



The Importance of Color Vision in Healthcare

Terrace L. Waggoner Jr. (T.J.), MBA, MA

Dr. Terrace L. Waggoner Sr., O.D.

Why is color vision important in healthcare?

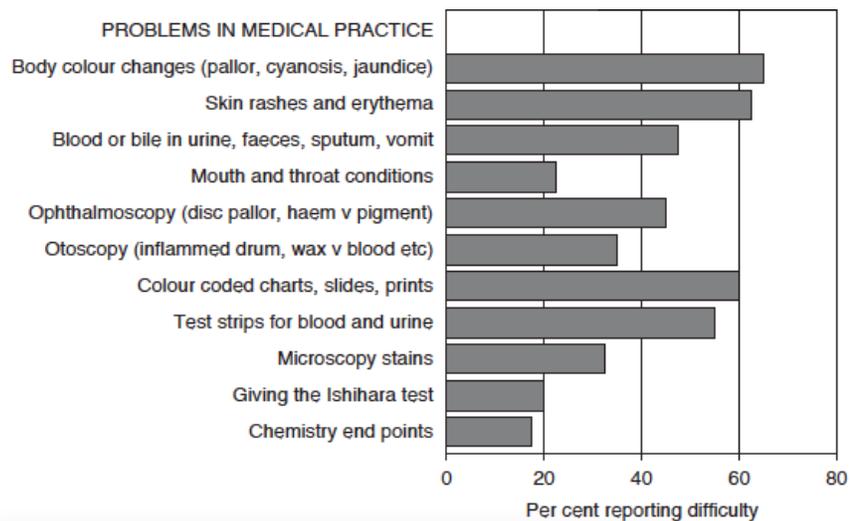
Color discrimination plays a fundamental role in the healthcare system. By being unaware of hospital employees or other healthcare workers with color vision deficiencies (CVD), patients' safety is at risk. Genetic CVDs affect between 8%-12% of males and 0.5% of females, and acquired CVDs affect as much as 15% of the total population (Ivan, 2013). What is dangerous is that 20% to 30% of people with a CVD are unaware they have the condition (Cole, 2007). With the majority of physicians being male and an increasing number of males becoming nurses, the safety of patients is potentially jeopardized if CVD is not tested both initially and routinely. CVD must be tested routinely, after employment, because acquired color vision deficiencies do develop after birth due to medications, disease, toxicity reactions, and age.

Following is a list created by a director of radiology and a registered nurse that medical profession practitioners suffering from CVD may have difficulty detecting with more listed in the graph below (Cole, 2004; Rouse, L., personal communication, April 9, 2012; Nolan, T. RN, BSN, personal communication, March 12, 2012)

- Stages of bruising (first stage: purple/black, second stage: green/yellow)
- Telemetry machines
- Color coded phlebotomy tubes, medications, charts, slides, and prints
- IV gauge catheters (color coded by size)
- Stage I pressure ulcers
- Color sensitive monitors
- Ultrasound Doppler color images
- Nuclear medicine and PET scan results

If a nurse or doctor missed certain symptoms or cues because of CVD, critical and preventable, medical issues may go undetected and worsen (ex. Stage I pressure ulcer). According to Bluni and O'Shaughnessy (2009), there were 257,412 cases of Stage III and IV pressure ulcers in 2007 that cost hospitals a non-reimbursed average of \$43,180 per stay. With the increased use of color-oriented computer screens, people with CVD are likely to overlook important signs that indicate cancer or other anomalies that are present.

Spalding (1999) found support that doctors and nurses with CVD, specifically moderate or severe, performed poorer than those with normal color vision for certain medical procedures. In a study by Campbell, Spalding, and Mir (2004) it concluded that doctors suffering from CVD were poorer at detecting physical signs and naming the colors and were less confident about their decisions.



Telephone: +1 (949) 396-1694 | Fax: +1 (949) 432-3523

Email: sales@waggonerdiagnostics.com

www.WaggonerDiagnostics.com



The following graph details the percentage of medical personnel that have difficulty with the indicated medical symptoms (Spalding, 1997, 1999a).

How Do We Raise Awareness and Create a Safer Environment?

There are a multitude of color vision tests available for purchase. The most common color vision test is the Ishihara, which is a pseudo-isochromatic booklet test. The Ishihara was made in 1917 and has not been updated, provides no quantitative assessment as to severity, and provides no detection of acquired (tritan) deficiencies (Cole, 2007). A military-grade color vision test, Waggoner Computerized Color Vision Test (WCCVT), provided by Waggoner Diagnostics is accessible at TestingColorVision.com (TCV). TCV is an online pseudo-isochromatic color vision test that defines all three CVDs, protan, deutan, and tritan, as well as their severities.

Additionally, the WCCVT can be installed on a computer and/or integrated into a hospital's learning management system. This allows a hospital to efficiently and effectively test thousands of employees annually. A common misconception is that people are only born with a CVD. This is incorrect. Here are a few ways that CVD can be acquired:

- Diabetes
- Medications (anti-depressants, erectile dysfunction)
- Multiple Sclerosis
- Aging (discoloration of the lens)
- Glaucoma

The prevalence of acquired CVDs provides justification for testing of employees on a regular (e.g. annual) basis.

Do Accreditations Require Color Vision Testing?

The College of American Pathologists (CAP) requires an initial color vision test when a laboratory technician is hired and when color discrimination is pertinent to the job (POC.06950). "The Joint Commission standards do not specifically require either visual acuity or color-blind testing for employees. The HR standards require assessment of the employees' abilities to fulfill the expectations of their job descriptions. Color-blind testing may be utilized as part of an organization's initial or ongoing competency assessment program, but other mechanisms that evaluate an individual's ability to interpret colorimetric determinations would also be acceptable" (Joint Commission, 2008). Related to the above, Joint Commission evaluators are known to ask if color vision screening is in place at hospitals.

According to O*Net, which develops job analyses for thousands of careers and is created by the U.S. Department of Labor, nurses must be able to do the following tasks (Department of Labor, 2010):

- Monitor, record, and report symptoms or changes in patients' conditions.
- Order, interpret, and evaluate diagnostic tests to identify and assess patient's condition.
- Identifying information by categorizing, estimating, recognizing differences or similarities, and detecting changes in circumstances or events.

For doctors and nurses suffering CVD, all of these tasks would be difficult to fulfill their job expectations and ethical responsibility as stated by the Joint Commissions website, therefore placing both the patient and hospital at great risk. Although the Joint Commission indicates that other mechanisms (besides color vision tests) are acceptable to use, it is crucial to note that the only way to determine if someone is colorblind is by taking a color vision test.

Telephone: +1 (949) 396-1694 | Fax: +1 (949) 432-3523

Email: sales@waggonerdiagnostics.com

www.WaggonerDiagnostics.com



As Spalding, a general physician with CVD, noted, “The evidence points to the need for CVD screening in medical students and doctors” (1999, pg. 474). With the evidence stated above, it is equally important for nurses to be tested. Testing for color vision deficiencies is an important aspect within the healthcare industry that should not be ignored. It will help save lives and minimize legal exposure to the doctors and healthcare providers. Failure to employ a routine color vision test to its doctors and nurses as part of a regular screening program places the patients at great personal harm. Further, it potentially places the doctors, nurses and hospitals at great financial risk by exposing them to negligent claims for failure to screen for CVD by proving that a doctor or nurse was unable to fulfill their fundamental job expectations.

References

- Bluni, R., & O’Shaughnessy, J. (2009). Words that save: Ensuring that “never events” never happen. *Health Management Systems, Fall Issue*, 13-17.
- Campbell, J. L., Spalding, A. B., & Mir, F. A. (2004). The description of physical signs of illness in photographs by physicians with abnormal colour vision. *Clinical and Experimental Optometry*, 87, 334-338.
- Cole, B. L. (2004). The handicap of abnormal colour vision. *Clinical and Experimental Optometry*, 87, 258-275.
- Cole, B. L. (2007). Assessment of inherited colour vision deficiencies in clinical practice. *Clinical and Experimental Optometry*, 90, 157-175.
- Department of Labor. (2010). Summary Report for: 29-1141.00 - Registered Nurses. In O*Net OnLine. Retrieved March 16, 2012, from <http://www.onetonline.org/link/summary/29-1141.00?redir=29-1111.00>.
- Ivan, D. J. (2013). Ophthalmology. In *Rayman’s Clinical Aviation Medicine 5th Edition*. (pp. 235-292). New York, NY, Castle Connolly Graduate Medical Publishing, LTD.
- Joint Commission. (November 24, 2008). Standards FAQ Details. In The Joint Commission. Retrieved March 16, 2012, from http://www.jointcommission.org/standards_information/jcfaqdetails.aspx?StandardsFaId=30&ProgramId=1.
- Spalding A. B. (1997). *Doctors with inherited colour vision deficiency: Their difficulties with clinical work*. In (Ed.) Cavanaugh C. R., *Colour Vision Deficiencies XIII*. Springer-Verlag: New York.
- Spalding, A. B. (1999). Colour vision deficiency in the medical profession. *British Journal of General Practice*, 49, 469-274.
- Spalding A. B. (1999a). Medical students and congenital colour vision deficiency: Unnoticed problems and the case for screening. *Occupational Medicine*, 49, 247-252.

Telephone: +1 (949) 396-1694 | Fax: +1 (949) 432-3523

Email: sales@waggonerdiagnostics.com

www.WaggonerDiagnostics.com