Disinfection of Surgical Procedures Undertaken with the NOTES Technique (Natural Orifice Translumenal Endoscopic Surgery)

11th World Sterilization Congress and the 7th International Symposium of Sterilization and Hospital Infection Control

Georg Spaun MD
Salzburg
Austria
Disclosure:
Dr Spaun`s research fellowship in Portland, Oregon was sponsored by a research grant from USGI Medical.
Good Samaritan Hospital, Portland, Or
Surgery

- Large colon polyps
- Common bile duct explorations
- Bile duct and foregut/hindgut palliative surgery
- GI bleeding
- Esophageal varix surgery
- Open Zenkers excision

Endoscopy

- Pancreatic necrosectomy
- Pancreatic pseudocyst drainage
- Iatrogenic perforation repair
- Esophagectomy for HGD Barrett
- Early gastric cancers

Swanstrom, Supercourse Portland 2009
Evolution of GI Surgery

- Open Surgery
- Flexible Endoscopy
- Laparoscopic Surgery
- Single Port Surgery
- Transluminal Endoscopic Surgery
- Invasiveness

- Therapeutic Endoscopy
- Stents
- Ablations

Mucosectomy/Mucosal resection

Swanstrom, NOSCAR Meeting 2007
“Future surgeons...”

Lee Swanstrom, Portland, OR
NOSCAR White Paper

- Natural Orifice Surgery Consortium for Assessment and Research

- 14 leaders from the American Society of Gastrointestinal Endoscopy (ASGE) and the Society of American Gastrointestinal and Endoscopic Surgeons (SAGES) met in New York City on July 2005

- Potential barriers to clinical practice:

<table>
<thead>
<tr>
<th>Name</th>
<th>Institution</th>
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<tbody>
<tr>
<td>Anthony Kalloo, MD</td>
<td>Co-Chair, Johns Hopkins Hospital</td>
</tr>
<tr>
<td>David Ratner, MD</td>
<td>Co-Chair, Massachusetts General Hospital</td>
</tr>
<tr>
<td>William Brugge, MD</td>
<td>Mayo Clinic</td>
</tr>
<tr>
<td>Robert Hawes, MD</td>
<td>MUSC Digestive Disease Center</td>
</tr>
<tr>
<td>Sergey Kantsevoy, MD</td>
<td>Johns Hopkins Hospital</td>
</tr>
<tr>
<td>Michael Marohn, MD</td>
<td>University of Texas Medical Branch</td>
</tr>
<tr>
<td>Jay Porecha, MD</td>
<td>Case Western University School of Medicine</td>
</tr>
<tr>
<td>William Richards, MD</td>
<td>Vanderbilt University Medical Center</td>
</tr>
<tr>
<td>Richard Rothstein, MD</td>
<td>Dartmouth-Hitchcock Medical Center</td>
</tr>
<tr>
<td>Nathaniel Soper, MD</td>
<td>Northwestern University School of Medicine</td>
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<tr>
<td>Lee Swanson, MD</td>
<td>Oregon Health Sciences University</td>
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<tr>
<td>Christopher Thompson, MD</td>
<td>Brigham &amp; Women's Hospital</td>
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NOSCAR White Paper

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- Gastric (intestinal) closure
- Prevention of infection
- Development of suturing and anastomotic device
- Spatial orientation
- Development of a multitasking device to accomplish procedures
- Management of iatrogenic intraperitoneal complications and hemorrhage
- Physiologic untoward events and compression syndroms
- Training
• **Potential barriers to clinical practice:**
  
  • **Access to peritoneal cavity**
    
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    • Prevention of infection
    
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    • Spatial orientation
    
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Access to the peritoneal cavity
Access to the peritoneal cavity
NOSCAR White Paper

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Gastric (intestinal) closure

Tissue Apposition System, Ethicon
Gastric (intestinal) closure

- NOSCAR White Paper: “a 100% reliable means of gastric closure must be developed” and “a 1% to 2% leak rate is not acceptable”

- Systematic review until 1/2010: 46 studies – describing 20 different closure techniques
Gastric (intestinal) closure

- Tissue anchors
- Endoclips
- Endoloops
- Over the scope clips (OTSC)
- Cardiac septal occluder
- Endoscopic stapler
- NDO plicator
- Eagle claw I-VIII
- Endoscopic suture
- Tissue glue
NOSCAR White Paper

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Prevention of infection

- Single shot antibiotics
- Acid suppression medication paused 4 weeks ahead of surgery
- Lavage optional (stomach), mandatory in rectum und vagina
- Sterile instruments (ETO, sterilant)
Prevention of infection

- Single shot antibiotics
- Acid suppression medication paused 4 weeks ahead of surgery
- Lavage optional (stomach), mandatory in rectum und vagina
- Sterile instruments (ETO, sterilant)

---

**Table 1** FDA-approved sterilants

<table>
<thead>
<tr>
<th>Sterilant</th>
<th>Mechanism of Action</th>
<th>Sterilant Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acetic acid high-level disinfectant</td>
<td>8.3% hydrogen peroxide, 7.0% peracetic acid</td>
<td>5 h at 25°C</td>
</tr>
<tr>
<td>Aldehyde III high-level disinfectant</td>
<td>3.4% glutaraldehyde, 26% isopropanol</td>
<td>10 h at 20°C</td>
</tr>
<tr>
<td>Bacticide Advanced for sterilization</td>
<td>3.5% glutaraldehyde</td>
<td>10 h at 25°C</td>
</tr>
<tr>
<td>and high-level disinfection</td>
<td>1.12% glutaraldehyde, 1.93% phenol/phenate</td>
<td>12 h at 20°C</td>
</tr>
<tr>
<td>Sporicidin sterilizing and disinfecting</td>
<td>2.5% glutaraldehyde</td>
<td>7 h 40 min at 35°C</td>
</tr>
<tr>
<td>solution</td>
<td>Crystalline G concentrate and dihydro</td>
<td>10 h at 20°C</td>
</tr>
<tr>
<td>Concentrate dihydrate concentrate</td>
<td>3.2% glutaraldehyde</td>
<td>10 h at 20°C</td>
</tr>
<tr>
<td>MetSolv 3% Glutaraldehyde</td>
<td>3% glutaraldehyde</td>
<td>10 h at 20°C</td>
</tr>
<tr>
<td>EndoSpore plus sterilizing and disinfecting solution</td>
<td>7.35% hydrogen peroxide, 0.23% peracetic acid</td>
<td>3 h at 20°C</td>
</tr>
<tr>
<td>Steroclav sterilizing and disinfecting solution</td>
<td>7.5% hydrogen peroxide</td>
<td>6 h at 20°C</td>
</tr>
<tr>
<td>Penr 20 liquid Sterilalid disinfectant</td>
<td>1.0% hydrogen peroxide, 0.08% peracetic acid</td>
<td>8 h at 20°C</td>
</tr>
<tr>
<td>14 N.S.</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 20°C</td>
</tr>
<tr>
<td>Oxidin Long-Life Activated Diethylide</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 20°C</td>
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<tr>
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<td>Oxidin Plus</td>
<td>3.4% glutaraldehyde</td>
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<tr>
<td>Mericid Plus 30 Long-Life Activated Diethylide solution</td>
<td>2.6% glutaraldehyde</td>
<td>10 h at 25°C</td>
</tr>
<tr>
<td>28 Long-Life Activated Diethylide</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 25°C</td>
</tr>
<tr>
<td>solution</td>
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<td>Celax Activated Diethylide solution</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 25°C</td>
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<tr>
<td>Celax Formula 7 Long-Life Activated Diethylide solution</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 20-25°C</td>
</tr>
<tr>
<td>Celax Plus 28-day solution</td>
<td>2.4% glutaraldehyde</td>
<td>10 h at 20-25°C</td>
</tr>
<tr>
<td>0.2% peracetic acid</td>
<td>12 min at 50-60°C</td>
<td>Ethylene oxide</td>
</tr>
<tr>
<td>ETO (ethylene oxide) gas sterilization</td>
<td>20 min at 50°C</td>
<td>Ethylene oxide</td>
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Use of flexible endoscopes for NOTES: sterilization or high-level disinfection?

Georg O. Spahn • Trudie A. Govers • Richard A. Pierce • Martin A. Caissens • Sandy Sosvári • Lee L. Swanson

Received: 30 October 2009 / Accepted: 22 November 2009
© Springer Science+Business Media, LLC 2009
Potential barriers to clinical practice:

- Access to peritoneal cavity
- Gastric (intestinal) closure
- Prevention of infection

Development of suturing and anastomotic device

- Spatial orientation
- Development of a multitasking device to accomplish procedures
- Management of iatrogenic intraperitoneal complications and hemorrhage
- Physiologic untoward events and compression syndroms
- Training
Development of suturing device

Eagle Claw II Prototype

Flexible EndoStitch, Covidien

Anubis, Storz

Tissue Apposition System, Ethicon

G-Prox, USGI Medical
Development of suturing device

Endosamurai, Olympus
Development of suturing device

- Compression anastomosis
- Palliative GJ anastomosis
- Gastric bypass
- Reconstruction

Development of suturing device

- Animal survival study (7 pigs)

- Endoscopic placement of the magnets: 34.3 ± 14.8 min

Attempts mimic effects of antireflux surgery by elongating angle of His

Feasibility study N=13
- 81% demonstrated anatomical integrity of the GE valve at 12 months
- 82% remained completely off PPIs
- 63% had normal pH (defined as less than or equal to 5.3% of time with pH<4); however, no pre-procedure pH measurements are provided

EsophyX

Development of suturing device
Development of suturing device

- Polyproplene
- 7 mm x 6 mm
- 16 with device kit – sterile

EsophyX

Two-year results of a feasibility study on antireflux transoral incisionless fundoplication using EsophyX

Guy-Bernard Cadierre · Nathalie Van Sante · Jaime E. Graves · Anna K. Gawlicka · Amin Rajan

Received: 12 June 2008 / Accepted: 12 January 2009 / Published online: 14 March 2009
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Development of suturing device

EsophyX
Development of suturing device

Weight loss surgery:

- TOGA system (Satiety Inc., Palo Alto, CA)
  - 21 patients, 6 mo f/u:
    - no adverse events;
    - % excess weight loss 1, 3, 6 mo: 16.2, 22.6, 24.4
Development of suturing device

- **Endoluminal Vertical Gastroplasty (EVG)**
  - 64 patients, 12 mo f/u
  - Procedural time 45 min
  - % excess weight loss at 1, 3, 12 mo: 21.1, 39.6, 58.1
  - BMI >40, 35-40, <35 %EWL: 48.9, 56.5, 85.1
  - No complications

NOSCAR White Paper

- **Potential barriers to clinical practice:**
  - Access to peritoneal cavity
  - Gastric (intestinal) closure
  - Prevention of infection
  - Development of suturing and anastomotic device

- **Spatial orientation**
  - Development of a multitasking device to accomplish procedures
  - Management of iatrogenic intraperitoneal complications and hemorrhage
  - Physiologic untoward events and compression syndroms
  - Training
Spatial orientation
Spatial orientation

Development and testing of a tethered, independent camera for NOTES and single-site laparoscopic procedures

Paul Swain · Ralph Austin · Kurt Bally · Robert Trusty

Received: 4 May 2009 / Accepted: 10 January 2010
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Potential barriers to clinical practice:

- Access to peritoneal cavity
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- Development of suturing and anastomotic device
- Spatial orientation

Development of a multitasking device to accomplish procedures

- Management of iatrogenic intraperitoneal complications and hemorrhage
- Physiologic untoward events and compression syndroms
- Training
Development of a multitasking platform to accomplish procedures
Development of a multitasking platform to accomplish procedures

Endosamurai, R-Scope, DCS, Olympus
Development of a multitasking platform to accomplish procedures

Direct Drive Endoscopic System (DDES), Boston Scientific
Development of a multitasking platform to accomplish procedures

Direct Drive Endoscopic System (DDES), Boston Scientific
Development of a multitasking platform to accomplish procedures
Development of a multitasking platform to accomplish procedures

Cholecystectomy
Development of a multitasking platform to accomplish procedures

ESD
Rigid Instruments

- Zornig et al.: German NOTES registry: 1000 procedures transvaginal, 5 flexible, all others rigid
Transvaginal (pure) NOTES
Transanal Endoscopic Microsurgical (TEM) Platform for Natural Orifice Surgery

Gastrointest Endosc 2008 Nov;68(5):954-9
Transanal Endoscopic Microsurgical (TEM) Platform for Natural Orifice Surgery
Robotics?
Development of a multitasking platform to accomplish procedures
Development of a multitasking platform to accomplish procedures

S. J. Phee · K. Y. Ho · D. Lomanto · S. C. Low · V. A. Huynh · A. P. Keneana · K. Yang · Z. L. Sun · S. C. Sydney Chung

Surg Endosc
DOI 10.1007/s00464-010-0955-8

Natural orifice transgastric endoscopic wedge hepatic resection in an experimental model using an intuitively controlled master and slave transluminal endoscopic robot (MASTER)

Received: 1 June 2009 / Accepted: 6 October 2009
© Springer Science+Business Media, LLC 2010
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  • Training
Management of iatrogenic intraperitoneal complications and control of intraperitoneal hemorrhage
Management of iatrogenic intraperitoneal complications and control of intraperitoneal hemorrhage

- Isolated electrodes + ERBE VIO 300D generator, 3.7mm shaft
- 7 pigs, 65 vessels
- As effective as laparoscopic control in sealing vessels 2.0-6.0mm

The NOTES Toolbox

- **Dissection**
  - Articulating Hook
  - Articulating Needle Knife
  - Articulating Hook

- **Manipulation**
  - Articulating Grasper

- **Ligation**
  - Flex Clip Applier

- **Hemostasis**
  - Bela Bipolar Forceps

- **ACCESS**
  - NOTES Trocar and Rotary Veress Needle

- **Specimen Retrieval**
  - Articulating Specimen Bag

- **Cutting**
  - Flexible Scissors

- **Dissection**
  - Oscar Marylands

- **Tissue Sampling**
  - Articulating Bx Forceps

- **Closure/Suturing**
  - TAS

**Adaptation of laparoscopic tools to a smaller, flexible, platform**

*Ethicon*
NOSCAR White Paper

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  - Management of iatrogenic intraperitoneal complications and hemorrhage
  - **Physiologic untoward events and compression syndroms**
  - Training
Physiologic untoward events

Airseal, Surgiquest
Physiologic untoward events

Heller myotomy; transesophageal
Physiologic untoward events

- 300 women using a 12-point questionnaire
- 32% unhappy or very unhappy to undergo a transvaginal procedure,
- 18% happy or very happy
- 50% felt neutral
- Younger nulliparous women were most concerned about the potential negative effect of NOTES on sexual function
NOSCAR White Paper

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• Training
Training

Fig. 2 A Overall performance was significantly faster using open or laparoscopic tools than endoscopy (open: 11 ± 4 s, lap 28 ± 8 s, endo: 262 ± 62 s; P < 0.001). The difference between open surgery and laparoscopy was not significant (P = 0.149).

B Comparison of performance time of the three different devices without initial learning curves. Time 7 ± 5 s (open), 17 ± 7 s (lap), 64 ± 15 s (endo); P < 0.001.

A comparison of early learning curves for complex bimanual coordination with open, laparoscopic, and flexible endoscopic instrumentation

Georg O. Spaun, Bin Zheng, Daniel V. Martinez, Brittany N. Arnold, Lee L. Swanson

Received: 4 May 2009 / Accepted: 7 October 2009
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Training

performance time all devices

performance time all devices without endoscopy
Clinical Results

- German NOTES registry: >1000 transvaginal procedures, only 5 flexibel, others rigid

- Transgastric NOTES cholecystectomy Portland, OR
  - 2007-2009: N=10, mean operative time 240 min

  - Mean operative time: transvaginal: 96 min; transgastric 111 min
  - General complication rate of 8.84% (minor 5.8%, maior 3.04%)
Background

- Standard endoscope-reprocessing is a three stage process

Standard dual channel endoscope
Background

• Standard endoscope-reprocessing is a three stage process
  • *Pre-processing* or cleaning the endoscope and its detachable components using a detergent solution and brushes
Background

- Standard endoscope-reprocessing is a three stage process
  - Pre-processing or cleaning the endoscope and its detachable components using a detergent solution and brushes
  - Processing or high level disinfection of the endoscope using an liquid chemical germicide followed by water rinsing to remove chemicals
Standard endoscope-reprocessing is a three stage process

- **Pre-processing** or cleaning the endoscope and its detachable components using a detergent solution and brushes
- **Processing** or high level disinfection of the endoscope using an liquid chemical germicide followed by water rinsing to remove chemicals
- **Post-processing** includes proper handling, drying and storage of the endoscope
Background

• Additional stage (sterilization) necessary to provide truly sterile endoscopes
Methods

- A comprehensive review of the available relevant literature was performed
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- We evaluated options that are currently available (2007-2009) for endoscope sterilization in the United States and analyzed them for:
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• We evaluated options that are currently available (2007-2009) for endoscope sterilization in the United States and analyzed them for:
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  • Cost (depreciation of machinery, regulatory fees, maintenance, labor, disposables, and chemicals used for sterilization)
Methods

- A comprehensive review of the available relevant literature was performed.
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  - Available validation
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- We evaluated options that are currently available (2007-2009) for endoscope sterilization in the United States and analyzed them for:
  - Potential for re-contamination
  - Cost (depreciation of machinery, regulatory fees, maintenance, labor, disposables, and chemicals used for sterilization)
  - Available validation
  - A score was developed to rank the available options for use in our facility
Methods

- Based on the score, a protocol for the sterilization of flexible endoscopes for NOTES procedures was created
Methods

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- The protocol involved mechanical cleaning and high level disinfection per multi-society guidelines with subsequent terminal sterilization.
Methods

- Based on the score, a protocol for the sterilization of flexible endoscopes for NOTES procedures was created.
- The protocol involved mechanical cleaning and high level disinfection per multi-society guidelines with subsequent terminal sterilization.
- Methods for transportation and handling of the sterile endoscope were created.
Results

- Literature survey reveals controversy around the absolute necessity for sterilization of surgical instruments
Results

• Literature survey reveals controversy around the absolute necessity for sterilization of surgical instruments

• Standard of practice seems to call for sterile instrumentation for surgical procedures and high level disinfection for flexible intralumenal endoscopy
Results

- Literature survey reveals controversy around the absolute necessity for sterilization of surgical instruments.
- Standard of practice seems to call for sterile instrumentation for surgical procedures and high level disinfection for flexible intraluminal endoscopy.
- It is possible to sterilize flexible endoscopes.
Results

- *Prolonged soak in high-level disinfectant/sterilant:*
Results

- **Prolonged soak in high-level disinfectant/sterilant:**
  - The cost for the sterilant was found to be <1% of the total cost for the prolonged soaking sterilization method in our institution.

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</tr>
<tr>
<td>Sterile gown</td>
<td>$15.12</td>
</tr>
<tr>
<td>Sterile container</td>
<td>$1.00</td>
</tr>
<tr>
<td>Mask /Shield</td>
<td>$3.66</td>
</tr>
<tr>
<td>Syringe</td>
<td>$1.86</td>
</tr>
<tr>
<td>Cidex (example)</td>
<td>$0.52</td>
</tr>
<tr>
<td>Sterile water</td>
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</tr>
<tr>
<td>Labor</td>
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<td><strong>Total Cost</strong></td>
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Results

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- The sterilization process is lengthy and therefore not practical.

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  - In our evaluation the risk of re-contamination was found to be the highest for this sterilization method.

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  - In our evaluation the risk of re-contamination was found to be the highest for this sterilization method.
  - The cost for the soak-sterilization was ranked second.

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<td>$1.00</td>
</tr>
<tr>
<td>Mask /Shield</td>
<td>$3.66</td>
</tr>
<tr>
<td>Syringe</td>
<td>$1.86</td>
</tr>
<tr>
<td>Cidex (example)</td>
<td>$0.52</td>
</tr>
<tr>
<td>Sterile water</td>
<td>$6.78</td>
</tr>
<tr>
<td>Labor</td>
<td>$24.41</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$59.17</strong></td>
</tr>
</tbody>
</table>
Results

- *Ethylene oxide (ETO) gas sterilization:*
Results

- **Ethylene oxide (ETO) gas sterilization:**
  - All flexible endoscopes are compatible with ETO, which provides true sterilization
Results

- **Ethylene oxide (ETO) gas sterilization:**
  - All flexible endoscopes are compatible with ETO, which provides true sterilization
  - Endoscopes sterilized with this method are dry and therefore easily packaged and transported to the sterile field as a sterile instrument
Results

- **Ethylene oxide (ETO) gas sterilization:**
  - All flexible endoscopes are compatible with ETO, which provides true sterilization.
  - Endoscopes sterilized with this method are dry and therefore easily packaged and transported to the sterile field as a sterile instrument.
  - Therefore, the risk of re-contamination was found lowest for ETO sterilization, but cost was found to be the highest.

<table>
<thead>
<tr>
<th></th>
<th>ETO 100%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost per load</td>
<td>$ 16.50</td>
</tr>
<tr>
<td>Labor</td>
<td>$ 15.00</td>
</tr>
<tr>
<td>Other costs*</td>
<td>$ 75.00</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td>$ 106.50</td>
</tr>
</tbody>
</table>

*Costs calculated for using ETO sterilization (100% ETO). “Other costs” include depreciation, regulatory standards and maintenance.*
Results

- **Steris System 1 (Steris Inc., Mentor, OH):**

As the Company previously announced, its new liquid chemical sterilant processing system, SYSTEM 1E™, was cleared by the FDA on April 5, 2010.
Results

- **Steris System 1 (Steris Inc., Mentor, OH):**
  - The automated System 1 claims sterilization capability using a liquid chemical sterilization method (peracetic acid)

As the Company previously announced, its new liquid chemical sterilant processing system, SYSTEM 1E™, was cleared by the FDA on April 5, 2010
Results

- **Steris System 1 (Steris Inc., Mentor, OH):**
  - The automated System 1 claims sterilization capability using a liquid chemical sterilization method (peracetic acid)
  - It uses a just-in-time method much like flash-steam sterilization with the advantages of permanent endoscope availability in the endoscopy suite and short sterilization time

As the Company previously announced, its new liquid chemical sterilant processing system, SYSTEM 1E™, was cleared by the FDA on April 5, 2010
Results

- **Steris System 1 (Steris Inc., Mentor, OH):**
  - The automated System 1 claims sterilization capability using a liquid chemical sterilization method (peracetic acid).
  - It uses a just-in-time method much like flash-steam sterilization with the advantages of permanent endoscope availability in the endoscopy suite and short sterilization time.
  - The cost for this sterilization method was ranked lowest in our evaluation and the risk for re-contamination second.

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterile gloves</td>
<td>$0.97</td>
</tr>
<tr>
<td>Sterile gown</td>
<td>$2.52</td>
</tr>
<tr>
<td>Mask</td>
<td>$0.61</td>
</tr>
<tr>
<td>Single use gloves</td>
<td>$0.01</td>
</tr>
<tr>
<td>Container sterilization</td>
<td>$1.25</td>
</tr>
<tr>
<td>Sterilant</td>
<td>$7.98</td>
</tr>
<tr>
<td>Indicator</td>
<td>$0.88</td>
</tr>
<tr>
<td>Maintenance</td>
<td>$8.00</td>
</tr>
<tr>
<td>Labor</td>
<td>$1.25</td>
</tr>
<tr>
<td><strong>Total Cost</strong></td>
<td><strong>$23.47</strong></td>
</tr>
</tbody>
</table>

As the Company previously announced, its new liquid chemical sterilant processing system, SYSTEM 1E™, was cleared by the FDA on April 5, 2010.
Results

- **Hydrogen peroxide gas vapor sterilization (e.g., STERRAD®, Ethicon Inc., Somerville, NJ, USA):**
  - Not available for clinical use for flexible endoscopes 2009 in the USA
  - Future?
Results

- **Ozone sterilization (TSO3 Inc., Dalton, Quebec, Canada):**
  - Not available for clinical use for flexible endoscopes 2009 in the USA
  - Future?
Results

Portland protocol
Results

Portland protocol

- Endoscopy Services provides standard three-stage endoscope processing (high level disinfection)
Results

Portland protocol

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- Endoscopes are stored afterwards in closed cabinets
Results

Portland protocol

- Endoscopy Services provides standard three-stage endoscope processing (high level disinfection)
- Endoscopes are stored afterwards in closed cabinets
- Two hours before a scheduled NOTES, a flexible endoscope is delivered to the central sterilization unit (Surgical Services), where sterilization is performed using the Steris ‘System 1’
Results

Portland protocol

- The sterile endoscope has to be removed from the sterilization container under sterile precautions, is placed in a sterile container with lid and delivered through the sterile core to the operating room
Results

Portland protocol

- Circulating nurse assists scrub nurse to unpack the sterile endoscope when the operator is in the room
Results

Portland protocol

• Circulating nurse assists scrub nurse to unpack the sterile endoscope when the operator is in the room
• Accessories like water bottle, lid and tubing are autoclaved and delivered sterile to the operating room
Conclusion

- Natural Orifice Surgery (flexible endoscopy) is evolving
Conclusion

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- Significant industry activity
  - Obesity, GERD, EMR-ESD, Anastomosis, EUS based therapies, NOTES
Conclusion

• Natural Orifice Surgery (flexible endoscopy) is evolving

• Significant industry activity
  • Obesity, GERD, EMR-ESD, Anastomosis, EUS based therapies, NOTES

• New devices and new treatment algorithms are on the way
Conclusion

- Natural Orifice Surgery (flexible endoscopy) is evolving

- Significant industry activity
  - Obesity, GERD, EMR-ESD, Anastomosis, EUS based therapies, NOTES

- New devices and new treatment algorithms are on the way

- We recommend sterile instrumentation for clinical NOTES until well-designed, randomized clinical trials are available and guidelines are published
Columbia river gorge, Oregon