

Ofstead Executive Summary:

Scientific evidence and new recommendations on COVID-19 and bronchoscopy

Bronchoscopy has been used for diagnosing and treating patients with COVID-19

- Bronchoscopes become heavily contaminated because they are used to:
 - Inspect the airways and lungs of patients who have infections or are critically ill
 - Remove mucus, pus, other bodily fluids, tissue, or foreign debris
 - Collect samples by obtaining biopsies and bronchoalveolar lavage (BAL) fluid
 - Perform therapeutic procedures
- Bronchoscopy played a critical role in identifying and characterizing the virus in China:¹
 - BAL samples were collected from early cases
 - The virus was isolated and the genome was sequenced from BAL samples
- CDC initially recommended collecting BAL samples for diagnosis²
- BAL was done on 33% (7/21) of COVID-19 patients in a study at a Washington State hospital³

Reprocessing of reusable bronchoscopes is often inadequate and ineffective

- In 4 US hospitals, microbes were detected in >50% of patient-ready bronchoscopes, including:
 - Gastrointestinal flora⁴
 - Waterborne pathogens^{4,5}
 - Mold⁴
- In 7 US hospitals, auditors discovered serious breaches of reprocessing standards:
 - Steps were skipped or performed incorrectly^{4,6}
 - Automated equipment was disabled or dirty⁴
 - Quality assurance steps were not done^{4,6}
- In 1 hospital in Wuhan (China), an outbreak investigation was initiated in 2018:⁷
 - *Stenotrophomonas maltophilia* was found in 55.5% of BAL samples
 - Patients did not have symptoms
 - The same pathogen was found in the bronchoscope
 - Reprocessing breaches were identified
- In 1 US hospital, a superbug outbreak was linked to a dirty, damaged bronchoscope:⁸
 - 19 bronchoscopy patients were infected with superbugs and 10 patients died:
 - Multi-drug resistant *Pseudomonas aeruginosa*
 - Carbapenem-resistant *Klebsiella pneumoniae*
 - Both pathogens were found in the bronchoscope channel
 - Borescope exams revealed residual soil and damage in the channel
- Bronchoscopes are at a higher risk than other types of endoscopes because:⁶
 - They are used around the clock on patients with serious infections and other pathology
 - Reprocessing is performed by personnel from multiple departments
 - Training and supervision are inconsistent for clinical personnel involved in reprocessing
 - Delayed reprocessing frequently occurs with emergent and after-hours cases

Critical insight: Contaminated bronchoscopes can infect patients and compromise laboratory results

Some patients with COVID-19 get other infections that can cause worse outcomes

- In Washington State, 19% of patients had co-infections, including influenza and *Pseudomonas*³
- In China, among patients with COVID-19:
 - 5-10% had fungal or bacterial co-infections^{9,10}
 - Bacterial pathogens were found in BAL samples¹¹
 - Viral co-infections (e.g., respiratory syncytial virus [RSV]) were also observed¹²
- Bacterial and fungal co-infections have been linked to significantly increased mortality risk:¹³
 - Researchers concluded: "...predictors of a fatal outcome in COVID-19 cases included age, the presence of underlying disease, the presence of secondary infection and elevated inflammatory indicators in the blood."

Critical insight: Preventing bronchoscope-associated infection safeguards patients with COVID-19

Bronchoscopy has risks for patients with COVID-19 and for healthcare personnel

- The virus has been detected in respiratory samples,^{11,14,15} stool,^{14,15} and blood¹⁵
- Asymptomatic patients had similar levels of virus as symptomatic patients¹⁶
 - Viral RNA was found in asymptomatic patients' cruise ship rooms 17 days after vacating¹⁷
- A lab study found viable SARS-CoV-2 persisted for 3 hours in aerosols and 3 days on surfaces¹⁸
- This type of virus should be readily eliminated by properly used normal disinfectants¹⁹
- Providers and personnel may be exposed to the virus while handling reusable bronchoscopes:
 - Point-of-care pre-cleaning requires:²⁰
 - Handling and wiping a heavily contaminated bronchoscope
 - Flushing large volumes of fluid that could be aerosolized and requires disposal
 - Transport to reprocessing suites may contaminate transport containers or carts²⁰
 - Leak testers are connected to bronchoscopes before manual cleaning or disinfection²⁰
 - Manual cleaning:²⁰
 - Is done using sinks and irrigation systems used for other instruments
 - Requires flushing and brushing that splash personnel with contaminated liquid
 - Sinks and counters are not customarily cleaned and disinfected between every use
 - PPE shortages and a lack of adequate PPE training could exacerbate risk

Critical insight: Frequent environmental decontamination and careful PPE removal is essential

You can take action to reduce the risk of bronchoscopy-associated infection transmission

- Bronchoscopy is currently discouraged for COVID-19 sample collection and elective procedures²¹
- New guidelines recommend:²¹
 - Bronchoscopy be performed only for life-saving care among patients with COVID-19
 - Sterile, single-use bronchoscopes be used whenever possible
 - Personnel wear sufficient respiratory and other personal protective equipment
- Ofstead recommends that institutions using reusable bronchoscopes:
 - Centralize reprocessing to one department with highly trained personnel
 - Sterilize any models that are compatible with available sterilization systems²²
 - Implement stringent quality control measures and audits to ensure compliance²²

References

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