

The effect of mechanical cleaning and thermal disinfection on light intensity provided by fibrelight Macintosh laryngoscopes

Most fiber light laryngoscopes tested were resistant to the effects of mechanical cleaning and thermal disinfection at 90°C for 300 cycles

Few fiber light laryngoscope blades tested could withstand additional sterilization at 134°C for 300 cycles

Objective

- To evaluate the effect of mechanical cleaning plus thermal disinfection, with or without subsequent steam sterilization, on the light intensity provided by fiber light Macintosh laryngoscopes

Methods

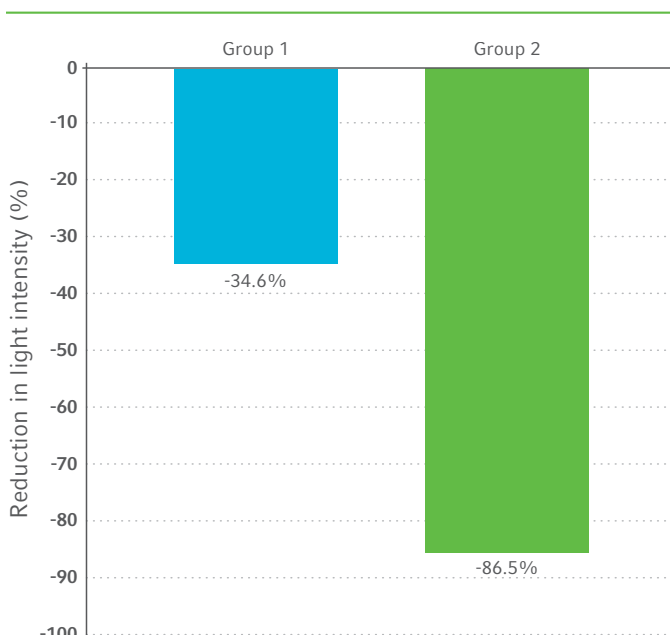
- To evaluate light intensity, reusable laryngoscope blades were mounted in a special frame with an in-built light source and the light intensity measured using a radiometer/photometer
- The positioning of the blades was performed by a single investigator who was blinded to the results
- A total of 14 blade brands from 11 manufacturers were tested in the study
 - The blades were categorized as having an integrated fiber light bundle (s, standard) or a removable fiber light bundle (r, removable)
- For each blade brand, the manufacturer supplied six new size 3 blades and one handle. The six blades were randomized to Group 1 (n=3) or Group 2 (n=3):
 - Group 1: mechanical cleaning and disinfection for 5 minutes at 90°C
 - Group 2: mechanical cleaning and disinfection for 5 minutes at 90°C with subsequent steam sterilization for 3.5 minutes at 134°C

- Measurements were taken before cleaning/disinfection and (when applicable) sterilization procedures were undertaken (control values) and then after each series of 50 cycles to a total of 300 cycles
- In addition, two investigators subjectively assessed the light intensity of all blades at 300 cycles and classified the light emitted as excellent, moderate or insufficient to perform laryngoscopy

Results

- The fiber light laryngoscope blades in Group 1 were reasonably resistant to the effects of cleaning and disinfection at 90°C with a mean (range) reduction in light intensity of 34.6% (2.1–78.3%; Figure 1) observed after 300 cycles compared with the control value

Figure 1. Mean reduction in light intensity in fiber light Macintosh laryngoscopes following 300 cycles of mechanical cleaning and disinfection only (Group 1) or mechanical cleaning and disinfection with subsequent steam sterilization (Group 2)



- After 300 cycles, 10 blades had excellent light intensity and 4 blades had moderate light intensity according to subjective investigator assessment
- In contrast, most of the blades that were exposed to an additional sterilization procedure at 134°C (Group 2) were not able to withstand the combined process for 300 cycles:
 - Overall, a mean (range) reduction in light intensity of 86.5% (32.0–98.7%) was observed after 300 cycles compared with the control value (Figure 1)
 - After 300 cycles, 6 blades had insufficient light intensity, 6 blades had moderate or insufficient light intensity (variation in subjective judgement between the two investigators) and 2 blades had excellent light intensity according to subjective investigator assessment
- After 300 cycles, several defects were observed in the blades that underwent sterilization (Table 1)

Conclusion

- While most of the fiber light laryngoscope blades tested appeared to be reasonably resistant to the effects of mechanical cleaning and disinfection at 90°C – the minimum requirement to comply with APIC, CDC and ASA high-level disinfection standards – few of the blades tested could withstand additional sterilization at 134°C, which offers a greater margin of safety

APIC, Association of Professionals in Infection Control and Epidemiology; ASA, American Society of Anesthesiology; CDC, Centers of Disease Control

Table 1. Defects observed after 300 cycles in blades that underwent sterilization

DEFECTS OBSERVED	NUMBER OF BLADE BRANDS
Fractures in the synthetic material within which the fibre bundle was mounted	2
Severe dislocation of the fibre bundle	1
Loss of small decorative caps	2
Changes that caused the fiber bundle to vibrate	2
Discoloration	6