

# Disinfection of flexible fibre-optic endoscopes out-of-hours: confidential telephone survey of ENT units in England – 10 years on

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## Abstract

**Objective:** To audit out-of-hours flexible endoscope disinfection practice in England and compare the findings with a previously published first audit cycle, with the 2005 ENT UK guidelines as the key intervention.

**Methods:** A telephone survey of the 104 ENT units in England was conducted out-of-hours, replicating the first cycle. The on-call clinician answered questions concerning access to flexible endoscopes, training, disinfection procedures and record keeping. Information regarding the clinician's trainee grade and their cross-covering duties was also acquired. Responses were compared to the first cycle results and published guidance.

**Results:** In total, 72 of the 104 units agreed to participate. The on-call clinician cleaned the flexible endoscope in 43 per cent of units. However, adequate training in disinfection only occurred in a minority of units (37 per cent), though this was an improvement from the first cycle (12 per cent). Furthermore, 27 per cent of units used an inadequate method of disinfection out-of-hours. One confounding factor may be the increase in cross-cover out-of-hours, with 68 per cent of respondents covering one or more other specialties.

**Conclusion:** An overall moderate improvement in the safety of out-of-hours endoscopy in the past 10 years cannot obscure the urgent need for universal compliance with national guidelines.

**Key words:** Endoscopes; Disinfection; Otolaryngology

## Introduction

Flexible endoscopic assessment of the upper aerodigestive tract is a crucial part of modern ENT examination and has been ubiquitous in both out-patient and emergency diagnosis for many years. As these endoscopes come into contact with non-intact skin, mucous membranes, saliva and potentially blood, they are categorised as 'semi-critical' as a source for transmissible infections.<sup>1</sup> As such, thorough disinfection between uses is required to reduce the potential risk for transmission of infectious diseases ranging from mild upper airway infections to human immunodeficiency virus, viral hepatitis and Creutzfeldt–Jakob disease. Despite these risks, previous studies have shown inadequate and inconsistent decontamination practices.<sup>2–4</sup>

In 2002, Kanagalingam *et al.* published the results of a confidential telephone survey of 124 English ENT departments that focused on the disinfection of flexible fibre-optic endoscopes out-of-hours.<sup>4</sup> The authors raised the concern that the out-of-hours use of flexible endoscopes by junior medical staff was likely to

represent a weak point in proper disinfection practice. Out-of-hours medical staff were likely to have only one flexible endoscope available, and were likely to require it for assessing patients with bleeding and airway infections. The significant time pressures on busy out-of-hours staff could also present as a factor affecting proper disinfection between uses.

The key results of the study by Kanagalingam *et al.* revealed that 91 per cent of units had access to a flexible endoscope out-of-hours, and in 35 per cent of these units the on-call resident doctor was responsible for disinfection. Forty-six per cent of these doctors used a chemical sterilant for disinfection, but only 12 per cent of doctors had received any training in this method. The other methods for disinfection, including the use of isopropyl alcohol and hand detergent, were inappropriate for proper disinfection. Four per cent of units made use of disposable endoscope sheaths. Only 26 per cent of units kept a record of patients subjected to endoscopy out-of-hours, with the majority of units having no method for patient tracking in the event of transmissible infections. The authors made the

following conclusions: there were significant problems with the out-of-hours disinfection of flexible endoscopes; patients and medical staff were potentially exposed to risk; and urgent national guidance was required to clarify the appropriate techniques.

In October 2005, ENT UK, the professional organisation for otolaryngologists in the UK, published 'Guidelines for cleaning fiberoptic laryngoscopes'.<sup>5</sup> Further clarification of these guidelines was published in 2010 in 'Guidance on the decontamination and sterilization of rigid and flexible endoscopes'.<sup>6</sup> Together, these documents provide clear advice for ENT units on the disinfection of flexible fibre-optic endoscopes, as outlined in Table I.

Concerns have been raised regarding the lack of knowledge of and adherence to the standards outlined in the disinfection guidelines. A key concern is the level of training received by out-of-hours junior medical staff in the use and decontamination of flexible endoscopes. This has become particularly relevant since the introduction of the working time restrictions imposed by the European Working Time Directive; many junior doctors are now expected to cover multiple specialties out-of-hours as part of the 'hospital at night' programme. The inclusion of ENT in these cross-cover schemes has been shown by multiple studies to be potentially dangerous owing to the specialised knowledge and equipment required to adequately treat ENT emergencies.<sup>7-9</sup>

In order to assess the impact of the published ENT UK guidelines and the effect of the European Working Time Directive on out-of-hours flexible fibre-optic endoscope decontamination practices, we performed a second cycle of the audit first carried out by Kanagalingam *et al.* 10 years previously.<sup>4</sup>

## Materials and methods

This study replicated the national telephone questionnaire carried out by Kanagalingam *et al.*<sup>4</sup> However, additional questions were included to reflect the

changing nature of resident on-call ENT doctor duties and cross-cover, as well as questions pertaining to adherence to ENT UK guidance.

The questions included in the survey provided information regarding: the grade of the on-call doctor, the specialty the doctor usually worked in during normal working hours and any specialties additional to ENT covered by the doctor on call. The questions also determined whether there was access to a flexible endoscope out-of-hours and whether the on-call doctor had been trained in its use. In addition, the on-call doctor was queried regarding: where and how the endoscope was stored; who cleaned it after use, how this was done and whether they had been trained in a disinfection technique; whether a sheath was used; and whether a register of endoscope use was kept.

As in the original audit, the telephone questionnaire was conducted out-of-hours by two of the authors (PR and SU). The authors contacted the resident on-call doctor covering ENT in 104 English ENT departments. Care was taken to avoid disruption to clinical duties, but if the on-call doctor was too busy to participate, the authors phoned again on a different day. Some units were repeatedly too busy to take part.

## Results

Data were collected for a total of 72 ENT departments. Of these, 93 per cent had access to a flexible endoscope (Figure 1) (an increase from 91 per cent in 2002), and these units were questioned further regarding endoscope cleaning.

In the 67 units with access to a flexible endoscope, 70.8 per cent of the on-call doctors had been trained in its use (Figure 2) (this information was not obtained in 2002). In 43.3 per cent of these units, the resident doctor was responsible for cleaning the endoscope (Figure 3) (a change from 35.1 per cent in 2002). Only 37.3 per cent of these doctors had received

TABLE I ENT UK GUIDELINES 2010 <sup>6*</sup>
<i>Decontamination</i> Chemical disinfection (e.g. chlorine dioxide wipes) Disposable sheaths Automated mechanical washers
<i>Storage</i> Cleaned endoscopes should be stored in drying cabinet, or in clean labeled bag or tray
<i>Training</i> Staff expected to use endoscopes should receive training in correct instrument usage & decontamination
<i>Traceability</i> Logbook should be kept to include details of: endoscope used, patient it was used on, who used it & how it was decontaminated (logbook must be available at all times) Endoscope use should be documented in patient notes
*For the cleaning of flexible endoscopes

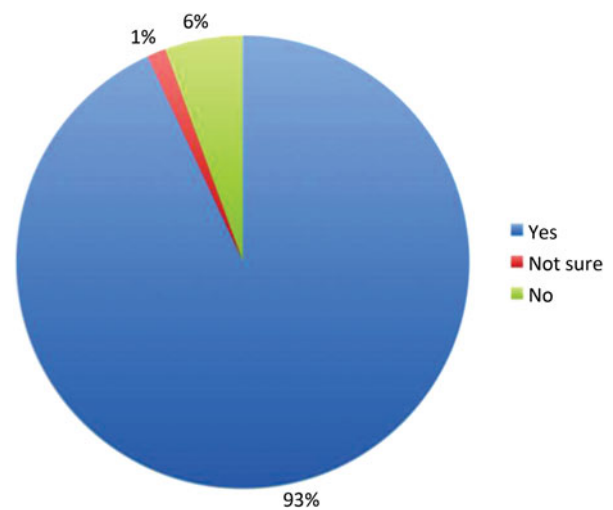


FIG. 1

On-call doctor responses regarding flexible endoscope availability out-of-hours.

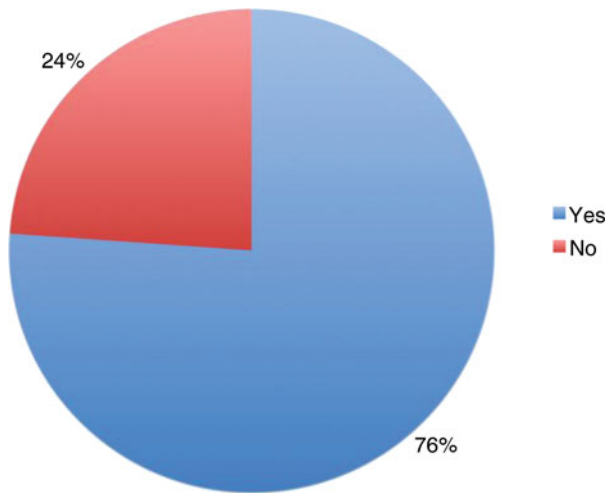


FIG. 2

On-call doctor responses regarding whether they had been trained to use the flexible endoscope.

formal training on how to clean the endoscope, but this was a sizeable improvement from 12.1 per cent in 2002.

Tristel wipes (Tristel, Snailwell, UK) (which are chlorine dioxide based) now appear to be the most widely used cleaning method, with 49.3 per cent of units using these (Figure 4). Automated mechanical washers were used in 19.4 per cent of units and Endozime® (Runhof, Mineola, NY USA) (chemical sterilant) was used in 4.5 per cent of units. Alcohol or chlorhexidine wipes were used in 4.5 per cent of units, with the remaining 22.4 per cent of units either not being sure of the cleaning method used or in one case admitting to not cleaning the flexible endoscope between uses. Fifty-four per cent of units now keep a register, revealing an increase from 26 per cent in 2002.

Storage of the flexible endoscopes was variable, with 32.8 per cent of units storing them in sealed sterile trays marked as clean and 9 per cent of units hanging them in a drying cupboard. The endoscope

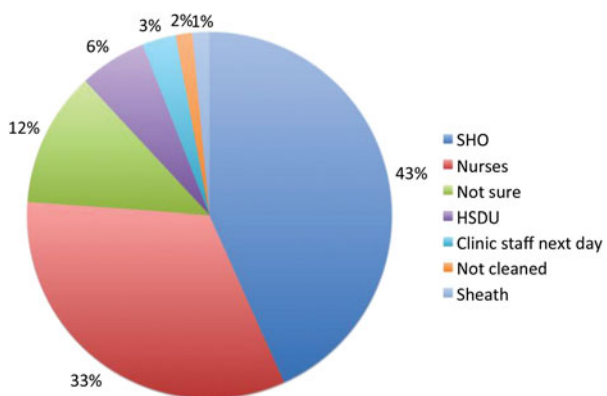


FIG. 3

On-call doctor responses regarding who cleans the flexible endoscope. SHO = senior house officer; HSDU = hospital sterilisation and decontamination unit.

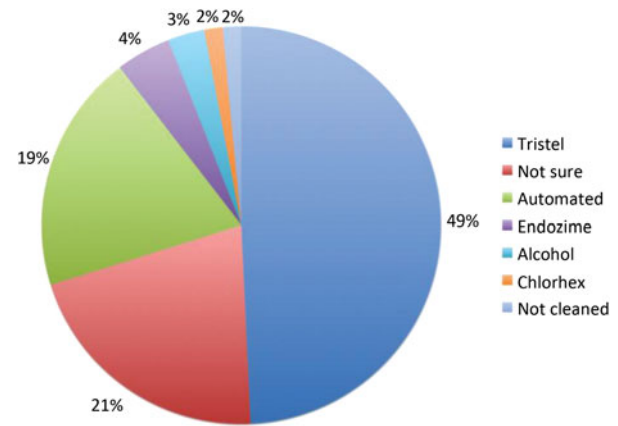


FIG. 4

On-call doctor responses regarding the cleaning method used.

was stored in a non-sterile carrying case in 49.3 per cent of units, and in 9 per cent of units the resident doctors surveyed did not know how the endoscope was stored. Sheaths were routinely used in 32.8 per cent of units, showing an increase from only 5 per cent in 2002.

An additional element of our questionnaire involved taking a cross-sectional snapshot of on-call ENT residents in light of the European Working Time Directive. Of the 72 units telephoned, the majority (72 per cent) were covered by doctors at a post-foundation programme level: core trainees, trust grade specialists, general practice vocational training scheme trainees or staff grade specialists. Twenty-four per cent of units were covered by a foundation year two doctor. The remaining three units were covered by a foundation year one doctor, a non-medically qualified dentist and a nurse practitioner. In all cases, the on-call professional was expected to provide resident ENT cover (Figure 5).

Of the doctors on call, 53 per cent were in an ENT post and 9.7 per cent were general practice vocational

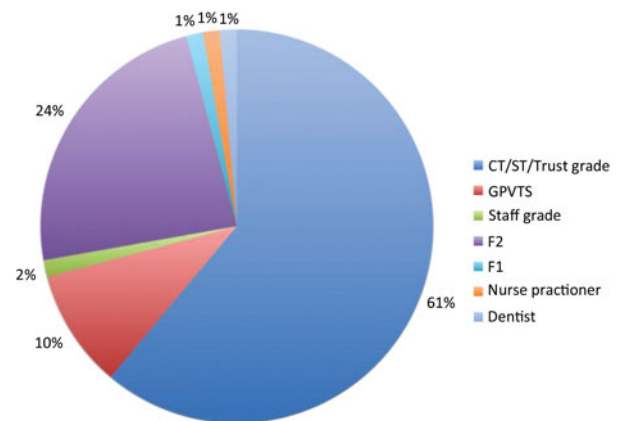


FIG. 5

On-call doctor responses regarding their grade. CT = core trainee; ST = specialty trainee; GPVTS = general practice vocational training scheme trainees; F2 = foundation year two doctor; F1 = foundation year one doctor.

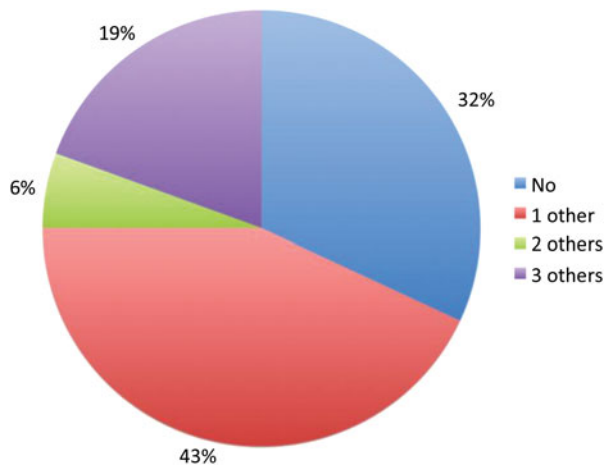


FIG. 6

On-call doctor responses regarding the number of other specialties cross-covered.

training scheme trainees. The remaining doctors were cross-covering from plastic surgery, orthopaedics, maxillofacial surgery, urology, general surgery, ophthalmology, and obstetrics and gynaecology. Only 32 per cent of doctors were solely covering ENT. Nineteen per cent of doctors were covering three or more other surgical specialties as well as ENT whilst on call (Figure 6).

Only 38 per cent of doctors from other specialties that were covering ENT had received training in how to use the flexible endoscope; 23 per cent of these doctors were aware of the decontamination protocol.

## Discussion

Flexible endoscopy of the upper aerodigestive spaces remains a critical skill in the armamentarium of the on-call ENT team. Reliable diagnosis of acute conditions requires skill, experience and familiarity, both with equipment and anatomy.

On 1 August 2009, the European Working Time Directive came into full force for National Health Service employees. This restricted doctors to working 48 hours per week (averaged over a 6-month period), with a phased reduction of hours being brought in over the preceding years. This change has necessitated complex shift rotas, with junior doctors in surgical specialties cross-covering out-of-hours.

Our study showed that only 32 per cent of on-call doctors were responsible for out-of-hours care in ENT alone. The majority were covering other surgical specialties, with 19 per cent covering 3 or more surgical specialties in addition to ENT. Thus, approximately half of the professionals covering the specialty of ENT surgery out-of-hours worked outside the specialty during normal hours, and they may not therefore have been able to develop the required endoscopic skills as part of their regular training.

In 2006, Pothier *et al.* conducted an audit on the nature of out-of-hours calls to the resident doctor

covering ENT.<sup>8</sup> The authors determined that 84 per cent of these calls required the doctor to have specialist ENT knowledge and 67 per cent required the use of ENT specific equipment. They argued that ENT was therefore not a suitable specialty to be cross-covered, as doctors from other specialties would not be suitably trained to deal with these referrals. In 2009, Sharpe *et al.* conducted a survey of junior doctors covering ENT.<sup>9</sup> The authors showed that of those cross-covering from other specialties, only 35 per cent had received any training on how to manage common ENT emergencies. Our audit confirms a lack of training for doctors from other specialties covering ENT on how to use and disinfect flexible endoscopes.

There is currently an intense and increasing focus on infection control in secondary healthcare. It is the view of the profession (as set out in the ENT UK position paper of September 2010<sup>6</sup>) that although the risk of inadvertent transmission of upper aerodigestive pathogens between patients is real, it is small and manageable; the risks engendered by the inability to diagnose potentially serious pathology are likely to be greater. However, the same position paper accepts that the acceptable standard of decontamination has not been adequately defined; it therefore falls to individual institutions to set their own policy.

Flexible endoscope availability out-of-hours has not changed appreciably over the past 10 years. Over a fifth of respondents in the current investigation had not been formally trained in the use of flexible endoscopes. A higher proportion of junior medical staff were taking responsibility for endoscope decontamination (43 per cent, up from 35 per cent 10 years previously). This was accompanied by a corresponding decrease in the proportion of nursing staff taking this responsibility (33 per cent, down from 50 per cent 10 years previously). More striking, however, is the 12 per cent of respondents who did not seem to know where this responsibility lay. From a clinical governance perspective, this must surely be taken to imply that these endoscopes are not being cleaned out-of-hours at all.

In the normal out-patient setting, some hospitals (the authors' institution among them) have opted for a central processing department, which provides a full cleaning cycle after each use of the flexible endoscope, employing similar equipment to that used for cleaning gastroscopes and colonoscopes. The official position of the profession in the UK is that this process may impair the quality of the optical image obtained, increase the risk of endoscope breakage and shorten mean endoscope lifespan. Thus, this policy is considered more likely to represent a burden on hospital finances than many of the alternatives currently in use.

The widely used chlorine dioxide wipe system is considered to be effective against all pathogens, provided that staff are adequately trained in its use.<sup>10</sup> These chemical sterilants have not been shown to be effective in reducing potential prion transmission.<sup>11</sup> With this in mind, a junior staff member trained to

use the flexible endoscope will not necessarily have been adequately trained in its safe decontamination. If junior staff are to take responsibility for flexible endoscope cleaning, it is an absolute requirement for patient safety that they receive adequate training. On a cost basis, Street *et al.* have shown that the chlorine dioxide wipes are the most cost-effective disinfection technique when compared to sheaths and automated reprocessing machines.<sup>12</sup> However, this technique puts the highest burden on medical staff in terms of adequate disinfection.

- **Thorough cleaning of flexible endoscopes is crucial to reduce potential transmission of infectious diseases**
- **ENT UK has published guidelines on endoscope cleaning and storage**
- **The percentage of out-of-hours doctors responsible for cleaning flexible endoscopes has increased since 2002**
- **The percentage of doctors who received formal training in flexible endoscope cleaning has also increased, but is still low**
- **Cross-covering is common; non-ENT doctors may not have sufficient training for adequate flexible endoscope use and disinfection**
- **Key elements of the guidelines are not being met (training, storage, register keeping) and local audits are needed to ensure best practice**

Chlorine dioxide wipes are the most common decontamination system in use today; they were employed in just under half of the units in the current study. Sixty-nine per cent of flexible endoscopes in out-of-hours use were being decontaminated (using this system and central automated cleaning) in line with recommended national guidelines. This is a distinct change from the findings of the study conducted 10 years previously. In that study it was revealed that in 46 per cent of units, flexible endoscopes were being immersed in chemical sterilant, in 39 per cent of units they were being cleaned with alcohol wipes, and in 12 per cent of units they were being cleaned with soap and water. However, 63 per cent of respondents in the current investigation had not been trained to use the wipe system according to the manufacturer's guidelines. It is therefore possible that this process was carried out in a manner that would be regarded as technically inadequate under close forensic scrutiny.

A robust audit trail is a medico-legal necessity. An institution may otherwise face the prospect of being unable to determine the provenance, extent and impact of any lapse in patient safety. In the current study, 54 per cent of respondents reported keeping a careful audit trail of the use of flexible endoscopes

out-of-hours. This represents a marked change from 10 years previously, when the comparable figure was 26 per cent. Although this is a distinct improvement, it cannot provide much comfort from a national clinical governance perspective.

Overall, although these findings suggest that the use and management of flexible endoscopes by acute ENT service staff has advanced over the past 10 years, there is clearly room for further improvement. Out-of-hours provision remains the weak link in the infection control chain. Hospitals are therefore subjecting emergency patients to risk, and the institutions themselves are exposed to medico-legal vulnerability. This situation is made more difficult by the rapid turnover of junior staff in ENT and the increase in cross-covering from other surgical specialties. The burden on departments in terms of continually training a shifting cadre of staff in safe flexible endoscopic technique is not expected to reduce in the near future.

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Mr P Radford takes responsibility for the integrity of the content of the paper

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