Are your Loupes as Clean as You Think?

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Objective

The purpose of this study was to evaluate which two cleaning protocols available to dental personnel was most effective in debunking the microbes present on dental loupes subsequent to patient care.

Background

Dental loupes are personal eyesore protective equipment (PEPE) worn by dental personnel for magnifying the clinician's field of view and improving work posture. PEPE serves to protect the eyes of the provider from liberated debris, both infectious and not, secondary to dental care. From the perspective of dental infection control, dental loupes are considered an infectious fomites and should require routine disinfection in order to mitigate the risk of unintentional transfer of microbes from one patient to another. The risk of transfer to a patient occurs principally as the provider adjusts their field of view. Presently, any overt fomites within the mUSC dental-operatory is subject to disinfection between cases. Modes of indirect contact transmission include surfaces and equipment that are not properly cleaned and disinfected between patients such a dental loupes. While the MUSC Clinic Policy and Procedure Manual states that dental loupes must be decontaminated with soap and water, it does not stipulate frequency. Previous studies have found that the loupes of dental students do indeed harbor significant microbial burden, averaging 498 colony-forming units per loupe. In this study, we evaluated the effectiveness of two cleaning protocols to assess which one is more effective in reducing the microbial burden associated with this essential piece of PEPE.

Methods

Forty loupes were randomized into one of two cleaning protocols: 1. The first were cleaned by hand using soap and water with the second group being disinfected by placing the loupe into the iCleanse Swift XL apparatus; a devices that subjects the PEPE to 30 seconds of microbial ultraviolet irradiation (260 nm) (Figure 1, Panel B). The concentration of microbes associated with the key contact points, (right and left temples and light-lens aperture adjustment ring) were liberated pre and post-cleaning by using a 1" x 2" sterile pre-moistened wipe (100ul of sterile phosphate buffered saline, augmented with lecithin and tween [PBSLT]) whereupon the wipes were placed into 2 ml of PBSLT, vortexes for 1 minute, and plated (100ul) onto a medium of Typticase Soy Agar supplemented with 5% sheep's erythrocytes. The plates were incubated for 48 hours at 37°C. Resident colonies were enumerated with the concentration expressed as Colony Forming Units (CFU)/loupe (Figure 1, Panel C).

Results

The disinfection of loupes using either method resulted in a significant reduction to the median concentration of bacteria associated with the loupes. The concentration of a bacteria recovered from the post Soap and Water loupes was found to be significantly cleaner than the concentration affiliated with the loupes prior to cleaning (p=0.0001), with the median concentration failing from 165 CFU/loupe to an undetectable concentration of microbes (Figure 1, Panel D). In fact 13 of the 20 loupes were found to completely free of bacteria post cleaning. It was speculated the mean concentration of 99 CFU/loupe was likely reflecting the concentration from one heavily soiled loupe (3,270 CFU/loupe).

The iCleanse Swift XL was found to be equivalently effective in its ability to disinfect dental loupes between cases. Here subjecting the loupes to this contactless disinfection protocol resulted in a significant decrease to the median concentrations (p=0.00005). Remarkably, the bulk of the loupes (15/20) were found to be completely free of viable bacteria even in spite of using a this contactless form of disinfection. Again, the post-disinfection mean concentration of 252 CFU/loupe was likely reflecting a concentration contributed from one heavily soiled loupe (4.320 CFU/loupe). Most impressive within this group was the observation from one loupe where its initial concentration of 5,70 CFI/loupe was reduced to 570 CFU/loupe subsequent to 30 second exposure to the microbial UV.

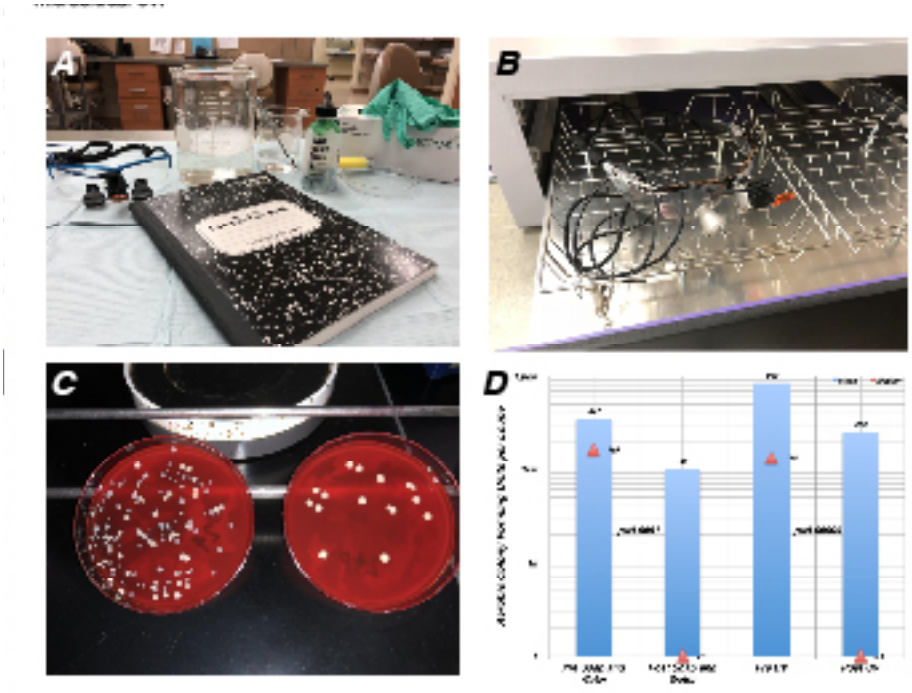

Figure 1. iCleanse Swift XL was found to be equivalently effective in its ability to disinfect dental loupes between cases A. Cleaning Station used to disinfect dental loupes using doap and water. **B.** Loupes in the iCleanse Swift XL for UV disinfection. **C.** Representative Pre-(left) and post UV disinfecting plating of colonies on blood agar plates. **D.** Graphical Representation of Data recovered pre/post disinfection.

Discussion

- Given a sample size of 20 loupes per method, it was postulated a difference of 41% or more would provide significant results. Given the results, the experiment demonstrated no statistical significance between using soap and water or using UV radiation.
- Fail to accept the null hypothesis.
- Based on the results obtained the bio burden on loupes following dental appointments confirms that they must be considered a significant fomites from which infectious agents may be inadvertently transferred to the next patient. Therefore Loupes should be disinfected in between patients.
- While there is a written protocol on how to clean loupes within MUSC's dental program, it fails to offer sufficient detail as to the frequency that loupes need to be cleaned.
- Loupe companies may consider addressing UV disinfection as part of their cleaning instructions.
- Further loupe design and testing should be preformed to determine any adverse effects of UV disinfection.
- The soap and water method is only as effective as the individual cleaning, whereas the iCleanse Swift XL was consistent cycle to cycle.

Conclusion

- Results revealed that the iCleanse Swift XL was equivalent to soap and water in its ability to significantly reduce the microbial load on loupe contact points.
- The iCleanse Swift XL was notionally preferred by providers as its use could be easily integrated into infection control practices post-appointment without any additional time.
- Future efforts should assess which of the two disinfection methods will garner greater compliance therefore, improve infection control in practice.

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References

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