

Supplementary File S1. Articles reporting SARS-CoV-2 and influenza virus co-infections (as of April 12, 2022).

Study / country	Time period	Number of co-infected cases / Characteristics	Findings	Management / Outcome
Kondo et al [9] /Japan	2020	57-year-old male with COVID-19 and influenza Comorbidities: DM, vasospastic angina	1 st fever and cough 2 nd SOB, anosmia, ageusia, fever 1 st CT: GGO in the left lung 2 nd CT: peripheral, bilateral, GGO with consolidation and intralobular lines	1 st garenoxacin 2 nd azithromycin, meropenem, favipiravir Hospitalization: yes Oxygen: yes Intubation: no Discharge: yes
Khodamoradi et al [10] /Iran	2020	4 cases (30% of 12 COVID-19 patients) 1 female (74 years) 3 males (40, 64, 50 years) Comorbidities: 1. ischemic cerebrovascular accident, HTN	Fever (4), dyspnea (4), dry cough (3), malaise (2), body pain (2), headache (3), orthopnea (2), anorexia cough, sweating, chills, severe compressive chest pain, diarrhea, respiratory distress CXR: bilateral infiltrates (4) Influenza A (4)	NA Hospitalization: 4 Oxygen: NA Intubation: NA Unknown outcome: 4
Hashemi et al [11] / Iran	2020	23 cases (22.3% of 105 dead COVID-19 patients)	Influenza A: 18 cases (78.3%) Influenza B: 5 cases (21.7%) Also, RSV and bocavirus in 9.7% of SARS-CoV-2 positive dead cases, parainfluenza viruses in 3.9%, hMPV in 2.9%, and adenovirus in 1.9%.	Death: 23(100%)
Huang et al [12] / Taiwan	2020	One 48-y.o. woman No comorbidities	Fever, dry cough, sore throat, myalgia, fatigue CT: clear at admission 1 st CXR bilateral pneumonia patches Influenza B	oseltamivir, baloxavir ceftriaxone, azithromycin hydroxychloroquine Hospitalization: 1 Oxygen: NA Intubation: NA Discharge: 1
Singh et al [13] /USA	2020	3 cases Mean age: 59.2 years (range: 41-71 years) 1 male, 2 females Comorbidities: HTN, DM	Cough, fever, SOB, myalgia CXR: bilateral patchy infiltrates CT: diffuse scattered GGOs, multi-lobar infiltrates RADT: influenza A (1), influenza B (2) PCR: SARS-CoV-2	oseltamivir (3) hydroxychloroquine (3) azithromycin (3) ceftriaxone (3) tocilizumab (1) convalescent plasma (1) Hospitalization: 3 Oxygen: NA Intubation: 2 Discharge: 3
Sang et al [14] / USA	2020	One 58-y.o. woman Comorbidities: RA, ILD, COPD, HTN	Fever, respiratory distress Complication: ARDS, cardiomyopathy (autopsy) PCR: Influenza A, SARS-CoV-2	Oseltamivir, antibiotics Hospitalization: 1 Oxygen: 1 Intubation: 1 Death: 1

Swets et al [15] / UK	February 2020-December 2021	583 (8.4%) of 6965 SARS-CoV-2 patients with viral co-infection: 227 influenza, 220 RSV, and 136 adenoviruses	NA	Hospitalization: 583 Intubation: NA Oxygen: NA Unknown outcome: 583 Influenza co-infection: increased risk of intubation and death
Liu et al [25] / China	2019-2020	Hospitalized children with LRTIs tested for RSV, adenovirus, parainfluenza 1,2,3, influenza A and B, hMPV, rhinovirus 7107 patients (4600 in 2019 and 2507 in 2020) Median age: 14 months in 2019 vs 2 months in 2020	2019 vs 2020: RSV (6.6% vs 4.5%), adenovirus (2.9% vs 0.2%), influenza A (1.3% vs 0.4%), influenza B (0.7% vs 0.2%), parainfluenza 1 (0.8% vs 0.2%), parainfluenza 3 (3.8% vs 2.1%), hMPV (0.6% vs 0.2%), rhinovirus (7.4% vs 11%). Overall positivity: 23.3% in 2019 vs 18.3% in 2020	NA Length of stay: median 7 vs 9 days (<0.001). No difference in ICU admission and mortality
Fujita et al [27] / Brazil	2021-2022	Rates of SARS-CoV-2 and influenza co-infection: Sao Paulo: 110/205 (53.6%); Bahia: 11/185 (5.9%); Pernambuco: 31/179 (17.3%); Parana: 0/75 (0%); Rio de Janeiro: 2/4,752 (0%); Amazonas: 0/494 (0%)	NA	NA
Yue et al [34] / Wuhan, China	January - February 2020	179 cases (57.3% of 307 COVID-19 patients)	Most patients had typical COVID-19 (fever and cough) regardless of influenza infection Influenza A co-infection: lighter disease, higher lymphocytes and eosinophils, less often chest CT abnormalities Influenza B co-infection: more severe disease: fatigue (13%), chest CT abnormalities: (100%), lower lymphocytes/eosinophils Influenza A: 49.8%; Influenza B: 7.5% early co-infected patients	Same treatment for all Prognosis: COVID-19 only: 7.6% Influenza A co-infection: 5.9% Influenza B co-infection: 30.4%
Maa et al [35] / Wuhan, China	NA	46 cases (49.5% of 93 COVID-19 patients)	Survivors: fever 73.9%, fatigue 30.4% Non-survivors: fever 72.7% Complications: survivors: cardiac injury 86.4%	NA Hospitalization: 46 Oxygen: NA Intubation: NA Discharge: 24

			non-survivors: higher WBCs, neutrophil count, creatinine levels, D-dimers, and TNF α Influenza A: 44 (47.3%) Influenza B: 2 (2.2%)	Death: 22
Cheng et al [36] /Beijing, China	January - March 2020	97 cases (45.5% of 213 COVID-19 patients) Median age: 61 y.o.	All: fever, cough, dyspnea, expectoration, GI symptoms Influenza A: 97 (100%)	Hospitalization: 97 Oxygen: N/A Intubation: N/A Discharge: 97 Influenza no effect on outcome
Zheng et al [37] /Wuhan, China	January 2020	4 cases Mean age: 35 years (range: 15-62 years) Comorbidities: malignancy	Fever and cough (3) Prolonged fever (24 days), oxygen therapy (1) H3N2: (1), B/Victoria: (3)	Oseltamivir and/or antibiotics Hospitalization: 1 Oxygen: 1 Intubation: 0 Discharge: 1
Miatechet al [38] / USA	March – April 2020	4 cases (4.9% of 81 COVID-19 patients) Mean age: 61.5 years (range: 58-66 years) 2 males, 2 females Comorbidities (3): DM (3), HTN (3), obesity (3), HF (1), ESRD (1)	Fever (4), cough (3), SOB (2), myalgia (2), diarrhea (1), malaise (1), dyspnea (1) CXR: infiltrate (2), mild vascular congestion (1), patchy diffuse bilateral infiltrates (1), streaky opacities bilaterally (1) PCR: SARS-CoV-2 (4) RADT: Influenza A (2) and B (2)	azithromycin(1) levofloxacin (2) vancomycin (2) metronidazole(1) augmentin(1) oseltamivir (1) Hospitalization: 3 Oxygen: 1 Intubation: 1 Discharge: 3
Konala et al [39] / USA	NA	3 cases Ages: 35, 57, 68 y.o. 1 male, 2 females Comorbidities in 2 cases: DM (2), HTN (2), MI (1), CKD (1)	Fever (2), myalgia (1), cough (2), SOB (3) headache (2), sore throat (1), respiratory distress (2), diarrhea (2), altered mental status (1) CXR: bilateral alveolar infiltrates (1), bilateral pleural effusions (1), air space opacities bilaterally (1), congestion (1) CT: patchy bilateral GGOs (1), bilateral scattered infiltrates (2) Influenza A: 3	azithromycin (3) oseltamivir (2) ceftriaxone (3) hydroxychloroquine (3) Hospitalization: 3 Oxygen: 1 Intubation: 1 Discharge: 2 Death: 1
Ding et al [40] / Wuhan, China	NA	5 cases (4.3% of 115 COVID-19 patients) Mean age: 50.2 years (range: 39-66 years) 2 males, 3 females Comorbidities in 5 cases: HTN (2), CVD (1), Ca (1)	Fever (5), cough (5), SOB (5), myalgias (2), fatigue (2), headache (2), expectoration (2), pharyngeal pain (3) Complications: ARDS (1), acute liver injury (3) Remission of CT findings Mean hospitalization: 25.6 days	antibiotics (5) oseltamivir (5) other antivirals (5) glycosteroids(3) Hospitalization: 5 Oxygen: 5 Intubation: 0 Discharge: 5

			(range: 16-39 days)	
Wu et al [41] /Beijing, China	January 2020	One 69 y.o. case Comorbidities: (-)	Severe hypoxemia Complications: ARDS CT: bilateral, mass, GGOs CXR: diffuse exudative shadows in bilateral lungs BAL: positive for SARS-CoV-2 Influenza A	oseltamivir (1) Hospitalization: 1 Oxygen: 1 Intubation: 1 Discharge: 1
Xiang et al [42] / Wuhan, China	NA	2 cases (1.4 % of 145 COVID-19 patients) 1 male 41 y.o., 1 female 34 y.o. Comorbidities in 1 case	Fever (1), cough (2), dyspnea (1), myalgia (2), fatigue (2) Complications: hypoxemia (1) CXR: abnormal (2)	oseltamivir (2) other antivirals (2) antibiotics (2) Hospitalization: 2 Oxygen: 1 Intubation: 0 Discharge: 2
Cuadrado- Payán et al [43] / Spain	NA	4 cases Mean age: 67 years (range: 53-81 years) 3 males, 1 female Comorbidities: HTN (4), DM (2), CKD (2)	Fever (4), dyspnea (4), non-productive cough (4), bronchospasm (3), low oxygen saturation (3) CXR: bilateral infiltrates (1), right lobal pneumonia (1),normal(2) Influenza A: (2) Influenza B: (1) Influenza A+B: (1)	oseltamivir (4) hydroxychloroquine (4) lopinavir-ritonavir (4) Hospitalization: 4 Oxygen: 3 Intubation: 3 Discharge: 1 Unknown outcome: 3
Konala et al [44] / USA	Early 2020	One 66-yo woman Comorbidities: obesity, ischemic cardiomyopathy, DM, HTN, CAD, CKD	synoptic episode, fever, SOB, non-productive cough, decreased appetite, hypoxia CXR: right lower lobe infiltrate Low WBCs and lymphocytes Influenza A	azithromycin, oseltamivir, ceftriaxone, hydroxychloroquine Hospitalization: 1 Oxygen: 1 Intubation: 1 Unknown outcome: 1
Hashemi et al [45] /Iran	March- April 2020	2 cases 78 y.o. female 75 y.o. male Comorbidities: chronic lung disease (1)	Fever (2), dyspnea (2), joint pain (2), cough (1), headache (1), confusion (1), joints pain (2), nausea (1), diarrhea (1) Increased WBCs (1), low WBCs (1), increased CRP (2), lymphopenia (2) Complications: ARDS (1) CT: peripheral GGOs (2), interlobular septal thickening (2)	Hydroxychloroquine (2) lopinavir/ritonavir (2) Hospitalization: 2 Oxygen: 2 Intubation: 2 Death: 2

			Influenza A (2)	
Munivenkatappa et al [46] / India	April 2020	One 65-y.o. male Comorbidities: obesity, COPD, DM, CKD, HTN, hypothyroidism	Breathlessness, productive cough, no fever, oxygen saturation <90, normal WBCs, lymphopenia Complications: ARDS CXR: bilateral patchy consolidation PCR: Influenza A, SARS-CoV-2	Oseltamivir, ceftriaxone, azithromycin, hydroxychloroquine Hospitalization: 1 Oxygen: 1 Intubation: 1 Death: 1
Coutinho et al [47] / UK	2020	One 74-y.o. male Comorbidities: COPD, DM, HTN	Non-productive cough, low-grade fever, myalgia, malaise. SOB, 86% oxygen saturation Lymphopenia, increased CRP CXR: GGOs bilaterally PCR: influenza B, SARS-CoV-2	oseltamivir, hydrocortizone, doxycycline, azithromycin Hospitalization: 1 Oxygen: 1 Intubation: 1 Discharge: 1
Azekawaa et al [48] / Japan	2020	One 78-y.o. woman Comorbidities: hypothyroidism, dislipidemia	Mmalaise, anorexia, cough, low-grade fever CXR: bilateral reticular shadow CT: GGO Influenza A	oseltamivir ceftriaxone azithromycin Hospitalization: 1 Oxygen: 0 Intubation: 0 Discharge: 1
Yu et al [49] / China	NA	64 co-infected cases (50% of 128 COVID-19 patients)	Ccoinfected patients vs non-coinfected patients: 1.no difference in lung involvement, 2.longer median virus shedding from admission for coinfecting patients, 3.no relation with pneumonia severity lopinavir/ritonavir treated co-infected patients: faster pneumonia resolution within 2 weeks (37% vs 1%, p=0.001) Influenza A: 54 (84.4%) Influenza B: 10 (15.6%)	lopinavir/ritonavir N/A Hospitalization: 64 Intubation: N/A Oxygen: N/A Discharge: 64
D'Abramo et al [50] / Italy	2020	One 56-y.o. male Comorbidities: smoker, overweight, MI	Fever, diarrhea, asthenia lymphopenia, increased CRP and serum fibrinogen levels 1 st CT: bilateral multiple peripheral GGOs 2 nd CT: worsening bilateral	oOseltamivir lopinavir/ritonavir, ceftriaxone, azithromycin, methylprednisolone iv Hospitalization: 1 Oxygen: 1

			GGO, bilateral fibrotic consolidation Complications: respiratory failure PCR: Influenza A, SARS-CoV-2	Intubation: 0 Discharge: 1
Lozano-Parras et al [51] / NA	January 2020	46-y.o. woman Comorbidities: RA, ILD, COPD, HTN	Dry cough, fever, prostration, arthromyalgia, dyspnea 89% oxygen saturation. Low WBCs, lymphopenia, low platelets CXR: consolidation in left upper lobe and right perihilar region PCR: Influenza A, SARS-CoV-2	oseltamivir, levofloxacin systemic steroids Hospitalization: 1 Oxygen: 1 Intubation: 0 Discharge: 1
Jing et al [52] /USA	2020	60-y.o. woman Comorbidities: ESRD	Non-productive cough, SOB, diarrhea, fever, worsening influenza-like symptoms, abdominal pain, nausea, vomiting CT: multifocal areas of consolidation, extensive hilar and mediastinal adenopathy RADT: Influenza A PCR: SARS-CoV-2	oseltamivir vancomycin/cefepime Hospitalization: 1 Oxygen: N/A Intubation: N/A Discharge: 1
Lew et al [53] / USA	2020	32-y.o. man No comorbidities	Fever, cough, SOB CXR: peripheral patchy opacities in lower lung zones 2 nd CXR: worsening opacities CT: extensive bilateral GGOs with areas of confluent consolidation in posterior lung bases Complications: ARDS, acute kidney injury (hemodialysis), diabetes	ceftriaxone, azithromycin, hydroxychloroquine linezolid, oseltamivir lopinavir/ritonavir Hospitalization: 1 Oxygen: 1 Intubation: 1 Death: 1
Alosaimi et al [54] / Saudi Arabia	2020	34 co-infected cases (71% of 48 COVID-19 patients) Influenza A H1N1 (17 cases, 50% of co-infected), <i>C. pneumoniae</i> (13 cases), adenovirus (10 cases)	NA	Hospitalization: 48 Oxygen: N/A Intubation: N/A Death: 1/3 of no co-infected COVID-19 cases, 2/3 of co-infected cases Association of influenza A with mortality

Fontana et al [55] / Italy	March – June 2020	152 respiratory specimens positive for SARS-CoV-2 (66 from BAL; 86 from SPU) 93 males, 59 females Mean age: 65 years	93 (61%) FAPP positive for bacteria and/or viruses: Bacteria: <i>S. aureus</i> (30/44, 62%), and Gram-negative pathogens: <i>P. aeruginosa</i> , <i>K. pneumoniae</i> , <i>A. baumannii</i> , and <i>H. influenzae</i> ; One case with influenza A	NA
Maddali et al [56] / USA	N/A	two-week-old healthy-term female neonate	apnea, nasal congestion, no fever, no cough, no vomiting 100% oxygen saturation CXR: no consolidation RADT: Influenza PCR: SARS-CoV-2	NA Hospitalization: 1 Oxygen: 0 Intubation: 0 Discharge: 1
Aggarwal et al [57] / India	July 2021 - January 2022	13,467 samples from both community and hospital settings tested for SARS-CoV-2/influenza virus co-infection during ILI/SARI sentinel surveillance	5 (0.04%) with SARS-CoV-2/influenza virus co-infection	NA Hospitalization: 3/5 co-infected patients Oxygen: 0 Intubation: 0 Discharge: 3
Alhoufie et al [58] / Saudi Arabia	May - June 2020	1 st case: 66 y.o. female 2 nd case: 44 y.o. male Comorbidities 1. DM type 2 2. no comorbidities	Fever (2), productive cough (2), chest pain (1), SOB (2), diarrhea (1), 88% oxygen saturation (1) CXR: 1.bilateral coarse reticular shadow, 2.bilateral hilar bronchial wall thickening Also, parainfluenza type 2 Influenza IgM and Influenza B	1. ceftriaxone, hydroxychloroquine, methylprednisolone 2. amoxicillin-clavulanate, azithromycin, hydroxychloroquine Hospitalization: 2 Oxygen: 1 Intubation: 0 Discharge: 2
Ishiguro et al [59] / Japan	February 2020 - January 2021	298 patients (mean age: 61.1 y.o.) with CAP due to severe SARS-CoV-2 infection Comorbidities: in 63.4% of patients	Primary viral pneumonia: 90.3%, mixed viral and bacterial pneumonia: 9.7% (mainly <i>M. pneumoniae</i>) Viral coinfection in 30.5% of patients with viral pneumonia. Influenza and parainfluenza viruses were the most common co-viruses (9.4% and 9.1%), coronavirus (6.0%), adenovirus (4.7%), bocavirus (3.4%), rhinovirus (3.0%), parechovirus(2.3%), hMPV (2.0%), RSV (2%), enterovirus (1.3%).	Mortality: 7.7% Viral and bacterial co-infections were not associated with severity on admission, need for high-flow nasal cannula, invasive ventilation, and mortality.

Rizzo et al [60] / USA	September 2020 - April 2021	Of 255 influenza-positive patients also tested for SARS-CoV-2, 58 (23%) positive. 22 females (38%), 35 males (60%), unknown 1 (2%) Age groups: 5 (9%) 0-17 y.o., 23 (40%) 18-49 y.o., 12 (21%) 50-64 y.o., 18 (31%) >65 y.o.	Among co-infected persons: 39 (67%) had influenza B. Among 28 with hospitalization record, 11 (39%) were hospitalized. Five (9%) died, including two who were hospitalized. All five who died were >50 years old.	Hospitalization: 11 Intubation: N/A Oxygen: N/A Discharge: 9 Death: 2 and 3 non-hospitalized
Heshmat-Ghahdarjani et al [61] / Iran	February – March 2020	Of 1639 SARS-CoV-2 patients only 2 were positive for influenza B. 76 y.o. male, 62 y.o. female Comorbidities: DM, HTN, CHD, CKD	Fever (2), dyspnea (1), body pain (1), dry cough (1), hemoptysis (1), muscular pain (1), respiratory distress (1) CXR: bilateral diffuse infiltrates CT: bilateral multiple patchy GGOs Influenza B and SARS-CoV-2	levofloxacin iv (1) oseltamivir p.o.(2) hydroxychloroquine (2) methylprednisolone i.v. ceftriaxone i.v(1) Hospitalization: 2 Oxygen: N/A Intubation: N/A Discharge: 2 Both cases symptom- free after 3-months follow-up
Ali et al [62] / USA	A	Five co-infected cases (61 y.o. female, 33 y.o. male, 46 y.o. male, 57 y.o. female, 41 y.o. male) Comorbidities: asthma, fever, COPD	Cough (3), fever (5), diarrhea (1), SOB (3), low oxygen saturation (2), double vision, myalgias (2), vomiting (1) CXR: diffuse patchy bilateral infiltrates, patchy left lower lung density, mild diffuse bronchial wall thickening, extensive GGOs at peripheral zones CT: bilateral multi-lobar peripheral GGOs raised inflammatory markers (5) PCR/RADT: SARS-CoV-2 (5) RADT: Influenza A (1) RADT: Influenza B (3) PCR: Influenza B (1)	remdesivir (5) oseltamivir (4) azithromycin (1) dexamethazone(4) ceftriaxone (1) metronidazole (1) Hospitalization: 5 Oxygen: 1 Intubation: 1 Discharge: 5
Zheng et al [63] / China	January - November 2020	220 adults with H1N1, 285 with COVID-19, 36 with COVID-19 and influenza H1N1 Median age of COVID-19 patients: 47 y.o. Median age of H1N1 patients: 50 y.o.	Coinfected patients had more fever and myalgia than COVID-19 patients	SARS-CoV-2 and H1N1 co-infection more severe disease c/w mono-infection with influenza or SARS-CoV-2 SARS-CoV-2 vs H1N1 co-infection: 2.8% mortality vs 0% of COVID-19 patients; 13.9% ICU admission vs 5.2%

Akhtar et al [64] / Bangladesh	March to December 2020	1986 patients with SARI (median age: 28 years): 285 (14.3%) SARS-CoV-2-positive patients, 175 (8.8%) influenza-positive patients, 5 (0.3%) SARS-CoV-2 and influenza coinfecting patients	NA	31 (10%) patients with SARS-CoV-2 SARI died One-month post-discharge: 25 additional deaths (9.1%) in SARS-CoV-2 infected patients No in-hospital or post-discharge mortality within one month among the 5 coinfecting patients.
Venkatram et al [65] / USA	2017-2021	412 influenza patients vs 18 co-infected patients Mean age: 60 y.o. Comorbidities: common	NA	NA Overall mortality: 6.5%. COVID-19: no increased mortality among co-infected patients
Sreenath K, et al. [66] / India	June 2020- January 2021	Of 191 COVID-19 patients, 89 (46.6%) had co-infection with ≥ 1 pathogens Median age: 50 years Comorbidities: 140 (89%)	Overall, 13 co-pathogens were identified: Bacterial coinfections: 41.4% Viral co-infections: 7.3% (mostly adenovirus and rhinoviruses)	NA
Jeong et al [67] / Korea	August 2020 - October 2021	35/436 adult COVID-19 patients (57 inpatients and 379 outpatients) with influenza co-infection Coinfecting adults; older median age (70 vs 46 years); more often admitted (85.7% vs 6.7%)	Coinfecting patients had significantly higher Cts and inflammatory markers, but less lymphocyte count	Risk factors for mortality: co-infection, older age, elevated lactate dehydrogenase
Castillo et al [68] /USA	March 2020	588 patients tested for SARS-CoV-2 with other respiratory infections on presentation	51 (8.7%) patients were positive for COVID-19 with one positive for another respiratory infection and one for influenza A	NA

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; COVID-19: coronavirus disease 2019; SOB: shortness of breath; DM: diabetes mellitus; CT: computer tomography; GGOs: ground glass opacities; PCR: polymerase chain reaction; NA: not available; HTN: hypertension; CXR: chest-X-ray; USA: United States of America; RADT: rapid antigen detection test; RA: rheumatoid arthritis; ILD: interstitial lung disease; ARDS: acute respiratory distress syndrome; COPD: chronic obstructive pulmonary disease; UK: United Kingdom; RSV: respiratory syncytial virus; vs: versus; LRTIs: lower respiratory tract infections; hMPV: human metapneumovirus; ICU: intensive care unit; WBCs: white blood cells; TNF α : tumor necrosis factor α ; GI: gastrointestinal tract; HF: heart failure; CKD: chronic kidney disease; ESRD: end-stage renal disease; MI: myocardial infarction; CRP: C-reactive protein; CVD: cardiovascular disease; Ca: cancer; BAL: bronchoalveolar lavage fluid; CAD: coronary artery disease; CFU: colony forming units; SPU: sputum; *S. aureus*: *Staphylococcus aureus*; *P. aeruginosa*: *Pseudomonas aeruginosa*; *K. pneumoniae*: *Klebsiella pneumoniae*; *A. baumannii*: *Acinetobacter baumannii*; *H. influenzae*: *Haemophilus influenzae*; TOF MS: time of flight mass spectrometry; ILI/SARI: influenza-type illnesses/severe acute respiratory infection; CAP: community-acquired pneumonia; *M. pneumoniae*: *Mycoplasma pneumoniae*; CHD: congestive heart disease; c/w: compared with; Ct: cycle threshold value

Supplementary File S2. Articles reporting co-infections of SARS-CoV-2 and respiratory viruses other than influenza (as of April 12, 2022).

Study / country	Time period	Number of co-infected patients / Characteristics	Findings	Management / Outcome
Uhteg et al [18] / USA	December 2019-October 2021	4/173 SARS-CoV-2 positive samples were also positive for enterovirus/rhinovirus (3) or adenovirus (1) Overall, enterovirus was the prevalent co-virus Coinfected patients were mostly children (≤ 18 y.o.)	NA	NA
Kanji et al [22] / Canada	June 2020-May 2021	4818 SARS-CoV-2 positive specimens (94.8% from adults, 53% males, median age: 56 years, ~50% outpatients) tested by multiplex PCR Co-infections in 134 (2.8%) cases (in children (10% vs 2.4% in adults) Enterovirus (118 cases; 88.1%), adenovirus (5 cases; 3.7%), RSV (4 cases; 3%), human coronaviruses (3 cases; 2.2%), parainfluenza viruses (2 cases; 1.5%), hMPV (2 cases; 1.5%) Enterovirus and adenovirus predominated in children	NA	NA
De Francesco et al [23] / Italy	January 2017 - February 2020 c/w March 2020 - May 2021	Hospitalized adults with respiratory symptoms: 10,121 samples before COVID-19 pandemic and 2362 during pandemic: positivity: 14.6% vs 2.7% Before the pandemic: co-infections with different respiratory viruses (influenza A-B, hMPV, parainfluenza, RSV, coronaviruses, adenovirus) During the pandemic: coinfections only with SARS-CoV-2 and rhinovirus (6 cases)	SOB, sore throat, cough and fever $\geq 37,5^{\circ}\text{C}$	NA
Ippolito et al [24] / Italy	November to February 2018/2019, 2019/2020, 2020/2021	178 hospitalized children ≤ 2 y.o. with LRTIs (66 in 2018/2019, 96 in 2019/2020, 16 in 2020/2021); in 171 children (96%) a virus detected (61 children (36%) with co-infections) Median age: 5 (2-13) months 53% males In COVID-19 pandemic 2/16 children positive for SARS-CoV-2: both had co-infection (bocavirus and rhinovirus)	NA	NA
Wanga et al [74] / USA	July – August 2021	113/713 (15.8%) children < 18 y.o. hospitalized with COVID-19 had a viral coinfection (32.4% of < 1 y.o., 36.1% of	NA	Co-infected children: more frequently oxygen support than COVID-19 only (69%)

		1-4 y.o.; 4.2% of 5-11 y.o., and 2.2% of 12-17 y.o.) RSV: 75 cases (66.4 % of coinfecting cases)		vs 51.2%). No difference in terms of ICU admission, duration of stay, ECMO required or outcome
Ishiguro et al [59] / Japan	February 2020-January 2021	91/298 (30.5%) patients with CAP due to SARS-CoV-2 with viral co-infection: influenza (28 cases; 9.4%), parainfluenza (27 cases; 9.1%), cold coronavirus (18 cases; 6%), adenovirus (14 cases; 4.7%), bocavirus (10 cases; 3.4%), rhinovirus (9 cases; 3%), parechovirus (7 cases; 2.3%), hMPV (6 cases; 2%), RSV (6 cases, 2%), enterovirus (4 cases; 1.3%) Bacterial co-infections: 10 cases (9.7%)	NA	Co-infection was not a risk factor for need of high-flow oxygen therapy, invasive mechanical ventilation or mortality
Sreenath et al [66] / India	June 2020-January 2021	89/191 (47.1%) SARS-CoV-2 positive patients (median age: 50 years, 895 with comorbidities) had coinfection: 79 (41.4%) bacterial co-infection 14 (7.3%) viral co-infection (coronaviruses: 4, rhinovirus: 4, adenovirus: 3 cases, influenza B: 2)	Fever (88.4%), cough (60.2%), SOB (58.6%), confusion (18.8%), abdominal pain-diarrhea(9.9%), headache (7.3%) Coinfected patients: more often abnormal creatinine levels, lower platelet counts, and higher CRP	Higher rates of ICU admission among coinfecting patients 36 (40%) co-infected patients died
Jeong et al [67] / Korea	August 2020-October 2021	35/436 COVID-19 patients had co-infection: 6/436 (1.4%) with respiratory viruses: RSV (2), rhinovirus (2), bocavirus (1), influenza B (1) 3 cases: 20-39 y.o. Comorbidities: 4 patients (HTN)	Fever (6), dyspnea (6), cough (6) Chest X-ray: infiltrates (2) Complications: renal failure (1)	Hospitalization: 2 Oxygen: 0 Intubation: 1 Discharge: 1 Death: 1
Chekuri et al [75] / USA	11 March-11 April 2020	14/306 (4.6%) SARS-CoV-2 positive adults (median age: 56 years) were positive for a non-influenza virus: human coronavirus (7; 46.6%), human rhinovirus (4; 26.7%), parainfluenza 3 (2; 13.3%), adenovirus (1; 6.7%), RSV B (1; 6.7%) Comorbidities: 60.1% HTN, 36% DM	NA	C/w co-infected patients, those with SARS-CoV-2 only were more likely to be admitted in ICU (73.6% vs 42.9%) Severe outcome in 111 (36.3%) SARS-CoV-2 infected patients vs 3 (21.4%) in co-infected patients
Soto et al [76] / Peru	September - December 2020	3/93 hospitalized patients with COVID-19 pneumonia had virus co-infection: rhinovirus (2), adenovirus (1)	NA	Unfavorable outcome: 1

Cooksey et al [77] / USA	May 2020 June 2021	23/1373 (1.7%) persons positive for SARS-CoV-2 had co-infections: 19 rhinovirus/enterovirus, 1 adenovirus, 1 <i>M. pneumoniae</i> , 1 parainfluenzae type 4, 1 human coronavirus plus parainfluenzae type 1	NA .	NA
Perez-Lazo et al [78] / Peru	July- November 2020	154 of 295 adults (52.2%) with moderate/severe COVID-19 pneumonia At admission: co-infection with <i>M. pneumoniae</i> (28.1%), <i>C. pneumoniae</i> (8.8%), both bacteria (11.5%), adenovirus (1.7%), <i>M. pneumoniae</i> / adenovirus (0.7%), <i>C. pneumoniae</i> /adenovirus (0.7%), RSV/ <i>C. pneumoniae</i> (0.3%), <i>M. pneumoniae</i> / <i>C. pneumoniae</i> /adenovirus (0.3%)	Coinfected patients more often sepsis c/w mono-infected patients (33.1% vs 20.6%), more mean duration in ICU (16 vs 8 days), and mean duration of intubation (16 vs 9 days)	No difference in mortality between co-infected and mono-infected SARS-CoV-2 patients (20.8% versus 19.2%)
Karaaslan et al [79] / Turkey	March 2020- May 2020	7/93 children (7,5%) with SARS-CoV-2 were co-infected. Rhinovirus/enterovirus: 2 Coronavirus NL63: 2 Adenovirus: 1 <i>M. pneumoniae</i> : 1 Rhinovirus/enterovirus/adenovirus: 1 Mean age: 10,02 years (range: 1 month-17,8 years) 51,6% males	Fever (68.8%), cough (57%), headache (10.8%) myalgia (5.4%), also sore throat, SOB, diarrhea, abdominal pain	Significantly longer hospital stays in patients with co-infection
Ling Ma et al [80] / Wuhan, China	January 19 toFeb 26, 2020	250 patients with COVID-19 (diagnosis of co-infections by PCR and immunoassays) RSV: 12 (4.8%); adenovirus: 7 (2.8%); influenza A: 2 (0.8%); influenza B: 1 (0.4%); <i>M. pneumoniae</i> : 11 (4.4%); <i>C. pneumoniae</i> : 13 (5.2%)	Acute fever or respiratory symptoms	No significant difference in age and sex between mono-SARS-CoV-2 and coinfecting group
Zhu et al [81] / China	January 22 to February 2, 2020	243/257 COVID-19 patients (mean: age 51 y.o.) had a co-infection: 81 (31.5%) viral, 236 (91.8%) bacterial, and 60 (23.3%) fungal co-infection Respiratory viruses detected: rhinovirus (12 cases, 4.7 %), adenovirus (10 cases, 3.9 %), influenza B (5 cases, 1.9 %), influenza A (2 cases, 0.8 %), bocavirus (1 case, 0.4 %), hMPV (1 case, 0.4 %)		The rates of viral co-infection (6, 35.3 %), fungal co-infection (5, 29.5 %) and bacterial-fungal co-infection (5, 29.5 %) were the highest in severe/critical category) of COVID-19 cases
oschi et al [82] / France	March to April 2020	27/643 (4.2%) SARS-CoV-2 positive patients had a virus co-infection: Rhinovirus (11), coronaviruses (5), influenza (4), parainfluenza (3), enterovirus (2), bocavirus (2),	NA	NA

		adenovirus (1), hMPV (1) 13 (48.2%) males Mean age: 59.6 y.o.		
Allou et al [83] / France	March 18 to April 15, 2020	5/36 (13.9%) patients with COVID-19 and hypoxemic pneumonia were co-infected, 3/5 with virus: influenza H1N1 (1), coronavirus (1), rhinovirus (1)	No differences in disease severity on chest CT (mainly GGOs and bilateral infiltrates) and in hospital length of stay between co-infected and no co-infected patients	Hospitalization: 3 Oxygen: NA Intubation: NA Discharge: 3
Tang et al [84] / China	January 28 to March 15, 2020	11/78 (14.1%) patients with COVID-19 pneumonia (6 men, mean age: 42.7 years) co-infected: <i>M. pneumoniae</i> (5; 45.5%), RSV (4; 36.4%), influenza B (1), adenovirus (1), Mycoplasma and Chlamydia (1), Mycoplasma and RSV (1), <i>C. pneumoniae</i> + <i>Legionella</i> (<i>pneumophila</i>). Comorbidities: CVD (1), HTN and DM (1)	Higher procalcitonin levels among coinfecting patients. No differences in other tests. Almost all coinfecting patients had unilateral or bilateral pulmonary lesions, except one patient with influenza B but no CXR lesions. No differences in sex, age, comorbidities, symptoms, CT findings, severity, length of stay between co-infected and mono-infected patients	Quinolones
Li Yet al [85] / China	January 21 to February 16, 2020	27/81 (33%) children with COVID-19 were co-infected (mainly <i>M. pneumoniae</i> : 20 cases; 25%). Viral co-infection in 6 (7%): children: influenza B: 2 (2%), influenza A + <i>M. pneumoniae</i> , parainfluenza + <i>M.</i>	No difference in clinical and laboratory findings or hospital stays between co-	Hospitalization: 27 Oxygen: 0 Intubation: 1 Discharge: 27

		pneumoniae, adenovirus + <i>M. pneumoniae</i> , RSV: 1 case each (1% each) No comorbidities	infected and mono-infected children (only lower WBCs, neutrophil and lymphocyte counts) Chest imaging of co-infected: consolidation in more cases	
Nowak et al [86] / USA	March 16 to April 20, 2020	36/1204 (2.9%) COVID-19 patients were coinfecting: other coronaviruses (1,5%), RSV (0,3%), adenovirus (0,2%), rhinovirus/enterovirus (0,7%), hMPV (0.4%), influenza A (0.1%) Coinfecting patients' mean age: 60 years; 56% female	NA	NA
Schirmer et al [87] / USA	September 29 2019 to May 31, 2020	56/3757 (1.5%) persons tested positive for SARS-CoV-2 had co-infection: rhinovirus, enterovirus (19), influenza (15), non-COVID-19 coronavirus (13), RSV (4), hMPV (3), parainfluenza (2), adenovirus (2), <i>C. pneumoniae</i> (1)	No differences of hospitalization rate, length of hospitalization, ICU admission, and mortality among COVID-19 only and co-infected patients	10/56 (18%) COVID-19 co-infected patients died (4 had rhinovirus and/or enterovirus, 2 had non-COVID-19 coronavirus, 1 influenza, 1 hMPV, 1 parainfluenza, 1 RSV)
Weissberg et al [88] / Switzerland	March 10, 2020	11/13 exposed cases (outbreak) developed COVID-19, of them 2 (index case and another case) had adenovirus co-infection	Fatigue, cough, fever, sore throat, rhinorrhea	NA
Si et al [89] / China	January 21 to February 29, 2020	1 of 24 COVID-19 patients had parainfluenza virus 2 co-infection	NA	NA
Hashemi et al [90] / Iran	2020	3 SARS-CoV-2 infected dead children (2 females) 13 months, 6 yrs and 6 yrs old Comorbidities: asthma (2) PCR: also, hMPV (3)	Cough, fever, malaise, diarrhea lymphopenia (3), increased CRP (3) CT: bilateral GGOs (3)	Hospitalization: 3 Oxygen: 0 Intubation: 3 Death: 3
Leuzinger et al [91] / Switzerland	January to March 2020	17/105 SARS-CoV-2 positive cases were coinfecting: human coronavirus (5), rhinovirus (5), parainfluenza virus (3), influenza A (2), rhinovirus and	Influenza-like illness	NA

		adenovirus (1), rhinovirus, RSV and parainfluenza virus (1)		
Motta et al [92] / Colombia	2020	40-year-old man: COVID-19 + adenovirus (also <i>K. oxytoca</i>) Comorbidities: DM	Odynophagia, dry cough, dyspnea, fever, fatigue, racheepnea, arthralgia, 82% oxygen saturation CXR: right basal GGO Chest CT: multilobar involvement Complication: ARDS (ICU for 12 days)	ampicillin, sulbactam, clarithroycin, hydroxychloroquine Hospitalization: 1 Intubation: 1 Discharge: 1 On supplementary oxygen at home
Sanchez-Nadales et al [93] / USA	2020	22-year female with severe acute hypoxic respiratory failure Coinfection: SARS-CoV-2 and HCoV NL63 Comorbidities: tubulointerstitial nephritis on steroids, HTN, DM	Nonproductive cough, Fever, chills, SOB Complications: pulmonary embolism, acute kidney injury, pneumothorax, pneumomediastinum, multiple cardiac arrests	30 days ICU Hospitalization: 1 Oxygen: Intubation: Death: 1
Nascimento et al [94] / Brasil	2020	25-year-old male physician with COVID-19 and measles (serology positive IgM) Comorbidities: asthma	Prostration, fever, cough, odynophagia, anosmia, ageusia, face edema, rash, conjunctival hyperemia, tachypnea, desaturation	azithromycin, prednisone Supplementary oxygen Favorable outcome
Touzard-Romo et al [95] / USA	2020	57 y.o. female with SARS-CoV-2 and hMPV Comorbidities: obstructive sleep apnea on continuous positive airway pressure, HTN, hyperlipidemia	Dry cough, SOB, fever CXR: no infiltrates	Albuterol inhaler, steroids Hospitalization: 1 Oxygen: 0 Intubation: 0 Discharge: 1

Sohal et al [96] / USA	2020	2 fatal cases with SARS-CoV-2 co-infection: a 40-year-old male with COVID 19 and parainfluenza and a 80-year-old female with COVID-10 and <i>Streptococcus pneumoniae</i> Comorbidities (1): DM, HTN, asthma, paroxysmal atrial fibrillation, dementia	Fever (2), cough (1), body aches (1), headache (1), SOB (1)	Ceftriaxone (2), azithromycin (2), Hydroxychloroquine (1) Hospitalization: 2 Intubation: 1 Death: 2
Danley et al [97] / USA	March 26, 2020	4-month-old boy coinfectd: adenovirus + COVID-19 Comorbidities: CHD	Loose stools, stuffy nose, decreased oral intake, mild cough, diaphoresis, tachypnea, 91% oxygen saturation	No antibiotics Hospitalization: 4 days Oxygen: yes Discharge
Jiang et al [98] / China	December 1 2019 - January 16 2020	Two children (both females, 6.5 years and 3.5 years): 1 st SARS-CoV-2, RSV, hMPV 2 nd SARS-CoV-2, hMPV, <i>M. pneumoniae</i>	Fever, cough, vomiting, swollen pharynx	oseltamivir (1), glucocorticosteroids(1), antibiotics (2) Hospitalization: 2 Oxygen: 2 ICU admission: 1 Discharge: 2
Kakuya et al [99] / Japan	February 2020	5-y.o. boy with COVID-19 and hMPV 11-y.o. boy with COVID-19 and influenza A (positive antigen) No comorbidities	Cough, fever, decreased appetite No complications	ceftriaxone, peramivir Hospitalization: 1 Oxygen: 0 Intubation: 0 Discharge: 1 Death: 0
Langerbeins et al [100] / Germany	2020	52-y.o. patient with SARS-CoV-2 and parainfluenza (Multiplex PCR) Comorbidities: CLL, psoriasis, asthma	Cough, ageusia, hyposmia CT: bilateral GGOs	hydrochloroquine, IVIG, piperacillin/tazobactam, Admission to ICU High flow oxygen via nasal cannula
Rodriguez et al [101] / USA	2020	21-year-old male with severe pneumonia due to SARS-CoV-2 and parainfluenza virus substance abuse, smoker no reported medical history	Fever, dry cough, dyspnea, myalgia, fatigue and diarrhea Increased WBCs, CRP, ferritin, procalcitonin CXR: bilateral opacities CT: multiple bilateral opacities and bilateral GGOs	oseltamivir, azithromycin, ceftriaxone, lopinavir/ritonavir, hydroxychloroquine Hospitalization: twice Oxygen: 1 Intubation: 0 Outcome: improvement

Alharthy et al [102] / Saudi Arabia	2020	25-year-old male admitted to ICU with acute respiratory failure due to COVID-19 No comorbidities hMPV by PCR	fever, dry cough, wheezing, chest pain, 75% oxygen saturation lymphocytopenia, increased CRP CXR: bilateral interstitial pneumonia	lopinavir/ritonavir, ribavirin, interferon beta-1b, dexamethasone Hospitalization: 1 Oxygen: 1 Intubation: 0 Discharge: 1
Scott et al [103] / USA	March 2020-February 2021	53/745 valid COVID-19 specimens (7,1%) positive for ≥ 1 pathogens: Rhinovirus/enterovirus: 41.5%; hMPV: 33.9%; adenovirus: 22.6% No influenza A or B Median age of co-infected patients: 38 years 53% males, 47% females Coinfections were more common in children ≤ 9 y.o. In children ≤ 9 y.o. mainly hMPV, adenovirus, RSV, bocavirus, and rhinovirus/enterovirus	NA	NA

SARS-CoV-2: severe acute respiratory syndrome coronavirus 2; USA: United States of America; y.o.: years old; NA: not available; PCR: polymerase chain reaction; RSV: respiratory syncytial virus; hMPV: human metapneumovirus; c/w: compared with; COVID-19: coronavirus disease 2019; vs: versus; SOB: shortness of breath; LRTIs: lower respiratory tract infections; ICU: intensive care unit; ECMO: extracorporeal membrane oxygenation; CAP: community-acquired pneumonia; CRP: C-reactive protein; HTN: hypertension; CXR: chest-X-ray; DM: diabetes mellitus; *M. pneumoniae*: *Mycoplasma pneumoniae*; *C. pneumoniae*: *Chlamydia pneumoniae*; CT: computer tomography; GGOs: ground glass opacities; CVD: cardiovascular disease; WBCs: white blood cells; *K. oxytoca*: *Klebsiella oxytoca*; ARDS: acute respiratory distress syndrome; CHD: chronic heart disease; IVIG: intravenous immune globulin; CLL: chronic lymphocytic leukemia