Limpeza de produtos para saúde

Camila Quartim de Moraes Bruna
Pós-doutoranda na Escola de Enfermagem da Universidade de São Paulo – EEUSP
Grupo de pesquisa: PETIRAS – Políticas Públicas, Epidemiologia e Tecnologias para Prevenção de Infecções Relacionadas a Assistência a Saúde

caquartim@yahoo.com.br

www.webbertraining.com 15 de agosto de 2018

- Declaro não possuir vínculos que possam ameaçar a neutralidade das informações aqui expostas
- Sem conflitos de interesses a declarar

Classificação de produtos para saúde

- Presume o risco potencial de infecção pelo paciente que utilizou o produto
- Utiliza o princípio de precaução padrão (exceção = príon)
- Aponta o nível mínimo de processamento exigido

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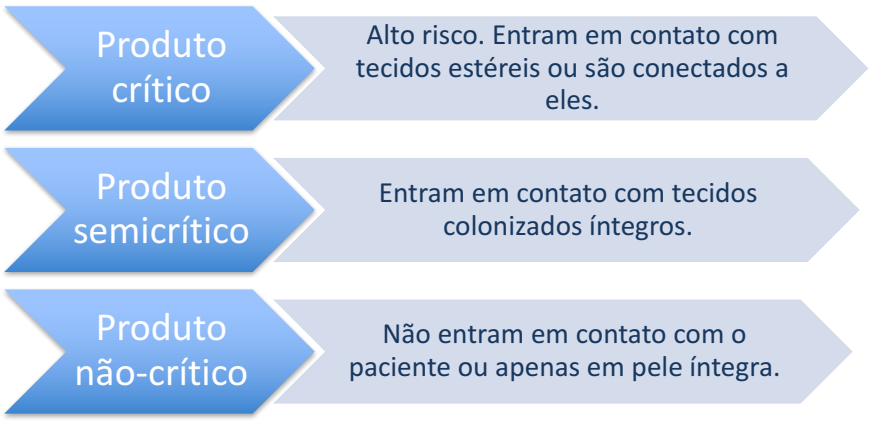

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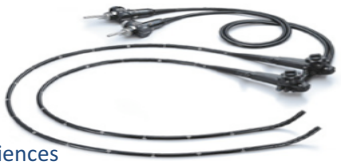
Spaulding, 1968

Classificação PPS – WFHSS, 2012

- Semi-críticos:
  - A – sem exigências especiais de processamento

  - B – requer processamento mais rigoroso



WFHSS: World Federation For Hospital Sterilisation Sciences
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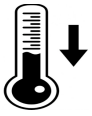
Classificação PS – WFHSS, 2012

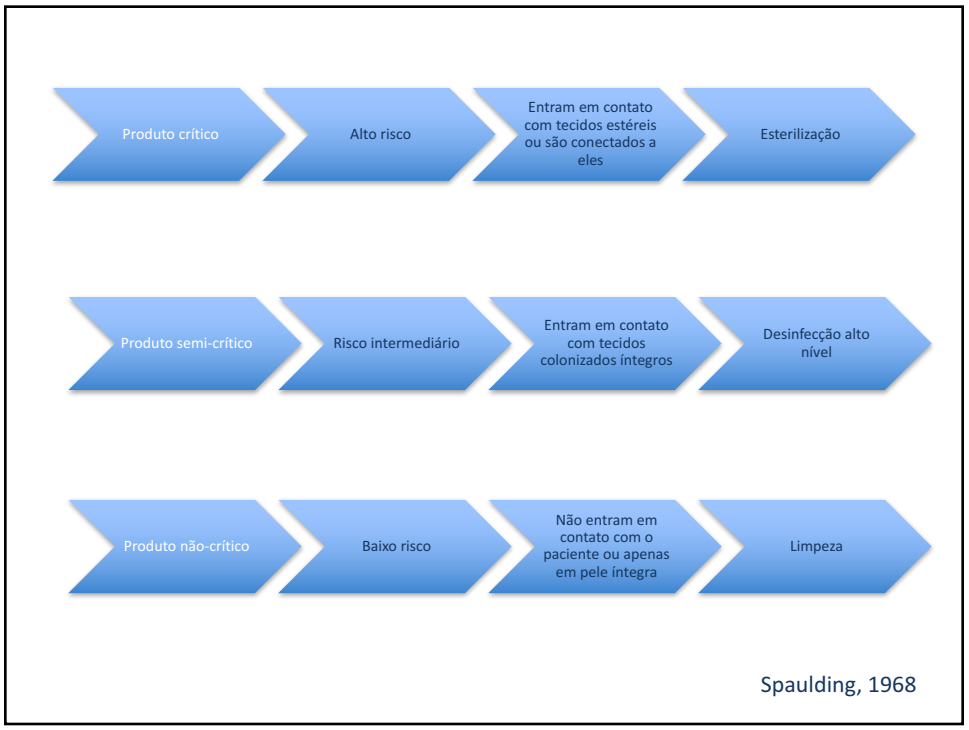
- Críticos:
  - A – sem exigências especiais de processamento

  - B – requer processamento mais rigoroso



  - C – requer processamento ultra-rigoroso

WFHSS: World Federation For Hospital Sterilisation Sciences
Camila Q M Bruna



Spaulding, 1968

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Major article

Analysis of microbial load on surgical instruments after clinical use and following manual and automated cleaning

Síntia de Souza Evangelista MSc[a,*], Simone Gonçalves dos Santos PhD[b], Maria Aparecida de Resende Stoianoff PhD[b], Adriana Cristina de Oliveira PhD[a]

[a] Department of Basic Nursing, School of Nursing, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil
[b] Department of Microbiology, Institute of Biological Sciences, Universidade Federal de Minas Gerais, Belo Horizonte, Brazil

Key Words:
Patient safety
Medical device reprocessing
Infection Control
Microbiology

Background: We aimed to monitor the microbial load and identify the microorganisms recovered from surgical instruments after clinical use and following manual and automated cleaning.
Methods: This experimental study was carried out in the Laboratory of Oral Microbiology and Anaerobes at the Federal University of Minas Gerais in Brazil. Microbial samples were taken from 125 surgical instruments used in 25 types of gastrointestinal surgeries.
Results: The average microbial load was 93.1 CFU/100 mL after clinical use and 41 CFU/100 mL and 8.24 CFU/100 mL on instruments following 2 sequential steps of manual cleaning, respectively, and 75 CFU/100 mL and 16.1 CFU/100 mL on instruments after automated cleaning. Surgical wound classification significantly affected the microbial load recovered on instruments. Coagulase-negative *Staphylococcus*, *Escherichia coli*, *Pseudomonas* spp, *Stenotrophomonas maltophilia*, and *Acinetobacter baumannii* complex were recovered.
Conclusions: The average microbial load observed after the cleaning steps decreased, and the decrease in microbial load was more pronounced using the manual method compared with that observed using the automated method.

Analysis of the microbial load in instruments used in orthopedic surgeries

Flávia Morais Gomes Pinto, BSN,[a] Rafael Queiroz de Souza, BSN,[a] Cely Barreto da Silva, MS,[b] Lycia Mara Jenné Mimica, PhD,[b] and Kazuko Uchikawa Graziano, PhD[a]
São Paulo, Brazil

Background: Because of advances in technology, the number of orthopedic surgeries, mainly hip and knee replacement surgeries, has increased, with a total of 150,000 prosthetic surgeries estimated per year in the United States and 400,000 worldwide.
Methods: We used an exploratory cross-sectional study, with a quantitative approach to determine the microbial load in instruments used in orthopedic surgeries, quantifying and identifying the microbial growth genus and species, according to the surgical potential of contamination that characterizes the challenge faced by the Material and Sterilization Center at the Institute of Orthopedics and Traumatology of Hospital das Clinicas of the School of Medicine of the University of Sao Paulo, Brazil.The orthopedic surgical instruments were immersed, after their use, in sterilized distilled water, sonicated in an ultrasonic washer, and posteriorly agitated. Subsequently, the wash was filtrated through a 0.45-μm membrane and incubated in aerobic and anaerobic mediums and in medium for fungi and yeasts.
Results: In clean surgeries, 47% of the instruments were contaminated; in contaminated surgeries, 70%; and, in infected surgeries, 80%. Regardless of the contamination potential of the surgeries, the highest quantitative incidence of microorganism recovery was located in the 1 to 100 colony-forming unit range, and 13 samples presented a microbial growth potential >300 colony-forming units. Regardless of the contamination potential of the surgeries, there was a convergence in the incidence of negative-coagulase *Staphylococcus* growth (28%, clean surgeries; 32%, contaminated surgeries; and 29%, infected surgeries) and *Staphylococcus aureus* (28%, contaminated surgeries; and 43%, infected surgeries).
Conclusion: Most of the microorganisms recovered from the analyzed instruments (78%) were vegetative bacteria that presented their death curve at around 80°C, characterizing a low challenge considering the processes of cleaning and sterilization currently employed by the Material and Sterilization Center. Fewer microorganisms were recovered from instruments used in clean surgeries in comparison with those used in contaminated and infected surgeries.
Key Words: Hospital infection; orthopedic surgery; surgical instruments; microbial load.

Natural bioburden levels detected on rigid lumened medical devices before and after cleaning

Harriet Chan-Myers, BS, RM (AAM)
David McAlister, PhD, ABMM
Patricia Antonoplos, PhD
Irvine, California

Controversy exists concerning the degree of microbial contamination associated with the use of rigid lumened medical devices, the efficacy of standard cleaning techniques used to remove pathogenic microorganisms from lumen channels, and whether patients are placed at risk of cross infection because of microbial contamination. In this study the level and types of microorganisms found on rigid lumened medical devices before and after cleaning in a hospital environment were investigated. The bioburden level after clinical use was found to be relatively low, ranging from 10^1 to 10^4 colony forming units (CFU) per device. After the instruments were cleaned, none of the devices studied contained bioburden levels greater than 10^4 CFU and 83% had bioburden levels less than or equal to 10^2 CFU. The bioburden present before cleaning was comprised of organisms derived from the handling of the device, from the hospital environment, and from the patient. The bioburden present after cleaning was comprised of organisms typically derived from the handling of the device and from the hospital environment. The level of bioburden per device was also related to the anatomic site where the device was used, with lower numbers of organisms found on devices exposed to sterile body sites and the respiratory tract. (AJIC Am J Infect Control 1997;25:471-6)

Levels of naturally occurring microorganisms on surgical instruments after clinical use and after washing

Nancy S. Chu, MS
Harriet Chan-Myers, BS, RM(
Nona Ghazanfari, BS
Patricia Antonoplos, PhD
Irvine, California

These studies confirm that surgical instruments used in sterile body cavity procedures have relatively low bioburden levels, averaging about 10^2 per instrument, when compared with instruments used in nonsterile body areas (eg, gastrointestinal endoscopes), which are in the range of 10^5 to 10^9. The results of this study are

Surgical instruments exposed to sterile body sites should be contaminated with relatively low levels of microbial contamination or bioburden; however, few studies in the literature have determined the quantitative level and types of contamination. A study was conducted at 2 clinical sites to determine the level of microbial contamination of surgical instruments after clinical use and after washing. Quantitative assays showed that bioburden levels were in the range of 0 to 4415 colony forming units per instrument after clinical use, and 88% of the instruments had bioburden levels lower than 1000. As expected, a reduction in counts occurred after washing; however, in some cases, higher counts were found on the instruments after the washing process. Although the washing procedure is effective in reducing the microbial levels deposited on the surgical instruments during use, a recontamination process occurs that results in increased counts after washing. The low bioburden level after washing consists of predominantly vegetative microorganisms that present a relatively low challenge to sterilization and disinfection systems. (AJIC Am J Infect Control 1999;27:315-9)

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Bioburden

- Varia de 10^2 a 10^4 UFC/produto que entra em contato com tecidos estéreis
- Pode chegar a 10^9 e 10^{10}/produto que entra em contato com tecidos colonizados

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Natural bioburden levels detected on flexible gastrointestinal endoscopes after clinical use and manual cleaning

Nancy S. Chu, MS, David McAllster, PhD, ABMM, Patricia A. Antonopios, PhD
Irvine, California

Background: **Colonoscopes present a special bacterial decontamination challenge because the colon has a large and diverse microbial population.**
Methods: **Bioburden of colonoscope insertion tube surfaces and suction channels were determined after use and after manual cleaning.**
Results: **After use bioburden in suction channels averaged 7.0×10^9 colony-forming units (cfu). Cleaning reduced this level to 1.3×10^5. Cleaning of tube surfaces reduced the after-use bioburden from a level of 5.1×10^5 to 2.2×10^4 cfu. Gram-negative rods accounted for approximately 99% of the bioburden within the suction channel after use and after cleaning. After use flora were predominantly *Escherichia coli* and *Bacteroides*. The flora shifted to waterborne *Pseudomonas* organisms, and other members of the family *Enterobacteriaceae* after cleaning. Gram-positive bacteria were the primary isolates from the device surfaces both after use (56%) and after cleaning (47%). Because gram-positive cocci and diphtheroids are a part of the normal microbiota of the skin, these bacteria may have been introduced by the hospital environment or by handling.**
Conclusions: **After the cleaning of in-use colonoscopes, fewer than 10^6 vegetative bacteria could be recovered. This value is several logs lower than some previous estimates. This finding may be useful in the formulation of sterilization and disinfection cycles. Microflora from the colonoscopes indicated that the cleaning process introduced waterborne and enteric microorganisms, which highlights the importance of sanitation in the device reprocessing area. (Gastrointest Endosc 1998;48:137-42.)**

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Levels of microbial contamination on surgical instruments

William A. Rutala, PhD, MPH[a,b]
Maria F. Gergen, MT(ASCP)[c]
Jessie F. Jones[c]
David J. Weber, MD, MPH[a,b]
Chapel Hill, North Carolina

Objective: To ascertain the microbial load and type of organisms on used surgical instruments following standard cleaning, which consisted of the use of a washer sterilizer followed by sonic cleaning.
Design: In this prospective experimental study, used surgical instruments were immersed in Peptamin Tween broth, the broth agitated, and then filtered through a 0.45 µm filter. Quantitative cultures were performed, and all microbes were identified by using standard techniques.
Setting: This study was conducted at a 660-bed university hospital.
Results: The microbial load remaining on used surgical instruments after cleaning was as follows: 36 (72%) instruments 0 to 10 colony-forming units (CFU), 7 (14%) instruments 11 to 100 CFU, and 7 (14%) instruments >100 CFU. Organisms contaminating the instruments included coagulase-negative staphylococcus (56%) followed by *Bacillus* (22%) and diphtheroids (14%). No other microbes were isolated from more than 4% of the instruments.
Conclusion: Most used nonlumen surgical instruments contain less than 100 CFU of relatively nonpathogenic microorganisms after cleaning. This suggests that new low-temperature sterilization technologies are likely to be highly effective in preventing cross-transmission of infection via nonlumen medical instruments. (AJIC Am J Infect Control 1998;26:143-5.)

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Automated washing with the Reliance Endoscope Processing System and its equivalence to optimal manual cleaning

Michelle J. Alfa, PhD, FCCM,[a] Nancy Olson, BSc, RT,[b] and Pat DeGagne, RT[a]
Winnipeg, MB, Canada

Background: Manual cleaning of flexible endoscopes is prone to error. To date, attempts to automate this process have been unsuccessful. The aim of this project was to compare the efficacy of the washing phase in the new Reliance EPS (STERIS Corp, Mentor, OH) with that of optimal manual cleaning.
Methods: Using simulated-use testing, all channels in 3 different flexible endoscopes, including a bronchoscope (Pentax, Pentax Medical Company, Miami, FL), a side-viewing duodenoscope (Olympus, Olympus Corporation), and a colonoscope (Fujinon, Fujinon Corporation, Wayne, NJ) were evaluated. All of the channels in the flexible endoscope were soiled with artificial test soil (ATS) (test soil that mimics the worst case levels of hemoglobin, protein, carbohydrate, and endotoxin from patient-used flexible endoscopes) containing 10^8 cfu/mL of *Enterococcus faecalis* and *Pseudomonas aeruginosa* The soiled scopes were allowed to dry for 1 hour prior to processing. Hemoglobin, protein, and viable organism counts for the flexible endoscopes were determined before and after cleaning.
Results: Both the Reliance EPS washing phase and optimal manual cleaning achieved >90% reduction of hemoglobin and protein, resulting in <6.4 μg/cm^2 after the cleaning cycle. The reduction factor for viable organisms was not significantly different between the 2 methods, which ranged from 2.06 to 6.21 for manual cleaning and from 2.1 to 5.93 for the Reliance EPS washing phase. The mean reduction factor (all tests) was 4.32 ± 1.03 for manual cleaning compared with 4.24 ± 1.11 for Reliance EPS washing phase.
Conclusion: The efficacy of the Reliance EPS washing phase for flexible endoscopes was equivalent to optimal manual cleaning for all the makes and models of flexible endoscopes tested. (Am J Infect Control 2006;34:561-70.)

Após a limpeza

- Redução na carga orgânica 4 a 6 $\log_{10}$
- E até 99% de cargas inorgânicas

✔ Manipulação segura

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Fatores que afetam a limpeza

- Tipo de sujeira;
- Qualidade e temperatura da água;
- Na indisponibilidade de produtos químicos a limpeza deve ser realizada com água e fricção;
- É importante seguir as instruções do fabricante para cada produto;
- É importante garantir treinamento para a equipe;

OMS. Decontamination and reprocessing of medical devices for health-care facilities, 2016

INFECTION CONTROL AND HOSPITAL EPIDEMIOLOGY DECEMBER 2011, VOL. 32, NO. 12

ORIGINAL ARTICLE

Outbreak of *Pseudomonas aeruginosa* Surgical Site Infections after Arthroscopic Procedures: Texas, 2009

Pritish K. Tosh, MD;[1,2,a] Maureen Disbot, MS, RN, CCRN;[3] Jonathan M. Duffy, MD, MPH;[1,2] Marc L. Boom, MD, MBA;[3] Gary Heseltine, MD, MPH;[4] Arjun Srinivasan, MD;[2] Carolyn V. Gould, MD, MSCR;[2] Sandra I. Berríos-Torres, MD[2]

SETTING. Seven organ/space surgical site infections (SSIs) that occurred after arthroscopic procedures and were due to *Pseudomonas aeruginosa* of indistinguishable pulsed-field gel electrophoresis (PFGE) patterns occurred at hospital X in Texas from April 22, 2009, through May 7, 2009.

OBJECTIVE. To determine the source of the outbreak and prevent future infections.

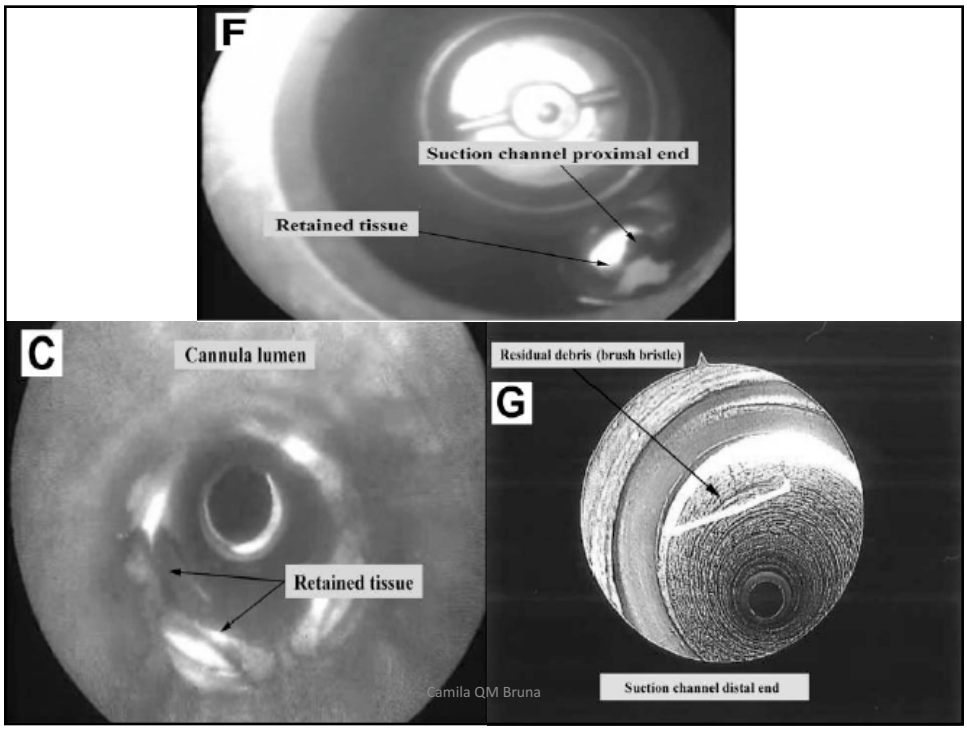
DESIGN. Infection control observations and a case-control study.

METHODS. Laboratory records were reviewed for case finding. A case-control study was conducted. A case patient was defined as someone who underwent knee or shoulder arthroscopy at hospital X during the outbreak period and subsequently developed organ/space SSI due to *P. aeruginosa*. Cultures of environmental and surgical equipment samples were performed, and selected isolates were analyzed by PFGE. Surgical instrument reprocessing practices were reviewed, and surgical instrument lumens were inspected with a borescope after reprocessing to assess cleanliness.

RESULTS. The case-control study did not identify any significant patient-related or operator-related risk factors. *P. aeruginosa* grew from 62 of 388 environmental samples. An isolate from the gross decontamination sink had a PFGE pattern that was indistinguishable from that of the case patient isolates. All surgical instrument cultures showed no growth. Endoscopic evaluation of reprocessed arthroscopic equipment revealed retained tissue in the lumen of both the inflow/outflow cannulae and arthroscopic shaver handpiece. No additional cases occurred after changes in instrument reprocessing protocols were implemented. After this outbreak, the US Food and Drug Administration released a safety alert about the concern regarding retained tissue within arthroscopic shavers.

CONCLUSIONS. These SSIs were likely related to surgical instrument contamination with *P. aeruginosa* during instrument reprocessing. Retained tissue in inflow/outflow cannulae and shaver handpieces could have allowed bacteria to survive sterilization procedures.

Infect Control Hosp Epidemiol 2011;32(12):1179-1186



ARTICLE IN PRESS

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journal homepage: www.ajicjournal.org

Major Article

Is retained bone debris in cannulated orthopedic instruments sterile after autoclaving?

Kenneth Smith MD *, Ibukunoluwa Araoye MS, Shawn Gilbert MD, Ken Waites MD, Bernard Camins MD, Michael Conklin MD, Brent Ponce MD

University of Alabama at Birmingham, Birmingham, AL

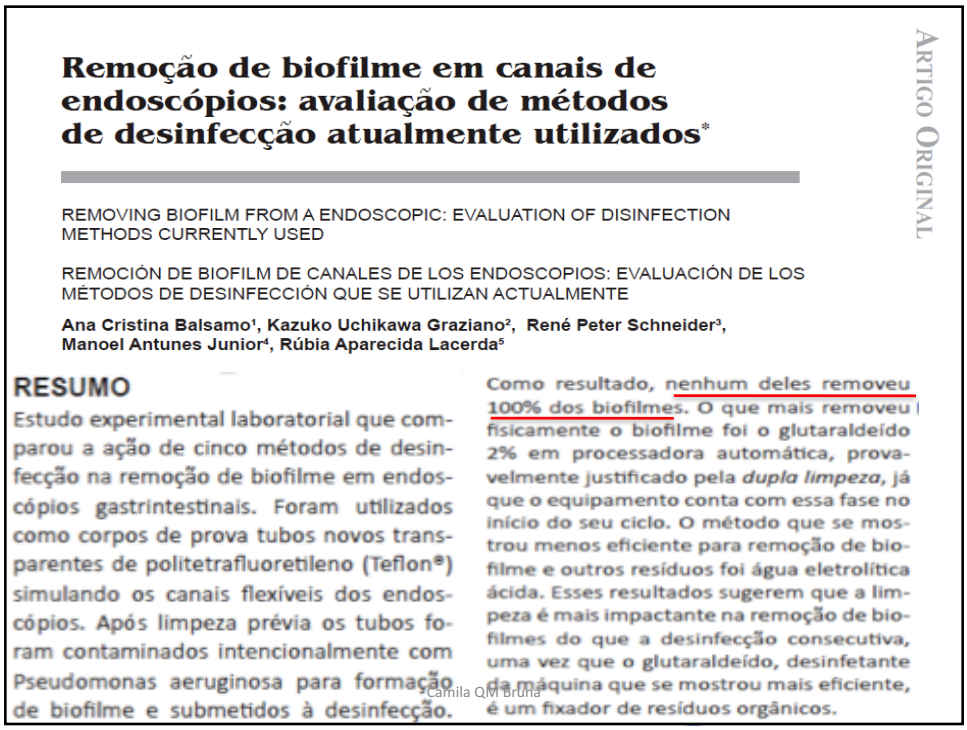
Key Words:
Autoclave
Instrument sterilization
Orthopedic
Contamination

Aims: Cannulated surgical instruments may retain biologic debris after routine cleaning and sterilization. Residual debris after cleaning is assumed to be sterile; however, there is no experimental basis for this assumption. The purpose of this study was to determine the sterility of retained biodebris found within cannulated surgical instruments after autoclave sterilization.

Materials and Methods: Fifteen cannulated drill bits were used to drill pig scapulae to create a plug of bone that was exposed to a mixture of *Bacillus cereus*, *Pseudomonas aeruginosa*, and methicillin-resistant *Staphylococcus aureus* for 60, 120, or 180 minutes prior to sterilization. The drill bits were autoclave sterilized using standard settings. The "sterilized" bone cores were then incubated in solution and streak-plated on blood agar.

Results: All 3 positive controls were positive for the experimental bacteria. Two negative controls were positive for contaminant bacteria. A *B. cereus* strain was recovered from 1 of the experimental group drill bits in the 180-minute group. Pulsed-field gel electrophoresis confirmed that the recovered *B. cereus* strain was identical to the experimental inoculate.

Conclusion: Retained biodebris in cannulated drills may not be sterile after standard autoclave sterilization. In addition, delay of surgical instrument reprocessing may increase the risk of resistant contamination.



ARTIGO ORIGINAL

Remoção de biofilme em canais de endoscópios: avaliação de métodos de desinfecção atualmente utilizados*

REMOVING BIOFILM FROM A ENDOSCOPIC: EVALUATION OF DISINFECTION METHODS CURRENTLY USED

REMOCIÓN DE BIOFILM DE CANALES DE LOS ENDOSCOPIOS: EVALUACIÓN DE LOS MÉTODOS DE DESINFECCIÓN QUE SE UTILIZAN ACTUALMENTE

Ana Cristina Balsamo[1], Kazuko Uchikawa Graziano[2], René Peter Schneider[3], Manoel Antunes Junior[4], Rúbia Aparecida Lacerda[5]

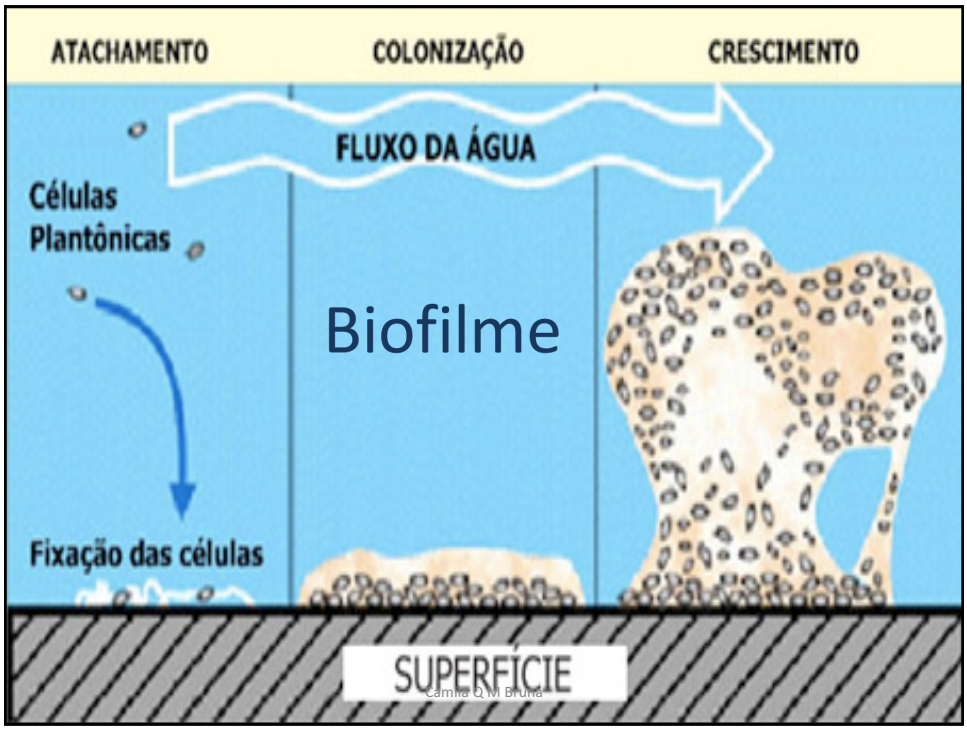
RESUMO

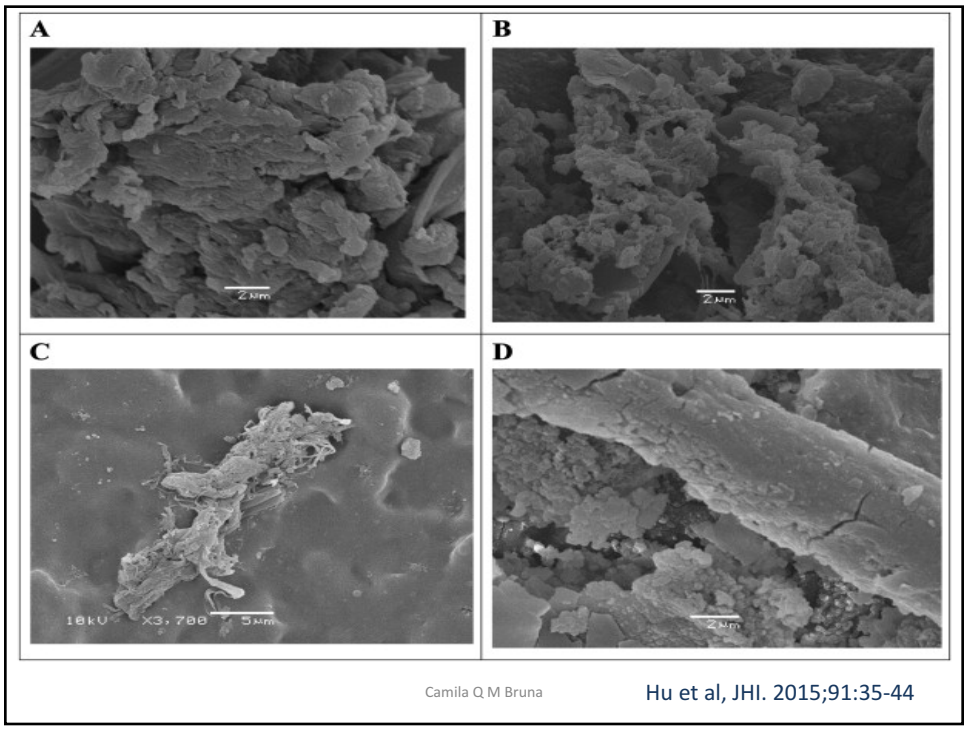
Estudo experimental laboratorial que comparou a ação de cinco métodos de desinfecção na remoção de biofilme em endoscópios gastrintestinais. Foram utilizados como corpos de prova tubos novos transparentes de politetrafluoretileno (Teflon®) simulando os canais flexíveis dos endoscópios. Após limpeza prévia os tubos foram contaminados intencionalmente com Pseudomonas aeruginosa para formação de biofilme e submetidos à desinfecção. Como resultado, nenhum deles removeu 100% dos biofilmes. O que mais removeu fisicamente o biofilme foi o glutaraldeído 2% em processadora automática, provavelmente justificado pela *dupla limpeza*, já que o equipamento conta com essa fase no início do seu ciclo. O método que se mostrou menos eficiente para remoção de biofilme e outros resíduos foi água eletrolítica ácida. Esses resultados sugerem que a limpeza é mais impactante na remoção de biofilmes do que a desinfecção consecutiva, uma vez que o glutaraldeído, desinfetante da máquina que se mostrou mais eficiente, é um fixador de resíduos orgânicos.

Biofilme

- Comunidade séssil de células aderidas irreversivelmente a um substrato, a uma interface ou entre si, envoltas por matriz de substâncias extracelulares poliméricas, por elas produzidas, e que tem a taxa de crescimento e transcrição de genes alteradas.

(Donlan R.M., Consterton J.W. Biofilms: survival mechanisms of clinically relevant microorganisms. Clin Microbiol Rev. 2002;15(2):167-93.)

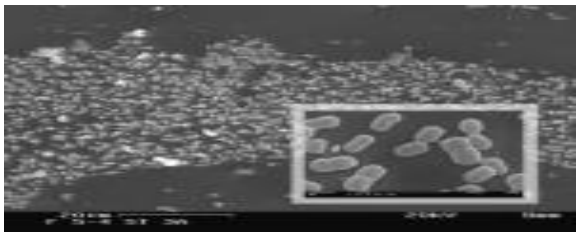




www.webbertraining.com

Biofilme

- *Pseudomonas aeruginosa* em aço inoxidável em 24 horas.



(ZOLTAI PT; ZOTTOLA EA; McKAY LL. Scanning electron microscopy of microbial attachment to milk and milk contact surfaces. **Journal of Food Protection**, v. 44, p.204-208, 1981)

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Ana Cristina Balsamo[1], Kazuko Uchikawa Graziano[2], René Peter Schneider[3], Manoel Antunes Junior[4], Rúbia Aparecida Lacerda[5]

Ao término desse período a tampa com as extensões de PVC foram rosqueadas no bocal do vidro com o nutriente, as suas extremidades foram conectadas aos tubos já contaminados com a suspensão de *Pseudomonas aeruginosa* e o nutriente foi escoando até atingir a extremidade distal do sistema, permitindo um fluxo lento e constante, controlado pelos clampes, por um período aleatório de seis horas, a fim de promover a formação de biofilmes. A escolha desse período foi estabelecida para simular o tempo de uso de um endoscópio, em ambiente hospitalar, que funciona em plantão de seis horas, embora no resultado laboratorial o biofilme tenha sido obtido a partir de uma hora. Após o

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Descontaminação no ponto de uso

- Evitar a o ressecamento da matéria orgânica nos produtos, facilita a limpeza;
- Remover pérfurocortantes;
- Retirar o excesso de matéria orgânica com pano úmido;
- Evitar exposição prolongada;
- Evitar soluções salinas;
- Acondicionar corretamente para transporte;
- Manter instrumentos úmidos com soluções de detergente ou sob pano umedecido;
- Não transportar container com água.

OMS, 2016

Limpeza

- Remoção física de resíduos orgânicos e inorgânicos, com consequente redução microbiana;
- Permite o adequado contato do agente esterilizante ou desinfetante.

ISO/TS 11139

Ciclo de Sinner

Figure 11. **Cleaning circle: all factors are essential** [18]

Ação mecânica

Ação química

Água

Tempo de contato

Temperatura

18 Sinner's Circle (Dr Herbert Sinner, 1959)

OMS, 2016

É possível limpar sem esterilizar, mas é impossível esterilizar sem limpar!

Limpeza

- Etapa mais importante do processamento!
- Manual ou automatizada;

Automated washing with the Reliance Endoscope Processing System and its equivalence to optimal manual cleaning

Michelle J. Alfa, PhD, FCCM,[a] Nancy Olson, BSc, RT,[b] and Pat DeGagne, RT[a]
Winnipeg, MB, Canada

Background: Manual cleaning of flexible endoscopes is prone to error. To date, attempts to automate this process have been unsuccessful. The aim of this project was to compare the efficacy of the washing phase in the new Reliance EPS (STERIS Corp, Mentor, OH) with that of optimal manual cleaning.
Methods: Using simulated-use testing, all channels in 3 different flexible endoscopes, including a bronchoscope (Pentax, Pentax Medical Company, Miami, FL), a side-viewing duodenoscope (Olympus, Olympus Corporation), and a colonoscope (Fujinon, Fujinon Corporation, Wayne, NJ) were evaluated. All of the channels in the flexible endoscope were soiled with artificial test soil (ATS) (test soil that mimics the worst case levels of hemoglobin, protein, carbohydrate, and endotoxin from patient-used flexible endoscopes) containing 10^8 cfu/mL of *Enterococcus faecalis* and *Pseudomonas aeruginosa* The soiled scopes were allowed to dry for 1 hour prior to processing. Hemoglobin, protein, and viable organism counts for the flexible endoscopes were determined before and after cleaning.
Results: Both the Reliance EPS washing phase and optimal manual cleaning achieved >90% reduction of hemoglobin and protein, resulting in <6.4 μg/cm^2 after the cleaning cycle. The reduction factor for viable organisms was not significantly different between the 2 methods, which ranged from 2.06 to 6.21 for manual cleaning and from 2.1 to 5.93 for the Reliance EPS washing phase. The mean reduction factor (all tests) was 4.32 ± 1.03 for manual cleaning compared with 4.24 ± 1.11 for Reliance EPS washing phase.
Conclusion: The efficacy of the Reliance EPS washing phase for flexible endoscopes was equivalent to optimal manual cleaning for all the makes and models of flexible endoscopes tested. (Am J Infect Control 2006;34:561-70.)

ORIGINAL ARTICLE

Manual and Automated Cleaning Are Equally Effective for the Removal of Organic Contaminants From Laparoscopic Instruments

Tamara Carolina de Camargo, PhD;[1,2] Alda Graciele Claudio dos Santos Almeida, MSc, PhD;[3] Camila Quartim de Moraes Bruna, PhD;[1] Caroline Lopes Ciofi-Silva, PhD;[1] Flávia Morais Gomes Pinto, PhD;[1] Kazuko Uchikawa Graziano, PhD[1]

OBJECTIVE. To compare the effectiveness of manual and automated methods for cleaning laparoscopic instruments.

DESIGN. Experimental laboratory study.

METHODS. We evaluated 4 methods of cleaning laparoscopic instruments: (1) manual-only cleaning and rinsing with potable tap water; (2) manual cleaning and rinsing with potable tap water, followed by ultrasonic cleaning without rinsing; (3) manual cleaning and rinsing with potable tap water followed by ultrasonic cleaning and rinsing with potable tap water; and (4) manual cleaning and rinsing with potable tap water, followed by ultrasonic cleaning and rinsing: first with potable tap water and then with sterile distilled water. Organic residues of protein, hemoglobin, and carbohydrates were evaluated using spectrophotometry.

RESULTS. The various cleaning methods tested did not result in statistically significant differences ($P > .05$) in the levels of investigated organic residues.

CONCLUSIONS. All cleaning and rinsing methods tested were found to be effective in reducing the levels of organic residues on laparoscopic instruments. Thus, there is no advantage gained by supplementing manual-only cleaning with automated ultrasonic cleaning, nor was there a difference between rinsing with potable tap versus sterile distilled water.

Infect Control Hosp Epidemiol 2017;1–6

Camila QM Bruna

Limpeza manual

- Os produtos devem ser totalmente desmontados;
- Imergir completamente as partes submergíveis do produto (aerolização);
- Atenção especial aos lumens:
  - Utilize escovas adequadas para limpeza de lumens;
  - Jato de solução nos lumens;
  - Enxágue no lumens;
  - Inspeção

Procedimento Operacional Padrão

- Validar POP de limpeza manual para cada tipo de produto;
- Imersão
- Limpeza especial (baterias, fonte elétrica)
- Lumens estreitos;
- Quantidades de produtos químicos;
- Diâmetro e comprimento das escovas;

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Cuidados com as escovas:

- Devem ser termodesinfetadas e secas ao final do “dia”;
- Pelo menos limpas e deixadas para secar.

OMS, 2016

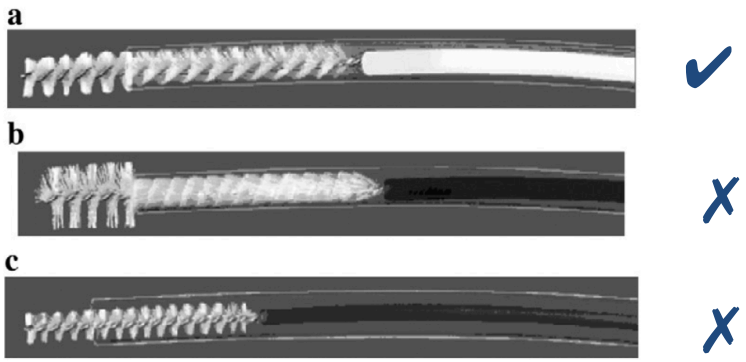

Figure 2. Importance of brush diameter for effective cleaning of endoscope channel (photograph provided by LTA Medical, Montreuil, France). (a) Diameter of the brush is correct for the channel size, and effective cleaning is ensured. (b) Diameter of the brush is too big, so brush fibres are compacted in the channel and are not effective. (c) Diameter of the brush is too small, so brush fibres do not touch the channel.

Bajolet et al. JHI 83; 2013:341-343

Produtos para limpeza

- Uso único;
- Quando não possível, desinfetar pelo menos diariamente;
- Limpar e secar após cada turno;
- Descartar aqueles danificados.

OMS, 2016

Limpeza mecânica

- Lavadoras:
  - ultrassônicas
  - automatizadas/termodesinfectadoras

OMS, 2016

Limpeza mecânica

- Preferencialmente;
- Instruções de uso (equipamento e produto);
- Ultrassônicas: articulações, lumens ou áreas de difícil acesso;
- Treinamento dos profissionais;
- Qualidade da água;
- Qualificação do equipamento.

OMS, 2016

Lavadoras automatizadas

- Água pressurizada remove mecanicamente os contaminantes;
- Fases: pré-enxágue, limpeza, enxágue, lubrificação, enxágue final (temperatura);
- Qualidade da água

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Lavadoras automatizadas

- Não sobrecarregar;
- Instrumentais abertos, sem tampas e contidos em cestos;
- Inspeção diária do funcionamento dos braços;
- Não é necessária pré-limpeza.

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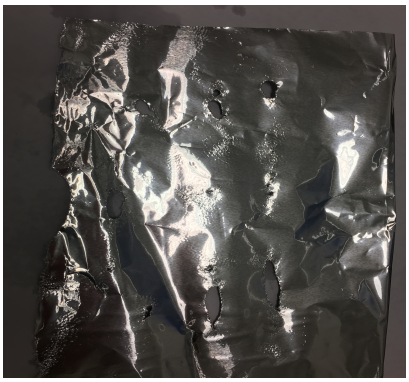
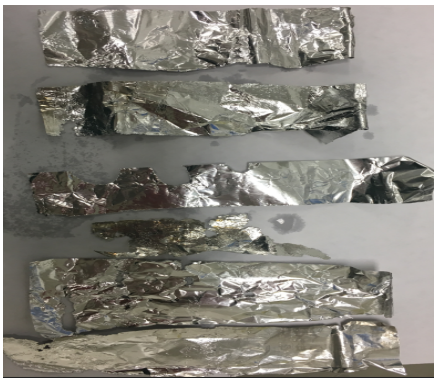
Lavadoras ultrassônicas

- Cavitação: implosão de bolhas e vácuo.





Foil test

Lavadoras ultrassônicas

- Produtos devem estar pré-limpos;
- Temperatura da água não deve ultrapassar 60°C (denaturação das proteínas sanguíneas);
- Troca da água;
- Desgaseificação (ciclo vazio 5-10 min);
- Instrumentos abertos e cheios de água;
- Tampa fechada (aerolização);
- Enxáguar após;
- Limpar

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Validação da limpeza

- Inspeção visual (preparo);
- Indicadores comerciais;
- Referencia ISO 15883:5.

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Lavadoras ultrassônicas

- Validação do processo:
  - Inspeção visual
  - Teste da folha (Foil test)
  - Teste comerciais (pelo menos 1 vez ao ano)

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Quando e o quê medir?

- Produtos para saúde: Cada item
  - Visualmente
  - Testes de limpeza
    - Hemoglobina
    - Proteína
    - ATP

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Qualidade da água na limpeza

- Recomenda-se avaliação periódica da água;
- Dureza (íons de Ca e Mg)
- Consequências: material, equipamento

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Tipos de detergentes

- Neutro
- Neutro com enzimas
- Levemente alcalino
- Alcalino
- Detergentes pré-desinfetantes

Considerações na escolha de detergentes

- Seguir as instruções do fabricante sobre:
  - Tipo de sujeira a ser removida;
  - Compatibilidade com o produto a ser limpo;
  - Tipo de equipamento usado na limpeza;
  - Dureza da água;
  - Não fazer misturas;
  - Não reenvasar ou reaproveitar recipientes.

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Recomendações OMS

- Preferência por detergente levemente alcalino (pH 8.0 – 10.8);
- Atenção à qualidade da água;
- Utilizar apenas detergentes para uso em estabelcimentos de saúde;
- Usar diluições recomendadas pelo fabricante;

Lubrificantes

- Devem ser hidrossolúveis;
- Devem ser utilizados quanto os produtos já estiverem limpos e antes da esterilização;
- Devem ser compatíveis com o método de esterilização;

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Enxágue

- Após a limpeza;
- Remover contaminantes e detergentes;
- O último enxágue lumens de produtos intravasculares ou intratecais dever ser feito com água pura.

OMS, 2016

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O impacto do último enxágue na citotoxicidade de produtos críticos passíveis de processamento*

The impact of the last rinse on cytotoxicity of critical items

Impacto del último enjuague en la citotoxicidad de productos críticos pasibles de procesamiento

Rafael Queiroz de Souza[1], Cláudia Regina Gonçalves[2], Tamiko Ichikawa Ikeda[2], Áurea Silveira Cruz[2], Kazuko Uchikawa Graziano[3]

* Extraído da tese "Avaliação *in vitro* da citotoxicidade de instrumentos cirúrgicos enxaguados com diferentes qualidades de água", Escola de Enfermagem, Universidade de São Paulo, 2014.

[1] Universidade de São Paulo, Escola de Enfermagem, São Paulo, SP, Brasil.

[2] Instituto Adolfo Lutz, São Paulo, SP, Brasil.

[3] Universidade de São Paulo, Escola de Enfermagem, Departamento de Enfermagem Médico-Cirúrgica, São Paulo, SP, Brasil.

ABSTRACT

Objective: To assess the cytotoxicity of products subsequent to a cleaning process based on a validated standard operating procedure (SOP), and a final rinse with different types of water: tap, deionized, distilled, treated by reverse osmosis and ultra-purified. **Method:** This was an experimental and laboratory study. The sample consisted of 130 hydrodissection cannulas, 26 per experimental group, characterized according to type of water used in the final rinse. The samples were submitted to internal and external contamination challenge with a solution containing 20% defibrinated sheep blood and 80% of sodium chloride 0.9%. Next, the lumens were filled with a ophthalmic viscosurgical device, remaining exposed for 50 minutes, and then were processed according to the validated SOP. Cytotoxicity was assessed using neutral red uptake assay. **Results:** No cytoxicity was detected in the sample extracts. **Conclusion:** The samples did not display signs of cytotoxicity, regardless of final rinse quality. The results obtained were reached by using only a validated cleaning operating procedure, based on the scientific literature, and on official recommendations and related regulation.

Enxágue abundante!!

Camila QM Bruna

Limpeza sem imersão

- Limpar o produto com pano limpo e descartável umedecido com detergente e água;
- "Enxágue" o produto com pano umedecido com água;
- Seque o produto;
- Soluções de limpeza devem ser trocadas a cada uso e quando sujas;

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Secagem

- Previne crescimento microbiano e diluição dos agentes desinfetantes;
- Ar comprimido ou panos limpos que não liberem partículas;
- Em aço inox previne manchas.

OMS, 2016

Notas finais

- Produtos devem ser desmontados o máximo possível;
- Resíduos impedem o contato dos agentes desinfetantes e esterilizantes;
- Alguns produtos químicos são inativados na presença de matéria orgânica;
- Alguns produtos químicos são inativados quando misturados a outros produtos químicos;

Notas finais

- Agentes de limpeza devem remover contaminantes orgânicos, inorgânicos e microbianos;
- Nenhum agente é capaz de remover completamente todos esses compostos;
- O primeiro passo da limpeza deve ser o uso de agentes que reduzam a tensão superficial.

Equipamento de proteção individual

- Usar ao manipular material sujo
- Proteger mucosas (máscara, óculos)
- Gorro
- Avental
- Sapatos fechados

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Obrigada!