

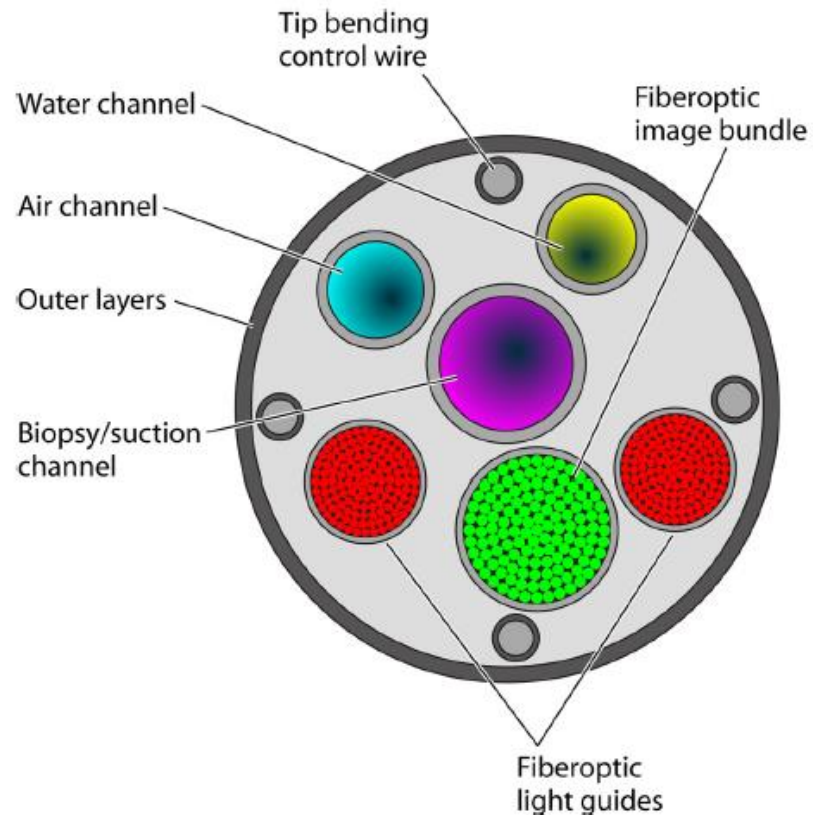
**ERCP and KPC and others CPE**

# Transmission of Infection by Flexible Gastrointestinal Endoscopy and Bronchoscopy

Julia Kovaleva,<sup>a</sup> Frans T. M. Peters,<sup>b</sup> Henny C. van der Mei,<sup>c</sup> John E. Degener<sup>a</sup>

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>a</sup>; Endoscopy Center, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>b</sup>; Department of Biomedical Engineering, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>c</sup>

April 2013 Volume 26 Number 2

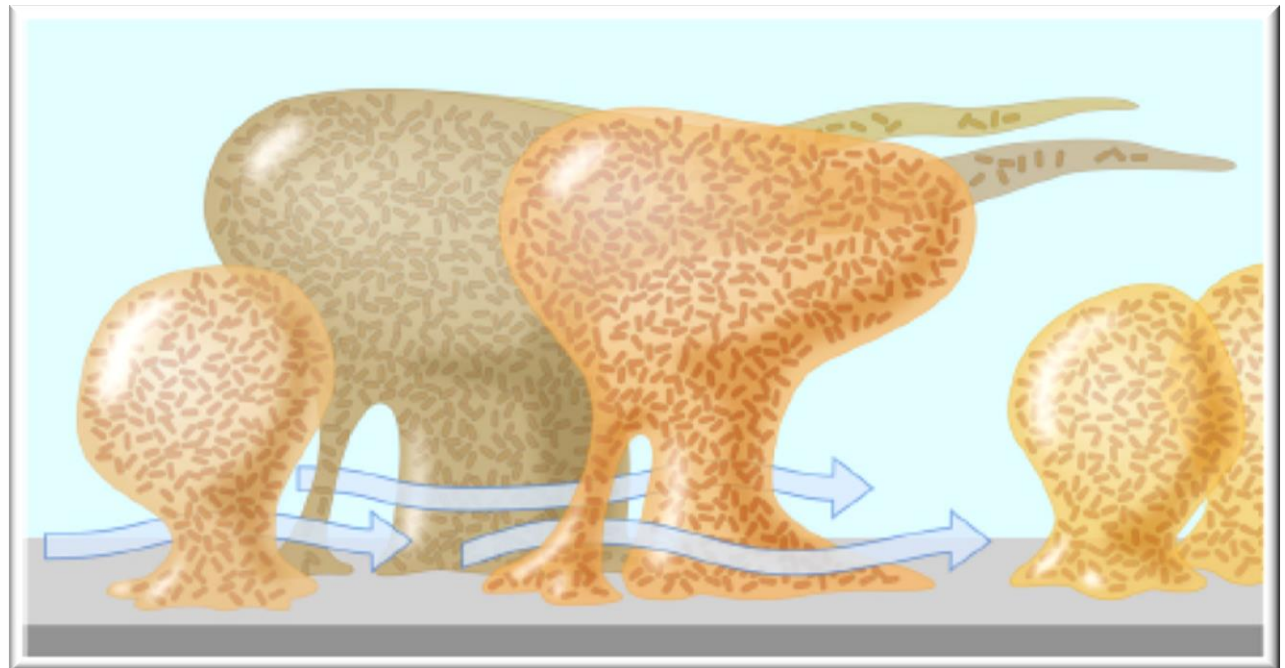


# Transmission of Infection by Flexible Gastrointestinal Endoscopy and Bronchoscopy

Julia Kovaleva,<sup>a</sup> Frans T. M. Peters,<sup>b</sup> Henny C. van der Mei,<sup>c</sup> John E. Degener<sup>a</sup>

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>a</sup>; Endoscopy Center, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>b</sup>; Department of Biomedical Engineering, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>c</sup>

April 2013 Volume 26 Number 2



# Transmission of Infection by Flexible Gastrointestinal Endoscopy and Bronchoscopy

Julia Kovaleva,<sup>a</sup> Frans T. M. Peters,<sup>b</sup> Henny C. van der Mei,<sup>c</sup> John E. Degener<sup>a</sup>

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>a</sup>; Endoscopy Center, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>b</sup>; Department of Biomedical Engineering, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>c</sup>

April 2013 Volume 26 Number 2

Endoscopia digestiva superiore: **19 studi**

TABLE 2 Infections associated with flexible upper gastrointestinal endoscopy

| Reference | Microorganism(s)                 | No. of contaminated patients after endoscopy | No. of infected patients | Infection type(s)                         | Detection of endoscope contamination | Cause(s) of contamination <sup>a</sup>  |
|-----------|----------------------------------|--|--------------------------|---|--------------------------------------|---|
| 80        | <i>P. aeruginosa</i>             | 3  | 2                        | Sepsis                                    | Yes                                  | Inappropriate cleaning and disinfection (benzalkonium chloride)                           |
| 62        | <i>P. aeruginosa</i>             | 4  | 3                        | Pneumonia, lung abscess                   | Yes                                  | Inappropriate cleaning and disinfection (cetrimide)                                       |
| 65        | <i>P. aeruginosa</i>             | 4  | 4                        | Sepsis                                    | Yes                                  | Contaminated water bottle and water supply; inappropriate cleaning and disinfection       |
| 23        | <i>P. aeruginosa</i>             | 99   | No data                  | Bacteremia/sepsis, cholangitis, pneumonia | Yes                                  | Contaminated AER (a flaw in design, presence of biofilm); drying with no ethanol flushing |
| 130       | <i>H. pylori</i>                 | 1  | 1                        | Gastritis                                 | Not tested                           | Biopsy forceps not sterilized   |
| 128       | <i>H. pylori</i>                 | 2  | 2                        | Gastritis                                 | Yes                                  | Inappropriate disinfection between patients (ethanol); biopsy forceps not sterilized      |
| 131       | <i>H. pylori</i>                 | 1  | 1                        | Gastritis                                 | Yes                                  | Inappropriate cleaning and disinfection between patients                                  |
| 84        | <i>Salmonella</i> Typhi          | 1  | 1                        | Bacteremia                                | Not tested                           | Inappropriate cleaning and disinfection   |
| 82        | <i>Salmonella</i> Typhimurium    | 7  | 7                        | Gastroenteritis, peritoneal abscess       | Yes                                  | Inappropriate cleaning and disinfection   |
| 28        | <i>Salmonella</i> Typhimurium    | 1  | 1                        | Urinary tract infection                   | Yes                                  | Lack of manual cleaning; insufficient disinfectant exposure                               |
| 88        | <i>Salmonella</i> Agona          | 5  | 5                        | Gastroenteritis, bacteremia/sepsis        | Yes                                  | Inappropriate cleaning and disinfection (cetrimide)                                       |
| 86        | <i>Salmonella</i> Kedougou       | 15   | 12                       | Gastroenteritis                           | No                                   | Inappropriate cleaning and disinfection (cetrimide)                                       |
| 162       | HBV                              | 1  | 1                        | HBV infection                             | Not tested                           | Inappropriate cleaning and disinfection (cetrimide); no disinfection between patients     |
| 163       | HBV                              | 1  | 1                        | HBV infection                             | Not tested                           | Endoscope reprocessing not described  |
| 161       | HBV                              | 1  | 1                        | HBV infection                             | Not tested                           | Lack of disinfection procedure  |
| 183       | HCV                              | 9  | 9                        | HCV infection                             | Not tested                           | Contaminated syringe or anesthetic vial; inappropriate cleaning and disinfection          |
| 150       | <i>Strongyloides stercoralis</i> | 4  | 4                        | Esophagitis                               | Not tested                           | Not found   |
| 152       | <i>Trichosporon</i> spp.         | 9  | 0                        | No  | Yes                                  | Inappropriate cleaning and disinfection (cetrimide)                                       |
| 151       | <i>Trichosporon asahii</i>       | 1  | 1                        | Esophagitis                               | Yes                                  | Biopsy forceps not sterilized   |

# Transmission of Infection by Flexible Gastrointestinal Endoscopy and Bronchoscopy

Julia Kovaleva,<sup>a</sup> Frans T. M. Peters,<sup>b</sup> Henny C. van der Mei,<sup>c</sup> John E. Degener<sup>a</sup>

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>a</sup>; Endoscopy Center, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>b</sup>; Department of Biomedical Engineering, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>c</sup>

April 2013 Volume 26 Number 2

Sigmoido/colonosopia: **5 studi**

TABLE 3 Infections associated with flexible sigmoidoscopy/colonoscopy

| Reference | Microorganism              | No. of contaminated patients after endoscopy | No. of infected patients | Infection(s)    | Detection of endoscope contamination | Cause(s) of contamination   |
|-----------|----------------------------|--|--------------------------|-----------------|--------------------------------------|---|
| 87        | <i>Salmonella</i> Lomita   | 2  | 0                        | No              | Not tested                           | Inappropriate cleaning and disinfection (phenolic solution)                                   |
| 28        | <i>Salmonella</i> Goerlitz | 1  | 1                        | Gastroenteritis | Yes                                  | Lack of manual cleaning; inappropriate disinfection (phenolic solution)                       |
| 85        | <i>Salmonella</i> Newport  | 8  | 2                        | Gastroenteritis | Yes                                  | Biopsy forceps not sterilized; inappropriate disinfection (iodophor solution)                 |
| 181       | HCV                        | 2  | 2                        | HCV infection   | Not tested                           | Inadequate manual cleaning; insufficient disinfectant exposure; biopsy forceps not sterilized |
| 182       | HCV                        | 1  | 1                        | HCV infection   | Not tested                           | Contaminated syringe or anesthetic vial; inappropriate disinfection                           |

# Transmission of Infection by Flexible Gastrointestinal Endoscopy and Bronchoscopy

Julia Kovaleva,<sup>a</sup> Frans T. M. Peters,<sup>b</sup> Henny C. van der Mei,<sup>c</sup> John E. Degener<sup>a</sup>

Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>a</sup>; Endoscopy Center, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>b</sup>; Department of Biomedical Engineering, University of Groningen, University Medical Center Groningen, Groningen, The Netherlands<sup>c</sup>

April 2013 Volume 26 Number 2

TABLE 4 Infections associated with endoscopic retrograde cholangiopancreatography<sup>a</sup>

| Reference | Microorganism(s)                     | No. of contaminated patients after endoscopy | No. of infected patients | Infection(s)                                 | Detection of endoscope contamination | Cause(s) of contamination   |
|-----------|--------------------------------------|--|--------------------------|--|--------------------------------------|---|
| 95        | <i>P. aeruginosa</i>                 | 1  | 1                        | Cholangitis, sepsis                          | Yes                                  | Inappropriate cleaning and disinfection (ethanol)   |
| 96        | <i>P. aeruginosa</i>                 | 14   | 0                        | No   | Yes                                  | Inappropriate cleaning and disinfection (povidone-iodine/ethanol)                                     |
| 97        | <i>P. aeruginosa</i>                 | 7  | 7                        | Cholangitis                                  | Yes                                  | Inappropriate cleaning and disinfection (ethanol)   |
| 100       | <i>P. aeruginosa</i>                 | 1  | 1                        | Sepsis                                       | Yes                                  | Contaminated water bottles  |
| 53        | <i>P. aeruginosa</i>                 | 4  | 3                        | Sepsis                                       | Yes                                  | Inappropriate disinfection; rinsing with nonsterile tap water   |
| 91        | <i>P. aeruginosa</i>                 | 5  | 5                        | Cholangitis, sepsis, urinary tract infection | Yes                                  | Inadequate cleaning and disinfection between uses in patients (tap water)                             |
| 22        | <i>P. aeruginosa</i>                 | 10   | 5                        | Cholecystitis, liver abscess                 | Yes                                  | Contaminated AER; inappropriate cleaning and disinfection; drying with no ethanol flushing            |
| 328       | <i>P. aeruginosa</i>                 | 1  | 1                        | Liver abscess                                | No                                   | Not found; endoscope reprocessing not described   |
| 98        | <i>P. aeruginosa</i>                 | 2  | 2                        | Sepsis                                       | Yes                                  | Inappropriate cleaning and disinfection (cetrimide)   |
| 90        | <i>P. aeruginosa</i>                 | 7  | 7                        | Bacteremia/sepsis, cholangitis, pancreatitis | Yes                                  | Contaminated water bottle; inadequate manual cleaning and disinfection between patients (isopropanol) |
| 99        | <i>P. aeruginosa</i>                 | 5  | 5                        | Sepsis                                       | Yes                                  | Contaminated water bottle (not disinfected)   |
| 23        | <i>P. aeruginosa</i>                 | 16   | No data                  | Bacteremia/sepsis, cholangitis, pneumonia    | Yes                                  | Contaminated AER (a flaw in design, presence of biofilm); drying with no ethanol flushing             |
| 75        | <i>P. aeruginosa</i>                 | 25   | 25                       | Bacteremia/sepsis                            | Yes                                  | Failure to disinfect elevator channel in AER; drying with no ethanol flushing                         |
| 101       | <i>P. aeruginosa</i>                 | 5  | 3                        | Cholangitis, sepsis                          | No                                   | Not found; endoscope reprocessing not described   |
| 29        | <i>P. aeruginosa</i>                 | 3  | 3                        | Sepsis                                       | Yes                                  | Contaminated water bottle; inadequate manual cleaning; insufficient disinfectant exposure             |
| 2         | <i>P. aeruginosa</i>                 | 3  | 3                        | Sepsis                                       | Yes                                  | Presence of biofilm in intact endoscope channels  |
| 83        | <i>Salmonella</i> Oslo               | 3  | 2                        | Gastroenteritis, sepsis                      | Not tested                           | Inappropriate cleaning and disinfection (povidone-iodine/ethanol)                                     |
| 141       | <i>Serratia marcescens</i>           | 1  | 0                        | No   | Yes                                  | Inappropriate cleaning and disinfection (povidone-iodine)   |
| 52        | <i>M. chelonae</i>                   | 14   | 0                        | No   | No data                              | Contaminated AER; inappropriate disinfection; rinsing with tap water; lack of drying procedure        |
| 147       | <i>Methylobacterium mesophilicum</i> | 1  | 1                        | Bacteremia                                   | Yes                                  | Contaminated endoscope channels   |
| 144       | ESBL-producing <i>K. pneumoniae</i>  | 16   | 12                       | Bacteremia/sepsis, cholangitis               | Yes                                  | Contaminated endoscope channels; insufficient drying procedure  |
| 145       | KPC-producing <i>K. pneumoniae</i>   | 7  | 2                        | Bacteremia                                   | Yes                                  | Contaminated endoscope channels; insufficient drying procedure  |
| 184       | HCV                                  | 1  | 1                        | HCV infection                                | Not tested                           | Inadequate disinfection (low concn, insufficient exposure); failure to perfuse elevator channel       |

ERCP: 23 studi



# Control of a multi-hospital outbreak of KPC-producing *Klebsiella pneumoniae* type 2 in France, September to October 2009

A Carbone (anne.carbone@sap.aphp.fr)<sup>1</sup>, J M Thiolet<sup>2</sup>, S Fournier<sup>3</sup>, N Fortineau<sup>4</sup>, N Kassis-Chikhani<sup>5</sup>, I Boytchev<sup>4</sup>, M Aggoune<sup>1</sup>, J C Séguier<sup>6</sup>, H Sénéchal<sup>7</sup>, M P Tavalacci<sup>8</sup>, B Coignard<sup>2</sup>, P Astagneau<sup>1,9</sup>, V Jarlier<sup>3,9,10</sup>

Article published on 2 December 2010

## TABLE

Case description<sup>a</sup>: multi-hospital outbreak of KPC-2 *Klebsiella pneumoniae*<sup>b</sup>, France, September to October 2009 (n=13)

| Case number | Hospital <sup>c</sup> | Duodenoscopy in Hospital B | Type of specimen tested | Infection/colonisation  | Outcome as of 1 November 2010                 | Comment  |
|-------------|-----------------------|----------------------------|-------------------------|-------------------------|---|--|
| 1           | A                     | Yes                        | Rectal swab             | Colonisation            | Alive   | Source case (transferred from Greece)  |
| 2           | B                     | Yes                        | Blood sample            | Infection (bacteraemia) | Death unrelated to KPC-2 <i>K. pneumoniae</i> | Index case Hospital B  |
| 3           | A                     | Yes                        | Blood sample            | Infection (bacteraemia) | Death unrelated to KPC-2 <i>K. pneumoniae</i> | Index case Hospital A  |
| 4           | A                     | No                         | Biliary fluid           | Infection (biliary)     | Alive   | Contact of Case 3  |
| 5           | A                     | No                         | Bronchial aspirate      | Infection (pulmonary)   | Death unrelated to KPC-2 <i>K. pneumoniae</i> | Contact of Case 3  |
| 6           | B                     | No                         | Rectal swab             | Colonisation            | Alive   | Contact of Case 2<br>Transferred to Hospital A   |
| 7           | B                     | No                         | Rectal swab             | Colonisation            | Alive   | Contact of Case 2  |
| 8           | B                     | Yes                        | Rectal swab             | Colonisation            | Alive   | –  |
| 9           | B                     | Yes                        | Rectal swab             | Colonisation            | Alive   | Transferred to Hospital D then to Hospital E   |
| 10          | B                     | Yes                        | Rectal swab             | Colonisation            | Alive: urinary tract colonisation in 2010     | Index case Hospital C<br>Returned home from Hospital B, then re-hospitalised in Hospital C |
| 11          | B                     | Yes                        | Rectal swab             | Colonisation            | Death unrelated to KPC-2 <i>K. pneumoniae</i> | Underwent follow-up in Hospitals F and G   |
| 12          | C                     | No                         | Rectal swab             | Colonisation            | Alive   | Contact of Case 10   |
| 13          | B                     | Yes                        | Rectal swab             | Colonisation            | Alive   | Underwent follow-up in Hospital G  |

## **Endoscopy-associated transmission of carbapenem-resistant *Klebsiella pneumoniae* producing KPC-2 $\beta$ -lactamase**

Thierry Naas<sup>1\*</sup>, Gaelle Cuzon<sup>1</sup>, Adrien Babics<sup>1</sup>,  
Nicolas Fortineau<sup>1</sup>, Isabelle Boytchev<sup>2</sup>, François Gayral<sup>3</sup>  
and Patrice Nordmann<sup>1</sup>

**2** paz colonizzati da Kp KPC e trattati con lo stesso duodenoscopia

**Caso indice:** pz greco colonizzato Kp KPC sottoposto a ERCP due mesi prima

**17** pz trattati con lo stesso strumento

**10** screenati: **6** positivi per Kp KPC

**2** pz hanno poi sviluppato infezione da Kp KPC (1 batteriemia 1 colangite)



SHORT REPORT

Open Access

# An outbreak of carbapenem-resistant OXA-48 – producing *Klebsiella pneumonia* associated to duodenoscopy

Axel Kola<sup>1\*</sup>, Brar Piening<sup>1</sup>, Ulrich-Frank Pape<sup>2</sup>, Wilfried Veltzke-Schlieker<sup>2</sup>, Martin Kaase<sup>3</sup>, Christine Geffers<sup>1</sup>, Bertram Wiedenmann<sup>2</sup> and Petra Gastmeier<sup>1</sup>

| Patient | Gender | Age (years) | Date of positive CRKP sample | Source                     | Infection/colonization      | Ward | Date of duodenoscopy |
|---------|--------|-------------|------------------------------|----------------------------|-----------------------------|------|----------------------|
| 1       | m      | 71          | 06/12/12                     | Tracheobronchial secretion | Respiratory tract infection | A    | -                    |
| 2       | m      | 20          | 10/12/12                     | Rectal swab                | Septicemia                  | A    | -                    |
| 3       | m      | 25          | 27/12/12                     | Rectal swab                | Septicemia                  | A    | 08/02/13             |
| 4       | f      | 34          | 30/12/12                     | Blood culture              | Septicemia                  | A    | -                    |
| 5       | f      | 72          | 10/01/13                     | Rectal swab                | Colonization                | A    | -                    |
| 6       | m      | 58          | 13/02/13                     | Blood culture              | Septicemia                  | B    | 12/02/13             |
| 7       | f      | 32          | 14/02/13                     | Intra-abdominal swab       | Septicemia                  | B    | -                    |
| 8       | m      | 57          | 18/02/13                     | Rectal swab                | Colonization                | B    | -                    |
| 9       | m      | 26          | 18/02/13                     | Rectal swab                | Surgical site infection     | C    | 12/02/13             |
| 10      | m      | 39          | 26/02/13                     | Rectal swab                | Respiratory tract infection | D    | 20/02/12             |
| 11      | m      | 43          | 14/03/13                     | Rectal swab                | Septicemia                  | E    | 13/02/13             |
| 12      | f      | 61          | 24/03/13                     | Rectal swab                | Colonization                | F    | 20/02/13             |

## New Delhi Metallo- $\beta$ -Lactamase–Producing *Escherichia coli* Associated with Endoscopic Retrograde Cholangiopancreatography — Illinois, 2013

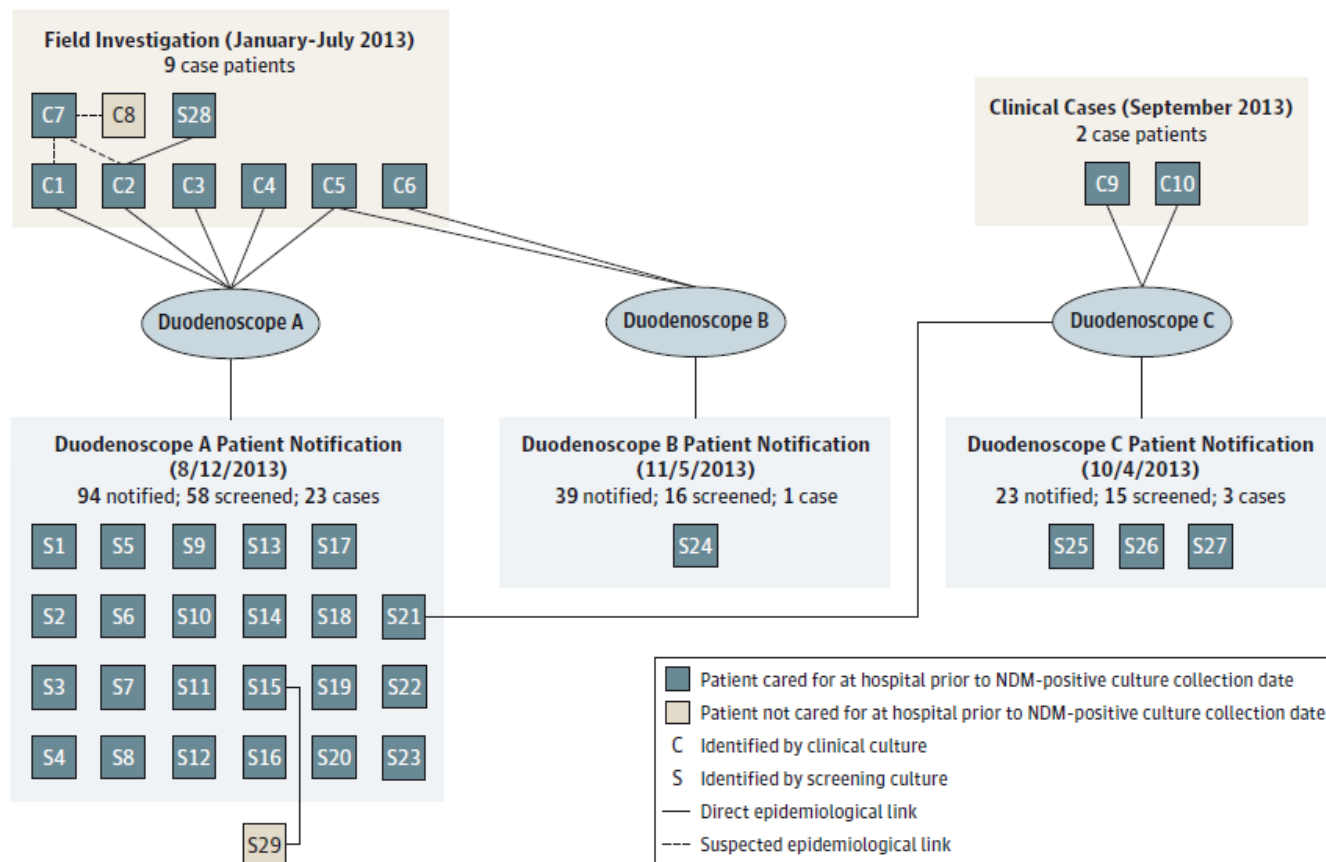
- marzo-luglio 2013: **8** pz con campioni clinici **1** pz con colture di sorveglianza
- **8** pz erano stati ricoverati nel medesimo ospedale
- **6** pz erano stati sottoposti a ERCP
- dallo stesso duodenoscopio utilizzato per **5** pz isolati *E. coli* NDM e KpKPC
- **23** di **50** pz trattati con lo stesso strumento e ctrl con TR pos *E. coli* NDM
- altri **12** pos *E. coli* NDM

**44 pz**

# New Delhi Metallo- $\beta$ -Lactamase-Producing Carbapenem-Resistant *Escherichia coli* Associated With Exposure to Duodenoscopes

Lauren Epstein, MD, MSc; Jennifer C. Hunter, DrPH; M. Allison Arwady, MD; Victoria Tsai, MPH; Linda Stein, MPH; Marguerite Gribogiannis, MPA; Mabel Frias, MPH; Alice Y. Guh, MD; Alison S. Laufer, PhD; Stephanie Black, MD; Massimo Pacilli, MS; Heather Moulton-Meissner, PhD; J. Kamile Rasheed, PhD; Johannetsy J. Avillan, BS; Brandon Kitchel, MS; Brandi M. Limbago, PhD; Duncan MacCannell, PhD; David Lonsway, PhD; Judith Noble-Wang, PhD; Judith Conway, RN; Craig Conover, MD; Michael Vernon, DrPH; Alexander J. Kallen, MD

JAMA. 2014;312(14):1447-1455. doi:10.1001/jama.2014.12720





[Home](#)

[Food](#)

[Drugs](#)

[Medical Devices](#)

[Radiation-Emitting Products](#)

[Vaccines, Blood & Biologics](#)

[Animal & Veterinary](#)

[Cosmetics](#)

[Tobacco Products](#)

## Medical Devices

[Home](#) > [Medical Devices](#) > [Medical Device Safety](#) > [Safety Communications](#)

### Safety Communications

[Information About Heparin](#)

[Preventing Tubing and Luer  
Misconnections](#)



# Design of Endoscopic Retrograde Cholangiopancreatography (ERCP) Duodenoscopes May Impede Effective Cleaning: FDA Safety Communication



SHARE



TWEET



LINKEDIN



PIN IT



EMAIL

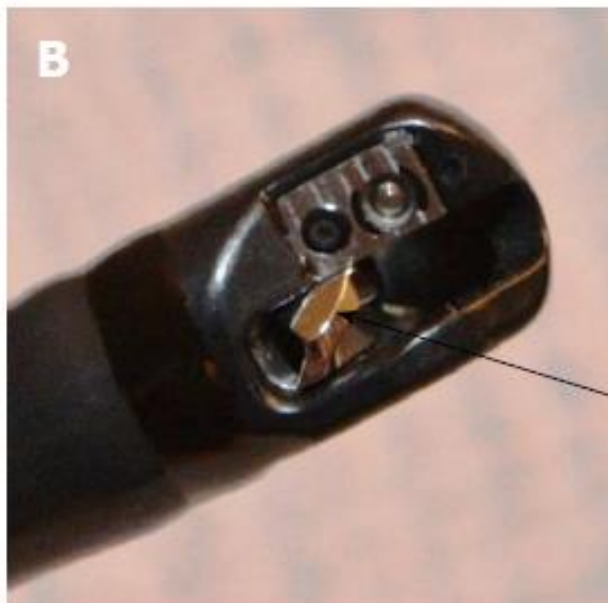


PRINT

**Date Issued:** February 19, 2015



**Follow these additional general best practices:**  
Meticulously clean the elevator mechanism and the recesses surrounding the elevator mechanism by hand, even when using an automated endoscope reprocessor (AER). Raise and lower the elevator throughout the manual cleaning process to allow brushing of both sides.  
Implement a comprehensive quality control program for reprocessing duodenoscopes.

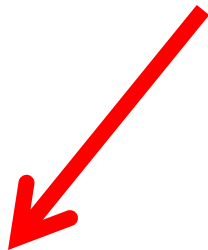


The forceps elevator in its  
"half-opened, half-closed"  
position

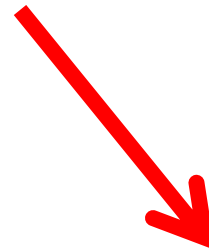
## ***Klebsiella* spp. in endoscopy-associated infections: we may only be seeing the tip of the iceberg**

P. Gastmeier · R.-P. Vonberg

da 2009 a 2013: 7 outbreak



1 ESBL



6 CP



## **Risk of transmission of carbapenem-resistant *Enterobacteriaceae* and related “superbugs” during gastrointestinal endoscopy**

Lawrence F Muscarella

**BJUI**  
BJU INTERNATIONAL

### **Multidrug-resistant NDM-1 *Klebsiella* outbreak and infection control in endoscopic urology**

**Vincent S.W. Koo, Patricia O'Neill\* and Andrew Elves**

*Departments of Urology and \*Microbiology, Shrewsbury and Telford Hospital Trust, Shrewsbury, UK*

Accepted for publication 20 June 2012

➤ **5 pz con infezione urinara**

# Gastrointestinal Endoscopes

## A Need to Shift From Disinfection to Sterilization?

William A. Rutala, PhD, MPH; David J. Weber, MD, MPH

**JAMA** October 8, 2014 Volume 312, Number 14

Finally, clinicians should be encouraged to report and publish cases of infectious diseases related to endoscopy, especially if current reprocessing methods were adhered to,



