Persistence of organic residue and viable microbes on gastrointestinal endoscopes despite reprocessing in accordance with guidelines

Cori L. Ofstead, MSPH1,2, Pritish K. Tosh, MD3, Hannah L. Yellin, BA4, Evan M. Doyle, BS1, Catherine K. Rocco, RN, MSN, CNOR1, Todd H. Baron, MD3, Kavel H. Visrodia, MD4, Harry P. Wetzler, MD, MSPH5
1Ofstead & Associates, Inc., Saint Paul, MN; 2Division of Infectious Diseases, Mayo Clinic, Rochester, MN; 3Division of Gastroenterology & Hepatology, University of North Carolina, Chapel Hill, NC; 4Department of Internal Medicine, Mayo Clinic, Rochester, MN

1. Introduction
- Contaminated gastrointestinal (GI) endoscopes can transmit multi-drug resistant organisms.1,2
- Guideline state visual inspection is sufficient to verify effectiveness of cleaning.3,4
- Validation3 rapid indicator tests can be used to detect organic residue on endoscopes.5
- Meticulous cleaning is necessary to remove debris that may interfere with disinfection.6
- High-level disinfection (HLD) should eliminate microbes (except remnant spores).7
- This study evaluated residual contamination when reprocessing guideline adherence was confirmed via direct observation.

2. Methods
- Setting: Large tertiary care GI center
- Dedicated reprocessing room and technicians
- Gastroenterology and endoscopy: Clinically-used
- Nobody else cleaning
- Controls (e.g., brand new)
- Extensive measures: Multiple components evaluated simultaneously
- Guideline adherence monitored via direct observation
- Measurement taken to prevent environmental contamination—*Sample taken after: Bedside cleaning
- Manual cleaning
- HLD
- Overnight storage
- Multiple components evaluated
- Direct observation
- Visual inspection
- Aerobic cultures
- Rapid indicators
- ATP
- Protein
- Hemoglobin
- Contaminates

3. Results
- 15 endoscopes sampled during 50 encounters:
  - Visual inspection of endoscopes (RE) and sampling materials (RM)
  - Aerobic cultures on 68 channel effluent samples (362 plates)
- Rapid indicator tests on 430 components
- After manual cleaning, visible residue was:
  - Not seen on endoscopes
  - Observed on reeds or on effluent (25%)
- Cultures of channel effluent showed (Figure 1 and Table 1):
  - No growth from controls
  - Frequent growth after bedside cleaning
  - Visible microbes present after HLD
  - Rapid indicators showed:
    - Hemoglobin only post bed-side cleaning (38%)
    - Protein not eliminated by reprocessing (Figure 2)
- ATP tests commonly exceeded post-cleaning benchmark (Figures 3 and 4)

4. Conclusions
- Residual endoscope contamination:
  - Not reliably identified via visual inspection
  - Detected by multiple tests
  - Retailed on multiple components
  - Persisted despite guideline adherence
  - Not eliminated by extensive reprocessing methods
- Viable microbes survived high-level disinfection
- Recommendations:
  - Re-evaluate current endoscope reprocessing guidelines
  - Conduct surveillance to ensure microbes are eliminated
  - Use a routine rapid monitoring system to verify cleaning

Citations