**Appendix 1**

**Literature on CXR in COVID-19**

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| **Author, Date** | **Study Population** | **CXR Findings** |
| **Studies:** |  |  |
| Wong, Mar 2020, *Radiology(6)* | 64 (Mean 56yrs (range 16-96); 26=M) | Hospital D1 – 31% normal, 41% mild findings, 28% extensive. Peak severity was reached at D10-12.    CXR had 69% sensitivity for detection.    “Mean time from initial positive CXR to negative CXR was 6±5 days (n=18, range 1-18 days)”.    28 patients (pts) had CT and CXR correlated, and only one pt had findings on CT without CXR findings.    “On baseline CXR, consolidation was the most common finding (30/64, 47%), followed by GGO (21/64, 33%). Peripheral (26/64, 41%) and lower zone distribution (32/64, 50%) were the more common locations, and most had bilateral involvement (32/64, 50%). Pleural effusion was found in 2 cases (3%).” |
| Yoon, Feb 2020, *Korean Journal of Radiology(13)* | 9 (Median age 52yrs; 4=M) | ﻿5/9 pts showed radiographic  “abnormalities” which they graded using a 5-point scale. 1pt (Grade 2) - ﻿”patchy atelectasis and/or hyperinflation and/or bronchial wall thickening”; 2pt (Grade 3)- ﻿”focal alveolar consolidation involving no more than one segment or one lobe”; 1pt (Grade 4) – “multifocal consolidation”; 1pt (Grade 5) – “diffuse alveolar consolidation”. **HOWEVER** when correlated with CT the first two pts described didn’t have true parenchymal findings (CXR findings due to breast tissue).    1 pt had a single nodular consolidation in the left lower lung zone. On CT this correlated with a “2.3 cm ill-defined nodular lesion with reversed halo sign with thick rim”. |
| Guan, Mar 2020, *NEJM(14)* | 274 (total in study =1099) | 59.1% had abnormal CXR, 20.1% had “GGO”, 28.1% had “local patchy shadowing”, 36.5% had “bilateral patchy shadowing”, 4.4% “interstitial abnormalities”. |
| Ng, Feb 2020, *Radiology: Cardiothoracic Imaging(7)*    *\*also performed literature review for the publications including papers with >10 pts only\** | 5/18 pts had CXR (comparison made to CT) | 2 pts showed normal CXR despite GGO on CT. 3 pts showed consolidation on CXR, 1 of which showed lower zone predominance – all of these CT showed peripheral predominance.    2 pts showed progression then resolution on serial CXRs, 1 pt showed no change over 8 days. |
| Choi, Mar 2020, *Radiology: Cardiothoracic Imaging* | 17 pts with COVID (20 CXR) and 20 control CXR | 20 baseline CXR and CT from 17 patients. Used semi-automatic segmentation tool to quantify opacity mass on CT. Median sensitivity AMONG READERS for identifying CXR opacities was 25%, with 90% specificity. CT abnormalities were not identified on the CXR for 9/20 CXRs.    19/186 CT visible “opacities” were detected on CXR. The visible “opacities” were of a larger extent and mass.    The “opacities” didn’t vary significantly in mean attenuation value, or if the lesion was located in a less visible region. |
| Hsih, Mar 2020, *Journal of Microbiology, Immunology, and Infection [In Press, Corrected Proof]* | 2 pts with proven COVID-19 (1 M, 1F), 41 pts who were screened for COVID-19 but were negative | 24/43 pts (55.8%) had an abnormal CXR.  Pt A with COVID - Illness D20 - Normal, Illness day 25 “interstitial infiltrates” right upper lobe.  Pt B with COVID - Illness D15 - left lower lobe “infiltrates”. Illness D19 - persistent changes. |
| Lomoro, Apr 2020, *European Journal of Radiology Open(35)* | 38 pts with CXR (58 pts total) | 46.9% had consolidation, and 37.5% had hazy increased opacities. 78.1% the findings were bilateral.  11 pts had correlated findings on CT |
| **Research Letters/Letter to Editor:** |  |  |
| Arentz, Mar 2020, *JAMA(15)* | 21 (mean age, 70 years [range, 43-92 years]; 52% male) | 20/21 had an abnormal CXR on admission. “bilateral reticular nodular opacities (11 patients [52%]) and ground-glass opacities (10 [48%]). By 72 hours, 18 patients (86%) had bilateral reticular nodular opacities and 14 (67%) had evidence of ground-glass opacities.” |
| Bandirali, 2020, *Radiology(18)* | ﻿“100 of 170 (59%) chest x-rays (mean patient age 57 ±16 years) had  abnormalities highly suspicious for COVID-19 pneumonia” \***Not confirmed cases**\* | ﻿“Involvement was bilateral in all cases: in 54% of patients the involvement was symmetrical, while chest x-ray abnormalities were greater on one side of the chest in 46%.” |
| Chang, Mar 2020, *JAMA* | 2 (32yr F, 69yr M) | Female – Normal  Male – “scattered opacities” left lower lobe |
| **Case Series/Reports:** |  |  |
| Bhatraju, Mar 2020, NEJM(25) | 23/24 (64±18 years, 63% M) | CXR on admission to ICU - all “showed bilateral pulmonary opacities. No pleural effusions were seen”. |
| Lescure, Mar 2020, *Lancet Infectious Diseases(26)* | 5 (31yrs M, 48yrs M, 80yrs M, 30yrs F, 46yrs F) | 31yr M – Illness D6 - “Bilateral pneumonia”. Later admitted to ICU.    48yrs M – Illness D9 - Normal CXR. Later admitted to ICU.    80yr M – Illness D3 - “Bilateral pneumonia”. Admitted ICU and expired.    30yr F – Illness D2 – Normal CXR.    46yr F – Illness D2 - Normal CXR. |
| Albarello, Feb 2020,  *International Journal of Infectious Diseases(16)* | 2 (66yr F, 67yr M) | Illness D2 – Male CXR Normal, Female CXR “interstitial lung alterations”. D3 – both had “ground-glass and crazy paving”on CT.    \*Interestingly they report pulmonary vessel enlargement preceding GGO on follow-up CTs, which may be a predictor of developing parenchymal disease\* |
| Zhu, Feb 2020, *NEJM(28)* | 1/3 with CXR (61yr M) | Males – Illness D8 + D11 shows progression of “bilateral fluffy opacities”, most marked in the lower lung fields. D11 also shows “changes consistent with the accumulation of pleural fluid”(Patient in ICU). |
| Cuong, Apr 2020, *The Lancet Inf Diseases* | 1 (25yr F) | Shows CXR at Hospital D1 + D4, but doesn’t describe findings. |
| Cheng, Feb 2020, *Journal of the Formosan Medical Association(29)* | 1 (55yr F) | Illness D10 - ﻿”Bilateral perihilar infiltration and ill-defined patchy opacities”. D13,17,25 – “patchy infiltrates” progressed diffusely and then improved, and coincided with changes in SPO2. |
| Pongpirul, Feb 2020, *NEJM(31)* | 1 (51yr M) | Illness D8 - “reticular, patchy infiltration of the left lower lung”. |
| Bastola, Feb 2020, *The Lancet Inf Diseases* | 1 (32yr M) | Illness D10 - “an ﻿infiltrate in the upper lobe of the left lung”. |
| Holshue, Jan 2020, *NEJM(30)* | 1 (35yr M) | Illness D4 +D7 – normal. D9 - ﻿”pneumonia in the lower lobe of the left lung” (accompanied decreased O2 sats). D10 - ﻿”basilar streaky opacities in both lungs, a finding consistent with atypical pneumonia”. |
| Shi, Feb 2020, *Radiology(8)* | 1 (42yr M) | Illness D7 – Left lower lobe and right upper lobe “opacities”. Correlates with D9 CT. |
| Wu, 2020, *Nature(34)* | 1 (41yr M) | Illness D6 – ﻿“air-space shadowing such as ground-glass opacities, focal consolidation and patchy consolidation in both lungs”. Illness D11 – ﻿“bilateral diffuse patchy and fuzzy shadow”. |
| Xu, Feb 2020, *Lancet Respiratory Medicine(22)* | 1 (50yr M) | Illness D8 – “multiple patchy shadows in both lungs”. D10 + D12 – persistent disease. D14 – expired. |
| Liu, Mar 2020, *NEJM(21)* | 2 (52yr F, 50yr M) | Female - Hospital D1 – “Diffuse infiltrates in the bilateral lower lungs”. D5 – “progressive diffuse interstitial opacities and consolidation in bilateral parahilar areas and lower lung fields”.  Male – Hospital D1 -Normal CXR. |
| Phan, Feb 2020, *NEJM(27)* | 2 (65yr M, 27yr M) | 65yr M - Illness D5 – “Infiltrate” left upper lobe. D8, D10, D11 – “progressive infiltrate and consolidation”, mainly left sided.    27yr M – Illness D2 – normal CXR |
| Wei, Feb 2020, *Korean Journal of Radiology* | 1 (40yr F) | Illness D3 - CXR normal, CT subpleural GGO right lower lobe. |
| Thevarajan, Mar 2020, *Nature Medicine(23)* | 1 (47yr F) | Illness D5 - CXR bibasal “infiltrates”, illness D10 - normal. |
| Silverstein, Feb 2020, *Lancet(24)* | 1 (56yr M) | Hosp D1 - CXR ill-defined, patchy bilateral “peribronchovascular opacities”. |
| Lim, Feb 2020, *Journal of Korean Medical Science(33)* | 1 (54yr M) | Illness D3 - Normal CXR. Illness D9, D15 - progressive patchy opacities bilaterally *(interpreted from CXR pictures, not written in text)* |
| Lee, Mar 2020, *Journal of Microbiology, Immunology, and Infection [In press, corrected proof]* | 1 (46yr F) | Illness D3 - “Patchy densities” left upper and middle lung fields. Illness D18 - Resolving “pulmonary infiltrates”. |
| Kong, Feb 2020, *Radiology: Cardiothoracic Imaging(32)* | 1 out of 3 with CXR (59yr F) | Hospital D1 - “right infrahilar airspace opacities”. |
| **Further papers that have CXR images:** |  |  |
| Chen, Jan 2020, *Lancet* | 2 CXR examples | Patient A - “Patchy shadow with uneven density”. Progression on follow-up.  Patient B - “Multiple patchy shadows” and “large ground-glass opacity”. Progression on follow-up. |
| Jin, 2020, *Military Medical Research* | 1 CXR example (51yr M) | Examples of CXR: “patchy shadows” left lower lobe. |
| Zhang, Feb 2020, *Allergy* | 2 CXR examples (36yr M, 67yr F) | Female - Illness D12 -“extended bilateral consolidation”, D17 - partial resolution.  Male - Illness D6 - “bilateral diffuse patchy and consolidation”, D7 - “scattered small irregular consolidation” (just been intubated), D14 - “bilateral lung lesions deteriorated, and bilateral costophrenic angles were not clearly displayed, suggesting pleural effusion”. D15 - expired. |
| **References** (those not included in the main manuscript):  Bastola A, Sah R, Rodriguez-Morales AJ, Lal BK, Jha R, Ojha HC, et al. The first 2019 novel coronavirus case in Nepal. Vol. 20, The Lancet Infectious Diseases. Lancet Publishing Group; 2020. p. 279–80.  Chang D, Lin M, Wei L, Xie L, Zhu G, Dela Cruz CS, et al. Epidemiologic and Clinical Characteristics of Novel Coronavirus Infections Involving 13 Patients Outside Wuhan, China. Vol. 323, JAMA - Journal of the American Medical Association. American Medical Association; 2020. p. 1092–3.  Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. Lancet. 2020 Feb 15;395(10223):507–13.  Choi H, Qi X, Yoon SH, Park SJ, Lee KH, Kim JY, et al. Extension of Coronavirus Disease 2019 (COVID-19) on Chest CT and Implications for Chest Radiograph Interpretation. Radiol Cardiothorac Imaging [Internet]. 2020 Apr 1 [cited 2020 Mar 30];2(2):e200107. Available from: http://pubs.rsna.org/doi/10.1148/ryct.2020200107  Cuong L Van, Giang HTN, Linh LK, Shah J, Van Sy L, Hung TH, et al. The first Vietnamese case of COVID-19 acquired from China. Lancet Infect Dis. 2020 Apr 1;20(4):408–9.  Hsih W-H, Cheng M-Y, Ho M-W, Chou C-H, Lin P-C, Chi C-Y, et al. Featuring COVID-19 cases via screening symptomatic patients with epidemiologic link during flu season in a medical center of central Taiwan. J Microbiol Immunol Infect. 2020 Mar 13;  Jin YH, Cai L, Cheng ZS, Cheng H, Deng T, Fan YP, et al. A rapid advice guideline for the diagnosis and treatment of 2019 novel coronavirus (2019-nCoV) infected pneumonia (standard version). Vol. 7, Military Medical Research. BioMed Central Ltd.; 2020.  Lee NY, Li CW, Tsai HP, Chen PL, Syue LS, Li MC, et al. A case of COVID-19 and pneumonia returning from Macau in Taiwan: Clinical course and anti-SARS-CoV-2 IgG dynamic. J Microbiol Immunol Infect. 2020 Mar 10;  Wei J, Xu H, Xiong J, Shen Q, Fan B, Ye C, et al. 2019 Novel Coronavirus (COVID-19) Pneumonia: Serial Computer Tomography Findings. Korean J Radiol. 2020 Apr 1;21(4):501–4.  Zhang J, Dong X, Cao Y, Yuan Y, Yang Y, Yan Y, et al. Clinical characteristics of 140 patients infected with SARS‐CoV‐2 in Wuhan, China. Allergy [Internet]. 2020 Feb 27 [cited 2020 Apr 1];all.14238. Available from: https://onlinelibrary.wiley.com/doi/abs/10.1111/all.14238 | | |