Supplementary Table 1. Reported indications, utility, bronchoscopic finding and complications

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| Author | Number of patients | Number of bronchoscopies | Number of BAL | Age  mean±SD age  or  median (IQR ) | Gender | Comorbidities | Indication-number of procedure (if available) | Bronchoscopic findings | Secondary or previously unidentified infection | Change in management | Complications |
| Guarino et al.17 | 87 | 87 | NS | NS | NS | NS | Increased resistance-30  Suspicion for DAH-17  Repositioning of ET-9  Assistance with tracheostomy-10  Difficult intubation-3  Suspected aspiration pneumonia-2  Suspected tracheal injury-1  Suspected obstruction by mucus or clot-7 (was on NIV)  Detection of COVID-19 in BAL-8 | Atrophic mucosa with fluid secretion  Hyperemic mucosa with superficialization  of the submucosal vessels and telangiectatic tracts  Spontaneously bleeding in some cases  Alveolar hemorrhage | Legionella-2  Fungal-2 | BAL identified COVID-19 in 4/8 patients  13/17 patients had DAH who were receiving  Anti-thrombotic therapy and anti-coagulant therapy | In 5/7 patients on NIV bronchoscopy had to be stopped  Desaturation below 60% in these patients  These 5 patients got intubated |
| Mondoni et al.21 | 109 | 108 flexible  1 rigid | NS | 60.0±13.6 years) | 71% male | NS | Diagnosis of COVID-19 in patients with two negative NP swabs-78  Urgent life-saving bronchoscopy-31  -Suspected secondary infection  -Obstructive atelectasis  -Suspicion for tracheal injury  -Tracheostomy complications  -Hemoptysis | NS | Haemophilus influenzae-1  Aspergillus-3  Candida-2  2 patients had both Aspergillus and Candida | BAL identified COVID-19 in 43/78 patients | Occurred in 5 (4.5%) of patients  Transient hypoxia in 3 patients  Fever in 2 patients |
| Patrucco et al.22 | 131 | 131 | NS | 64.65 (53.71–73.98) | 70.99% male | NS | Diagnosis of COVID-19 in patients with negative NP swab-86  Alternative diagnosis (hemoptysis/lung consolidation)-17  Suspected secondary infection-26  Lung atelectasis-2 | Erythematous endobronchial mucosa  Nonpurulent fluid secretion | Among all patients:  Bacterial pathogen-30  Fungal pathogen-17  Non SARS-CoV-2 virus-14 | 76% of BAL positive patients had a double negative swab  33/120 patients with 2 negative swabs were positive  15 patients had definitive alternative diagnosis (8 lung cancer, 4 alveolar hemorrhage, 2 organizing pneumonia and 1 vasculitis) | NS |
| Chang et al.20 | 107 | 241 | 54 patients (50.5%) | 62  IQR (47-69) | 83.1% male | NS | NS | NS | 35/54 (65%) of patients had a secondary bacterial infection | NS | No severe hypoxia, Pneumothorax, tube dislodgement or cardiac arrhythmia  3 patient required ET tube advancement after procedure |
| Torrego et al.18 | 93 | 101 | 63 patients (67.7%) | NS | NS | NS | Suspected superinfection-63  Airway secretion management with/without atelectasis-38 | Normal or mildly hyperemic  bronchial mucosa  White and gelatinous secretions, difficult to suction, was observed in 95% (88/93) of patients  Mucohemorrhagic plugs occupying the main or lobar bronchi were  Observed in 12 patients | 18/63 (28.6%) of patients had a secondary bacterial infection | New  antibiotic was prescribed in 15/18 (83%) patients | Transient desaturation below 90%  No procedure was aborted  BAL was associated with more desaturation |
| Bruyneel et al.23 | 32 | 90 | 51 samples | 59+-8.5 years | NS | Hypertension (41%) Diabetes  (28%)  Obesity (22%) | Removal of mucus plug-60  Microbiological sampling-22  Worsening hypoxia-8  Extubation-1 | Purulent  plugs were removed during 33 procedures  In the  majority of these patients, very thick and dry plugs (like limestone) were stuck in the endotracheal tube | 30/51 (58.8%) of samples had a secondary bacterial infection  Fungi were found in 16 samples | New  antibiotic was prescribed in 9/30 (30%) patients | 1 patient needed intubation after bronchoscopy  1 patient had technical problems with the bronchoscope |
| Mehta et al.16 | 61 | 98 |  | 62.1+-11.5 years | 83.6% male | Diabetes (47.54%)  Hypertension (44.26%)  CKD (11.48%)  Heart disease (14.75%) | Clinical worsening with new or  increasing infiltrates on CXR- 70\*  Segmental collapse on  CXR-27  Increased endotracheal secretions-36  Hemoptysis-3 | Increased secretions in 87 (88.8%) cases  Thick purulent secretions in 53 (61%)  Clear mucoid secretions in 16 (18.4%)  Frothy secretions 12 (14%)  Hemorrhagic in 6 (7%)  Airway hyperemia was seen in 85 cases (87%)  Mucus plugging was seen in 30 (30.6%)  Mild bleeding was noted in 4 cases (4.1%) | 53/98 (54%) of patients had bacterial superinfection  7 (7.1%) had fungal infection | Antibiotics were changed/escalated in 31 (31.6%) cases  Decreased steroid use in 6 (6%) patients  Anticoagulation was reduced from intermediate to preventive in 6 (6%) patients  Fluid administration was reduced, and diuretics added in 12 patients (12.2%) based on the  visual perception of pulmonary edema (frothy copious upwelling secretions). | No complications reported |
| Baron et al.19 | 24 | 28 | 28 | NS | NS | NS | Diagnosis of COVID-19 with negative swab-2  Suspicion for secondary infection-26 | NS | Positive bacterial culture in 14/28 (50%)  Positive Aspergillus culture in 7 (25%) | Modification of antibacterial therapy in 8 (29%)  Modification of antifungal therapy in 5 (18%)  Introduction of antiviral therapy 1 (4%)  Initiation of corticosteroid therapy in 6 (21%)  5/13 (38%) patients tested positive with a recent negative swab | No immediate complication  One patient deteriorated within 24 hours after BAL |
| Loor et al.24 | 75 | 222 | NS | 60 (54- 67) years | 72% male | NS | Airway secretion clearance-150  Hemoptysis-29  Respiratory distress-13  Assessment of airway injury-12  Stent placement or revision-9  Atelectasis-5  Polypoid lesion biopsy-3  Suspicion of eosinophilic pneumonia-1 | Normal  mucosa in 138/222 (62%)  Inflammatory/friable mucosa in 84/222 (38%). | NS | Change in antimicrobials 31 (14%)  Adjustment of anticoagulant 5 (2.3%)  Negative cultures leading to stopping antibiotic 3 (1.4%)  Mucus plug extraction that improved ventilation 62 (27.9%) | Transient hypoxia (SpO2<90%) in 7 procedures  Mild hemoptysis in 5 |
| Mahmood et al.11 | 53 | 53 | 53 | 62 (46-69) years | 67.9% male | Diabetes (32.1%)  Hypertension (26.4%)  CKD (22.6%)  Heart disease (24.5%)  Heart failure (7%) | Diagnosis of COVID-19 in patients with negative NP swab-41  Suspicion for secondary infection with positive NP PCR-12 | NS | Bacterial infection-3  S aureus-2  Pseudomonas-1  Aspergillus-1  Pneumocystis-1  M avium-1 | BAL identified COVID-19 in 1/42(2.3%) | Transient hypotension in 1 patient |
| Arenas De-Larriva et al.25 | 515 | 1027 | 300 | 61.5±11.2 years | 73% male | Diabetes  (22.5%)\*  Hypertension (47.6%)  Cardiovascular (10.9%)  Pulmonary (14%) | Diagnosis of COVID-19 in patients with negative NP swab-30  **Positive swab-485 patients who underwent 997 bronchoscopies**  Suspicion for secondary infection-147 (86 patients)  Therapeutic indications-850\*(399 patients)  Difficult ventilation-436 (43.7%)  Mucus plug-389 (39%)  Persistent infiltrate-233 (23.4%)  Worsening infiltrate-100 (10%)  Atelectasis-70 (70%)  Difficulty weaning-63 (6.3%)  Hemoptysis-60 (6%) | Normal mucosa in 84 (8.4%)  Airway hyperemia in 114 (11.4%)  Thick mucus in 597 (59.9%)  Thin mucus in 224 (22.5%)  Mucus plug in 175 (17.6%)  Hemorrhagic secretion in 176 (17.7%)  Intrabronchial clot in 60 (6%) | Bacterial infection-271 (27.2%)  Fungus-128 (12.8%)  Virus-36 (3.6%) | Bronchoscopy identified COVID-19 in 11/30 (36.7%) patients | NS |
| Cornelissen et al.26 | 58 | 58 | 58 | 60.5 (54-68) years | 74.1% male | NS | Microbiologic and cytologic analysis-58 | NS | Bacterial infection-(37.9%)  Fungus-13.8%  Virus-10.3% | NS | NS |

BAL, bronchoalveolar lavage; COVID-19, coronavirus disease 2019; CXR, chest X-ray; DAH, diffuse alveolar hemorrhage; ET, endotracheal tube; NIV, noninvasive ventilator; SARS-CoV-2, severe acute coronavirus disease 2019

\*the added total number based on indications is more than the number of procedures as some patients had more than one indication for bronchoscopy