

Bibliografia articoli

Procedure endoscopiche apparato digerente

Test models to determine cleaning efficacy with different types of bioburden and its clinical correlation.

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Journal of Hospital Infections 2004 Apr;56 Suppl 2:S44-8.

The importance of cleaning as a first crucial step in reprocessing instruments and endoscopes is recognized worldwide. However, no standards to determine the efficacy of cleaning have been established. We have therefore investigated Bodedex forte, a new cleaner, in various test models derived from critical types of bioburden on flexible endoscopes. Removal of dried blood from metal carriers was determined in comparison with standard instrument disinfectants. Removal of biofilm endotoxin from silicone test pieces and removal of dried X-ray contrast medium from polyethylene pieces was measured in comparison with one other Standard cleaner. Residual bacteria in a biopsy channel from duodenoscopes following use of Bodedex forte, compared with two other cleaners, were measured in an endoscopy unit. After 15 min exposure to Bodedex forte, 95% of the dried blood were removed. Removal was between 0 and 86% with the disinfectants.

Bodedex forte reduced endotoxin by $1.91 \pm 0.19 \log(10)$ -steps compared with $0.43 \pm 0.19 \log(10)$ -steps Cidezyme ($P < 0.001$) two-sided t-test). Removal of dried X-ray contrast medium was 99% with Bodedex forte and 94% with a conventional cleaner. No bacterial contamination after reprocessing was found in 98% of duodenoscopes with Bodedex forte (78 duodenoscopes), in 72% with a conventional cleaner (129 duodenoscopes) and in 69% with an enzymatic cleaner (100 duodenoscopes). The difference between the three cleaners was significant ($P < 0.001$) chi-squared test). The superiority of the cleaning capacity of the new cleaner was demonstrated in various test models, which were designed according to the clinical relevance of different bioburdens. Implementation of accepted and reproducible standards for testing the cleaning efficacy will remain a goal for the next years.

Publication Types:
Evaluation Studies

Reprocessing endoscopes: United States perspective

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Journal of Hospital Infections 2004 Apr;56 Suppl 2:S27-39.

Endoscopes are used frequently for the diagnosis and therapy of medical disorders. For example, greater than 10000000 gastrointestinal endoscopic procedures are performed each year in the United States. Failure to employ appropriate cleaning and disinfection/sterilization of endoscopes

has been responsible for multiple nosocomial outbreaks and serious, sometimes life-threatening, infections. Flexible endoscopes, by virtue of the site of use, have a high bioburden of microorganisms after use. The bioburden found on flexible gastrointestinal endoscopes following use has ranged from 10(5) to 10(10)CFU/ml, with the highest levels being found in the suction channels.

Cleaning dramatically reduces the bioburden on endoscopes. Several investigators have shown a mean log(10) reduction factor of 4 (99.99%) in the microbial contaminants with cleaning alone. Cleaning should be done promptly following each use of an endoscope to prevent drying of secretions, allow removal of organic material, and decrease the number of microbial pathogens. Because the endoscope comes into intimate contact with mucous membranes, high-level disinfection is the reprocessing standard after each patient use. High-level disinfection refers to the use of a disinfectant (e.g., FDA-cleared chemical sterilant or high-level disinfectant) that inactivates all microorganisms (i.e., bacteria, viruses, fungi, mycobacteria) but not high levels of bacterial spores. The disinfection process requires immersion of the endoscope in the high-level disinfectant and ensuring all channels are perfused for the approved contact time (e.g., for ortho-phthalaldehyde this is 12 min in the US). Following disinfection, the endoscope and channels are rinsed with sterile water, filtered water, or tapwater. The channels are then flushed with alcohol and dried using forced air. The endoscope should be stored in a manner that prevents decontamination. A protocol that describes the meticulous manual cleaning process, the appropriate training and evaluation of the reprocessing personnel, and a quality assurance program for endoscopes should be adopted and enforced by each unit performing endoscopic reprocessing.

Gastroscope processing in washer-disinfectors at three different temperatures

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Journal of Hospital Infections 2003 Dec;55(4):276-82.

Endoscopes are processed chemo-thermally at approximately 56 degrees C in washer-disinfectors in Germany. In this study we investigated the processing of gastroscopes by an endoscope washer-disinfector at different temperatures. A total of 87 gastroscopes were tested hygienically and microbiologically before manual cleaning (after patient use), as well as after manual cleaning and after endoscope washer-disinfector processing at running temperatures of 43, 51 and 56 degrees C. In all tests the suction/biopsy channels of the gastroscopes were flushed with 50 mL sterile solution throughout their full length, from the proximal to the distal ends. The rinse solutions were plated on to various culture media. Also, in order to detect low bacterial counts, 3x10 mL rinse solution was membrane filtrated. The German guideline level for total bacterial counts, applicable since 2002, was exceeded at all temperatures tested (159 cfu/mL at 43 degrees C, <60 cfu/mL at 51 degrees C, and 8 cfu/mL at 56 degrees C). A temperature increase from 43 to 51 degrees C resulted in a highly significant reduction of the residual contamination by aerobic bacteria (P<0.001, Mann-Whitney U Test), Gram-negative bacilli (P<0.001), and pseudomonads (P=0.002). A further temperature increase from 51 to 56 degrees C resulted in a further highly significant drop in residual contamination by aerobic bacteria (P=0.021) and pseudomonads (P=0.036). The aim of the user-minimizing material damage to endoscopes or prolonging their product life-cannot be achieved through lowering the processing temperature without putting patients at risk. In order to ensure adequate processing, endoscope washer-disinfectors should meet the requirements of

current draft standards.

Comparison of the microbicidal activities of superoxidized and ozonated water in the disinfection of endoscopes

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Journal of international medical research 2003 Jul-Aug;31(4):299-306.

The microbicidal activities of superoxidized water (electrolysed strong acid water [ESAW] or electrolysed weak acid water [EWAW]), ozonated water, 0.05% chlorhexidine and 2% glutaraldehyde were tested against seven strains of clinical micro-organism isolates. Following incubation of bacterial suspensions in ESAW and EWAW for 10 s, the number of micro-organisms was reduced below the detection limit. The microbicidal activities of ESAW and EWAW were similar to that of glutaraldehyde, and superior to ozonated water and 0.05% chlorhexidine. The microbicidal activities of ESAW, EWAW and ozonated water were markedly diminished in the presence of albumin. Microbial contamination of upper gastrointestinal endoscopes was detected after 90 endoscopic procedures, but treatment of the endoscope with ESAW, EWAW or ozonated water eradicated the microbes. These results indicate that ESAW and EWAW are effective disinfectants after mechanical cleaning of upper gastrointestinal endoscopes, and can, therefore, be used in the endoscopy unit.

[Quality of hygiene in endoscope reprocessing--the fundamentals of indicator-assisted quality management in gastroenterology]

[Article in German]

Birkner BR, Bader L, Blumenstock G, Riemann JF, Selbmann HK.

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Zeitschrift für ärztliche Fortbildung und Qualitätssicherung 2003 Jun;97(3):227-32

High level disinfection and infection control in reprocessing gastrointestinal endoscopes is a critical security factor for patients in gastrointestinal health care. National and international guidelines for an adequate high quality disinfection of gastrointestinal endoscopes have been developed aiming to obtain infection control. The German Medical Association has recently published recommendations on quality assurance in gastrointestinal endoscopy including standardised procedures for disinfection and infection control. A prospective study was carried out in a large urban area in both private practices and hospitals to identify and characterise flaws and limitations in disinfection of gastrointestinal endoscopes by measuring a set of indicators of the quality of structures, processes

and outcomes. Moreover, the influence of information and continuous medical education on the quality of disinfection and infection control were to be evaluated. The bacterial contamination of endoscopes after reprocessing was measured as a relevant outcome quality indicator. The results revealed substantial flaws in cleaning and disinfection procedures in gastrointestinal endoscopy under routine clinical conditions. Overall, 49 and 39 percent of all (pre- and post-interventionally, resp.) checked endoscopes were contaminated by one or more bacteria. More often failures were discovered in the optic rinse system than in the cleaning/disinfection and the final rinse and drying process. A substantial failure rate was detected in gastrointestinal endoscope reprocessing under routine conditions according to the reprocessing procedure. Compared to manual and semi-automatic cleaning and disinfection, the full automatic cleaning and disinfection machines (RDG-E) showed the best results. Though their cleaning process remains improveable, it seems advisable to prefer RDG-E-machines for disinfection and infection control in gastrointestinal endoscopy. Continuous quality control of disinfection should be obtained by introducing regular microbiological examinations of the reprocessed endoscopes. Negative microbiological controls of the contamination of endoscopes are suitable quality indicators of a quality management system aiming to improve the quality of structures, processes and outcomes in gastroenterological health care.

[Acute colitis induced by a peracetic acid based solution used to disinfect endoscopes]

[Article in French]

Coton T, Bohand X, Guisset M, Carre D, Delpy R, Valette M, Debonne JM.

Gastroenterologie clinique et biologique 2003 May;27(5):556-8

Publication Types:

Case Reports
Letter

Colonoscopes may spread HCV and HPV

[No authors listed]

AIDS patient care and STDs 2003 May;17(5):257-8.

Publication Types:

News

Improvement of the automatic endoscopic reprocessor: self-cleaning disinfecting connectors between endoscope and reprocessor

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Endoscopy 2003 Jun;35(6):469-71.

BACKGROUND AND STUDY AIMS: We have previously pointed out a defect of automatic endoscopic reprocessors, i. e. the contamination of the connecting part between the endoscope and the reprocessor. We evaluated a newly designed connector (MH-861; Olympus, Tokyo, Japan) with a self-cleaning and disinfection mechanism, which enabled cleaning and disinfection of both the connector itself and its interface with the suction and air/water valves during a reprocessing cycle, which was not previously possible. **METHODS:** Ten upper gastrointestinal endoscopes were examined in the study. Swabs were taken from the suction and air/water valves for microbiological culture before and after reprocessing by the washer-disinfector. The numbers of contaminated endoscopes before and after reprocessing with the new connector were compared. **RESULTS:** Before the procedure there were five contaminated endoscopes and none after the procedure. When the new connector was used, the difference in cleaning and disinfection of the connecting parts was significant ($P = 0.0325$). **CONCLUSIONS:** We conclude that the newly developed connector permits effective cleaning and disinfection by automatic reprocessors.

Do conventional cleaning and disinfection techniques avoid the risk of endoscopic *Helicobacter pylori* transmission?

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Endoscopy 2003 Apr;35(4):295-9.

BACKGROUND AND STUDY AIMS: The aim of the present study was to determine whether endoscopes serve as a reservoir for *Helicobacter pylori* and whether the disinfection technique currently recommended for manual cleaning and disinfection of the instruments completely removes the risk of *H. pylori* transmission. **PATIENTS AND METHODS:** A prospective study was carried out in 400 patients who were undergoing upper gastrointestinal endoscopy for routine clinical indications. The patients' *H. pylori* status of the patients was identified using a urea detection system (HUT) and culture. *H. pylori* contamination was assayed by culturing rinsing samples from the endoscopes before and after manual cleaning and disinfection. Gastric biopsies were assayed using rapid urease testing (*Helicobacter urease* test, HUT) of two antral and gastric body biopsies and cultures. **RESULTS:** A total of 128 of the 400 patients examined were found to be *H. pylori*-positive using HUT testing. Endoscopes were contaminated in 54 of the 128 rinsing samples from endoscopes used in *H. pylori*-positive patients (42 %) before cleaning and disinfection. One of the 128 rinsing samples (0.8 %) was found to be contaminated with *H. pylori* even after routine manual cleaning and disinfection - indicating that these cleaning and disinfection procedures may be insufficient to eradicate *H. pylori* from endoscopes completely. No seroconversion was observed during serological follow-up in the patient who had previously been examined with an endoscope contaminated with *H. pylori*. The patient was still found to be seronegative 5 months after inoculation. **CONCLUSIONS:** Endoscopes are frequently contaminated with *H. pylori* immediately after gastroduodenal endoscopy in *H. pylori*-infected patients. Iatrogenic transmission is possible, as *H. pylori* can survive manual cleaning and disinfection with 2 % glutaraldehyde, particularly when there is ineffective cleaning before disinfection.

Infection control during gastrointestinal endoscopy

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Journal of laboratory and clinical medicine 2003 Mar;141(3):159-67.

Infection-control issues during gastrointestinal endoscopy, which are becoming increasingly important, can generally be divided into three major areas: (1) infectious complications resulting from a patient's own microbial flora (autologous), (2) infections transmitted from patient to patient by way of the endoscope (exogenous), and (3) infections transmitted between the patient and the health-care provider. The mean frequency of postprocedure bacteremia ranges from 0.5% for flexible sigmoidoscopy to 2.2% for colonoscopy, 4.2% for esophagogastroduodenoscopy, 8.9% for variceal ligation, 11% for endoscopic retrograde cholangiopancreatography, 15.4% for variceal sclerotherapy, and 22.8% for esophageal dilation. Although postprocedure bacteremia is not uncommon, it seldom results in infectious complications. Exogenous infections transmitted during endoscopy, which are extremely rare, generally result from failure to follow accepted guidelines for the cleaning and disinfection of gastrointestinal endoscopes, underscoring the importance of meticulous attention to endoscope reprocessing. Finally, although the risk of patient-staff transmission of infection is also rare, standard infection-control recommendations are important in protecting both patients and health-care providers.

Publication Types:

Review

Review, Tutorial

Standardized reprocessing of reusable colonoscopy biopsy forceps is effective: results of a German multicenter study

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Endoscopy 2003 Mar;35(3):197-202.

BACKGROUND AND STUDY AIMS: National and international guidelines recommend that a standardized protocol consisting of cleaning, ultrasound cleaning, and sterilization should be used for the reprocessing of endoscopic accessories in order to reduce the risk of transmission of microorganisms. This German multicenter study investigated the efficacy of standardized reprocessing of reusable biopsy forceps used during colonoscopy. **MATERIALS AND METHODS:** Ten endoscopy centers (eight hospitals and two private practices) used 330 biopsy forceps during routine colonoscopy. The forceps were used once, five times, or 20 times for colonoscopy, based on a randomization plan. The reprocessing protocol consisted of manual cleaning with an enzymatic agent, ultrasound cleaning with an enzymatic agent (30 min, 40 degrees C, 47 Hz), neutralization, drying, and sterilization (5 min, 134 degrees C). Aldehydes were not used, and the protocol did not

include a disinfection step. The biopsy forceps were sent to three microbiological institutes, based on a randomization plan, to have them tested for the presence of organisms, including identification of bacteria. RESULTS: A total of 318 of the 330 forceps were evaluable; 314 forceps (98.74 %) were sterile after use once, five times, or 20 times. Four forceps were contaminated with *Staphylococcus epidermidis* (n = 2), *Bacillus licheniformis* (n = 1) and *Corynebacterium aquaticum* (n = 2). All of 25 forceps were sterile after being used 20 times. CONCLUSION: Colonoscopy biopsy forceps can be reliably reprocessed following this standardized protocol, even without aldehydes.

Publication Types:
Multicenter Study

Surveillance cultures to monitor quality of gastrointestinal endoscope reprocessing

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American journal of gastroenterology 2003 Jan;98(1):77-81.

Comment in: *American journal of gastroenterology* 2003 Jan;98(1):3-5.

OBJECTIVES: High-level disinfection of GI endoscopes can be reliably obtained under controlled conditions with approved reprocessing methods. However, there are scant data regarding the effectiveness of these methods in clinical practice and no published methods of verification. The purpose of this study is to review retrospectively the results of environmental cultures of flexible endoscopes and to analyze the pattern of results. METHODS: Cultures of selected GI endoscopes listed as ready to use were obtained by adding 5-15 ml of trypticase soy broth or saline or 30-50 ml of sterile water to the biopsy channel of an endoscope. This wash was collected in a sterile container, plated onto blood and MacConkey agar, incubated at 37 degrees C, and examined for growth at 24 and 48 h. Personnel trained in accordance with approved procedures performed endoscope reprocessing. RESULTS: A total of 312 surveillance cultures were performed between 1990 and 1999. Initially, three of 17 water bottles were found to be contaminated with *Pseudomonas* species. The bottles were sterilized daily; only sterile water was used and subsequent cultures were negative. Between 1992 and 1994, 15/129 (11.6%) cultures were positive; 14 (93%) were from duodenoscopes. From 1995 to 1997, 18/124 (14.5%) cultures were positive, but only six (33%) were from duodenoscopes. However, 10 (55.6%) positive cultures were obtained from therapeutic upper endoscopes, attributed to faulty mechanical cleaning by nonnursing personnel after emergent procedures. The reprocessing procedure was altered, with improvement. One duodenoscope was persistently culture positive and was found to have a damaged biopsy channel. There were no recognized iatrogenic infections associated with endoscopic procedures. Organisms cultured were commonly gram-negative rods. CONCLUSIONS: The use of environmental endoscope culturing is a rapid, simple, inexpensive method to monitor effectiveness of standard reprocessing procedures. Disinfection is less effective with poor mechanical cleansing, and high-titer positivity is a marker for poor cleaning technique. Standard upper and lower scopes are commonly culture negative. Duodenoscopes, because of their inherent complexity, and other scopes used in emergent conditions require particular attention. Surveillance culture results can be used to identify patterns of poor technique, to reinforce proper procedure,

and to modify clinical practice. No associated clinical illness was apparent during this study.

[Reprocessing of flexible endoscopes and endoscopic accessories – an international comparison of guidelines]

[Article in German]

Leiss O, Beilenhoff U, Bader L, Jung M, Exner M.

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Zeitschrift für Gastroenterologie 2002 Jul;40(7):531-42.

Endoscopic examinations and procedures are essential for diagnosis and treatment of gastrointestinal diseases. As a result of poor reprocessing practice microorganisms can be transmitted via endoscope. The majority of infection transmissions is due to insufficient performance of cleaning and disinfection disregarding guidelines of societies of gastrointestinal endoscopy. A review of the literature and a comparison of European and American guidelines for reprocessing flexible endoscopes are given. Differences in the classification of endoscopic devices, on the possibility of prion transmission, recommendations on staff training and protection, quality assurance of reprocessing and evidence-based graduation of guidelines are stressed and discussed. With respect to the procedure of endoscope reprocessing, differences concerning the cleaning solution to choose, necessity of thoroughly manual cleaning and brushing of the accessible endoscope channels (even in the case of subsequent automatic reprocessing endoscopes in washers-disinfectors), disinfection solution, microbiological quality of water for final rinsing and rationale for alcohol flush of endoscope channels for better drying are mentioned. The need for experimental investigations of the cleaning and disinfection process is stressed. In contrast to recent guidelines of European and American societies of gastrointestinal endoscopy, the now updated recommendations of the Robert Koch-Institute for reprocessing flexible endoscopes and endoscopic accessories are evidence-based and graduated.

[Esophageal manometry: equipment cleaning and disinfection with glutaraldehyde]

[Article in Portuguese]

Muller S, Gruber AC, Hoefel HH, de Barros SG.

Centro Cirurgico Ambulatorial do HCPA, Programa de Pos-Graduacao em Gastroenterologia e Ciencias Aplicadas a Gastroenterologia, Faculdade de Medicina, Universidade Federal do Rio Grande do Sul, FAMED, UFRGS.

Arquivos de gastroenterologia 2001 Oct-Dec;38(4):276-80.

BACKGROUND: Many publications have emphasized the need of proper cleaning, disinfection and sterilization process for reused materials intended to prevent cross infections. As the endoscope the esophageal manometry catheters are considered as semicritical materials and must be free of microorganisms. AIM: To standardize the esophageal manometry materials cleaning and disinfection process to guarantee the safety of patients when reusing semicritical materials. It was based on international protocols and according to recommendations of the Hospital Infection Control

Commission of the "Hospital de Clinicas de Porto Alegre", Porto Alegre, RS, Brazil. MATERIALS AND METHODS: Enzymatic detergent was used for catheter cleaning, followed by immersion with 2% glutaraldehyde solution during 20 minutes for high-level disinfection. The water reservoir was kept clean and dry to prevent microorganisms proliferation. CONCLUSIONS: The high level disinfection with 2% glutaraldehyde, preceded by enzymatic detergent cleaning, is a safe and simple technique that avoids cross infection in the esophageal manometry equipment. This care must be taken after each manometric procedure. The transducers must be resterilized in ethylene oxide. The professionals of this area must work in concordance with the Hospital Infection Control Commission, being acquainted with the country laws and regulations and keeping sterilizing process and materials updated.

Duration of antibiotic therapy for cholangitis after successful endoscopic drainage of the biliary tract

van Lent AU, Bartelsman JF, Tytgat GN, Speelman P, Prins JM.

Department of Internal Medicine, Division of Infectious Diseases, Tropical Medicine and AIDS, Amsterdam, The Netherlands.

Gastrointestinal endoscopy 2002 Apr;55(4):518-22.

BACKGROUND: Drainage of the obstructed biliary tree is the mainstay of therapy for patients with acute cholangitis; antibiotic therapy is complementary. It is unknown whether it is necessary to continue therapy with antibiotics once biliary drainage is achieved and signs of systemic inflammation have subsided. METHODS: Patients who presented with acute cholangitis and were successfully treated at ERCP were studied retrospectively. Patients were followed for 6 months after ERCP. RESULTS: Eighty patients fulfilled study criteria. In 46% of patients blood cultures grew microorganisms. All patients recovered from the episode under study. Antibiotic therapy after ERCP was given for a median duration of 3 days (range: 0-42). Forty-one patients received antibiotic therapy for 3 days or less, 19 for 4 or 5 days, and 20 patients longer than 5 days. The 3 groups were well-matched. In none of the patients did the index episode of cholangitis result in a secondary complication not present at the time of ERCP. The percentage of patients with recurrent cholangitis (24%) was not statistically different for the 3 groups ($p = 0.80$). CONCLUSIONS: Short-duration antibiotic therapy (3 days) appears sufficient when adequate drainage is achieved and fever is abating.

[Clinical thinking and decision-making in practice. 4 times ERCP, 6 times echography of the upper abdomen and 3 CT scans in a woman with recurrent fever and bacteremia]

[Article in Dutch]

Kuipers EJ, de Man RA, van Buuren H.

Nederlands tijdschrift voor geneeskunde 2002 Mar 2;146(9):438; author reply 438-9.

Comment on: *Nederlands tijdschrift voor geneeskunde* 2001 Nov 24;145(47):2264-70.

Publication Types:
Comment
Letter

[HYGEA (Hygiene in gastroenterology--endoscope reprocessing): Study on quality of reprocessing flexible endoscopes in hospitals and in the practice setting]

[Article in German]

Bader L, Blumenstock G, Birkner B, Leiss O, Heesemann J, Riemann JF, Selbmann HK.

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Zeitschrift für Gastroenterologie 2002 Mar;40(3):157-70.

Comment in: *Zeitschrift für Gastroenterologie* 2002 Mar;40(3):155-6.

The quality of reprocessing gastroscopes, colonoscopes and duodenoscopes in daily routine of 25 endoscopy departments in hospitals and 30 doctors with their own practices was evaluated by microbiological testing in the HYGEA interventional study. In 2 test periods, endoscopes ready for use in patients were found contaminated at high rates (period 1: 49 % of 152 endoscopes; period 2: 39 % of 154 endoscopes). Culture of bacterial fecal flora (*E. coli*, coliform enterobacteriaceae, enterococci) was interpreted indicating failure of cleaning procedure and disinfection of endoscopes. Detection of *Pseudomonas* spp. (especially *P. aeruginosa*) and other non-fermenting rods – indicating microbially insufficient final rinsing and incomplete drying of the endoscope or a contaminated flushing equipment for the air/water-channel - pointed out endoscope recontamination during reprocessing or afterwards. Cause for complaint was found in more than 50 % of endoscopy facilities tested (period 2: 5 in hospitals, 25 practices). Reprocessing endoscopes in fully automatic chemo-thermally decontaminating washer-disinfectors with disinfection of final rinsing water led to much better results than manual or semi-automatic procedures (failure rate of endoscopy facilities in period 2 : 3 of 28 with fully automatic, 8 of 12 with manual, 9 of 15 with semi-automatic reprocessing). The study results give evidence for the following recommendations: 1. Manual brushing of all accessible endoscope channels has to be performed even before further automatic reprocessing; 2. For final endoscope rinsing, water or aqua dest. should only be used disinfected or sterile-filtered; 3. Endoscopes have to be dried thoroughly using compressed air prior to storage; 4. Bottle and tube for air/water-channel flushing have to be reprocessed daily by disinfection or sterilization, and in use, the bottle have to be filled exclusively with sterile water. The HYGEA study shows that microbiological testing of endoscopes is useful for detection of insufficient reprocessing and should be performed for quality assurance in doctors' practices, too. The study put recommendations for reprocessing procedures in more concrete terms.

Flexible endoscopes: structure and function--the air and water system

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Gastroenterology nursing 2000 Nov-Dec;23(6):264-8.

Flexible endoscopes are complex medical instruments that are easily damaged. To maintain the flexible endoscope in optimum working condition, the user must have a thorough understanding of the structure and function of the instrument. This series of articles will present an in-depth look at the care and handling of these expensive devices. The flexible endoscope is constructed of several systems that operate simultaneously to produce a highly technical, yet effective diagnostic and therapeutic medical device. These systems include the air and water system, the suction and operating channel system, the mechanical system, the endoscopic retrograde cholangiopancreatography (ERCP) elevator system, the optical system, and the electrical system. This first article in a series will focus on the air and water system of the endoscope. A review of the internal and external structure of the flexible endoscope and the functions of the air and water system, including infection control issues, potential problems and evaluation, and prevention of minor problems to avoid expensive repairs, will be addressed.

Current instrument reprocessing practices. Results of a national survey

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Gastroenterology nursing 2001 Sep-Oct;24(5):253-60.

In June 1998, a questionnaire was mailed to approximately 2,900 healthcare professionals to assess current instrument reprocessing and infection control practices and determine whether they have changed during the past decade. Surveys were returned from 146 respondents whose facilities performed gastrointestinal endoscopy. Most respondents were registered nurses and almost all worked in healthcare facilities located in the United States. More than 75% of the respondents reported that infection control practices in endoscopy have improved during the past 10 years. Most respondents used glutaraldehyde to reprocess flexible endoscopes. Immersing endoscopes for 20 minutes at room temperature was commonly practiced. Almost 75% of respondents used an automated device to reprocess flexible endoscopes. Most respondents terminally rinsed the endoscope's channels with 70% alcohol followed by forced-air drying. Few respondents outsourced instruments to a commercial reprocessing company and almost 50% reused disposable items. While some practices in endoscope reprocessing have changed during the past several years, others have not. In general, infection controls appear to have improved during the past decade, with the possible exception of a trend to reuse single-use items.

Recommendations for preventing hepatitis C virus infection: analysis of a Brooklyn endoscopy clinic's outbreak.

Muscarella LF; New York State health officials.

Infection Control and Hospital Epidemiology 2001 Nov;22(11):669.

Publication Types:
Letter

Revised ASTM Standard offers solid endoscope reprocessing protocol to GI community

[No authors listed]

Standardization news: SN 2000 Feb;28(2):15.

Publication Types:
News

Effectiveness of manual cleaning and disinfection for the elimination of hepatitis C virus from GI endoscopes

Nelson DB.

American journal of gastroenterology 2002 Jan;97(1):204-6.

Comment on: *American journal of gastroenterology* 2001 Jun;96(6):1803-6.

Publication Types:
Comment
Letter

[Risk of viral infections in colonoscopy and endoscopic procedures]

[Article in German]

Draenert R, Goebel FD.

Der Internist 2001 Dec;42(12):1690-1.

[Risk of contamination by hepatitis C of endoscopes utilized in gastroenterology hospital service]

[Article in French]

Deflandre J, Cajot O, Brixko C, Crine M, Labalue J, Senterre JM.

Service de Gastroenterologie, CHR la Citadelle, Liege.

Revue medicale de Liege 2001 Oct;56(10):696-8.

Transmission of hepatitis C virus by gastrointestinal endoscopy has been suggested especially therapeutic procedures. The aim of this study was to investigate the frequency of contamination of the endoscopes by hepatitis C virus and to assess the efficacy of a semi-automatic disinfection procedure. METHODS: In 19 patients with chronic replicative hepatitis C, upper gastrointestinal

endoscopy with different invasive procedures was performed. Cleaning and disinfection were carried out according to the recommendation of the belgian "Conseil Superieur de l'Hygiene": cleaning with detergent solution, rinsing, disinfection with a disinfectant solution for 10 minutes and again rinsing. Before the procedure (T0), a blood sample was collected to detect the presence of hepatitis C virus RNA. Immediately after the endoscopic procedure, the operating channel of the endoscope was flushed with water and was sterilely collected (T1); after cleaning (T2) and after disinfection (T3, T3EC), the same procedure was repeated. The collected samples were analysed by PCR in order to detect hepatitis C virus RNA. RESULTS: All the samples were positive at T0. Virus C RNA was found in 10 out the 19 patients at T1 (53%). The results were negative in all the samples both after cleaning (T2) and disinfection (T3-T3 EC). CONCLUSIONS: Our study confirmed the presence of hepatitis C virus in the operating channel after invasive upper gastrointestinal endoscopy. The contamination rate of the endoscope is high. Our cleaning and disinfection procedure seems to be effective in regard of hepatitis C virus RNA clearance.

[Glutaraldehyde-induced iatrogenic rectocolitis]

[Article in Spanish]

Vila V, Brullet E, Montserrat A, Bella R, Campo R, Colomer L, Junquera F.

Gastroenterologia y hepatologia 2001 Oct;24(8):409-10.

Publication Types:

Case Reports
Letter

Overview of infection control problems: principles in gastrointestinal endoscopy

Bond WW.

Research Consulting Service Associates, Inc, Lawrenceville, GA 30044, USA.

Seminars in laparoscopic surgery. 2001 Sep;8(3):223-32

Publication Types:

Review
Review, Tutorial

Cleaning and disinfection practices in digestive endoscopy in spain: results of a national survey

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BACKGROUND AND STUDY AIMS: Disinfection and surveillance of it are important for ensuring safety in gastrointestinal endoscopy. The aim of this survey was to assess the current status of disinfection in gastrointestinal endoscopy units in Spain. **MATERIALS AND METHODS:** An anonymous questionnaire on cleaning and disinfection methods was sent to gastrointestinal endoscopy units at 244 public hospitals in Spain. A minimum standard of disinfection (MSD) was defined to evaluate the appropriateness of disinfection practices. **RESULTS:** A total of 144 centers responded (58 %). All units perform manual washing of endoscopes before disinfection. Automatic washers are available in only 23 % of the centers. Selective cleaning of internal channels is systematically performed in 85 % of the centers. Glutaraldehyde-based disinfectants are the most commonly employed (84 % of units). The time of exposure to the disinfectant is at least 10 min in 97 % of units, but 20 min or more in only 36 % of them. Endoscopic accessories are sterilized in 57 % of centers. The MSD was complied with by 79 % of the units evaluated. Compliance with the MSD was significantly lower in small units ($P = 0.0005$) performing small numbers of examinations per month. Quality control tests on the efficacy of disinfection methods are conducted at 66 % of the centers. Specialized personnel record disinfection procedures in 85 % of the centers and supervise them in 55 % of the centers. Half of the units have inadequate equipment and facilities. **CONCLUSIONS:** This survey suggests that cleaning and disinfection practices in gastrointestinal endoscopy units in Spain have improved in recent years, and that there is a good compliance with standard guidelines. Most units should improve their equipment and facilities in order to provide better comfort and safety for patients and staff.

[Disinfection procedures in digestive endoscopy. Experience at a large Roman hospital]

[Article in Italian]

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Determination of glutaraldehyde residues on flexible endoscopes after chemothermal treatment in an endoscope washer-disinfector

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BACKGROUND AND STUDY AIMS: Although there are several cases of glutaraldehyde-induced colitis following colonoscopy there is only one study on residues after disinfecting. Our report describes the determination of water-soluble glutaraldehyde residues after processing endoscopes with a glutaraldehyde-containing disinfectant. **MATERIALS AND METHODS:** A gastroscope and a colonoscope were processed in a washer-disinfector and then immersed in 20 l of NaCl solution. Glutaraldehyde was determined by high performance liquid chromatography in 84 samples.

Samples were taken after immersing the endoscopes for 5 h and 24 h with and without rinsing the channels. RESULTS: After 5 h and with the channels having been rinsed, the median for colonoscopes was only 0.409 mg/l. The highest level of glutaraldehyde was 0.846 mg/l. CONCLUSIONS: After endoscopes have been processed in the washer-disinfector there is no risk of a glutaraldehyde-induced colitis, proctitis or diarrhoea.

Freely accessible endoscope channels improve efficacy of cleaning

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BACKGROUND AND STUDY AIMS: Inadequate cleaning and disinfection of medical devices, including flexible endoscopes, can result in the transmission of micro-organisms to patients. The aim of this study was to investigate the influence of the design of medical devices on the efficacy of manual cleaning of endoscope channels. MATERIALS AND METHODS: The investigation was carried out using four endoscopes (two duodenoscopes and two gastroscopes). The air/water channels of one duodenoscope and one gastroscope were freely accessible and could be brushed. The instrumentation and the air/water channels were contaminated with blood containing *Enterococcus faecium* as a test organism. After manual cleaning of the channels by flushing and, where possible, brushing, the recovery rates for the test organism were studied. RESULTS: The comparable rates for recovery of the test organism after cleaning of the instrumentation channels proved that the method used was reproducible. With regard to the air/water channels, the rate of micro-organisms in the cleaning solution recovered after flushing alone was a maximum of 3 % relative to the rate detected after brushing and flushing. CONCLUSIONS: The data collected in the study show that only flushing channels that are not freely accessible resulted in significantly lower ($P < 0.001$) recovery rates for the test organism. In practice, this means that contamination may remain in the channels, and it shows that the design of a medical device has an important influence on the reprocessing of reusable instruments such as flexible endoscopes.

Reutilization of accessories in gastrointestinal endoscopic practice

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The key issues that determine the decision between reusable versus disposable accessories are cost and functionality. In most health-care systems the availability and dissemination of endoscopic services relates directly to the resources (i.e. budget) of that system. Given the limitations of health-care budgets, access to endoscopic services will depend upon the cost efficiency of endoscopic practice. The onus on endoscopists and health-care providers, therefore, is to meticulously evaluate the necessary steps for safe reutilization of accessories. This paper

addresses the principles of reuse, quality assurance and particularly disinfection practices. Any change to a more costly disposable accessory policy must bear the responsibility of denied access to endoscopic services in a system with finite resources.

Publication Types:
Review
Review, Tutorial

Preventing nosocomial infections from gastrointestinal endoscopy

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Gastrointestinal procedures have been associated with a wide range of infectious complications, including bacterial endocarditis. Although the rate of bacteremia from the patient's own flora is quite high after some procedures, only a few cases of endocarditis caused by gastrointestinal instrumentation have been reported. Because of the severity of the illness, however, antibiotic prophylaxis has been recommended for patients who are categorized as high risk for some procedures. Bacteremia and other infections, such as colitis, may also originate from a contaminated endoscope. To prevent such an occurrence, high-level disinfection has been recommended for gastrointestinal endoscopes. High-level disinfection includes manual cleaning of the endoscope, flushing of internal channels with a liquid chemical sterilant, and thorough rinsing and drying of internal lumens.

Publication Types:
Review
Review, Tutorial

Overview of infection control problems: principles in gastrointestinal endoscopy

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The practice of flexible gastrointestinal endoscopy has matured significantly in recent years. Unfortunately, two long-standing problems still exist: the complex physical nature inherent to the endoscopes and accessories, and user compliance with established reprocessing guidelines. Improvements have been made, but newer instruments remain comparatively fragile, expensive, and physically complex, and validated data on reprocessing specific instruments is generally lacking. The practice of flexible gastrointestinal endoscopy today, however, is demonstrably safe and beneficial, provided established practice procedures for reprocessing, with emphasis on instrument cleaning, are followed meticulously in each endoscopy center.