How clean is your scope? A completed audit cycle of the disinfection of nasendoscopes

Raj Lakhani, Abigail Smithard, Nigel Bleach

ENT Department, Wexham Park Hospital, Slough, UK

ABSTRACT

INTRODUCTION Correct disinfection of nasendoscopes is essential to address both the potential iatrogenic transmission of infection and to avoid injury from the chemicals used.

MATERIALS AND METHODS Standards-based audit of the disinfection of nasendoscopes against the ENT UK guidelines.

Intervention: instructional poster and staff training session. The disinfection process was re-audited one month later.

RESULTS A total of 10 sessions and 31 cleaning episodes were audited in the first cycle (C1). A total of 12 sessions and 36 cleaning episodes were re-audited in the second cycle (C2). Clinic set-up results: there was a marked improvement in the checking of the expiry date (C1 = 5/10; C2 = 10/12; $P \leq 0.001$) and recording the date for the solution to be discarded (C1 = 0/10; C2 = 10/12; $P \leq 0.048$). Each cleaning episode results: an improvement in transportation in a 'dirty bag' (C1 = 0/31; C2 = 19/36; $P \leq 0.001$), washing of the scope (C1 = 0/31; C2 = 36/36; $P \leq 0.001$), adequate disinfection time (C1 = 16/31; C2 = 33/36; $P \leq 0.001$), rinsing and drying with alcohol swab (C1 = 0/31; C2 = 35/36; $P \leq 0.001$) and placing of the scope in a 'clean bag' for storage (C1 = 0/31; C2 = 35/36; $P \leq 0.001$) was seen after the intervention.

CONCLUSIONS The introduction of a poster and training in the disinfection of nasendoscopes proved successful in improving compliance with the published guidelines. These simple measures were simple, cheap and effective to institute. The benefit of improving the disinfection of nasendoscopes to patients, doctors and the organisations that they work in is clear.

KEYWORDS

Disinfection – Nasendoscopes

Accepted 2 June 2010; published online 29 June 2010

CORRESPONDENCE TO

Raj Lakhani, ENT Department, Wexham Park Hospital, Slough SL2 4HL, UK
E: dr lakhani@doctors.net.uk

Flexible nasendoscopy forms an integral part of a complete ear, nose and throat (ENT) examination and thousands of flexible nasendoscopes are performed each year. A nasendoscope has a limited life-span owing to attrition of the rubber coating, damage of optical fibres and traumatic fracture through mishandling which occurs with repeated use and disinfection.

Flexible nasendoscopes are classified as semi-critical medical instruments as they come into contact with mucous membranes, but do not pierce them.¹ The potential for contamination of nasendoscopes with blood, organic debris and infectious organisms during clinical use is well recognised. Inadequate disinfection of nasendoscopes has been shown to increase the risk of disease transmission from patient to patient.² Therefore, correct and thorough disinfection of nasendoscopes is essential to address both the potential iatrogenic transmission of infection from patient to patient and to avoid patient injury from the chemicals used in disinfection.^{3,4}

Disinfection describes a process that eliminates many or all pathogenic micro-organisms, with the exception of bacterial spores. This is generally achieved by the use of liquid chemicals or wet pasteurisation in the medical setting.¹

There are a number of factors that affect the efficacy of disinfection. They include previous cleaning, the organic load, the type and number of pathogens on the object, the exposure time to germicide, the potential for pathogens to enter crevices or lumens within the object and the temperature and pH at which disinfection is performed.^{5,6}

High level disinfection (HLD) is defined as the highest and most effective level of disinfection. It eliminates mycobacteria (*i.e.* is tuberculocidal), viruses, fungal spores and vegetative bacteria. Some, but not all, bacterial spores are destroyed by HLD. It is this that distinguishes it from sterilisation, a process in which all micro-organisms are destroyed.^{1,7} Research suggests that HLD with products such as 2% glutaraldehyde is required in the disinfection of semi-critical medical instruments such as nasendoscopes.^{4,8}

In 2005, ENT UK produced evidence-based guidelines for the disinfection of nasendoscopes.⁹ Four steps were proposed to ensure adequate scope disinfection. The apparent lack of awareness of these guidelines and the varying methods of disinfection employed within the hospital prompted this audit of the disinfection of ENT nasendoscopes.

Materials and Methods

First cycle

A standards-based audit of the disinfection of nasendoscopes in the ENT department was carried out in the ENT out-patient clinics, ward and emergency clinics. Each episode of cleaning of the nasendoscope was audited against the disinfection of nasendoscopes ENT UK guidelines.⁹ Data collection was carried out by two doctors working within the ENT team. The clinics selected were chosen at random and each consecutive cleaning episode within the clinic was audited.

Intervention

After the first cycle, results were evaluated, guidance on the cleaning of nasendoscopes was formatted into an instructional poster, laminated and placed in each of the relevant clinical settings (Appendix 1). All team members involved in the cleaning of the nasendoscopes were also provided with formal training in disinfection practice by the two doctors conducting the audit.

Second cycle

Each consecutive cleaning episode was re-audited at randomly selected clinics one month later and the results were assessed and published to the team.

Statistical analysis

Data were analysed using the Microsoft Excel program and tests of statistical significance were performed using the Fischer's exact test for non-Gaussian data.

Results

An overall summary of the results obtained is given in Tables 1 and 2.

Figure 1 Results from clinic set-up – first cycle (10 sessions).

Table 1 Disinfection steps completed in the clinic set up before and after the intervention

Step	First cycle	Second cycle	P-value
Cleaned at clinic start	5/10	10/12	0.11
Cleaned at clinic end	10/10	12/12	1
Expiry date check	1/10	12/12	< 0.001
Date solution made	4/10	12/12	0.455
Date solution to be discarded	0/10	10/12	0.048

Table 2 Disinfection steps completed in each use before and after the intervention

Step	First cycle	Second cycle	P-value
Transport dirty scope in bag	0/31	19/36	< 0.001
Tap water and foam clean	0/31	36/36	< 0.001
Suitable disinfection fluid	31/31	36/36	
Times recorded/timer	16/31	33/36	0.18
Immersion time sufficient	16/31	33/36	0.18
Rinse and dry with alcohol swab	0/31	35/36	< 0.001
Place in 'clean' bag/back on stand	0/31	35/36	< 0.001

First cycle

A total of 10 sessions were audited. The results of the preparation of the cleaning apparatus and disinfection fluid are summarised in Figure 1. A total of 31 cleaning episodes were identified and audited against the ENT UK guidelines. These results are summarised in Figure 2.

Second cycle

After the initial audit of disinfection practice, staff were trained in disinfection of nasendoscopes and an instructional poster was placed in all ENT clinics and the ward treatment room.

A total of 12 sessions were re-audited with regard to the preparation and disinfection process as summarised in Figure 3.

A total of 36 cleaning episodes were identified and compared with the ENT UK guidelines as summarised in Figure 4.

Discussion

It is vital to ensure that ENT ward and out-patient nasendoscopes are disinfected according to current guidelines in order to avoid potential contamination and the risk of dissemination of infection, including prion disease. Despite this, the practice of disinfection of nasendoscopes varies

Figure 2 Results from each cleaning episode – first cycle (31 cleaning episodes).

greatly between different hospitals and also between hospital sites within the same health care trust.¹

This audit clearly demonstrated poor awareness of the ENT UK guidelines for nasendoscope disinfection in our own hospital. This was reflected in the poor disinfection practice demonstrated in the first cycle. Preparation of the nasendoscope disinfection equipment and sterilisation fluid did not, in general, conform to the ENT UK guidelines. The nasendoscope was disinfected prior to use (if this was greater than 3 h since the prior use) in only half of the clinics audited. This may have allowed time for re-colonisation of the nasendoscope with pathogens. In addition, the simple step of checking the expiry date of the solution to be used was performed in only one of the 10 clinics audited. Documentation of the date that the disinfection solution was made and the date it was due to be discarded was equally variable.

The intervention (poster and guideline training programme) improved these results greatly. Repeating the audit showed that, in only 2 of 10 of the clinics, were the nasendoscopes not cleaned prior to use (if it was greater than 3 h since the last use) and in only two of these cases was the date for the solution to be discarded missing. There were no failures to check the expiry date and to document the date that the disinfection fluid was made.

A similar pattern was seen when reviewing the individual cleaning episodes. In the first cycle, a 'contaminated' bag was never used to transport the scope once it had been used. In addition, when the nasendoscope was cleaned, it was never cleaned with detergent under running water. Often, the scope was placed directly into the disinfection fluid without the manual removal of visible debris. It was, however, clear that an appropriate disinfection fluid was in use throughout the hospital audited. In contrast, there was variability in the amount of time that the nasendoscope was immersed. This may have been due to the lack of use of a timer to guide immersion time, but may

Figure 3 Results of the re-audit of each clinic set-up (12 sessions).

also have been due to lack of knowledge regarding the immersion time required for safe disinfection. Indeed, there was little knowledge of the potential problems (*e.g.* damage to the scope) with leaving the nasendoscope in the disinfection fluid for an excessive amount of time. In the first cycle, the scope was always removed from the solution and either dried with a hand towel or placed directly into the storage case. There was no subsequent use of a 'clean' bag to place the disinfected scope in prior to storage in the case. This again reflects poor knowledge of the guidelines.

An improvement in compliance with adherence to the guidelines was seen in the re-audit of each cleaning episode after the intervention. The nasendoscope was cleaned with tap water and detergent to remove visible debris in all cleaning episodes. The improved adherence to the manufacturer advised immersion time may have been aided by ensuring all

Figure 4 Results from re-audit of each cleaning episode (36 cleaning episodes).

disinfection areas had working timers. The final wiping dry with an alcohol wipe and storage in a 'clean bag' of the nasendoscope after sufficient immersion was also performed in 35 of 36 cleaning episodes. The failure to improve compliance in the use of a 'contaminated' bag was probably due to it being impractical for use in the out-patient setting. Here, the nasendoscope is routinely taken straight from the patient to a nearby disinfection room, whereas ward nasendoscope use may be quite distant from the site of disinfection thereby requiring mandatory use of a 'contaminated' bag.

The introduction of a simple poster and formal training in the disinfection of nasendoscopes proved successful in improving compliance with the published guidelines. These simple measures proved simple, cheap and effective to initiate. Despite these encouraging results, total compliance was not achieved with this audit. Achieving this must be the aim and re-auditing these results in the future after further re-enforcement of the guidelines would assess this.

It is well documented that nasendoscopes can act as a vector in the transmission of infection from patient to patient.^{2,3} It is surprising, therefore, that there has been little dissemination of disinfection guidelines, particularly when one considers the increasing emphasis upon infection control in the hospital setting.¹⁰

The benefit of improving the disinfection of nasendoscopes to patients, doctors and the organisations that they work in is clear. For patients, the potential for transmission of pathogens and chemicals would be reduced. The doctor using the nasendoscope would be sure of having a clean, safe nasendoscope to use and the healthcare trust would have an instrument which had a longer life and also a potential reduction in adverse incidents and exposure to clinical risk.

Conclusions

There appears to be poor dissemination of the established guidelines for the disinfection of nasendoscopes. Furthermore, the disinfection of nasendoscopes is not always performed according to these guidelines. This study demonstrated that a simple poster combined with a brief staff training programme for the cleaning of nasendoscopes was effective and increased adherence to the guidelines. This simple, practical intervention in the hospital setting may decrease the risk of transmission of infection and thus the associated morbidity.

References

1. Rutala WA. APIC guideline for selection and use of disinfectants. *Am J Infect Control* 1996; **24**: 313–42.
2. Muscarella LF. Prevention of disease transmission during flexible laryngoscopy. *Am J Infect Control* 2007; **35**: 536–44.
3. Kanagalingam J. The disinfection of flexible fibre-optic nasendoscopes out-of-hours: confidential telephone survey of ENT units in England. *J Laryngol Otol* 2002; **116**: 817–22.
4. Anon. Ensuring the effective reprocessing of flexible endoscopes. *Health Devices* 2007; **36**: 352–61.
5. Rutala WA. Selection and use of disinfectants in health care. In: Mayhall CG. (ed) *Hospital Epidemiology and Infection Control*. Baltimore, MD: Williams and Wilkins, 1995; 913–36.
6. Favero MS, Bond WW. Chemical disinfection of medical and surgical materials. In: Block SS. (ed) *Disinfection, Sterilization and Preservation*, 4th edn. Philadelphia, PA: Lea & Febiger, 1991; 617–41.
7. Muscarella LF. Reprocessing flexible and rigid laryngoscopes: are quaternary ammonium disinfectants adequate? *Infection Control Today* 21 May 2005; <<http://www.infectioncontroltoday.com/articles/551cover.html>>.
8. Bhattacharyya N, Kepnes LJ. The effectiveness of immersion disinfection for flexible fiberoptic laryngoscopes. *Otolaryngol Head Neck Surg* 2004; **130**: 681–5.
9. ENT UK. *Decontamination of ENT Fiberoptic Scopes*. 2005 <<http://www.entuk.org/members/publications/scopesfullweb2.pdf>>.
10. Llata E, Gaynes RP, Fridkin S. Measuring the scope and magnitude of hospital-associated infection in the United States: the value of prevalence surveys. *Clin Infect Dis* 2009; **48**: 1434–40.

APPENDIX 1

Disinfection of nasendoscopes poster