LED Surgical Headlights: Criteria for Choosing the Right One
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LED surgical headlights continue to grow in popularity among surgeons. Every day we talk with surgeons looking for a surgical headlight that will better meet their needs. Not all LED surgical headlights are alike and the variety of choices in the market can be overwhelming. How do you choose the right one? What overall criteria do surgeons ask about? What should you care about? If you’re new to the process of looking for an LED surgical headlight or it’s been a while since you purchased your last one, this white paper covers criteria to consider.

There are basically ten criteria to consider when evaluating LED surgical headlights. They include: brightness, type of light, battery life, control, comfort, durability, portability, maintenance, service, and cost.

Quality of Illumination
Quality of illumination encompasses light brightness, color temperature, spot size and uniformity of light.

Surgical headlights are not alike when it comes to brightness and color temperature, both of which impact how well you see the surgical site. Brightness is measured in lux and surgical headlight brightness can range from as low as 40,000 lux to as high as 225,000 lux. When comparing the brightness of headlights it is important to note the distance at which lux is measured. The industry standard for measuring lux is at 14 inches.
Color temperature is the hue of the light. It can be cool or warm and is measured in degrees Kelvin. The optimum color temperature for surgical headlights is 6100 degrees Kelvin, which is pure white illumination (comparable to daylight) that provides most surgeons with the truest tissue color rendition. Depending on the type of surgery performed, you may want a slightly different hue, which can be adjusted by using light filters. Recent reports suggest that some surgeons have found that a lower color temperature may provide greater tissue differentiation though this appears to be a matter of individual preference.

The size of the light spot is important too. Depending on the kind of surgery performed, you generally want the ability to adjust the headlight’s light spot larger or smaller.

In addition, the light itself should be uniform or consistent from edge-to-edge, not bright in the middle and dimming on the edges.

**Type of Light**

There are three basic types of surgical lights: halogen, xenon and LED. Halogen and xenon light sources require a fiber optic cable and replaceable bulbs. Halogen bulbs are relatively inexpensive but have a limited use of 80 – 100 hours and often cast a yellowish light. Xenon bulbs are rated for 500 to 1000 hours of use and tend to cast a bluish light. Both Halogen and Xenon light sources generate significant heat. LEDs, or light emitting diodes, provide pure white, bright light and don’t emit infrared heat like halogen and xenon bulbs. It is also valuable to consider the quality of light each light type emits. Halogen and xenon light bulbs tend to lose luminosity over time because of bulb and cable degradation. LEDs will not break or burn out and have an estimated life of over 50,000 hours.

**Battery Life**

This issue relates solely to LED headlights as xenon and halogen lights are powered by a light box which is plugged into an AC circuit. The number of battery types is as varied as surgical headlights. The length of time you are in surgery throughout the day or week will dictate the headlight system you choose. Most LED surgical headlight battery packs use lithium ion or lithium polymer.
batteries, both of which are rechargeable. Battery life can range from fewer than two hours to 24 hours and will depend on the headlight used and intensity chosen. Digital batteries offer superior performance because they are either “on” or “off,” which means the illumination is consistently bright.

Control
Having control means the light is direct and precise. Is the headband and light adjustable? Is the brightness adjustable? Is the aperture adjustable? What’s important to you? Plus, consider how easy it is to adjust the headlight during surgery. Is it cumbersome? Does it stay in place once adjusted on your head?

Comfort
Surgical headlights have different weights. The heavier a headlight, the higher the chances you’ll have neck and shoulder pain during and after performing surgery. This is an important criteria should you be required to wear other gear such as a lead vest. How it is balanced is as important as weight. Is the headlight comfortable on your head? Is it fully adjustable? Is it balanced front to back?

Durability
How well constructed is the headlight? Is it made with flimsy materials? Can it be dropped and still work? Is it durable while being comfortable and lightweight? Check with the manufacturer to ensure all parts of the headlight system are covered under warranty for any malfunction that may occur.

Portability
How easy is it to move wearing a surgical headlight? Fiber optic headlights depend on a power source box and heavy fiber optic cable, which prevent you from being mobile. Where does the battery sit if the headlight is battery-operated?

Maintenance
How easy is it to clean the surgical headlight? Replace pads? Carry from your office to the OR? How often does the cable need replacing? These are all important questions to ask before making a purchase.

“Lighting is key in any kind of surgery. In cosmetic surgery, we must have adequate visualization to avoid making a mistake. When making small incisions or working on a nose, cleft palate or breast, the space is cavity and requires focused light. In addition to overhead light and surgical headlight, we use lighted retractors which have two purposes—to hold up tissue and provide light, but the light is not always pointing where you need it.

I use the Enova XLT-125 when I’m in surgery, which is two to three times per week. A surgery can take from one hour to as much as seven or eight hours. I especially like the Enova battery pack. I have the bigger pack and it lasts all week and is easy to change out if necessary. The intensity adjustment on the battery pack is nice too. I usually use one off of the highest setting; it is brighter without reflection.”
Service
Is it possible to evaluate the surgical headlight before buying it? How important will you be to the headlight provider? Will calls for service and replacement parts be returned? How long has the company been in business? Do you believe they’ll be around into the future? Good service makes a difference.

Cost
No matter what headlight you purchase, there will be long-term costs. Most high quality surgical headlight systems cost between $1,500 to $6,000, with LED headlight systems ranging from $1,500 to $3,000 and fiber optic systems ranging from $3,000 to $6,000. The typical annual costs for fiber optic systems range from $300 - $900 to replace xenon and halogen bulbs plus an additional annual cost of $400 to $800 for fiber optic cables. The annual maintenance cost of LED headlights is minimal with battery replacements ranging from $200 to $400 every one to two years. Weigh these costs in addition to the initial cost of the headlight. How often might parts need to be replaced? How much will replacement parts cost over time? Cost shouldn’t be the only criteria. Consider all of the criteria listed above as well as price.

Evaluating a surgical headlight before purchasing it will ensure you are satisfied with it. Enova offers a no-risk evaluation program that lets surgeons evaluate Enova LED surgical headlights for up to 30 days without risk or obligation. Learn more.

Enova Illumination stands alone as the first LED surgical headlight designer and manufacturer in the industry. Our headlights can be found in the best clinics, hospitals, universities and military bases around the world. And, because Enova® headlights are designed for surgeons, by surgeons, we remain on the forefront of innovation to provide the brightest, lightest, and most dependable surgical headlights available.

Visit www.enovaillumination.com to learn about our LED surgical headlights including the Enova XLT-1125 Coaxial LED Surgical Headlight, the Iris D-200, Iris S-100 and Iris S-50 LED surgical headlights.

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