

An artificial intelligence-based first-line defence against COVID-19: digitally screening citizens for risks via a chatbot

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Supplementary Information

Symptom Frequencies

	COVID-19	Common cold	Influenza	Hay fever
Fever	87.9 [1]	15 [3]	68 [6]	–
Fatigue	38.1 [1]	42 [4]	94 [6]	–
Dry cough	67.7 [1]	80 [3]	93 [6]	22 [10]
Sneezing	–	74 [4]	58 [7]	96 [11]
Malaise	14.8 [1]	30 [4]	94 [6]	–
Rhinorrhea	4 [2]	95 [3]	91 [6]	62.1 [12]
Sore throat	13.9 [1]	70 [3]	84 [6]	30 [10]
Diarrhea	3.7 [1]	11 [4]	14.4 [8]	–
Headache	13.6 [1]	80 [5]	91 [6]	50 [13]
Dyspnea	18.6 [1]	21 [4]	63 [9]	–

Table S1. Symptom frequencies as extracted from the literature.

[1] <https://www.who.int/docs/default-source/coronaviruse/who-china-joint-mission-on-covid-19-final-report.pdf>

[2] <https://www.thelancet.com/action/showPdf?pii=S0140-6736%2820%2930211-7>

[3] <https://www.sciencedirect.com/science/article/pii/S0095454305703559?via%3Dihub>

[4] <https://www.ncbi.nlm.nih.gov/pubmed/3057962>

[5] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4347877/pdf/nihms658637.pdf>

[6] <https://jamanetwork.com/journals/jamainternalmedicine/fullarticle/485554>

[7] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4915903/>

[8] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4676820/>

[9] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3650195/>

[10] <https://www.ncbi.nlm.nih.gov/pubmed/10971479>

[11] <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5806744/>

[12] https://www.researchgate.net/publication/307953143_Inverse_correlation_of_soluble_programmed_cell_death-1_ligand-1_sPD-L1_with_eosinophil_count_and_clinical_severity_in_allergic_rhinitis_patients

[13] <https://www.ncbi.nlm.nih.gov/pubmed/17300360>

COVID-19 Case Reports

Case ID	Source
3007	Zhang X, Song W, Liu X, Lyu L. CT image of novel coronavirus pneumonia: a case report. <i>Jpn J Radiol.</i> 2020 Mar 18. doi: 10.1007/s11604-020-00945-1.
3006, 2987, 2986, 2985	Wang Z, Chen X, Lu Y, Chen F, Zhang W. Clinical characteristics and therapeutic procedure for four cases with 2019 novel coronavirus pneumonia receiving combined Chinese and Western medicine treatment. <i>Biosci Trends.</i> 2020 Mar 16;14(1):64-68. doi: 10.5582/bst.2020.01030.
3005	Thevarajan I, Nguyen THO, Koutsakos M, et al. Breadth of concomitant immune responses prior to patient recovery: a case report of non-severe COVID-19. <i>Nat Med.</i> 2020. doi: 10.1038/s41591-020-0819-2
3004	Ng K, Poon BH, Kiat Puar TH, et al. COVID-19 and the Risk to Health Care Workers: A Case Report. <i>Ann Intern Med.</i> 2020. doi: 10.7326/L20-0175
3003, 3002	Chen L, Liu W, Zhang Q, et al. RNA based mNGS approach identifies a novel human coronavirus from two individual pneumonia cases in 2019 Wuhan outbreak. <i>Emerg Microbes Infect.</i> 2020 Feb 5;9(1):313-319. doi: 10.1080/22221751.2020.1725399
3001, 2997	Lin X, Gong Z, Xiao Z, Xiong J, Fan B, Liu J. Novel Coronavirus Pneumonia Outbreak in 2019: Computed Tomographic Findings in Two Cases. <i>Korean J Radiol.</i> 2020 Mar;21(3):365-368. doi: 10.3348/kjr.2020.0078
3000	Lim J, Jeon S, Shin HY, et al. Case of the Index Patient Who Caused Tertiary Transmission of COVID-19 Infection in Korea: the Application of Lopinavir/Ritonavir for the Treatment of COVID-19 Infected Pneumonia Monitored by Quantitative RT-PCR. <i>J Korean Med Sci.</i> 2020 Feb 17;35(6):e79. doi: 10.3346/jkms.2020.35.e79.
2999	Park WB, Kwon NJ, Choi SJ et al. Virus Isolation from the First Patient with SARS-CoV-2 in Korea. <i>J Korean Med Sci.</i> 2020 Feb 24;35(7):e84. doi: 10.3346/jkms.2020.35.e84.
2998	An P, Song P, Lian K, Wang Y. CT Manifestations of Novel Coronavirus Pneumonia: A Case Report. <i>Balkan Med J.</i> 2020 Mar 6. doi: 10.4274/balkanmedj.galenos.2020.2020.2.15.
2996	Wei J, Xu H, Xiong J, et al. 2019 Novel Coronavirus (COVID-19) Pneumonia: Serial Computed Tomography Findings. <i>Korean J Radiol.</i> 2020 Apr;21(4):501-504. doi: 10.3348/kjr.2020.0112.
2995	Zhu L, Xu X, Ma K, et al. Successful recovery of COVID-19 pneumonia in a renal transplant recipient with long-term immunosuppression. <i>Am J Transplant.</i> 2020 Mar 17. doi: 10.1111/ajt.15869.
2994	Wang S, Guo L, Chen L, et al. A case report of neonatal COVID-19 infection in China. <i>Clin Infect Dis.</i> 2020 Mar 12. pii: ciaa225. doi: 10.1093/cid/ciaa225.
2993	Chen D, Xu W, Lei Z, et al. Recurrence of positive SARS-CoV-2 RNA in COVID-19: A case report. <i>Int J Infect Dis.</i> 2020 Mar 5. pii: S1201-9712(20)30122-3. doi: 10.1016/j.ijid.2020.03.003.
2992	Xu Z, Shi L, Wang Y, et al. Pathological findings of COVID-19 associated with acute respiratory distress syndrome. <i>Lancet Respir Med.</i> 2020 Feb 18. pii: S2213-2600(20)30076-X. doi: 10.1016/S2213-2600(20)30076-X.
2991	Kim JY, Ko JH, Kim Y, et al. Viral Load Kinetics of SARS-CoV-2 Infection in First Two Patients in Korea. <i>J Korean Med Sci.</i> 2020 Feb 24;35(7):e86. doi: 10.3346/jkms.2020.35.e86.
2990, 2989, 2988	Bernard Stoecklin S, Rolland P, Silue Y, et al. First cases of coronavirus disease 2019 (COVID-19) in France: surveillance, investigations and control measures, January 2020. <i>Euro Surveill.</i> 2020 Feb;25(6). doi: 10.2807/1560-7917.ES.2020.25.6.2000094.
2984	Shi H, Han X, Zheng C. Evolution of CT Manifestations in a Patient Recovered from 2019 Novel Coronavirus (2019-nCoV) Pneumonia in Wuhan, China. <i>Radiology.</i> 2020 Apr;295(1):20. doi: 10.1148/radiol.2020020269.
2983, 2982	Fang Y, Zhang H, Xu Y, Xie J, Pang P, Ji W. CT Manifestations of Two Cases of 2019 Novel Coronavirus (2019-nCoV) Pneumonia. <i>Radiology.</i> 2020 Apr;295(1):208-209. doi: 10.1148/radiol.2020020280.
2981	Liu P, Tan XZ. 2019 Novel Coronavirus (2019-nCoV) Pneumonia. <i>Radiology.</i> 2020 Apr;295(1):19. doi: 10.1148/radiol.2020020257.
2980	Lei J, Li J, Li X, Qi X. CT Imaging of the 2019 Novel Coronavirus (2019-nCoV) Pneumonia. <i>Radiology.</i> 2020 Apr;295(1):18. doi: 10.1148/radiol.2020020236.
2979	Park JY, Han MS, Park KU, Kim JY, Choi EH. First Pediatric Case of Coronavirus Disease 2019 in Korea. <i>J Korean Med Sci.</i> 2020 Mar 23;35(11):e124. doi: 10.3346/jkms.2020.35.e124.
2978	Hosoda T, Sakamoto M, Shimizu H, Okabe N. SARS-CoV-2 enterocolitis with persisting to excrete the virus for about two weeks after recovering from diarrhea: A case report. <i>Infect Control Hosp Epidemiol.</i> 2020 Mar 19:1-4. doi: 10.1017/ice.2020.87.

Symptoma userbase captures virus diffusion

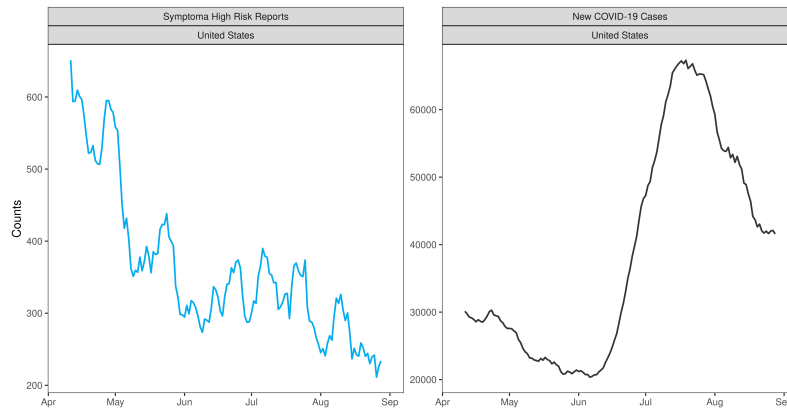


Figure S1. New cases of COVID-19 reported within the United States compared to the number of COVID-19 online tests labelled as high-risk by Symptoma. The time-series are shown for the period 2020-04-11 to 2020-08-28 and the Pearson correlation coefficient is -0.368 .