Medical & Scientific Affairs

Are ‘patient-ready’ endoscopes free of microbial contamination?

- Gastrointestinal endoscopies are high volume procedures performed worldwide.[1–5]
- Researchers have linked inadequate reprocessing to outbreaks involving multidrug-resistant bacteria.[6]
- Bacterial contamination continues to persist despite reprocessing endoscopes according to guidelines and endoscope instructions for use.[1,6,7]
- High-level disinfection may be unable to completely remove biofilm originating from residual bacterial contamination.[8–12]

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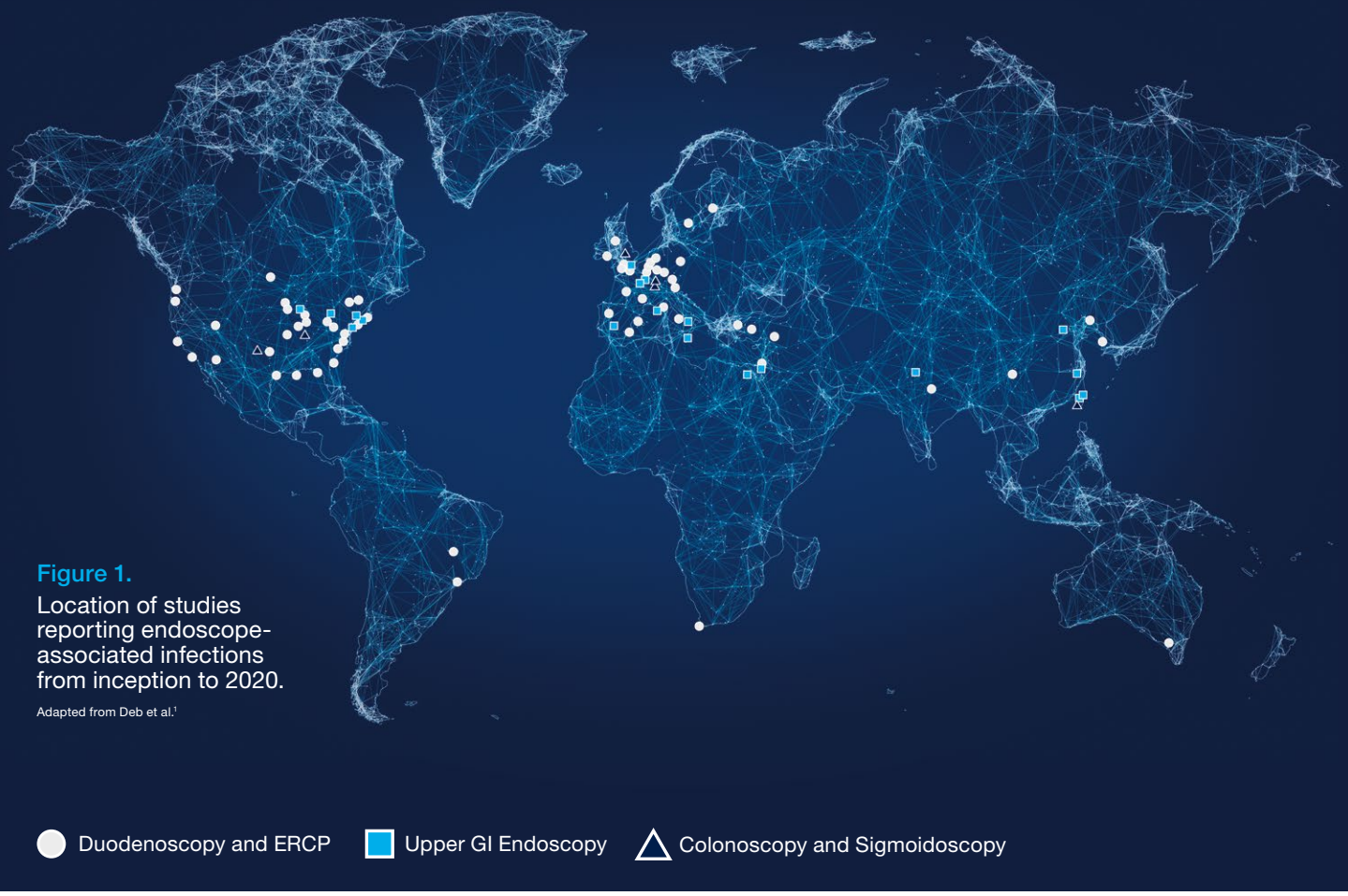


Figure 1.
Location of studies reporting endoscope-associated infections from inception to 2020.

Adapted from Deb et al.[1]

Every year, endoscopies are regularly performed around the world[1,3–5]

Annually, health care professionals perform millions of gastrointestinal (GI) endoscopy procedures around the world.[1,3–5] An estimated 17.7 million GI endoscopies occur each year in the United States.[1,2] In Europe, the annual number of procedures is in the tens of millions.[3] In Japan and China, more than 14 million procedures are performed every year.[4,5]

After each procedure, reprocessing staff are responsible for cleaning and disinfection of endoscopes.[6] Reprocessing lapses result in contaminated endoscopes which put patients at risk of infections.[9]

Contaminated GI endoscopes implicated in more outbreaks than other medical devices[6,9]

Based on a review of 15 journal articles, the proportion of duodenoscope-associated infected or colonised patients ranged from 6% to ≥20%.[7] From infection rates reported in 16 studies, the calculated composite infection rate, which included duodenoscopes and gastroscopes, was 123 per 1,000 procedures.[1] An emerging cause of endoscope-associated infections is multidrug-resistant organisms.[1,6,7]

Reports of more than 500 episodes of microbial transmission span 45 years in a review of 63 articles. In five outbreaks with no reprocessing breaches, bacterial transmission resulted in 93 infected patients.[10] Post-procedure infections arise from contaminated endoscopes or exposure to the patient's own gut flora.[1]

Complications from contaminated endoscopes[1,7]

- Intestinal colonisation
- Delayed remote site infections
- Secondary transmission to patients at other hospitals
- Bloodstream infections, sepsis
- Deaths

Contamination persists despite endoscopes reprocessed according to guidelines[1,6,7]

Almost three-quarters of endoscopes sampled (8/11; 73%) were still contaminated after a successful high-level disinfection (HLD) cycle was completed. Additionally, surface ATP was detected on two endoscopes, while surface protein was present on six endoscopes.[13]

Nearly half of reprocessed GI endoscopes (47/102; 46.1%) were found contaminated in an Italian teaching hospital. These endoscopes were positive for *E.coli* (of which one was multidrug resistant), *K. pneumoniae* and multidrug-resistant *P. aeruginosa*.[14] Other researchers detected biofilm contamination in endoscopes reprocessed per guidelines.[15]

Suggestions of biofilm found in endoscope deemed source of outbreak[16]

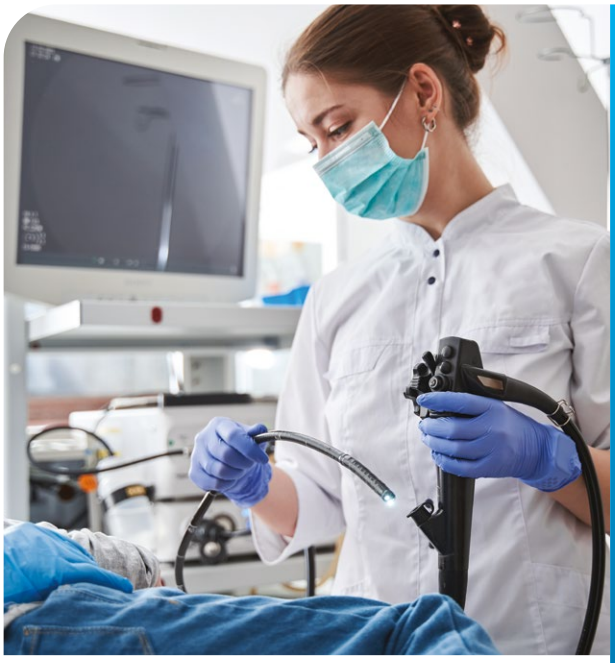
An outbreak involved three patients infected with multidrug-resistant *P. aeruginosa* sepsis. All patients underwent endoscopic retrograde cholangiopancreatography (ERCP) with the same endoscope. After intensive HLD, negative cultures suggested the endoscope was patient-ready.[16]

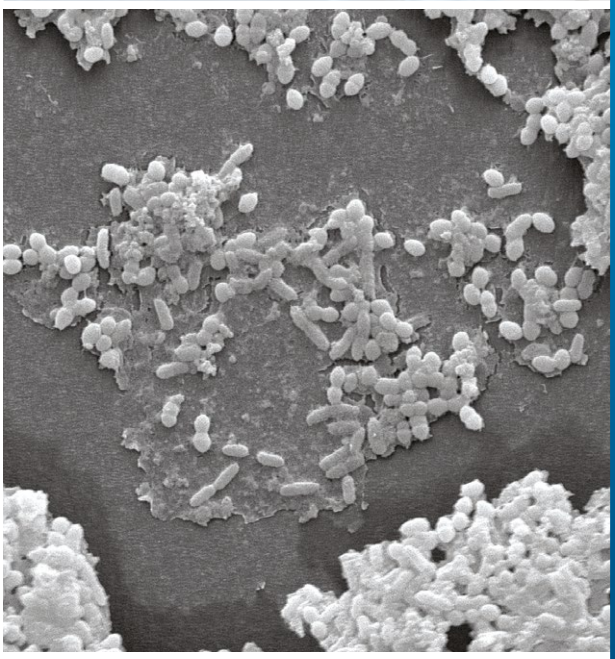
Patients and endoscope channels yielded linked *P. aeruginosa* isolates over several months. Four months after ethylene oxide sterilisation, *P. aeruginosa* contamination reoccurred. Manufacturer repair of the endoscope found suggestions of biofilm inside the endoscope channels. Persistent contamination after HLD and sterilisation highlight the difficulty of removing biofilm.[16]

The challenges of biofilm removal[8–12,17,18]

The biofilm in endoscopes forms under multiple cycles of wetting and drying. This cyclic buildup of biofilm results in compacted biofilm which is difficult to remove.[19] Researchers in one study observed damage, residue or debris on or inside all reprocessed endoscopes. These defects may harbour bioburden and could facilitate biofilm formation.[17]

Rapid biofilm formation may occur in a new endoscope after only 30 days of clinical practice.[18] Limited access for brushes, water or air contributes to ineffective reprocessing.[10–12] Evidence shows HLD is sometimes unable to completely remove biofilm.[8,9]





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ATP: adenosine triphosphate; ERCP: endoscopic retrograde cholangiopancreatography; GI: gastrointestinal; HLD: high-level disinfection.

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