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The disinfection of flexible fibre-optic nasendoscopes out-of-hours: confidential telephone survey of ENT units in England

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Abstract
We present the results of a confidential telephone survey of ENT units in England on the disinfection of flexible fibre-optic nasendoscopes out-of-hours. The on-call residents of 124 units were contacted and questioned. In 35.1 per cent of units surveyed, the on-call resident was primarily responsible for cleaning the scopes after use. Only 46 per cent of these junior doctors had access to a chemical sterilant to allow for high-level disinfection of these scopes. Provision for disinfection of scopes was poorer in teaching hospitals and in units that served inner city populations. Only 12.1 per cent of Senior House Officers (SHOs) received any training in disinfection techniques and only 25.5 per cent of units kept a register of patients nasendoscoped out-of-hours for purposes of contact tracing.

Key words: Endoscope; Disinfection

Introduction

The use of flexible fibre-optic nasendoscopes is indispensable to modern ENT practice. They allow for a quick and accurate assessment of the upper aerodigestive tract in a way that supersedes traditional indirect laryngoscopy using mirrors and spirit lamps. Most out-patient departments have access to these scopes, where their use is now routine.

Outside normal working hours, the flexible fibre-optic nasendoscope has been invaluable in the management of ENT emergencies in the casualty department, on the wards and in intensive care units. They are routinely used to evaluate the airway, identify foreign bodies, search for sources of epistaxis, and address problems with tracheostomy tubes.

As their use is now ubiquitous, the issue of disinfection is becoming increasingly important. This is particularly so as blood-borne diseases such as human immunodeficiency virus (HIV), hepatitis B and C, and other infectious diseases such as tuberculosis are commonplace in routine ENT practice. Failure to employ proper methods of cleaning, disinfection and sterilization can almost certainly cause nosocomial outbreaks, as has been demonstrated in the case of gastrointestinal endoscopes and bronchoscopes.[1]

Flexible fibre-optic nasendoscopes come into intimate contact with mucous membranes but do not cross the mucosal barrier. Studies suggest that between 3000 to 5000 colony-forming units (CFUs) of microorganisms adhere to the surface of laryngoscopes following a single use.[2] The data suggests that sterilization does not confer any additional degree of safety over high-level disinfection (HLD).[3] High-level disinfection refers to the use of a chemical sterilant, such as two per cent glutaraldehyde, at shorter exposure times than would achieve sterilization. This eradicates all microorganisms (bacteria, viruses, fungi and mycobacteria) but not high levels of bacterial spores.

Sadly, whilst other specialties, such as gastroenterology, have clear protocols for cleaning fibre-optic endoscopes, there are no UK otolaryngology guidelines for the disinfection of nasendoscopes other than guidelines put forward by the manufacturers.[4] A survey of disinfection techniques employed in ENT out-patient departments found 'a lack of standard practice that is wasteful of financial resources and may expose patients to unnecessary risk'.[5] Seventy-four per cent of ENT out-patient departments claimed to have written protocols but only 51 per cent actually had a nurse 'trained' in these procedures. Only 67 per cent of units used a chemical soak and 23 per cent used a simple 70 per cent v/v isopropyl alcohol wipe.

An increasingly popular method, which obviates the need for high-level disinfection, is the use of protective sheaths. Studies have shown that the use of sheaths must be combined with intermediate level

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disinfection to ensure safety.[6] Whilst there is anecdotal evidence of scope damage due to careless removal of sheaths, up to 10 per cent of units in the survey by Banfield and Hinton[5] have adopted its use.

More recently, a new issue has been raised. As a response to the recent concern about the transmission of variant Creutzfeldt-Jakob disease (vCJD), most units now have to record the details of patients who are subjected to nasendoscopy to allow for contact tracing should the need arise. There are no effective methods of decontaminating scopes exposed to prions and these scopes must therefore be destroyed.

An area of growing clinical risk is the disinfection of these scopes out-of-hours. It is here that scopes are more commonly exposed to blood and infected upper airways. The junior doctors responsible for their use does not have the luxury of using a different scope with each new patient and must operate under significant time limitations. We feel that it is in this context that their improper disinfection could contribute to the spread of nosocomial infections – a major concern raised in a highly publicized recent study.[7] The provision of good out-of-hours disinfection facilities for flexible fibre-optic nasendoscopy is, therefore, an important area for both infection control and clinical risk management.

This survey identifies current practice in ENT units in England, and raises some legitimate concerns.

Methods

To assess disinfection techniques employed out-of-hours, a questionnaire was designed and piloted amongst several ENT units in inner London. To ensure a good capture of data, the questionnaire was brief and designed to be administered as a telephone survey. This allowed for on-call residents, most commonly Senior House Officer (SHOs), to be contacted out-of-hours and surveyed without disrupting their clinical duties.

SHOs were asked 1) whether they had access to a flexible nasendoscope out-of-hours, 2) who would normally clean it after use, 3) how the scopes were cleaned, 4) whether a register was kept of patients scoped, and finally 5) whether they had received any instruction – formal or informal – in the techniques of disinfection.

The list of ENT units targeted was based on a list held at the Royal College of Surgeons by the British Association of Otolaryngologists, Head and Neck Surgeons (BAO-HNS) and included all the teaching and district general hospitals in England. Units that did not have out-of-hours provision of ENT services were excluded leaving a list of 124 units.

Phone calls were made out-of-hours by three of the authors (JK, AZ and CG).

Results

A total of 124 ENT units in England were contacted during the period of this survey, from which 101 SHOs agreed to answer questions as part of the survey. Of these, 77.7 per cent worked in district general hospitals and the remaining 22.3 per cent worked in teaching hospitals. Thirty-four per cent of units surveyed claimed to serve a predominantly inner-city population.

Ninety-one per cent of units had access to flexible nasendosope out-of-hours. There was no difference in accessibility to scopes between teaching and district general hospitals. However, a large number

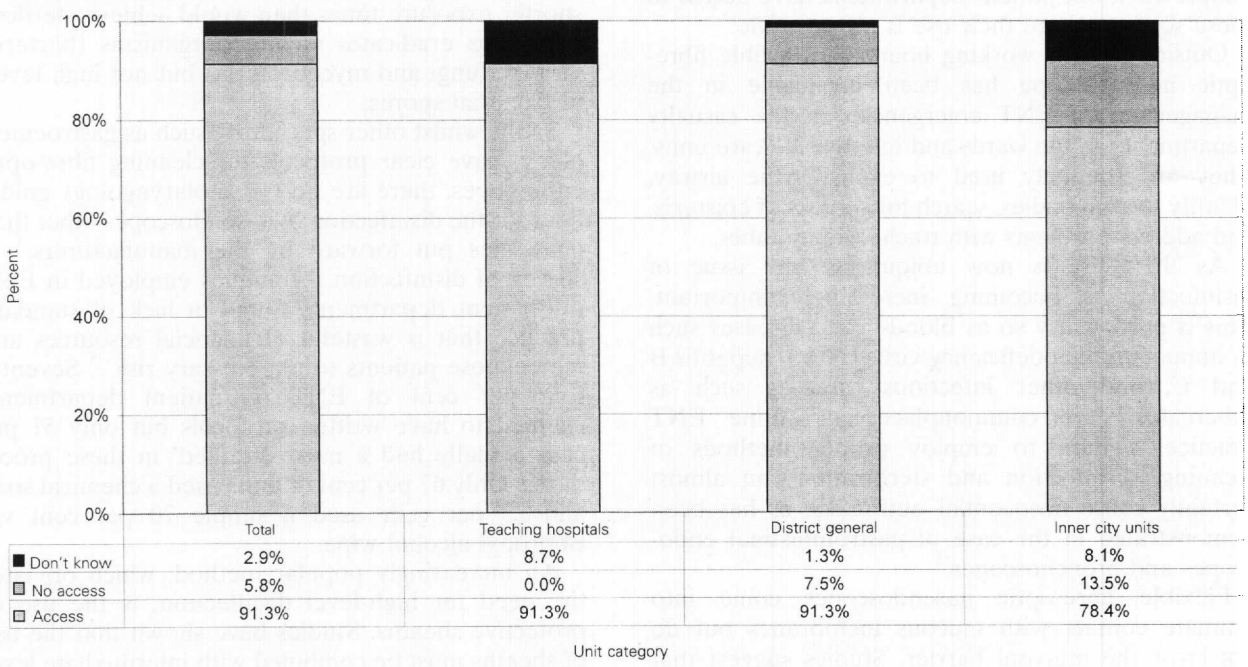
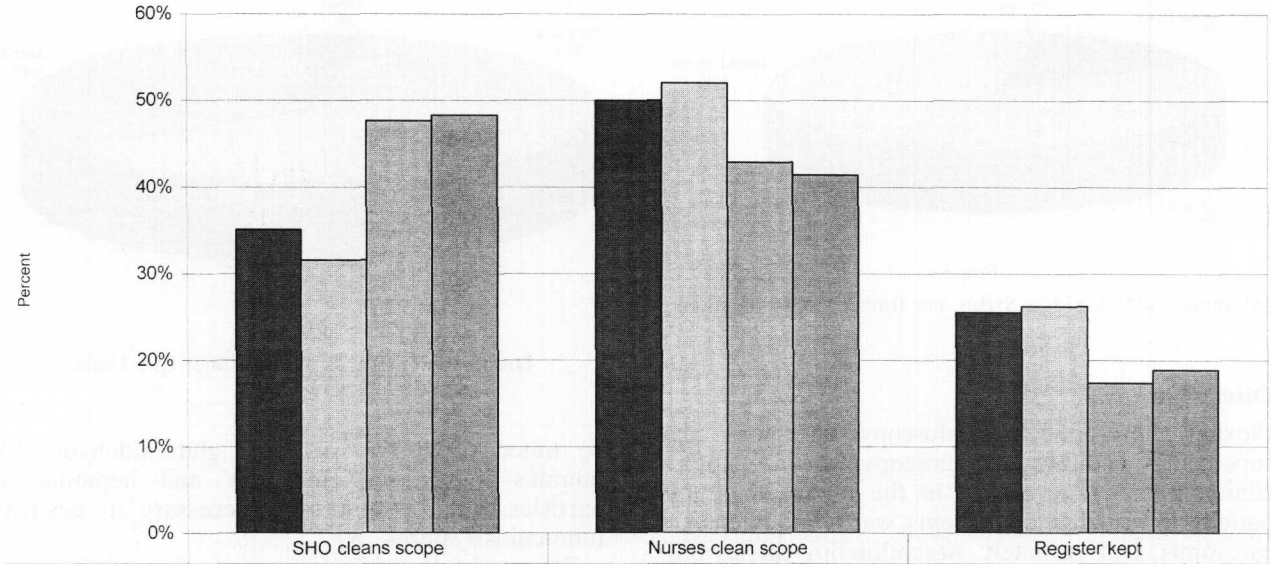


FIG. 1
Access to nasendoscopes.



	SHO cleans scope	Nurses clean scope	Register kept
Total	35.1%	50.0%	25.5%
District general	31.5%	52.1%	26.3%
Teaching hospitals	47.6%	42.9%	17.4%
Inner city units	48.3%	41.4%	18.9%

FIG. 2
Scope cleaning and patient registration.

of SHOs in teaching hospitals surveyed (8.7 per cent) did not know if they had access to a scope. Units that served inner city populations had poor access (78.4 per cent). (See Figure 1). SHOs were more likely to be responsible for cleaning scopes in inner city units (48.3 per cent) and teaching hospitals (47.6 per cent) than in district general hospitals (31.5 per cent). Very few units kept a register of patients subjected to nasendoscopy out-of-hours (25.5 per cent) with teaching hospitals (17.4 per cent) fairing worse than district generals (26.3 per cent) (Figure 2).

The on-call SHO was primarily responsible for cleaning the scope in 35.1 per cent of the units surveyed. In these units, 46 per cent of the SHOs immersed scopes in some form of chemical sterilant, 39 per cent used a 70 per cent v/v isopropyl alcohol wipe and 12 per cent used water and hand detergent only (Figure 3). Only 12.1 per cent of these SHOs claimed to have received some form of training in scope disinfection techniques. This left the vast majority of SHOs undertaking disinfection without any – formal or informal – instruction on correct methods. Forty-two per cent of those 'not trained' used potentially toxic chemical sterilants (Figures 4 and 5).

In units where ward nursing staff held responsibility for disinfection, the SHOs surveyed were largely ignorant of methods of disinfection employed by their nursing colleagues. However, in cases where the SHO claimed knowledge, half their nursing colleagues used a chemical soak, 43 per cent used alcohol wipes and seven per cent used water and a hand detergent.

Amongst inner city units, where the incidence of tuberculosis, hepatitis B and HIV may be expected to be higher, 34 per cent of units used alcohol wipes, which are clearly ineffective against TB spores and viral particles (Figure 6). The accuracy of this figure is in doubt, as up to 21 per cent of SHOs questioned from inner city units had no knowledge of the disinfection method used.

In five of the units surveyed, protective disposable sheaths were used and in two, nasendoscopes were taken to the operating-theatre for proper disinfection.

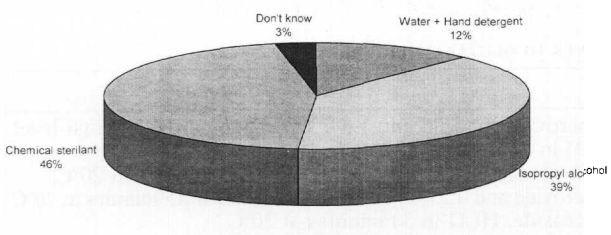


FIG. 3
Disinfection methods used by SHOs.

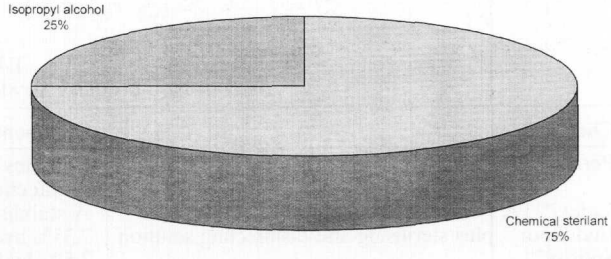


FIG. 4
Methods used by 12.1% SHOs 'trained' in disinfection.

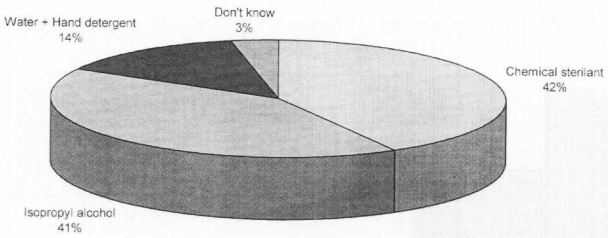


FIG. 5
Methods used by 87.9% SHOs 'not trained' in disinfection.

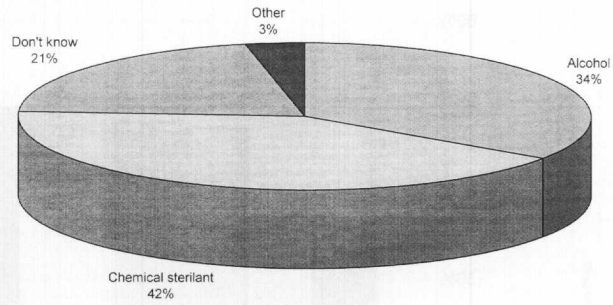


FIG. 6
Disinfection methods used in Inner City Units.

Discussion

Flexible fibre-optic nasendoscopy has not only superseded indirect laryngoscopy in out-patient clinics, but is now critical in the management of patients in casualty departments, wards and intensive care units. Unfortunately, nasendoscopy carries the potential of transmitting infectious diseases from one patient to another. These range from minor respiratory infections and influenza to tuberculosis, hepatitis B and C, and HIV. With the advent of prion diseases, it is difficult to assess the potential additional risks conferred by nasendoscopy, if any.

The risk of transmission is clearly higher in the in-patient setting where the presence of blood in the upper airway and tracheal lumen, and nosocomial pathogens are more common.[7] The disinfection of flexible nasendoscopes out-of-hours is therefore an important area of clinical risk management and infection control.

Initial cleaning with running water is an important first step to remove soiling prior to proper disinfection. Thereafter immersion in a chemical soak such as two per cent glutaraldehyde, or 3.2 per cent alkaline glutaraldehyde (Cidexplus®) will ensure sufficient decontamination. Glutaraldehyde in a simple trough or coiled plastic tube has traditionally been used. However, the hazards that this chemical pose to staff mean that this method falls short of guidelines put forward by the Department of Health.[8] Glutaraldehyde vapours are irritating to the eyes, nose and throat and in sufficient concentration may cause epistaxis, allergenic contact dermatitis, asthma and rhinitis.[9,10]

Most departments have automated cleaning machines which are housed in extraction fume cupboards with activated charcoal filters. Staff who handle disinfectants should wear goggles, gloves and aprons for their own protection. Immersion should be timed. With two per cent glutaraldehyde, 10 minutes is sufficient for HIV and hepatitis B particles, but 45 minutes is necessary to destroy tuberculosis spores.

Thorough cleansing after immersion in disinfectant solutions is important, as residual levels of disinfectant can be irritative to the mucosa of the upper respiratory tract and potentially toxic or even carcinogenic. Automation certainly is associated with reduced levels of residual disinfection in endoscopes used in gastroenterology.[11]

Since the conclusion of our survey, the Health and Safety Executive (HSE) have instructed the withdrawal of glutaraldehyde from all hospitals. There are several alternatives that exist and are being licensed for high level disinfection (HLD) in hospitals.[12] These can be broadly divided into 'drop-in liquid chemicals' and 'enclosed systems' (see Tables I and II). A thorough cost analysis of switching to these new methods of high-level disinfection, including the cost of occupational dermatitis and asthma, will invariably favour an immediate transition to non-glutaraldehyde based systems.

A commendable alternative to disinfection is the use of plastic sheaths that fit over the flexible scope. These are easy to use and cost £11 per sheath (EndoSheath™, produced by Vision Sciences, Inc. and marketed by Gyrus International Ltd, Wokingham, Berkshire).

However, only five of the 103 departments surveyed used this method and the SHOs questioned appeared to have a few reservations about it. The main criticism of these protective sheaths is that they often cause damage to the flexible scope when they are removed. Several scope manufacturers we contacted actually discouraged the use of sheaths.

TABLE I
DROP-IN LIQUID CHEMICAL ALTERNATIVES TO GLUTARALDEHYDE

Chemical	Comment
Peract™ 20	Contains 0.08% peroxyacetic acid and 1.0% hydrogen peroxide. High-level disinfection (HLD) in 25 minutes at 20°C.
Cidex™ PA peracetic acid solution	A stabilised 0.08% peracetic acid solution. HLD in 25 minutes at 20°C.
EndoSpor™ plus sterilising and disinfecting solution	7.35% hydrogen peroxide and 0.23% peracetic acid. HLD in 15 minutes at 20°C.
Sporox™	7.5% hydrogen peroxide. HLD in 30 minutes at 20°C.
Cidex OPA	0.55% ortho-phthalaldehyde. HLD in 12 minutes at 20°C.

(Source: www.sustainablehospitals.org)

TABLE II
ENCLOSED SYSTEMS THAT PERFORM HIGH-LEVEL DISINFECTION

System	Comments
Steris 20™ Sterilant	0.2% peracetic acid (diluted from 35%). Designed for sterilisation. Sterilizes in 12 minutes at 50°–55°C. Instruments 'patient ready' in under 30 minutes.
Sterrad 50 and Sterrad 100S	Enclosed system generates hydrogen peroxide gas plasma from 58% hydrogen peroxide. Effective for sterilization. Sterrad 50 sterilizes during a 45 minute cycle.
Sterilox 2501	The Sterilox system generates chemically activated water with strong oxidizing properties. Cycle time approx. 25–30 minutes.

(Source: www.sustainablehospitals.org)

Whist many units use a Steret wipe containing 70 per cent v/v isopropyl alcohol, these wipes are clearly ineffective against spores and viral particles. Their use is often cursory and not regulated by time or technique.

Our survey reveals that the on-call SHO bears the responsibility for cleaning nasendoscopes out-of-hours in 35.1 per cent of units. This figure is higher in larger teaching hospitals (47.6 per cent) where, paradoxically, provisions for disinfection are poorer. Forty-six per cent of SHOs used a chemical sterilant, but only a fifth of these SHOs received any form of training – formal or informal – in the techniques of scope disinfection. This leaves them exposed to the potential hazards of these chemicals, and patients exposed to unnecessary risk should incorrect methods be used.

Should any patient subjected to nasendoscopy then develop a transmissible disease such as vCJD, the identification of other patients exposed to the same scope is essential. Keeping a register is therefore critical to contact tracing. In the out-patient department, a register is often kept and, even in absence of this, a record of clinic attendances is extremely useful. Our study reveals that this practice has not permeated the use of flexible scopes out-of-hours. Only 25.5 per cent of units surveyed kept any record of patients subjected to nasendoscopy out-of-hours.

Inner City populations, which have a higher incidence of transmissible diseases such as tuberculosis, hepatitis B and C, and HIV, had an unacceptability higher rate of inferior disinfection methods. Thirty-four per cent used 70 per cent v/v isopropyl alcohol wipes, which are ineffective against these pathogens. Only 18.9 per cent kept a register of patients subjected to nasendoscopy, making contact tracing in most units largely impossible.

Conclusions

Our survey demonstrates that the 'weakest link' in the disinfection of flexible fibre-optic nasendoscopes clearly occurs out-of-hours. It does not seek to apportion blame to the SHO tier for current inadequacies but clearly identifies a 'systems failure' in most units. On a national level, there is an urgent need to set out guidelines for the disinfection of these scopes, not unlike the ones in place for endoscopes used in gastroenterology.

This policy must extend to the use of scopes out-of-hours. The persons responsible for the cleaning of scopes must be familiar with the techniques of disinfection, and the potential hazards of the disinfectant used. Traditionally, the nursing education and culture has centred on sterilization/disinfection principles and techniques, and most nurses perform sterilization procedures on many occasions during their daily duties. For that reason we feel they are most suited to adopt this responsibility. Sterilizing equipment does not normally constitute a part of a doctor's routine duties and this could explain the observed inadequacy on the part of SHOs in this survey. Either way, the current atmosphere of confusion regarding responsibility and techniques in the disinfection of the scopes is clearly dangerous.

Patients subjected to nasendoscopy have a right to know the risk of the procedure. In most instances, few surgeons detail the risks involved and patients give implied consent. Clearly, in these days of patient empowerment, this practice has no place. Several of the SHOs we questioned felt unhappy about subjecting themselves to nasendoscopy given the methods of disinfection available to them out-of-hours.

We hope this survey will reinforce previous calls for national otolaryngology guidelines on the use of nasendoscopes in order to address an important area of clinical risk management.

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