is posted on www.EyeCareCE.org.

Successful Completion:

Review the post-test questions and practice before you login to take the test. Successful completion of this activity includes: purchasing the course, reading the article, completing the evaluation, taking the online post-test, and achieving a passing rate of 80% or higher. This activity has an expiration date that is stated in the course description listed on EyeCareCE. This post-test may not be available immediately. An email will be sent when the test is posted on www.EyeCareCE.org.

POST-TEST QUESTIONS

1. There was an early difficulty in understanding and treating leprosy because:
   - A. There were not enough persons infected with the disease.
   - B. The bacteria would not be cultured in the laboratory.
   - C. The disease was confined to one area in the world.
   - D. All patients with leprosy die.

2. Leprosy disease is caused by which type of organism?
   - A. Virus
   - B. Fungus
   - C. Bacteria
   - D. Protozoa

3. What is the dominant clinical feature of leprosy?
   - A. Skin lesions
   - B. Peripheral nerve involvement
   - C. Fever
   - D. Pain

4. Papules that do not show M. lepraebacteria and nerve involvement are indicative of which type of leprosy?
   - A. Tuberculoid leprosy
   - B. Indeterminate leprosy
   - C. Pure neural leprosy
   - D. Lepromatous leprosy

5. The first signs of leprosy may include the following:
   - A. Lepogtitilomas
   - B. Loss of corneal sensitivity
   - C. Madarosis
   - D. Iris atrophy

6. Which eye condition is not commonly seen in patients with ocular leprosy?
   - A. Glaucoma
   - B. Dacryocystitis
   - C. Pupil abnormalities
   - D. Iris atrophy

7. Immediate treatment for an acute inflammatory reaction is important because:
   - A. Leprosy treatment should be discontinued.
   - B. Antibiotics are needed as soon as possible.
   - C. Nerve damage and disability can be prevented.
   - D. Hospitalization is required.

8. Mrs. Smith arrives in the clinic complaining of an inability to close her eye. She started antileprosy treatment three months ago for lepromatous leprosy. What medication is essential to prevent permanent nerve damage in this Type 1 reaction?
   - A. Clofazimine
   - B. Corticosteroids
   - C. Morphine
   - D. No medication is required.

9. Commonly used medications to treat leprosy including all of the following except:
   - A. Dapsone
   - B. Rifampin
   - C. Clofazimine
   - D. Streptomycin

10. Mr. Jones lacks corneal sensation as a result of leprosy. Patient education should include the following:
    - A. Ocular muscle strengthening exercises
    - B. Protective eye glasses
    - C. Artificial tears
    - D. Limiting exercise and taking prescribed medications

ASORN members and other eye care professionals now have an online source for continuing education and training: EyeCareCE. The site is the collaborative effort of five organizations. Together, the Joint Commission on Allied Health Personnel in Ophthalmology (JCAHPO), the American Society of Ophthalmic Registered Nurses (ASORN), the Association of Technical Personnel in Ophthalmology (ATPO), the Canadian Society of Ophthalmic Medical Personnel (CSOMP), the American Academy of Ophthalmic Executives (AAOE), the International Joint Commission on Allied Health Personnel in Ophthalmology (IJCAPHO), the Contact Lens Society of America (CLSA), and the Ophthalmic Photographer’s Society (OFS) teamed to produce a comprehensive online training resource for eye care professionals. ASORN is proud to participate in this online educational partnership.
Introduction
The concept of the ophthalmic specialist nurse is not new. The inception of the advance nurse practitioner (ANP) and clinical nurse specialist (CNS) into this specialization has been widely recognized and discussed within various regions of the world (Pulcini et al., 2010). This discussion has predominantly been held within the developed world, through routine academic publications highlighting nurse advancement and competence and the services they provide to their local community and their health-care colleagues.

In the Pacific Island Region (PIR), Oceania, ophthalmic nurses and technicians have quietly performed tasks and taken on responsibilities that elsewhere would be considered advanced and diverse ophthalmic nursing roles. Within the PIR, their health-care colleagues, health ministries, and supporting development agencies recognize and support their training, knowledge, and skills. However, within this region, there are very few peer academic publications outlining their services to the eye care community. This article will discuss the PIR, eye care and its related workforce including advanced services by ophthalmology nurses.

The Pacific Island Region (PIR)
A diverse region, the PIR is home to some 36.7 million people and home to the economic, and resource-rich, powerhouses of Australia and New Zealand, which are ranked second and seventh, respectively, on the 2014 United Nations International Human Development Indicator list (United Nations, 2014). This is in striking contrast to 21 other nations in the region that rank between 54th (Guam) and 157th (Papua New Guinea) (see Table 1). Within these 21 nations a multitude of different languages and cultures is intertwined to create a diverse tapestry that attracts thousands of tourists per year.

While urban populations in the region are embracing electric-generated technologies and growth in their infrastructures, island villages have seen little to no change. Village elders and chiefs remain the predominant local leaders and islander life remains relatively unchanged. Boats also remain one of the primary modes of transport across the many scattered islands.

Away from images of blissful, timeless escape lies a health system that simultaneously survives and perishes within a community that is increasingly exposed to both positive and negative aspects of Western development. For example, while smartphones and technology have bridged communication gaps, obesity and diabetes are on the rise, resulting in diabetic retinopathy.

Eye Health Care and Workforce
Diabetes rates, which were relatively low in indigenous Pacific Island villages up until 30 years ago (Smith, Szetu, & Bourne, 2007), have now increased dramatically. Diabetic retinopathy is now one of the leading causes of blindness, alongside cataracts and uncorrected refractive error, within Fiji, The Cook Islands, and Tonga (Ramke, Brian, & du Toit, 2007). Additionally, in the region’s smallest nation, Palau, diabetes is becoming a greater problem as more people are presenting with advanced retinopathies (International Agency for the Prevention of Blindness, 2014).

The available health workforce, however, is maldistributed, with urban hubs, particularly in the nations’ capitals (Palagyi, Brian, & Ramke, 2010), attracting a concentrated workforce, resources, and expertise. Of course, access to health care in Pacific Island cities varies, but in comparison to their neighboring rural remote villages, island cities are moderately equipped with some technologies, trained doctors, pathology services, and various other health-related services that are familiar within urban settings.
The majority of the world’s vision impaired live in developing countries (Armstrong, Jovic, Vo-Phuoc, Thorpe, & Doolan, 2012), with all health costs from 2011 to 2020 estimated globally at $632 billion U.S. dollars per year (World Health Organization, 2014). The need to support local solutions in developing ophthalmic services is paramount. Conversely, the current access to universal eye-care services is varied across the PIR. Some countries lack the capacity to provide specialized health services and trained eye-care personnel, and as a result, eye-care services are at times available only at urban centers. Therefore, services remain beyond the reach of many villagers, who usually do not have the means to travel (World Health Organization, 2014).

Relative to the larger regional cities, villages and smaller nations lack much needed sufficient access to ophthalmologists. In Tonga, for example, with a population of 105,000 scattered over 170 islands across a 740,000 square kilometer expanse (Tonga Visitors Bureau, 2014), there are currently no trained ophthalmologists. Kiribati, a smaller nation, welcomed its first ophthalmologist in 2015. This situation, coupled with irregular and often short-term optometrist and orthoptist services in the PIR, means that ophthalmic nurses and technicians predominantly, and through necessity, have evolved to become the central provider of eye-care services to a majority of the regional and remote populations. Ophthalmic nurses and technicians are working as both team members and primary practitioners. In some countries they are functioning as the refraction specialist, diabetic laser practitioner, consulting triage nurse, and surgical assistant.

In countries where ophthalmologists are present, nurses are the primary referral point to transfer patients from villages to city treatment centers. In the Solomon Islands, for example, due to a shortage of eye doctors outside of the capital of Honiara, trained ophthalmic nurses in each of nine provinces are responsible for providing referrals to Honiara’s National Referral Hospital (International Agency for the Prevention of Blindness, 2014). Often nurses, like those in the provinces of the Solomon Islands, have also been required to perform nursing and medical tasks for which they may or may not have had formal training (Palagyi et al., 2010). (This deficit, however, has been addressed in recent years through the implementation of specific training programs – which will be outlined further on in this article.)

The ability of ophthalmic nurses and technicians not only to provide basic and mid-level entry care to patients but also, and often, to simultaneously complete additional duties – as refractionists, public health and community eye-care advocates, solo practice carers, specialist clinic managers, and so on – makes this group unique and impressive. Their ability to retain their practice and knowledge in a multitude of disease areas, standards, and clinical and management skills is outstanding and worthy of praise. This is additionally noteworthy when they do so within the confines of a restricted resource environment.

Within the PIR, a broad community-wide approach as a component of central ophthalmology clinics and surgery facilities has been implemented. This has been an essential method for tackling many of the risk factors behind avoidable blindness, such as obesity and smoking (World Health Organization, 2014). Within this approach, ophthalmic nurses and technicians with advanced training have been enlisted to facilitate eye health promotion campaigns, screening, and early referral programs within the PIR’s village communities. (As they are in the UK, ophthalmic nurses in the PIR are key care providers who tackle system issues, such as long surgical waiting lists, outpatient services (Czuber-Dochan, Waterman, & Waterman, 2005), and rural and remote services.

Advanced Skills for Nurses and Others

The literature suggests that the demarcation and diversification of nursing roles expanded dramatically in the 1950s in developing regions (Raynel & Marsden, 2010) in direct correlation with the advancement of medical and scientific technologies, discoveries, and the formalization of health care. This has occurred primarily out of need and opportunity (Chiarella 2006, as cited in Raynel & Marsden, 2010) rather than as the result of a strategic plan to expand nursing territory. In the United States in the mid-1960s, advanced practice nurse (APN) positions were again redefined, as physicians and services began to subspecialize; now the APN was able to assist in the provision of rural and specific health services (Marsden, Shaw, & Raynel, 2010). Across the developed world, the ophthalmic APN had also been identified as providing an efficient, cost-effective, and high-standard alternative pathway for care (Kirkwood, Pesudovs, Loh, & Coster, 2005) in areas where access to timely, traditionally ophthalmologist-led services was limited.

Very little is specifically written about the diversification of advanced ophthalmic nursing roles in developing regions. There is a great deal that can be gained from observing APNs or nurses and technicians with advanced duties in the PIR. Their model of care also goes beyond that of the conventional responsibilities of an entry nurse and what is required for practice under this license (Wilson & Bunnell, 2007).
Ophthalmic nurses in the PIR are by definition educationally prepared according to the (1) International Council of Nurses (International Council of Nurses, 2002), (2) Australian standards (Kirkwood, Coster, & Essex, 2006), and (3) Accreditation Council for Graduate Medical Education and the Institute of Medicine De Toit, Brian, Palagyi, Williams, & Ramke, 2009). They have advanced training that is recognized by health systems, and they are utilized as members of the interdisciplinary team with additional skills and responsibilities. They are also recognized in their states and countries as a first point of contact and may, depending on the country, have the legal authority to prescribe and administer specific medications and spectacles. They also order investigations and retain a position as the primary referral point. For example, in Tonga, additional duties are recognized for advanced trained ophthalmic nurses, technicians, and medical assistants. Within Tonga, one medical assistant has now been trained to provide laser treatment and intravitreal medical therapy for diabetic retinopathy (International Agency for the Prevention of Blindness, 2014).

In the UK and the Republic of Ireland, advanced skilled nurses within some disciplines have been authorized to provide prescription services in response to their local needs (Bowskill, Timmons, & James, 2013). This authorization also appears, in the current climate, favorably supported within specific health-care settings (Johnson, Griffiths, & Birch, 2003) and emphasizes the need for locally appropriate adaptation and utilization of nursing services. Nurses need to work collaboratively to explore and address how they can support advanced skilled nurses within the context of their local and national health systems.

### Ensuring Safety, Quality, and Uniformity

The effectiveness of ophthalmic nurses and technicians is very much influenced by the individual and environmental work conditions they are subject to (Kirkwood et al., 2005), as well as the needs of their local and national health-care systems. Therefore, the following forms of legal and peer recognition and acknowledgment are necessary:

---

**TABLE 1**

<table>
<thead>
<tr>
<th>PIR Demographics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td><strong>International Human Development Indicator ranking</strong></td>
</tr>
<tr>
<td>Australia</td>
</tr>
<tr>
<td>Cook Islands (The)</td>
</tr>
<tr>
<td>Fiji</td>
</tr>
<tr>
<td>French Polynesia</td>
</tr>
<tr>
<td>Kiribati</td>
</tr>
<tr>
<td>Marshall Islands</td>
</tr>
<tr>
<td>Micronesia (Fed. States of)</td>
</tr>
<tr>
<td>Nauru</td>
</tr>
<tr>
<td>New Zealand</td>
</tr>
<tr>
<td>Niue</td>
</tr>
<tr>
<td>Northern Mariana Islands</td>
</tr>
<tr>
<td>Noumea (New Caledonia)</td>
</tr>
<tr>
<td>Palau</td>
</tr>
<tr>
<td>Papua New Guinea</td>
</tr>
<tr>
<td>Samoa</td>
</tr>
<tr>
<td>Solomon Islands</td>
</tr>
<tr>
<td>Timor Leste</td>
</tr>
<tr>
<td>Tokelau</td>
</tr>
<tr>
<td>Tonga (Kingdom of)</td>
</tr>
<tr>
<td>Tuvalu</td>
</tr>
<tr>
<td>Vanuatu</td>
</tr>
<tr>
<td>Wallis and Futuna</td>
</tr>
</tbody>
</table>

Celebrating the Diverse Roles of Pacific Island Ophthalmic Nurses and Technicians

Continued from page 17

• Recognition of their positions
• Definition of their job roles
• Definition and understanding of their geographical and work areas
• Confirmation of their competence
• Availability of effective evidence-based protocols and work instructions

Kirkwood et al. (2005) suggest that with these in place, there will be an increase in the safety and effectiveness of ophthalmic nurse and technician practices, including diverse additional roles.

Additionally, such protocols and safety mechanisms may also form the basis for establishing recruitment, training, and performance/evaluation criteria (De Toit et al., 2011). Training programs, particularly related to medication prescribing rights, need to reflect the scope of practice and pertinent local and national formulary restrictions (Nissen & Kyle, 2010). Debate, consideration, and discussion of such advanced training and education needs to take place in consultation with existing ophthalmic nursing bodies, nursing councils, ministries of health, and medical (ophthalmology) councils. Additional special interest groups, such as pharmacists, may also be key stakeholders to include when discussing medication prescribing rights.

Advanced Services
Provided by PIR Ophthalmic Nurses

Within some key Pacific Island countries (PICs), ophthalmic nursing bodies work alongside their nursing councils, ministries of health, development agencies, ophthalmology colleges, and the Pacific Eye Care Society (PacEYES). (The latter is a regionally recognized ophthalmological association for all eye healthcare providers whose mission is to develop sustainable solutions to avoidable blindness.) Through this cooperative effort, over the course of more than 10 years, multiple PICs have supported and approved the provision of legally recognized prescribing and provision rights to advance trained ophthalmic nurses. Additionally, these rights have been regionally championed in some countries by ophthalmologists, who provide local and national training. Importantly, the ophthalmologists also evaluate the quality and safety monitoring of these additional skills being performed by the ophthalmic nurses and technicians.

The decision to implement and formally recognize services provided by the PIR ophthalmic nurses and technicians has been supported by several key factors. First, the need for additional services in each location, and secondly, the accessibility to advanced and evidence-based training. The need has primarily been determined through the International Agency for the Prevention of Blindness (IAPB) statistics for the Western Pacific Region. IAPB outlines the variability between patient need, blindness rates and accessibility to resources. As optometrists and orthoptists are not routinely available, and with limited access to ophthalmologists, ophthalmic nurses and technicians in these areas remain the primary eye-care providers in the PIR. In Papua New Guinea (PNG), for example, which struggles from a chronic shortage of health-care professionals and has some of the poorest health outcomes in the Western Pacific Region (IAPB 2014), the implementation of additional training and legal allowance is necessary.

Training within the region has been supported by development agencies such as the Fred Hollows Foundation NZ (FHFNZ), the IAPB, the Royal Australian and New Zealand College of Ophthalmologists, and the Joint Commission on Allied Health Personnel in Ophthalmology. These organizations have worked collaboratively with PacEYES and regional leaders to provide localized training for nurses alongside training for ophthalmologists.

Training, which is predominantly delivered through the Pacific Eye Institute (PEI) in Suva, Fiji, and the Modilon Hospital in Madang (MHM), PNG, with the support of the FHFNZ, is accredited by the Fiji National University in Fiji and the Divine World University in PNG. These courses provide certified training – in some cases, up to master’s degree level – to ophthalmologists, nurses, and technicians in a variety of subspecializations, such as diabetic eye disease, management, and community eye care. They also provide a range of other specific training programs, such as prescribing or operating theater skills. Mentorship (either at PEI or within their home country) is also provided, with the option for ongoing training through PEI and MHM following graduation as a mechanism to support ongoing continual professional development.

To date, trained ophthalmic nurses within six nations of the PIR (excluding Australia and New Zealand) have been granted varied degrees of approval to provide additional services to their local communities. Additionally one other nation, Fiji, is currently awaiting reply from their governing agencies (see Table 2).

Generally, to be authorized to perform additional duties in the PIR, nurses in each country must demonstrate that they have completed appropriate, recognized training, including
competency sign-off and completion of a supervised number of training hours. In some cases, though not all, PIR nurses must hold a position that is nationally equivalent (titles and positions vary) to the Western positions of advanced practice nurse or clinical nurse specialist.

As Table 2 indicates, ophthalmic nurses in these six nations are authorized to prescribe certain eye drops and prescribe spectacles. While eye drop prescribing rights vary from country to country, most of these countries permit nurses to prescribe topical anesthetics (e.g., tetracaine/proparacaine/benoxinate), diagnostic ophthalmic dye (e.g., fluorescein), and topical mydriatic and cycloplegics (i.e., phentolamine, tropicamide, homatropine, and cyclopentolate).

While some countries also accept nurse prescription of antibiotics (i.e., tetracycline, chloramphenicol, and ciprofloxacin) and antifungals (i.e., natamycin), PNG is the only nation to include steroids.

The range of skills employed by these ophthalmic nurses varies and depends on the situation and health system they are working in. In many cases, nurses are working either without other eye-care support – or perhaps with a similarly trained ophthalmic nurse, but no ophthalmologist. In these (predominantly remote) settings, skills commonly employed are those to manage and treat common eye conditions, including eye disease, trauma, and refractive problems.

Nurses who are permitted to prescribe spectacles are often using ready-made spectacles, which are commonly dispensed and available items. This is because the services and infrastructure to provide custom-made spectacles are often underdeveloped, unless access to a large urban hub is available. The nurses often have access to a range of diagnostic equipment (and often mobile device versions, too). This allows them to provide a sufficient degree of therapeutic and refractive examination and follow-up.

Ophthalmic nurses are also encouraged to take their clinical and public health skills out into the communities, especially to school screenings, church/marketplace settings, and other more remote mountain or island areas. This helps to increase primary public health eye care in the districts where it would otherwise be unavailable.

### National Eye Plans

In some PICs there have been extended periods without ophthalmologists present; for example, Samoa was without an ophthalmologist from 2010 until 2012. Vanuatu functions with very little ophthalmology cover, and some countries, such as PNG, have an extremely limited number of ophthalmologists relative to their population size and geographic expanse. In such situations, the role of the ophthalmic nurse is a crucial one. Great responsibility is placed upon their shoulders to manage eye-care needs, and they do so autonomously. Outside support, in terms of a visiting team, may provide some relief to the cataract backlog and diabetic retinopathy needs in some areas, but acute eye care (and, for the most part, preventative eye care) requires nurse-led management. This level of management may also include referral to the urban-based ophthalmologist and, in medical emergency situations, the arrangement of medi-air evacuations to urban hubs that can provide specialist services for treatment – at considerable cost to the patient.

Development of a national eye plan is also often part of the ophthalmic nurse’s responsibility. This plan is required to help tackle workforce issues in their region. Senior nurses are automatically involved in this, as they are a pivotal part of the wider goals of the IAPB 2014–2019 Global Action Plan and Regional Action Plan towards Universal Eye Health. This has meant that some

---

**TABLE 2**

<table>
<thead>
<tr>
<th>Pacific Island nation</th>
<th>Availability of post-graduate level ophthalmic nursing course (or similar)</th>
<th>Trained to prescribe specific eye drops</th>
<th>Authorized to prescribe certain eye medications</th>
<th>Trained to prescribe spectacles (glasses)</th>
<th>Authorized to prescribe spectacles (glasses)</th>
<th>Additional trained services provided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiji</td>
<td>Yes</td>
<td>Yes</td>
<td>Submitted for approval</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Kiribati</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Unknown</td>
</tr>
<tr>
<td>Papua New Guinea</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Prescribe steroids</td>
</tr>
<tr>
<td>Samoa</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Solomon Islands</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Tonga</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>1 technician providing diabetic laser services</td>
</tr>
<tr>
<td>Vanuatu</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>
senior nurses are taking on additional educational and management responsibilities in order to facilitate the plan. In Fiji, for example, some ophthalmic nurses are embarking on extension studies (up to master’s level) to help gain the required skill-set. In many of the larger PICs, these nurses are also working as workforce support officers and local coordinators.

**Leadership and Urban Utilization**

The training of nurses and technicians in care of specific eye diseases, such as diabetic eye-care screening and grading, has also allowed for planning and investment in diabetic eye treatment centers in the larger urban hubs across the Pacific. Nurses not only play an integral role in the management of diabetic eye disease but also provide the required workforce skills. They allow for greater penetration of laser and anti-VEGF intravitreal injection services in a region with a shortage of ophthalmologists.

While a predominant goal of training nurses to perform additional skills is to support rural and remote eye care, there has also been the opportunity to utilize their extended expertise within the larger tertiary referral centers. Within these centers they are not required to utilize skills traditionally undertaken by ophthalmologists, as the concentration of ophthalmologists within these areas does not require them to do so; however, their expertise has been creatively utilized to support specific clinics, such as diabetic eye-care clinics. Within these settings, nurses are taking on more structured, traditionally nurse-led health service management positions and education roles. This assists in the development of next-generation advanced nursing services and provides quality-driven and synergistic collegial support to the ophthalmologists through the development of conventional nurse-led positions as nurse directors/managers/educators.

**Outcomes**

Since 2006, approximately 180 nurses and technicians have been trained to provide advanced eye-care services in the PIR. This has been supported through the FHFNZ-funded, accredited training programs operating in Suva, Fiji, and Madang, PNG. As a result, eye care has reached far into the more remote parts of the developing PIR. The enrolled professional-students originate from both urban and rural centers within Fiji, the Solomon Islands, Vanuatu, the Kingdom of Tonga, Timor Leste, and many more PICs, and they take their skills back to their communities upon graduation.

From these 180 graduates scattered across both rural and remote villages throughout the PIR, 31 reported back to FHFNZ in a 2014 survey. These respondents reported that they are regularly prescribing medications. While they are trained to do so, and 70% reported that they were confident in their expertise and ability to prescribe, the greatest single issue that these nurses reported had to do with accessing the medication itself. Sixty-seven percent reported that at least 50% of the medications on the list of items they are permitted to prescribe are not readily or regularly available at their place of work or associated pharmacies.

Additionally, 90% reported that they continue to provide refractive and general eye examination services to their community. All reported that they remain competent with diagnosing, treatment, and/or referral of up to 20 presenting ocular conditions.

**Discussion**

While the impact of these nursing services on direct community backlog or the reduction of the regional blindness rate is beyond the objectives of this article, there is no question that the implementation of advanced training to nurses and technicians in the PIR has provided much-needed care to patients in rural and remote areas who would otherwise go without. PIR ophthalmic nurses and technicians who have additional duties hold a unique role and level of responsibility that is recognized by their communities, health ministries, and peer eye-care professional bodies (Czuber-Dochan et al., 2005). They are an essential solution to the burden of eye disease in the Pacific. Nurses and technicians are becoming integrated into their health-care systems and are helping to strengthen the cross-cutting benefits beyond a single disease focus, as encouraged by the Western Pacific Action Plan (World Health Organization, 2014). Additionally, while both new and existing cadres seek to extend their scope of practice, they continue to require up-to-date, defined roles, associated competency levels, and evidence-based guidelines and standards (De Toit et al., 2011). This ensures they remain up to date and in line with regional and international standards, and they do so in complimentary and reciprocal support of their ophthalmology colleagues.

While the exact title or category of the PIR nurses with advanced skills is unclear in comparison to the titles defined by the more developed nations, it is evident that these nurses possess aspects of both CNS and APN skills. For example, like CNSs in the United States, the PIR nurses provide primary care and acute
care (Begley et al., 2013). Similar to APNs in the United States, they also provide specific treatment traditionally provided by physicians and other care providers such as optometrists. That said, unlike APNs in the developed nations, these PIR nurses are in their infancy in terms of contributing as ophthalmic nurse academics, research collaborators and principle investigators, committee leaders and mentors, and they may or may not have completed master’s degree level study or beyond or hold academic posts. This may primarily be because the authorization for their advanced skills was awarded to specifically provide immediate and urgent eye care to their burdened health systems, which suffer from gross underaccess to ophthalmologists and a lack of available optometry and orthoptic support teams. Therefore, such higher-level role definition has not been prioritized at this point.

**Conclusion**

As avoidable blindness prevention remains a global priority, there remains an essential need for eye health care communities, particularly in the developing regions of the world, to explore unconventional nurse roles and services as a potential mechanism to tackle the regional burden of eye disease. The PIR eye-care community is exemplary of the possible clinical role of eye-care nurses and technician professionals as one component of the wider solution. While outcome data regarding service implementation within each region is beyond the scope of this celebratory article, the long-term collation of outcome data relating specifically to these nurses with advanced skills is essential for ascertaining the ongoing suitability of their contribution to blindness prevention in the region. These nurses also have the potential to further educate their communities and other primary health-care workers in their vicinities, thus making adequate eye-care services available to a vast number of people previously denied access to care.

Their expertise is also commenmorative in pioneering, and their inclusion in global ophthalmic nursing forums is essential. There is much this nursing cadre can offer in terms of benchmark examples and learning and research opportunities, all of which would offer enormous benefits to both developed and developing nation nurse leaders and educators. Lastly, the identification, acknowledgment, and simultaneous training of nurses, technician, ophthalmologists, and other health-care professionals, who work together as a community to tackle the long-term needs in Oceania, is inspiring, empowering, encouraging, and ultimately symbolic of the essence of survival in the Pacific Islands.

**References**


Heather Machin, RN, MBA, is a nurse consultant at Fred Hollows Foundation NZ, Auckland, New Zealand, and project officer for the Lions Eye Donation Service, Centre for Eye Research Australia, University of Melbourne, Melbourne, Australia. She can be reached at heather.machin@unimelb.edu.au or hmachin@hollows.org.nz.
Rely on ASORN publications for comprehensive and current information for ophthalmic nurses and allied health personnel in ophthalmology.

Care and Handling of Ophthalmic Microsurgical Instruments
4th Edition
NOW AVAILABLE!
Members: $49
Nonmembers: $59

Ophthalmic Procedures in the Operating Room and Ambulatory Surgery Center
4th Edition
NOW AVAILABLE!
Members: $69
Nonmembers: $79

Ophthalmic Procedures in the Office and Clinic
Members: $59
Nonmembers: $69

Essentials of Ophthalmic Nursing Series
Members: $249 series; $79/bk
Nonmembers: $349 series; $119/bk

Scope and Standards of Ophthalmic Clinical Nursing Practice
Members: $19
Nonmembers: $24

Get more info and order online!
www.asorn.org/publications
The Pediatric Ophthalmic Examination: Challenges and Strategies, Part I

Introduction
This article aims to help ophthalmic practitioners who examine children by describing the challenges inherent in the pediatric ophthalmic examination and by introducing different strategies to facilitate the ocular exam. Examining children can be challenging and requires special communication skills beyond basic medical examination skills, as children often are not willing participants (Lorin, 2015). The pediatric ocular examination is often frustrating for inexperienced practitioners since children, unlike adults, are unable to realize or verbalize what is wrong with their eyes or vision (Lorin, 2015).

Communicating with children, gaining their trust, and establishing a friendly relationship are no less important than the actual ophthalmic exam. A positive relationship with the child will highly facilitate history taking and examination. The pediatric ocular examination is considered an art form, requiring significant patience, adaptability, and practice. It is important to keep the following general considerations in mind during the examination:

1. The children, not the families, are your patients. Build friendships with the children and engage them throughout the exams with different games and funny toys.

2. Always explain to the children what are you doing in child-friendly terms. Don’t tell the children untruths. If the procedure will involve discomfort, explain this beforehand.

3. The examination time is limited, as children can lose interest quickly. Be fast and efficient.

The Setting
Pediatric ocular examination rooms should be designed to provide a safe and joyful environment for the child. Cartoon paintings on the walls, stars on the ceiling, games, and other
trendy designs can help make the child feel happy, safe, and thus more cooperative during the examination. The room light should be adjusted to facilitate the exam without causing fear or worries in the child. A dark room that causes the child to be afraid may result in an uncooperative exam.

Near fixation targets that could be used are small finger toys, toys with lights, colorful figures on pencils or a pen light, and stickers. The toy should have enough visual detail to require the child to focus (hold accommodation) on the object in order to resolve the detail. Distant fixation targets that should be available include animated toys, toys with lights, TVs with cartoon movies, animal figures, and visual acuity charts. Ideally, objects for near fixation should be silent, so as not to test hearing (Hoyt & Taylor, 2013). In contrast, distant fixation targets can be audible to draw the child’s attention (Hoyt & Taylor, 2013). Moreover, rewards should be available in the room and may include stickers, fancy pencils, or, if the family agrees, candy or suckers. “One toy, one gaze, one look” is a good rule (Hoyt & Taylor, 2013).

In addition to the usual ophthalmic equipment, a portable slit-lamp, a tonometer, and appropriate vision charts are needed. Other electrodiagnostic tests such as visual evoked potential (VEP), electroretinogram (ERG), eye movements recording (EMR), and imaging tests like optical coherence tomography (OCT), fundus photography, and visual fields (VF) should be available if indicated. Moreover, the clinic should have interpreters for non–English speaking families to improve history taking, transmission of health education, and quality of care (Ngo-Metzger et al., 2007).

Ten Steps of the Pediatric Ophthalmic Examination

The time for a pediatric ophthalmic examination is often limited by poor cooperation and the child’s short attention span. If the practitioner cannot perform every test, the most relevant ones should be chosen first. Children must be engaged throughout the visit, and the practitioner must hold their attention and learn how to “play” with them. The examination should be thorough and performed in a stepwise method to maximize cooperation and efficiency (see Table 1).

<table>
<thead>
<tr>
<th>Step</th>
<th>History or Examination Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gather medical and ocular information from previous charts.</td>
</tr>
<tr>
<td>2</td>
<td>Establish a friendship with the child during the first encounter.</td>
</tr>
<tr>
<td>3</td>
<td>Observe the child while talking to the child or the family.</td>
</tr>
<tr>
<td>4</td>
<td>Take medical and ocular history from the child and family.</td>
</tr>
<tr>
<td>5</td>
<td>Examine ocular sensory status (fusion and stereopsis).</td>
</tr>
<tr>
<td>6</td>
<td>Examine visual acuity, color vision, and confrontation visual fields.</td>
</tr>
<tr>
<td>7</td>
<td>Examine ocular alignment and motility.</td>
</tr>
<tr>
<td>8</td>
<td>Examine face, orbit, and anterior segment.</td>
</tr>
<tr>
<td>9</td>
<td>Perform cycloplegic refraction and posterior segment examination.</td>
</tr>
<tr>
<td>10</td>
<td>Perform other ancillary tests: photos, visual evoked potentials, electroretinogram, eye movement recordings, formal visual field testing, corneal topography, corneal pachymetry, and optical coherence tomography (when possible and if necessary).</td>
</tr>
</tbody>
</table>

Step 1. Gather information

The first step in pediatric ocular examination is to gather information about the child before the first meeting. The practitioner should gather all ocular and systemic history from the patient chart and previously recorded staff notes before the encounter. Key information includes known systemic or ocular diseases in the child or family, pregnancy and birth history, prematurity, ocular and systemic congenital or genetic diseases in the family, and growth, development, and social history. If not available, this information can be obtained during the first encounter. Many physician practices use intake forms for patients where the parents can fill out some of the history while they are in the waiting room (Nelson & Olitsky, 2015).

This information assists in determining the approach to the child and family, guiding medical history questioning, and making the exam patient-oriented, fast, and effective. Moreover, the practitioner should take opportunities to observe the child in the waiting room or while entering the exam room. While the patient is with the family, the practitioner can observe the child’s visual attention and behavior, head posture, body language, and any other obvious signs of ocular or bodily abnormalities.

Step 2. Establish friendship at the first encounter

The first encounter with the child and the family is the most important step in establishing a good relationship. During the first encounter, the practitioner should try to gain the child’s trust and build a friendship with the child in order to achieve cooperation and ease the exam (Lorin, 2015).
CLOTHING. The practitioner should be dressed in an appropriate and humble fashion. A white coat is not preferred with the pediatric population and should be avoided (Feldman & Acosta, 2015). Some practitioners wear ties or shirts with cartoon figures that can be used to play with the child or gain fixation during the exam.

ENCOUNTER. Upon entering the room, the practitioner should introduce him or herself to the family and then approach the child with a greeting or handshake (Lorin, 2015). At this moment, the practitioner should try to build a relationship with the child by gaining their trust and helping overcome any fear of the encounter (Lorin, 2015). This can be done by talking to the child and engaging older children in interesting conversation. Clothes, shoes, toys, and stuffed animal names are all good topics of conversation that create a welcoming atmosphere.

Examples of how to begin a conversation with a verbal child:
—“Hello, young man/young lady. I like your shoes/shirt – did you choose them? Did you buy them with your own money? Where did you buy them? Tell me about it.”

—“Who are these people [parents]? “Is this your sister? Are you friends with her? Tell me more.”

—“What do you do? What do you play? “How many friends do you have?” “Who is your best friend?” “What is your favorite game? Tell me about it.”

Examples of how to begin an encounter with a nonverbal child:
—“Hey, sweetie, did you see this toy? Look how funny it is.”

—“Hey, young man, I have a lot of stickers. Take a look.”

—“Hey, young lady, did you see my shining light? You can hold it.”

The above examples or similar conversations can build a friendship by showing the child that the practitioner is interested in the child and not the examination itself. Moreover, during the conversation the practitioner can observe the child and look for gross abnormalities.

CHILD POSITIONING. Often children are reluctant to cooperate with strangers, especially doctors. During the first encounter, the practitioner should make sure that the child feels safe. Oftentimes the young child will prefer to be close to the parents or in a parent’s lap during the encounter. The practitioner should accept this preference and facilitate feelings of safety. Examining a crying infant or worried three-year-old will be extremely difficult and will not yield useful information. Calming the infant with feeding, keeping the child on the parent’s lap, and giving rewards will often facilitate the exam. If none of these can be done, the practitioner should continue the exam with the child in the most comfortable position under the circumstances. Once the child’s trust is gained, the practitioner can position the child on the exam chair. There are rare cases where the information needed from the examination is so critical that the child must be restrained, such as a suspected corneal foreign body in a crying, photophobic two-year-old. It may be justified in such circumstances to restrain the child with a papoose board or a tightly wrapped blanket. However, this type of procedure should be used sparingly and followed by abundant praise and rewards.

Examples of what to say when positioning a child:
—“Hey, do you want to sit on this magic chair? It goes up and down. Here, you can try.”

—“Hey, do you know that every kid who sits on that chair gets one sticker? If you do that I will give you two.”

Step 3. Observe
Examining the child should start with observation. While talking to the child and the family, the practitioner should simply watch, taking a hands-off approach. Observe the child’s visual attention, following and fixation behaviors, ocular alignment, eye oscillations, and head posture. Any abnormal findings can indicate amblyopia, strabismus, nystagmus, media opacities, or retinal and/or optic nerve abnormalities. Structures that can be examined from distance include head (hydrocephaly, microcephaly, craniosynostosis), face (dysmorphism, facial palsy), orbits (hyper/hypotelorism, telecanthus), eyelids (ptosis, masses, coloboma, distichiasis, blinking function), gross ocular surface (injection, dermoid, nevus), and pupils (coloboma, white reflex).

Step 4. Take medical and ocular history
After establishing a trusting relationship during the first encounter, the practitioner should start asking about visual problems, addressing the child first. The chief complaint should be stated in the child’s or parent’s own words (Swartz, 2014). This can be performed by asking the child open-ended questions, followed by specific follow-up questions according to the complaints.

Examples of how to ask about the chief complaint:
—“Do you know why you are here?”

—“Do you know why are we looking into your eyes?”

—“Do your eyes bother you?”

—“Is your vision clear?”

continued on the next page
Once the practitioner finishes taking history from the child, the family should be approached and asked more specific questions. Parents are the most reliable source for a history of the present illness (Lorin, 2015; Swartz, 2014). The child’s primary caregiver(s) will have the best information, and their understanding, cooperation, and engagement in the care process are essential (Sanders, Federico, Klass, Abrams, & Dreyer, 2009). Barriers to successful communication include poor family dynamics, “blame games,” avoidance, and socioeconomic and cultural differences. The practitioner should be aware of potential barriers to successful communication. Common chief complaints include failed vision screen, “lazy eye,” red eyes, itchy eyes, wandering eyes, shaking eyes, head tilt, troubles with reading, and headaches. Inquiries about the chief complaint should include time of onset, constant or intermittent symptoms, other accompanied symptoms, and the presence of any alleviating or contributing factors.

As part of a complete history, it is important to ask about the child’s ocular and medical history, family ocular and medical history, prenatal and postnatal history, birth weight, surgical history, trauma history, and developmental milestones. More thorough questioning should be done if the practitioner suspects strabismus, amblyopia, ocular genetic diseases, or ocular congenital diseases (cataract, glaucoma, retinoblastoma). Almost everyone carries photos or videos of their children on their phones or other electronic devices. The practitioner can ask for pictures or videos to help determine the timing of the onset of the condition in question. This information may help in the assessment of abnormalities such as Brown syndrome, Duane syndrome, nystagmus, cataract, and retinoblastoma.

Conclusion
The pediatric ophthalmic eye examination requires cooperation from children, with assistance from their parents, ophthalmic equipment, and a 10-step process that begins with gathering patient information. Asking specific child-focused questions can aid in child participation and successful completion of a comprehensive examination.

Part II of “The Pediatric Ophthalmic Examination” to be published in the spring issue will elaborate on steps five through 10.

References
A Vision for the Arts

I was diagnosed at age five with severe but correctable myopia and was given glasses. Suddenly and miraculously, the details of the external world emerged like a dazzling, kaleidoscopic, magical display. Before glasses, I saw only vague, nebulous external shapes and colors. Because I was born with a visual field of only 10 inches, this close-up world was all that I could see clearly. I started drawing as soon as I could hold a pencil, and I learned to process my reality through drawing.

When Dr. Elizabeth Kubler-Ross (1999) worked with children, she would offer them Coca-Cola, doughnuts, and drawing material. Invariably, the child would express his or her experience of loss visually, using symbolic language in the drawing. When the images appeared, therapeutic communication could begin. We all have an inborn ability to communicate using this kind of symbolic language. Unfortunately, as we grow up the outer physical world becomes more and more impressed on our psyche, and we often lose sight of this wild, imaginative potential within us.

Since time immemorial, the arts have served as a vehicle for connecting us with the transcendent. From the cave paintings in Lascaux to the Guggenheim on Fifth Avenue, artists have been translating inner visions onto an outer surface in order to convey a reality that transcends mere physically.

It is my experience, as a nurse and an artist, that fine art and nursing go hand in hand. Being with patients, for me, is similar to being with an empty canvas or a blank sheet of paper. I experience an exchange of energy in both disciplines that is full of subtlety and unexpected possibilities.

With regard to ophthalmic nursing, the eye is a circle through which our consciousness exits. Sight is our highest sense, and to be able to see one’s own potential as well as the patient’s requires the ability to transform external vision into insight and understanding. In other words, our insight depends on our external perception and assessment of each situation.

In her book of compiled lectures, The Tunnel and the Light (1999), Dr. Kubler-Ross speaks of the importance of using one’s mind and heart when engaged with patients: “What I’m trying to say to you is that knowledge helps, but knowledge alone is not going to help anybody. If you do not use your head and your heart and your soul, you are not going to help a single human being” (p. 6).

Seeing with the heart involves creativity and inspiration. When immersed in the creative process, either at the bedside of a patient or in the artist’s studio, we have an incredibly unique opportunity to experience life in its most precious state. Like a butterfly emerging from a cocoon, we begin to glimpse possibilities that we never knew existed.

Figure 1. Circles represent joy, movement, and the dance of life. The eye is a circle, the earth is circular, and the rhythms of day and night revolve around themselves. Living near the sea, I’m influenced by the rhythmic movements of the tides and the breath. I experience the ebb and flow of the tides as linked to the inhalation and exhalation of my breath. Without beginning and end, I see it all as unity contained within the circle of life.

References
Procedural Pain Reduction and Comfort for Patients Undergoing Ophthalmic Surgery

Introduction
Patients undergoing ophthalmic surgery may be fearful and anxious about the overall surgical experience, including touching or cutting of the eye. As nurses, we need to recognize and address the emotions associated with ophthalmic surgery. This article will discuss how a team at the Post-Anesthesia Care Unit (PACU) of the University of Michigan Health System, Kellogg Eye Center (KEC), translated an evidence-based practice initiative from the pediatric population to adults undergoing surgery.

Background and Evidence
Pain is influenced by genetics, temperament, and past experiences. Past experiences with procedural pain and anxiety can have both short- and long-term effects. Short-term effects may be distress, high anxiety, delays in care, canceled procedures, and dissatisfaction. In the long term, procedural pain may result in phobias and panic, with potential health ramifications such as refusal of treatments, vaccinations, and blood draws (Czarnecki et al., 2011; Given, 2010). The emotional impact of high anxiety and distress is felt not only by the patient but also by the family and clinicians caring for the patient. To improve patients’ comfort and satisfaction with pain management, the nursing staff decided to focus on procedural pain and implemented a Poke Plan with a Comfort Menu.

The Poke Plan includes an assessment of the patient’s past experiences and identification of coping strategies and comfort interventions that they have found to be helpful. Patients are also offered options for comfort, and their choices of nonpharmacological and pharmacological therapies are used to develop a plan of care. A body of evidence suggests that an individualized plan for procedural pain and anxiety can enhance coping, improve comfort, and decrease anxiety for patients of all ages (Czarnecki et al., 2011). Most of the literature on improving comfort during procedures has focused on the pediatric population, but if applicable and appropriate, evidence can be translated to the adult population (McGrath, Rawson-Huff, & Holewa, 2013; Given, 2010; Uman, Chambers, McGrath, & Kisely, 2008).

<table>
<thead>
<tr>
<th>Strengths (+Forces)</th>
<th>Barriers (−Forces)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diverse and talented staff: medical assistant / patient care technician / registered nurse</td>
<td>Fast-paced environment</td>
</tr>
<tr>
<td>Good intravenous skills</td>
<td>Limited time for meetings</td>
</tr>
<tr>
<td>Patient-focused care: patient satisfaction, happy patients</td>
<td>Extra work and meeting deadlines can be hard</td>
</tr>
<tr>
<td>Many skills: independence, experience, professionalism, consideration, communication, and team work</td>
<td>Limited family focus and permission for family members to visit and participate in care</td>
</tr>
<tr>
<td>Processes for obtaining items for distractions</td>
<td>Poor communication, lack of consistency and follow through</td>
</tr>
<tr>
<td>Leadership and support from nurse manager, Level E nurse, clinical nurse specialist (project coordinator)</td>
<td>Change can be scary and hard to do.</td>
</tr>
<tr>
<td></td>
<td>Making it “stick” it is also hard.</td>
</tr>
<tr>
<td></td>
<td>Limited resources for decreasing patient anxiety and making a comfortable environment</td>
</tr>
<tr>
<td></td>
<td>Work flow and processes could be better.</td>
</tr>
<tr>
<td></td>
<td>Unsure how the committees will work and what the work will be</td>
</tr>
</tbody>
</table>
Effective nonpharmacological strategies for pain management include preparation, distraction, and music (Yinger & Gooding, 2015; Adachi, et al., 2014; Faigeles et al., 2013; Demir & Khorshid, 2010; Gillen, Biley, & Allen, 2008; Klieber, Craft-Rosenberg, & Harper, 2001). Positions of comfort, deep breathing, tactile stimulation, and coaching are also effective (Park, Oh, & Kim, 2013). Local anesthetics are often used to decrease pain associated with needle sticks, but wait time is required for the medication to be effective (Zempsky, 2009). Buzzy® is a relatively new device that vibrates, and when used with ice it has demonstrated effectiveness in decreasing the sharp pain of needle sticks (Canbulat, Ayhan, & Inal, 2015; MMJ Labs, 2016).

Patient- and family-centered care (PFCC) is an approach to the planning and delivery of health care that is based on a partnership of patient, family, and caregivers (Institute for Patient- and Family-Centered Care, 2010). PFCC has four core concepts: (1) dignity and respect, (2) information sharing, (3) collaboration, and (4) participation (Mastro, Flynn & Preuster, 2014; Andrew, 2009). The health-care team can provide dignified and respectful care by listening to and honoring each patient’s personal values, practices, and beliefs throughout all phases of care (Bass, 2012). Establishing a relationship and connection with the patient can contribute to the success of procedures such as eye drops instillation and needle sticks, as well as anticipatory anxiety about the procedure. A Poke Plan provides information and an opportunity for collaboration with the patient and members of health-care team.

Kolcaba’s comfort theory provides a framework for assessing and addressing the patient’s physical, psychospiritual, sociocultural, and environmental discomforts (Kolcaba, Tilton, & Drouin, 2006; Kolcaba & DiMarco, 2005; Kolcaba & Wilson, 2002). Physical and environmental care for ophthalmic patients may include dim lights, quiet environment, and warm blankets. Psychospiritual and sociocultural care may include eye contact, family at the bedside, hand holding, comforting, and coaching. Foot and hand massage has been identified as an effective intervention for postoperative pain (Wang & Keck, 2004) and preoperative anxiety (Brand, Munroe, & Gavin, 2013). Words matter, and using best words to encourage the patient to tell their story or to coach a patient through a procedure or discharge planning can profoundly effect outcomes and healing (Lang, 2012; Lang et al., 2005; Minden, 2005). Knowing the patient and providing individualized comfort is an effective strategy for diminishing both pain and anxiety. Nurses are in a position to identify the comfort needs of their patients, design comfort measures, and assess outcomes to support enhanced comfort. Comfort is a holistic outcome of effective nursing care.

Developing a respectful and caring relationship with patients and providing comfort interventions can positively impact patient self-care activities and satisfaction. Three goals were identified to focus our work and measure its success: (1) improved pain management and increased comfort, (2) increased patient satisfaction, and (3) enhanced patient/family-centered care.

### The Implementation Process

A subcommittee of the Unit Practice Committee was assigned leadership for the implementation of a Poke Plan and comfort interventions. Members of the Poke Program Subcommittee were assigned to either a steering group or a group called “change champions.” The steering group developed timelines, coordinated work, organized meetings, finalized materials, and maintained records. Change champions provided input and feedback, identified work-flow issues, assisted in developing Poke Plan materials, and conducted staff education. In the beginning a force field analysis was completed by the Poke Program Subcommittee. Each member submitted a personal assessment of the strengths of the unit, negative forces, and skills and education needed to implement the practice change. Table 2 summarizes the force field analysis that drove the plan for a practice change.

### Baseline Data

The first step in the implementation process was to survey nursing staff to assess their perceptions of patient care and teamwork, as well as their knowledge and skills related to comfort, anxiety, and change. Questions were chosen from the literature and the health-care system patient satisfaction questionnaire. The survey was reviewed by staff in the Quality Improvement Department, and revisions were made accordingly. An online survey was sent via email to all nurses, medical assistants, technicians, and clerical staff, with a 78% response rate. Staff rated the work environment and patient education high, but offering choices to individualize care and providing physical and emotional care were rated lower (see Table 2).

---

**TABLE 2**

<table>
<thead>
<tr>
<th>Selected Items from KEC Staff Survey</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient offered choices</td>
<td>3.9&lt;</td>
</tr>
<tr>
<td>Patient knows about pain at discharge</td>
<td>3.97</td>
</tr>
<tr>
<td>Staff provide physical and emotional care</td>
<td>3.07</td>
</tr>
<tr>
<td>Patients prepared from procedures</td>
<td>&lt;.16</td>
</tr>
<tr>
<td>Staff able to explain EBP changes</td>
<td>&lt;.00</td>
</tr>
<tr>
<td>KEC staff have good team communication</td>
<td>&lt;.06</td>
</tr>
<tr>
<td>Environment is supportive</td>
<td>&lt;.13</td>
</tr>
<tr>
<td>We teach patients in a way they understand</td>
<td>&lt;.16</td>
</tr>
</tbody>
</table>

---

*continued on the next page*
Lack of knowledge and skill regarding theories of comfort and promoting self-care activities to decrease stress were rated lowest by staff, providing direction for future education. See Table 3 for results of the staff assessment of skills and knowledge.

A similar process was used for development of a patient survey. Questions targeted pain and satisfaction with physical, psychospiritual, sociocultural, and environmental comfort as well as caring relationships. One hundred patients were interviewed, with 76% having undergone cataract, plastic, or retinal surgery. Many patients acknowledged concern about discomfort associated with needle sticks. Patient survey information is reported in Table 4. Patient responses were highly positive but cannot be considered truly baseline since education about the project had already occurred and staff were already participating in its development and piloting.

**Poke Plan and Comfort Menu**

The pediatric Poke Plan was used to develop a plan applicable to adults. Assessments of past experiences with procedures, distraction techniques, and coping strategies were maintained from the original pediatric plan. Additional content for the adult ophthalmic patient included history of severe nausea and/or vomiting, high anxiety, post-traumatic stress disorder, and chronic pain. The patient’s plan is developed during a preoperative phone call, a face-to-face triage appointment, or the preoperative phase of the case. A paw print is stamped on a hard copy of preoperative Poke Plan, and comments are entered in the electronic medical record. These comments are viewable the day of surgery to alert all staff of the individualized plan of care. A flag is hung from the intravenous pole on the stretcher in a discrete way to alert all staff, in any phase of care, that the patient has a Poke Plan.

A list of items and interventions that could be provided to increase comfort for the adult patient undergoing ophthalmic surgery was developed. This list, called the Comfort Menu, includes topical anesthetics, Buzzy®, and specific actions for needle sticks (see Figure 1). General comfort items such as a warm blanket, the presence of a companion, or a special position were also included. Specific items for the ophthalmic patient such as dim lighting and sunglasses were added. The Comfort Menu was reviewed and endorsed by the medical director. The marketing department assisted in the design and produced a patient information sheet that includes the menu as well as other surgical information. The sheet is distributed to all patients prior to surgery and used to individualize their plan for comfort.

**Staff Education**

Education included posting of research articles, examples of best words to use when communicating with patients, and continuing education (CE) programs at the beginning of the shift. Thirty-minute interactive programs were planned and presented by Poke Program Committee members and the clinical nurse specialist who assisted in the planning and implementation of the practice change. Competencies for required knowledge and skill were developed for nurses and medical assistants. Work flow and processes were reviewed by change champions and revised as needed. For the official rollout of the practice change, a two-page document, “Essential Information for the Poke Program,” was developed. Staff were required to read this document, which

**TABLE 3**

<table>
<thead>
<tr>
<th>Selected Items from KEC Staff Survey (1 = never heard of it to 5 = I do it and can teach it)</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>What do you know and do?</td>
<td></td>
</tr>
<tr>
<td>Comfort theory</td>
<td>3.37</td>
</tr>
<tr>
<td>Self care activities to decrease stress</td>
<td>3.77</td>
</tr>
<tr>
<td>Use evidence to evaluate care and make changes</td>
<td>3.83</td>
</tr>
<tr>
<td>Provide psychospiritual comfort</td>
<td>3.87</td>
</tr>
<tr>
<td>Provide social/cultural comfort</td>
<td>3.97</td>
</tr>
<tr>
<td>Assess patient anxiety</td>
<td>4.03</td>
</tr>
<tr>
<td>Provide the ideal patient experience</td>
<td>4.03</td>
</tr>
<tr>
<td>Incorporate change and innovation into your work</td>
<td>4.03</td>
</tr>
</tbody>
</table>

**TABLE 4**

<table>
<thead>
<tr>
<th>Patient Survey</th>
<th>(1 = strongly disagree to 5 = strongly agree)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Questions</td>
<td>Responses</td>
</tr>
<tr>
<td>Nurses take my pain seriously.</td>
<td>79</td>
</tr>
<tr>
<td>KEC environment recognizes mind, body, spirit.</td>
<td>91</td>
</tr>
<tr>
<td>Caregivers introduce themselves.</td>
<td>91</td>
</tr>
<tr>
<td>Family present met my needs in preop.</td>
<td>92</td>
</tr>
<tr>
<td>Family presence met my needs in postop.</td>
<td>93</td>
</tr>
<tr>
<td>Information prepared me for surgery and care at home.</td>
<td>93</td>
</tr>
<tr>
<td>When called, the wait for a nurse was short.</td>
<td>58</td>
</tr>
</tbody>
</table>
included key concepts and content, and to attend a discussion session held during work hours. A short video about Poke Program goals, materials, and processes was developed and made available to physicians.

**Timeline**
A timeline was developed to establish target dates for key work initiatives. There were a number of delays with the patient survey due to work-load and unit needs. The formal rollout occurred much later than planned owing to delayed completion of physician education. The KEC practice change, from introduction of the concept to post-implementation data collection, took two years.

**Evaluation and Future Directions**
Post-implementation data are not available at this time, as staff and patient surveys are scheduled for completion at a later date. KEC patient satisfaction data were used to evaluate the effects of the practice change. Data from March 2015, when staff education began and the staff survey was launched, indicated increased satisfaction on four key items that could be attributed to improved knowledge and skill. More recent data show a decrease in three of the items; however, mean satisfaction scores are still higher than before program planning (see Table 5). In addition, there have been many patient comments and stories of the positive effects of individualizing care to assist in dealing with needle phobia, stress, or painful procedures.

Sustaining and improving the practice change will require ongoing monitoring, education, and discussion to ensure that staff continue to individualize care and utilize PFCC principles in planning and delivering patient care. The Poke Program Committee continues to meet and has assigned small work groups to address survey completion, pain management protocols, and strategies to improve PFCC. An education series titled “Focus on Excellence in Ophthalmic Patient Care” will provide opportunities for nurses to participate in presenting and attending programs to increase their knowledge and skills. Documentation of the Poke Plan and comfort interventions is difficult using the current electronic medical record. Therefore the current paper Poke Plan will be incorporated into a revised and expanded electronic version for all age groups, patient populations, and care settings. The goal is for patients to have a plan that follows them through the continuum of care and is readily available for all members of the health-care team, including nurses, physicians, phlebotomists, child life specialists, and other professionals involved in procedures. KEC nurses – as innovators, change champions, and leaders – will be involved in assisting other units and departments with implementation of comfort practices.

**Implications for Ophthalmic Patient Care**
Patients of all ages have varied eye conditions that will require diagnostic tests, treatments, and possibly surgery, some of which may not be comfortable. Patients need to be prepared, comforted, coached with best words, and allowed to make choices. Care needs to be individualized, and ophthalmic patients need to be supported throughout procedures. Patient education focusing on coping strategies, comfort techniques, and self-advocacy can result in a positive patient experience. Nurses are in a key position to identify and articulate evidence that supports caring practices and enhances patient health.

<table>
<thead>
<tr>
<th>TABLE 5</th>
<th>Ambulatory Surgery Patient Satisfaction (mean rating)</th>
</tr>
</thead>
<tbody>
<tr>
<td>KEC Patient Satisfaction Items</td>
<td></td>
</tr>
<tr>
<td></td>
<td>August 2014</td>
</tr>
<tr>
<td>Respect is shown by nurses to patient before surgery.</td>
<td>93.0</td>
</tr>
<tr>
<td>Recovery room staff use words that are understood.</td>
<td>90.3</td>
</tr>
<tr>
<td>Information is given on controlling pain.</td>
<td>88.8</td>
</tr>
<tr>
<td>Communication with family during surgery.</td>
<td>86.8</td>
</tr>
</tbody>
</table>

continued on the next page
Procedural Pain Reduction and Comfort for Patients Undergoing Ophthalmic Surgery

Continued from page 31

Michelle Churches, RN is an RN, ADN-Level E, at the University of Michigan Kellogg Eye Center PACU. Michelle is the lead of the Poke Plan at KEC. She is currently earning a MSN in Health Systems Leadership / Education at Gonzaga University, where she has an expected graduation date of May 12, 2018. Michelle can be reached at mchurches@umich.edu.

Sandra Merkel, MS, RN-BC, is a clinical nurse specialist and works at Kellogg Eye Center as project coordinator for nursing services. She is certified in pediatric nursing and pain management nursing and continues to work on the Pediatric Acute Pain Service at C. S. Mott Children’s Hospital. She can be reached at sandym@umich.edu.

The authors would like to acknowledge the work of the Poke Program Committee members. They were active in planning, collecting data, developing education, and implementing the Poke Plan and Comfort Menu. They continue to be involved in sustaining and improving this individualized aspect of patient care.

Shelly Robbins, RN, is an RN, ADN-Level E at the University of Michigan Kellogg Eye Center’s PACU. Shelly is the co-lead of the Poke Plan. Shelly can be reached at shlrobbin@med.umich.edu.

Carol George, MSA, BSN, is the manager of Kellogg Eye Center’s OR/PACU at the University of Michigan. Carol has given managerial support for the implementation of the Poke Plan at Kellogg Eye Center, helping to individualize care for our patients.

References


A Teaching Model for the Brückner Test:

Improving Screening for Congenital Cataract

Introduction

The diagnosis and early treatment of congenital cataracts are critical in the prevention of blindness. Indeed, they are given priority in the recent action plan of Vision 2020, the global avoidable blindness elimination initiative (AAP, AAPOS, & AAO, 2003a). Congenital cataract is the leading cause of preventable blindness in children (AAP, AAPOS, & AAO, 2003b). Untreated congenital cataract is responsible for 10% of cases of childhood blindness (AAP, AAPOS, & AAO, 2003b). It is related to intrauterine infection, metabolic diseases, and chromosomal disorders (AAP, AAPOS, & AAO, 2003b). To avoid vision problems and save lives, it is important to treat eye diseases in newborns early; specifically, congenital cataract surgery should be performed early in order to avoid the risk of amblyopia (AAP, 2008). The red reflex screening test plays a key role in the early diagnosis of congenital cataract. However, testing newborns presents challenges to the practitioner. So we developed a model for teaching red reflex testing technique.

The red reflex test was originally described by Brückner in 1962. Although the test’s reflection of light was originally described as red, it can be yellow-orange or any combination of red and yellow. Normal red reflex (in shades of red, orange, or yellow, depending on the incidence of light and retinal pigment epithelium) means that the main internal structures of the eye (cornea, anterior chamber, iris, pupil, lens, vitreous, and retina) are transparent, indicating that the retina is probably normal. In the presence of any abnormality that impedes the arrival of the light to the retina and its characteristic reflex, the reflected light undergoes changes that interfere with the color homogeneity and symmetry.

The Brückner test is used to screen for a variety of diseases, including cataracts, glaucoma, retinoblastoma, retinal abnormalities (i.e., Coats disease, persistent primary hyperplastic vitreous, retinal detachment, vitreous hemorrhage, and uveitis), leukemia, high ametropia, and systemic diseases with ocular manifestations. It must be performed during the routine physical examination of newborns in order to detect diseases found in infants, toddlers, and preschoolers (leukoma, cataracts, retinal abnormalities, and high ametropia) (AAP, AAPOS, & AAO, 2003a; AAP, 2008).

The examination should be performed on both eyes in a dark room with an ophthalmoscope about 45 cm away from the eye. Findings of dark spots in the red reflex, absence of red reflex, or white reflection should be referred to an ophthalmologist. A red reflection change indicates a lack of transparency of the cornea, lens, or vitreous humor (AAP, AAPOS, & AAO, 2003a; AAP, AAPOS, & AAO, 2003b; AAP, 2008). The red reflex is not the same in both
A Teaching Model for the Brückner Test: Improving Screening for Congenital Cataract

Continued from page 33

eyes. If the test cannot be performed at birth due to edema of the eyelids, it should be conducted on the second day of life (AAP, AAPOS, & AAO, 2003a).

Experts suggest that the red reflex test has a specificity of 65% (a measure of the proportion of negatives that are correctly identified) and a sensitivity of 86% (a measure of the proportion of positives that are correctly identified); these trend to increase with effective training, resulting in a low false positive rate (7 in 11,500) (Lloyd, Ashworth, Biswas, & Abadi, 2007; AAP, 2008). All newborns should have the red reflex test performed by a trained pediatrician before hospital discharge, and infants with red reflex changes or abnormalities should be referred to an ophthalmologist (AAP, 2002). (Note: The red reflex test is different from the Hirschberg test, a screening test for strabismus. In the Hirschberg test, the practitioner shines a light in the person’s eyes and observes where light reflects off the corneas. The light that reflects from each eye is compared and should be symmetrical in individuals without disease.)

Methodology

We developed a model for teaching students to perform the red reflex examination using cardboard, acrylic spheres of different sizes to simulate anisometropia, plastic to simulate opacity medium, and photographs to simulate different changes in the retina (see Figures 1 and 2).

Following investigation of use of the model and approval by the Ethics Committee of the Federal University of São Paulo, a questionnaire was administered and completed by 30 student participants. The students were randomly selected from the fourth year of medical school at the Federal University of São Paulo. All the students signed a consent form and began making their own model. Ninety-three percent of respondents stated that it was fun to use the model, which increased their interest in the subject, and that repeated training with the model contributed to knowledge retention.

Discussion

Recognition and early treatment of amblyopia is critical for good pediatric vision. But many children do not undergo eye screening (AAP, Section on Ophthalmology, 2002). Screening tests should be performed by doctors in primary care settings to ensure early diagnoses and subsequent referrals to eye specialists.

The red reflex test can be used to screen for amblyogenic factors such as anisometropia, strabismus, and medium opacity in preverbal children.

A major advantage of this examination is that it requires only a direct ophthalmoscope. However, the test is difficult to perform on noncompliant patients with small pupils and dark colored retinas.

Because complex and difficult screening tests may challenge the performance confidence of health professionals, they might tend to avoid routine use of these tests. We demonstrated that a teaching model in which students participate in the construction of the red reflex model and its use helps them understand the principle of this important screening test. Training is of primary importance in achieving greater sensitivity and specificity with testing. If more confident and fully trained health care professionals perform this test at basic health care facilities, more children will be referred early to ophthalmologists, consequently avoiding many of the causes of blindness.

Conclusion

The red reflex test is simple and quick and requires little equipment. But the main determinant of its specificity is the health care professional’s proficiency in administering it. Consequently, we must train health care professionals and encourage the use of the test on all newborns in order to detect eye diseases at an early stage, thus possibly preventing visual impairment in many children.

Research was conducted at the Federal Universities of Rio de Janeiro and São Paulo.

Thiago Gonçalves dos Santos Martins, MD, is an ophthalmologist at the Federal University of São Paulo (UNIFESP) and can be reached at thiagomsmartins@yahoo.com.br.

Ana Luiza Fontes de Azevedo Costa, MD, is an ophthalmologist at the University of São Paulo (USP).

Ricardo Vieira Martins, PhD, is in the Science History and Techniques Department of the Federal University of Rio de Janeiro (UFFJ).

Paulo Schor is an ophthalmologist at the Federal University of São Paulo (UNIFESP).

References


ON THE HORIZON

2017 EYEQ WEBINARS SERIES: BASICS & INNOVATIONS

February 21
4:30pm PT/7:30pm ET
Thyroid Eye Disease
with Richard Cutler Allen, MD

May 16
4:30pm PT/7:30pm ET
Sterilization
with Barbara Ann Harmer, MHA, BSN, RN

Summer Webinar – Date TBD
4:30pm PT/7:30pm ET
Zika Virus
with William May, MD

October 3
5:00pm PT/8:00pm ET
Age Related Wet and Dry Macular Degeneration
Andrew N. Antoszyk, MD

Registration opens January 11.
Please check our website for more information about the 2017 Webinar Series.
Free for paid 2017 members!

2017 LIVE MEETINGS

April 22, 2017
Dallas-Fort Worth Ophthalmic Update
Presbyterian Hospital
Dallas, TX

August 11–12, 2017
Combined Ophthalmic Symposium
Nurse and Technician Program
JW Marriott
Austin, TX

November 10–11, 2017
2017 Annual Meeting
Morial Convention Center
New Orleans, LA

Please continue checking our website for more information about 2017 Meetings.
For more info, visit www.asorn.org

ONLINE CONTINUING EDUCATION COURSES, EYECARECE

Comprehensive Diabetic Care: Focus on Eye-Related Changes
Insight, Fall 2016

Optic Neuritis
Insight, Summer 2016

Retinal Imaging: Past, Present, and Future
Insight, Spring 2016

Fundamentals of Fluorescein Angiography
Insight, Winter 2016

For more info, visit www.EyeCareCE.org
An efficient replacement for the traditional syringe method of rinsing Phaco and I/A hand pieces, cannulas, vit cutters, and tubing.

- Provides consistent rinsing pressure and volume regardless of the operator.
- Eliminates ergonomic issues associated with repetitive syringe use.
- Frees up your hands to perform other tasks, greatly improving the speed and efficiency of your reprocessing department.

Call AOI for Information
800.576.1266 or 949.580.1266

AOI
ADVANCED OPTISURGICAL INCORPORATED
9 Orchard, Suite 111
Lake Forest, CA 92630
www.optisurgical.com
info@optisurgical.com

Legislative Update

Vision Requirements for Commercial Drivers:
Certification Mandates from the Federal Motor Carrier Safety Administration

The Federal Motor Carrier Safety Administration (FMCSA) is a separate administration within the U.S. Department of Transportation (DOT), with the primary mission of reducing crashes, injuries, and fatalities involving large trucks and buses. Its role is to develop and enforce data-driven regulations to balance safety and efficiency, provide educational messages to carriers and commercial drivers, and partner with the federal, state, and local enforcement agencies on efforts to reduce bus- and truck-related accidents.

In support of these continuing safety efforts, the FMCSA has recently mandated a new National Registry of Certified Medical Examiners. This registry is, in part, a response to alarming reports from the National Transportation Safety Board (NTSB), revealing that U.S. roadway deaths accounted for nearly 94 percent of all transportation deaths in 2013, and that bus fatalities were up from 39 percent of the total annual number in 2012 to 48 percent in 2013 (NTSB, 2013). Further concerns arose when data from the NTSB crash investigations indicated that improper medical certification of Commercial Motor Vehicle (CMV) drivers with serious disqualifying medical conditions was contributing to fatal crashes (FMCSA, 2014a). In response to these findings, the national registry was created to enhance CMV driver health and reduce highway accidents. As of May 21, 2014, all commercial drivers whose licenses expire must be examined by a medical professional certified and listed on the National Registry of Certified Medical Examiners, which is maintained and managed by the FMSCA (FMSCA, 2014b). Medical professionals are defined by the FMSCA as medical doctors, chiropractors, advanced practice nurses, and physician assistants. In order to become a certified medical examiner, these professionals are required to attend and complete training, pass a four-hour certification test, comply with the FMCSA administrative requirements, and register on the National Registry system. Once certified, a medical examiner is required to update and transmit monthly results of all commercial motor vehicle driver exams performed to the FMCSA through the National Registry System online.

Several changes were made in the physical examination and other requirements for commercial drivers according to FMCSA regulation 49 CFR 391.41 (FMCSA, 2014c). The diagnosis of any vision concerns requires a detailed evaluation from the professional examiner, and the exam includes but is not limited to color blindness, field of vision deficits, and
inadequate visual acuity. The DOT vision requirement for the driver is a 20/40 in each eye separately and binocularly, with or without correction (FMCSA, 2014c). If corrective lenses are required for certification, this will need to be addressed and noted on the driver’s certificate. Examiner observation is essential during the Snellen chart reading to ensure that the commercial driver faces the chart directly and does not try to read from the side, which could indicate the presence of macular degeneration. If macular degeneration or mono-vision is identified through history or visual exam, the CMV license certification will need to be denied (FMCSA, 2014c).

Color deficiency exam for commercial drivers is a necessity; they are required to recognize the colors of traffic signals and devices showing standard red, green, and amber. Color perception tests such as Ishihara, pseudoisochromatic plates, or yarn are generally administered by the examiner, and any failure to identify these colors results in denial of certification for the driver. A commercial driver also needs a field of vision exam, ensuring they have at least 70 degrees in the horizontal meridian in each eye. To pass all vision requirements, full range of motion of the neck is checked to ensure the driver can see rearview mirrors and vehicles to the side of the commercial truck or bus.

Visual exemptions are sometimes granted. However, to be considered for a visual exemption, the driver must be qualified under all of the other physical standards in 49 CFR 391.41 without any other waivers or exemptions (FMCSA, 2014a). An application is submitted along with a history of driving experience and a signed statement from present or past employer(s) on company letterhead or notarized letter that the driver has operated a CMV with the present vision deficiency for a three-year period. In addition, the applicant’s driving record of the previous three years must include no reported suspensions or revocations of the driver’s license. This includes no traffic accidents or convictions for a disqualifying offense.

Drivers with a pre-existing visual deficit are required to be evaluated by an ophthalmologist or optometrist within three months preceding the exemption application. The ophthalmology documentation should include the nature and duration of the visual deficiency and the date of the examination. The examiner should certify that the visual deficiency is stable; document the visual acuity of each eye, corrected and uncorrected, the field of vision for each eye with formal perimetry test, and the visual color perception; and determine that in his or her medical opinion, the driver has sufficient vision to perform the driving tasks required to operate a commercial vehicle (FMCSA, 2014b).

Driving is a highly visual task, and many aspects of visual function and processing are undoubtedly involved in maintaining effective control of a commercial motor vehicle. Goals of the FMSCA and related Medical Expert Panels (MEP) will be to continually review research literature and data to provide updated medical fitness guidelines for drivers of commercial motor vehicles.

Tammy Sadighi, DNP, ARNP-BC, MBA, is a Federal Certified Medical Examiner at Millennium Health Care in Fort Myers, Florida. Email: tsadighi@fgcu.edu

References

Advanced Optisurgical Inc. has over 20 years of combined experience repairing Phaco handpieces.
All repairs are performed at our facility in Lake Forest, California USA.

COMPLETE HANDPIECE REBUILD INCLUDES:
• New Ultrasonic Motor
• New Connector
• New Cable and Strain Reliefs

WE BUY USED PHACO HANDPIECES (working or not)
WE SELL REFURBISHED PHACO HANDPIECES (call for current inventory)

Call AOI for Information
800.576.1266 or 949.580.1266
Presented for Nurses and Technicians

APRIL 22
PRESBYTERIAN HOSPITAL
DALLAS, TEXAS

Program Topics*
• DMEK/Corneal Crosslinking
• Contact lens update
• Oculoplastics
• Retina
• and more!

*COURSE DIRECTORS:
Karen Fogelman, BSN, RN, CRNO
Susan Clouser, MSN, RN, CRNO

For more information visit
WWW.ASORN.ORG/
educational_programs/regional_meetings/ophthalmicupdate