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Laryngoscope handles and the very real threat of cross-contamination

The Medical Device Challenge

Abstract

Patient to patient transfer, staff to patient and vehicle transmissions are all concerns when facilities reuse laryngoscope blades, handles, and light sources.

For centuries, medical practitioners have been searching for the best view of the vocal folds and glottis. Historians give credit to Benjamin Guy Babington, an English epidemiologist, for the invention that lets doctors inspect the oropharynx and hypopharynx. Babington developed a device he named the glottiscope – a precursor to today’s modern laryngoscope.

A conventional modern day laryngoscope is a combination of a number of past inventions. It consists of a handle to provide grip and storage for the batteries, a light source and interchangeable blades – such as the curved Macintosh blade or the straight Miller blade. As concern regarding cross-contamination becomes more prevalent in light of resistant bacteria strains, the laryngoscope handle falls into focus.

Hospital Acquired Infections

Hospital acquired infection is on the rise. The Centers for Disease Control and Preventions reports there are as many as 99,000 deaths each year from nosocomial infections. Of the over 1.7 million cases reported annually, gram-negative bacteria accounts for an estimated two-thirds based on European hospital surveys. In the United States, hospital acquired infections cost the healthcare industry between 4.5 to 11 billion dollars each year.

Nosocomial infections lead to:

- Pneumonia
- Urinary tract complications
- Sepsis

The most common infection is urinary tract. This accounts for approximately 36 percent of all nosocomial infections. Following UTIs are surgical site infections at around 20 percent with bloodstream infections and pneumonia at around 11 percent each.

These hospital acquired infections are a contributing factor to the rise in antibiotic resistance, as well. Two common bacteria attributed to hospital cross-contamination are MRSA and Acinetobacter. There are few drugs available for the treatment of the evolving Acinetobacter strains – making it a more serious danger than even resistant staph.

Hospitals in Brooklyn, NY are reporting a surge of drug-resistant *Klebsiella pneumoniae*. Experts estimate more than 20 percent of these nosocomial infections in New York are resistant to all modern antibiotics. *Klebsiella pneumoniae*, MRSA and Acinetobacter are just a handful of the supergerms spreading worldwide.

The Risk of Cross-Contamination

Cross-contamination is at the top of the list of infection issues that hospitals face. Infectious pathogens, and especially resistant bacteria, can survive for long periods on surfaces in healthcare facilities. These surface contaminations provide pathogens a number of transmission routes.

Staff to Patient – The most frequent mode, contact transmission occurs when a staff member touches an infected hospital surface and then transfers the pathogens directly to the patient by touch.

Vehicle Transmission – another common problem, vehicle transmission means a patient or staff member comes in contact with pathogens through contaminated items such as food, water or medical devices like the laryngoscope.

Many manufacturers provide disposable options to help reduce the risk of vehicle transmission. Single-use laryngoscope blades are part of this revolution. The user simply discards the blade between patients to limit the risk of cross-contamination. While this practice is an improvement over the old Babington glottoscope, it doesn't go quite far enough. Recent studies show that the reusable laryngoscope handle is a hot bed for pathogens.

Laryngoscope Contamination Studies

SUNY Upstate Medical University Study

A 2009 study published in *Anesthesia & Analgesia* sampled 60 laryngoscope handles from the operating rooms of SUNY Upstate Medical University. The hospital recognized their lack of regulations regarding the disinfection of these handles and authorized the testing. The researchers took samples of scopes used for a variety of cases.

Forty of these samples went for antimicrobial susceptibility testing and aerobic bacterial cultures. The other 20 were given polymerase chain reaction assays. Of the 40 sampled for bacterial contamination, 75 percent (30 total samples) tested positive.

- 25 showed evidence of coagulase-negative staphylococci
- 7 produced *Bacillus*
- 3 α -hemolytic *Streptococcus*
- 1 also produced *Enterococcus*, *Staphylococcus aureus* and *Corynebacterium*

All the viral tests were negative. The researchers concluded there was certain evidence of bacterial cross-contamination with reusable laryngoscope handles even when treated with a low-level disinfectant.

Swansea UK Study

Researchers at the Swansea University School of Medicine published a similar study in the 2010 Journal of Hospital Infection. This study collected 192 specimens from 64 laryngoscope handles deemed ready for use. Researchers isolated at least one species of bacteria on 86 percent of the handles with a total of 128 different organisms. Pathogens discovered included:

- Enterococci
- Meticillin-susceptible *Staphylococcus aureus*
- *Klebsiella*
- *Acinetobacter*

The most common organism found was coagulase-negative staphylococcus. Of the 99 positive cultures, many were polymicrobial.

- Thirty percent of the handles grew just one species
- Twenty-eight percent grew two species
- Seventeen percent grew three species
- Eight percent four species
- Two percent five species

These are just two studies in a number that provide clinically based proof of the cross-contamination risk in reusable devices that touch mucous membranes such as the laryngoscope. Although most products require single-use blades, the handle continues to be a source of vehicle transmission.

Reasons for this Overlooked Issue

A 2013 issue of the European Journal of Anesthesiology addresses the problem of cross-contamination of reusable laryngoscope handles calling the issue “largely overlooked.” The authors theorized there were three contributing factors:

1. The switch to single-use blades to reduce the risk of the transmission of prions has limited the health care community’s diligence regarding the disinfection of handles. Healthcare professionals are assuming the use of single-use blades negates the risk.
2. The lack of indisputable evidence of contamination is dimming the clinical consequence of pathogen transmission via the handle despite a 2011 alert from the UK Medicine and Healthcare product Regulatory Agency. The agency attributed a patient death to the failure to decontaminate a laryngoscope handle leading to septicemia.

3. Healthcare professionals inherently trust institutional decontamination protocols and assume other staff members handle the task. It is likely most are not even aware of the practice.

Even though the handle of the laryngoscope does not touch oral mucosa during intubation, the tip of the blade still contaminates it. Users fold the device and the infected area makes contact with the handle. The UK study showed heavier growth on the knurled section of the handle. This is the area that touches the blade when the device is closed between uses.

The conclusion drawn in the European Journal article was more facilities should consider switching to single-use laryngoscopes to reduce the risk of cross contamination.

Single-Use vs. Reusable Laryngoscopes

Medical technology is stepping up to reduce the risk of nosocomial cross-contamination and lower the incidents of hospital acquired infections. Studies prove that reusable devices such as laryngoscopes present this risk. In response, medical product manufacturers are now offering single use scopes where both the blade and handle are single-use.

Despite disposable blades, reusable scopes provide a cross-contamination route for patient-to-patient transmission. Experts admit that switching to disposable blades does improve the odds but research shows it is not enough. The reported death in the United Kingdom associated with cross-contamination of a laryngoscope handle proves there is a real need for a better system.

What about the Cost of a Single-Use Device?

With healthcare expense under a microscope these days, hospitals are looking for cost-cutting options. On the outside, it might seem like disposing of an entire laryngoscope with each use is a waste of funds, but the truth is reusable devices are less cost-efficient. Laryngoscopes have high failure rates primarily due to poor cleaning practices. In addition, the handle section frequently get lost leaving the facility with a stock of single-use blades they cannot utilize until they get a replacement.

Benefits of Single-Use Laryngoscopes

A single-use laryngoscope is a sterile unit individually packaged. These products offer a one-piece structure with an attached blade, handle and light source. Unlike the reusable units, the disposable devices have an integrated LED light source for improved tissue visualization. LED technology eliminates the need for a bulky storage area for batteries, as well.

Benefits of the single-use scope include:

- Advanced lighting that is brighter and easier to manage

- Ergonomic styling fit for any hand size
- Sterile packaging the eliminates the risk of bacterial contamination

Opting for single-use units is the budget-friendly choice. When you consider all that goes into using a more traditional scope, the cost savings becomes clear. Reusable laryngoscopes require:

- Disposable blades
- Batteries
- Sterilization equipment
- Replacement or backup devices
- Staff training to improve education on cross contamination with these devices

The proven contamination risk of reusable laryngoscopes is too costly to ignore. A hospital acquired infection leads to over 40,000 dollars in unreimbursed expense. Broken down, that adds up to 27 dollars per intubation for every single infection. Studies show there is a high risk of pathogen transmission with reusable handles. The cost of switching to an entirely single-use laryngoscope is nothing compared to that extra 27 dollar per use expense.

Conclusion

Patient to patient transfer, staff to patient and vehicle transmissions are all concerns when facilities reuse laryngoscopes in operating theaters, emergency rooms and in the field. It is a risk that the healthcare industry can no longer afford to ignore. Antibiotic resistance is a growing phenomenon. Now is the time to take steps to reduce cross-contamination and fight this escalation where possible. That means switching to single-use devices like laryngoscopes.

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