How to handle and care for bulbs in ophthalmic

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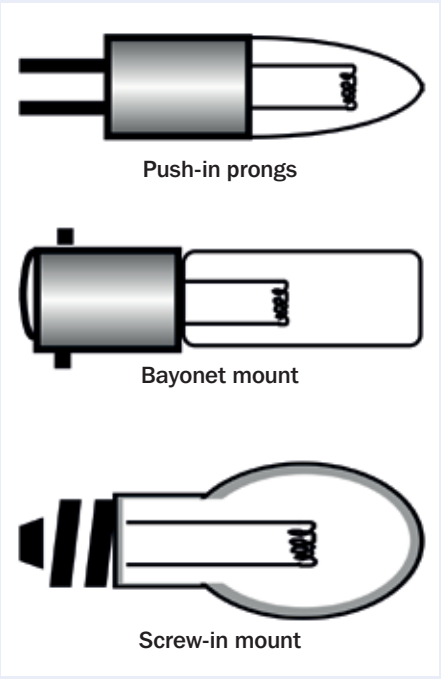
Many devices used in eye care rely on light bulbs or lamps for their operation. All light bulbs have a limited lifespan and when the bulb fails the device becomes unusable. Therefore, knowing how to handle, how to inspect and how to replace bulbs is important. Just as important is keeping spare bulbs to hand!

Prolonging the lifespan of bulbs

The lifespan of a bulb varies widely among different types of bulbs and also will depend on the particular application and the environment in which it is used, among many other factors. To help ensure the longest bulb life possible you should follow these guidelines.

- Turn on the equipment at the lowest light intensity setting. Sudden high voltage surges can blow bulbs, especially when cold.
- Use the equipment at lower light intensity settings as much as possible.
- Turn off the bulb or equipment when it is not being used.
- Don't move a device while the bulb is still lit or hot: wait until the bulb has cooled. Even gentle vibrations may cause a hot bulb filament to break since they are more brittle when hot.
- Each time you turn the unit on, a current surge stresses the bulb's filament. The more often this stress is applied the sooner the bulb will fail. For this reason, turning the equipment on and off frequently is not recommended.
- Inadquate cooling can cause the bulb envelope seal to fail or the bulb capsule to swell. Make sure that the fan, if included, is operating and that the intake and exhaust vents are not blocked. Keep the filters clean and the area around the equipment free from objects that might restrict airflow and create heat.
- High power line voltage is a major cause of short bulb life. Typically an increase of 5% in the voltage supply above the bulb's rated voltage can reduce its lifespan by 50%.
- Oils and other stains on the bulb's glass can create hot spots that can cause the bulb to fail. You should avoid touching bulbs with your bare fingers.
- Pitting, corrosion or other damage in the bulb socket's contacts will cause inconsistent current and will shorten the bulb's life. Replace damaged sockets.

Figure 1. Different connection types



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Removing and installing bulbs

- Shut off the instrument and unplug it from the electrical outlet.
- Let the bulb cool before removing it. You should remember that the bulb – especially if it is a halogen bulb – will be very hot and could burn your fingers. You should allow sufficient cooling time and use a cloth or a suitable heat insulator to hold the bulb.
- Do not touch the new bulb directly with your fingers; use tissue or cotton gloves. If the bulb is touched accidentally, it should be wiped clean with a cloth moistened in alcohol to remove potential skin oil deposits. These deposits can burn into the glass, creating shadows and weakening the glass, and causing premature failure.
- Know how each specific bulb fits into its socket (Figure 1).
- When installing bulbs, be sure the lamps are secured completely. The tendency is to stop at the first sign of resistance. Continue to carefully apply force at the base of the lamp until you are sure the lamp is secure. Improper installations will cause electrical arcing, overheating and shorten the lifespan of both lamp and socket.
- Check that the filament is correctly aligned to ensure that the light projected is of even intensity.
- Replace a defective bulb with the identical type (same shape, voltage and wattage). Some bulbs may look very similar but may have quite different heat characteristics that could cause damage or fire risk. The two bulbs in Figure 2 look alike and can both fit into the same type of socket, but one is a 12 volt/35 Watt bulb, while the other is a 120 volt/25 Watt bulb. Also, the filaments have different shapes and will yield different light profiles.

Inspecting bulbs

- Check for bent or sagging filaments as these indicate imminent failure.
- Inspect the filament for continuity and welding points. Loose filaments will produce a blue arc of light and flickering.

Figure 2. Similar but different bulbs

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Figure 3. Bulb stock can be kept in a container and labelled as shown

Instrument(s): Optix SL-50 and SL-150 Slit Lamps
Details: Osram 7215, 6 volts, 150 watts
Vendor: Bulb City, 19 South Bank Street, Singapore. Tel: 6779533
Part Number: 142566-3
Price: $32.50 per bulb
Minimum/maximum stock levels to be kept*: 3/9

*(Reorder when minimum quantity is reached)

equipment

- A metallic haze on the inside of the glass envelope of the bulb signifies evaporation of the filament, precedes filament failure, and also reduces the lamp's brightness.
- Inspect the bulb's contacts for corrosion. Sometimes it is possible to remove the corrosion with a file or sandpaper.

Maintaining a bulb inventory

- Based on the number of instruments you have that require a specific type of bulb, and on how often you replace this type of bulb, you should purchase and store replacements in clearly labeled containers. Figure 3 shows one way to label the bulb containers.

General handling and safety precautions

- Always turn off the electrical power before inserting, removing, or cleaning a bulb.
- Always handle bulbs with care and store them appropriately to minimise the likelihood of glass breakage. If you do break a bulb, please remember that some contain harmful substances and should be handled accordingly. Incandescent bulbs pose little or no threat except that of the broken glass and can be dealt with as regular waste. Fluorescent tubes and most discharge bulbs can contain potentially harmful chemicals that should be handled with care and disposed of in accordance with your local waste authority rules and health and safety policies.
- Bulbs should be easy to install and remove from their fittings and should never be forced as this can often result in breakage of the glass.
- Many bulbs contain gases at either greater than or less than atmospheric pressure and may either explode or implode if the glass is broken. This can cause a significant hazard. Bulbs should not be disposed of by breaking them unless appropriate protective equipment is used and environmentally sound disposal methods are followed.
- Do not use halogen or other hot burning bulbs near paper, cloth or other combustible materials that can catch fire.
- Do not look directly at an operating bulb for any period of time; this may cause serious eye injury.

How to measure the pulse

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Before surgery, eye patients must be assessed for their suitability for surgery. Taking the pulse allows us to find out what the patient's heart rate is and to assess the strength, regularity, and character of the pulse. Irregularities might indicate a heart problem and must be investigated.

Taking the pulse also provides an initial recording (a 'baseline') that will enable us to compare future measurements and monitor changes in our patient's condition.

The pulse can be measured at several points in the body. These points are where an artery is situated just under the skin, where it can be compressed against a bone, allowing us to feel each beat.

This article will cover the measurement of the pulse at the radial point (inside the wrist, see Figure 1) as this is the most common point at which to measure the pulse of eye patients.

NOTE: Many things – such as anxiety, pain and fever – can raise the patient's pulse (heart rate) and certain medications such as beta blockers or digoxin can lower it; all of these reasons should be considered when assessing and recording the patient's pulse. If you are taking repeat measurements of the same patient, try to measure the pulse under the same conditions each time.

What is normal?

A normal pulse is regular and strong. Heart rates, and therefore pulse rates (number of beats per minute) change with age and can vary between individuals of the same age.

Table 1: Normal pulse rate range, by age

Age	Pulse rate (beats per minute)
Newborn (resting)	100–180
Infant (resting)	80–150
Child 26 years	75–120
Child 6–12 years	70–110
Adolescent–adult	60–90

You will need

- A watch that has a second hand
- A chart to record the pulse measurement
- A black pen.

Before you begin

1. Wash your hands – this will help to prevent cross-infection.
2. Explain what you are about to do. This will help the patient to understand what is about to happen and will make it easier for them to co-operate.

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Figure 1

Procedure

1. Ask whether the patient has walked, climbed stairs, or otherwise exerted themself in the last 20 minutes. If not, you can proceed. If the answer is yes, wait 20 minutes before taking the reading. This will help to prevent false readings.
2. Make sure the patient is relaxed and comfortable.
3. Place the tips of your first and second finger on the inside of the patient's wrist (Figure 1).
4. Press gently against the pulse. Take your time to note any irregularities in strength or rhythm.
5. If the pulse is regular and strong, measure the pulse for 30 seconds. Double the number to give the beats per minute (e.g.: 32 beats in 30 seconds means the pulse is 64 beats per minute). If you noticed changes in rhythm or strength, you must measure the pulse for a full minute.
6. Record the pulse rate (the number of beats per minute) in the patient's notes and describe its strength and rhythm. Compare the pulse rate with the values in the Table 1 and record whether the pulse is normal, slow or fast. Any abnormalities should be recorded and reported to the senior nurse and doctor.
7. Strength of the pulse is a very subjective measurement, but an experienced nurse will compare it with what has been felt previously in other patients. Describe the puse as 'weak', 'faint', 'strong' or 'bounding'.
8. Think about the rhythm of the pulse. Is it regular? If irregular, in what way? Cardiac problems may present as a regular missed beat, for example, so is the irregularity regular (described as regularly irregular) or is there no pattern (described as irregularly irregular)?
9. Discuss with your patient the result of the pulse measurement and if any further investigations are required.
10. Wash and dry your hands.

Sources

Nursing and midwifery: a practical approach. Sally Huband, Pam Hamilton Brown and Gillian Barber Macmillan Education

Royal Marsden Hospital Manual of Clinical Nursing Procedures

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