## Supplementary Materials

**Table S1.** Lists the organizations' websites that were consulted, along with their addresses and dates of access.

| Name of the organization | Address of the website | Access date |
|---|---|---|
| ▪ Organisation for Economic Co-operation and Development (OECD) | https://www.oecd.org/ | 15/03/2022 |
| ▪ The World Bank | https://www.worldbank.org/en/home | 15/03/2022 |
| ▪ European Observatory on Health Systems and Policies | https://eurohealthobservatory.who.int/home | 15/03/2022 |
| ▪ European Commission | https://ec.europa.eu/info/index_en | 16/03/2022 |
| ▪ U.S. Centres for Medicare & Medicaid | https://www.cms.gov/newsroom/press-releases/cms-announces-comprehensive-strategy-enhance-hospital-capacity-amid-covid-19-surge | 14/03/2022 |
| ▪ World Health Organization (WHO) | https://www.who.int/health-topics/hospitals#tab=tab_1 | 14/03/2022 |
| ▪ American Hospital Association (AHA) | https://www.aha.org/fact-sheets/2021-05-26-fact-sheet-ensuring-hospital-infrastructure-meets-nations-needs-today-and | 14/03/2022 |
| ▪ American Society for Health Care Engineering (ASHE) | https://www.hfmmagazine.com/articles/4329-designing-the-post-pandemic-hospital | 16/03/2022 |
| ▪ Centre for Disease Control and Prevention (CDC) | https://www.cdc.gov/nhsn/covid19/report-patient-impact.html | 16/03/2022 |
| ▪ European Hospital & Healthcare Federation (hope) | https://hope.be/ | 16/03/2022 |
| ▪ Association of Schools of Public Health in the European Region (ASPHER) | https://www.aspher.org/covid-19-situation-reporting.html | 16/03/2022 |
| ▪ Omnia health | https://insights.omnia-health.com/management/building-health-centres-future | 16/03/2022 |

**Table S2:** Data extraction format for empirical papers

| Research question (RQ) | Data extracted | Coding examples |
|---|---|---|
| **RQ1**: What were the general characteristics of the study (authorship/title; date of publication; studies focused on specific countries or with a regional or global approach)? | ▪ Authors<br>✓ Acronym<br>✓ Full reference<br>▪ Title<br>▪ Date of publication<br>▪ Research place | • N/A<br>• Author(year)<br>• N/A<br>• N/A<br>• Year and month: e.g.: 2019 June → 2019/06<br>• 1_ research in one country (specify the country); 2_ multi country |

| | | |
|---|---|---|
| | | in same continent; 3_ multi country in different continents (international); 4_no information on research country |
| **RQ2**: What design was the study? | ▪ Research design | • Qt_Quantitative: QtL_longitudinal; Qtc_cross-sectional; Qtm_ modelling)<br>• Ql_Qualitative<br>• Mx_Mix |
| | ▪ Period of the study | • From (MM/YYYY) to (MM/YYYY) e.g., 01/2019 - 04/2019 |
| | ▪ Sample | • M_Multicountry; N_national; R_regional; L_local; H1_case study based on 1 hospital only |
| | ▪ Type of hospital | • GH_general hospital, SH_specialised hospital, UH_university (teaching) hospital, NH_hospital not specified |
| | ▪ Number of hospitals | • Number, e.g.,5<br>• Not specified (NS) |
| **RQ3**: What was (were) the objective(s)/type of association(s) being evaluated? | ▪ Study objective (type of association being assessed) | • Impact of the COVID pandemic on the hospital infrastructure (COVID → hospitals)<br>• Association between COVID management and available infrastructure, e.g., mortality vs ICU beds (hospitals → COVID)<br>• Modelling studies on number of beds needed (hospital →bed prediction) |
| **RQ4**: What was (were) the solution(s) or adaptation(s) or conceptual/theoretical framework(s)/planning stated? | ▪ Study results/conclusions (solution/ conceptual/theoretical framework) | • ST_ (shor-term solutions) Adaptation:<br>• ST1_Temporary facilities: e.g., Mobile makeshifts, field hospitals, etc; ST2_Repurposing non-clinical/non-medical buildings: e.g., training centers, malls, schools.; ST3_Repurposing existing clinical/medical buildings, e.g, converting pediatric rooms into ICU beds); ST4_Remote strategies: e.g., remote triage via websites, call centers, etc; |

|  |  | • LT_(long-term-solutions) Planning: |
|  |  | • LT1_Architecture, LT2_Engineering, LT3_Construction (builders), LTO_other hospital infrastructure planning |
| **RQ5**: What limitations were stated? | ▪ Limitations stated | • Related to data<br>• Related to methods<br>• Not stated |

**Table S3. Search Results in PubMed**

| PubMed Search strategy | | |
| --- | --- | --- |
| Database: MEDLINE via PubMed | | |
| Steps:<br>• Step1:  #1<br>• Step2: #2<br>• Stpe3: #1 AND #2<br>• Step4: #1 AND #2 AND filters (Full text, English language, from 2019-2021) | | |
| #1 | Search: **"Hospital infrastructur*"[Title/Abstract] OR "hospital capacit*"[Title/Abstract] OR "hospital equipment*"[Title/Abstract] OR "hospital bed*"[Title/Abstract] OR "hospital plan*"[Title/Abstract]** | 6,831 Results |
| #2 | Search: **"COVID-19"[Title/Abstract] OR "Sars-Cov-2"[Title/Abstract] OR " Coronavirus"[Title/Abstract] OR "pandemic*"[Title/Abstract]** | 243,785 Results |
| #1 AND #2 | Search: **("Hospital infrastructur*"[Title/Abstract] OR "hospital capacit*"[Title/Abstract] OR "hospital equipment*"[Title/Abstract] OR "hospital bed*"[Title/Abstract] OR "hospital plan*"[Title/Abstract]) AND (COVID* OR Sars-Cov-2 OR Coronavirus OR pandemic*)** | 562 Results |
| #1 AND #2 AND filters | Search: **("Hospital infrastructur*"[Title/Abstract] OR "hospital capacit*"[Title/Abstract] OR "hospital equipment*"[Title/Abstract] OR "hospital bed*"[Title/Abstract] OR "hospital plan*"[Title/Abstract]) AND (COVID* OR Sars-Cov-2 OR Coronavirus OR pandemic*)** Filters: **Full text, English, from 2019 - 2021** | 489 Results |

**Table S4. Search Results in Scopus**

| Scopus Search strategy |
| --- |
| Database: Scopus |
| Steps:<br>• Step1:  #1<br>• Step2: #2 |

| | • Stpe3: #1 AND #2 | |
|---|---|---|
| | • Step4: #1 AND #2 AND filters (Full text, English language, from 2019-2021) | |
| #1 | TITLE-ABS-KEY ( "Hospital infrastructur*" OR "hospital capacit*" OR "hospital equipment*" OR "hospital bed*" OR "hospital plan*" ) | 53,063 document results |
| #2 | TITLE-ABS-KEY (COVID-19 OR sars-cov-2 OR coronavirus OR pandemic* ) | 330,602 document results |
| #1 AND #2 | ( TITLE-ABS-KEY ( "Hospital infrastructur*" OR "hospital capacit*" OR "hospital equipment*" OR "hospital bed*" OR "hospital plan*" ) ) AND ( TITLE-ABS-KEY ( covid* OR sars-cov-2 OR coronavirus OR pandemic* ) ) | 1,504 document results |
| #1 AND #2 AND filters | ( TITLE-ABS-KEY ( "Hospital infrastructur*" OR "hospital capacit*" OR "hospital equipment*" OR "hospital bed*" OR "hospital plan*" ) ) AND ( TITLE-ABS-KEY ( covid* OR sars-cov-2 OR coronavirus OR pandemic* ) ) AND ( LIMIT-TO ( PUBYEAR , 2021 ) OR LIMIT-TO ( PUBYEAR , 2020 ) OR LIMIT-TO ( PUBYEAR , 2019 ) ) AND ( LIMIT-TO ( DOCTYPE , "ar" ) ) AND ( LIMIT-TO ( LANGUAGE , "English" ) ) | 787 document results |

**Table S5. Search Results in Web of Science**

| Web of Science Search strategy | | |
|---|---|---|
| Database: Web of Science | | |
| Steps: | | |
| • Step1: #1 | | |
| • Step2: #2 | | |
| • Stpe3: #1 AND #2 | | |
| • Step4: #1 AND #2 AND filters (Full text, English language, from 2019-2021) | | |
| 1 | (TI=("Hospital infrastructur*" OR "hospital capacit*" OR "hospital equipment*" OR "hospital bed*" OR "hospital plan*")) OR AB=("Hospital infrastructur*" OR "hospital capacit*" OR "hospital equipment*" OR "hospital bed*" OR "hospital plan*") | 4,816 results |
| 2 | (TI=(COVID* OR Sars-Cov-2 OR Coronavirus OR pandemic*)) OR AB=(COVID* OR Sars-Cov-2 OR Coronavirus OR pandemic*) | 274,073 results |
| 3 | #1 AND #2 | 517 results |
| 4 | #1 AND #2 and 2019 or 2020 or 2021 (Publication Years) and Articles (Document Types) and English (Languages) | 391 results |

**Table S6: All 106 studies included**

| Study No | Accronym | Full reference | Type of publication |
|---|---|---|---|

| 1 | Capolongo, S. et al. (2020) | Capolongo, S. et al. (2020) 'COVID-19 and Healthcare Facilities: a Decalogue of Design Strategies for Resilient Hospitals.', Acta bio-medica: Atenei Parmensis, 91(9-S), pp. 50–60. doi: 10.23750/abm.v91i9-S.10117. | Multicountry non-modelling |
|---|---|---|---|
| 2 | Louri, N. A. et al. (2021) | Louri, N. A. et al. (2021) 'Establishing a 130-Bed Field Intensive Care Unit to Prepare for COVID-19 in 7 Days in Bahrain Military Hospital', Disaster Medicine and Public Health Preparedness, 15(1), pp. e34–e43. doi: 10.1017/dmp.2020.297. | Singlecountry non-modelling |
| 3 | Lefrant, J.-Y. et al. (2020) | Lefrant, J.-Y. et al. (2020) 'A national healthcare response to intensive care bed requirements during the COVID-19 outbreak in France', *Anaesthesia Critical Care and Pain Medicine*, 39(6), pp. 709–715. doi: 10.1016/j.accpm.2020.09.007. | Singlecountry non-modelling |
| 4 | Fang, D. *et al.* (2020) | Fang, D. *et al.* (2020) 'Large-scale public venues as medical emergency sites in disasters: Lessons from COVID-19 and the use of Fangcang shelter hospitals in Wuhan, China', *BMJ Global Health*, 5(6), pp. 1–7. doi: 10.1136/bmjgh-2020-002815. | Singlecountry non-modelling |
| 5 | Arabi, Y. M. et al. (2021) | Arabi, Y. M. et al. (2021) 'How the COVID-19 pandemic will change the future of critical care', Intensive Care Medicine, 47(3), pp. 282–291. doi: 10.1007/s00134-021-06352-y. | Singlecountry non-modelling |
| 6 | Tadavarthy, S. N. et al. (2021) | Tadavarthy, S. N. et al. (2021) 'Developing and implementing an infection prevention and control program for a COVID-19 alternative care site in Philadelphia, PA', American Journal of Infection Control, 49(1), pp. 77–81. doi: 10.1016/j.ajic.2020.07.006 | Singlecountry non-modelling |
| 7 | Hickey, S. et al. (2020) | Hickey, S. et al. (2020) 'Rapid deployment of an emergency department-intensive care unit for the COVID-19 pandemic', Clinical and Experimental Emergency Medicine, 7(4), pp. 319–325. | Singlecountry non-modelling |
| 8 | Emmanuel, U.et al. (2020) | Emmanuel, U., Osondu, E. D. and Kalu, K. C. (2020) 'Architectural design strategies for infection prevention and control (IPC) in health-care facilities: towards curbing the spread of Covid-19', *Journal of Environmental Health Science and Engineering*, 18(2), pp. 1699–1707. | Country-not-specified non-modelling |
| 9 | Akuamoa-Boateng, D. *et al.* (2020) | Akuamoa-Boateng, D. *et al.* (2020) 'Managing patient flows in radiation oncology during the COVID-19 pandemic: Reworking existing treatment designs to prevent infections at a German hot spot area University Hospital', *Strahlentherapie und Onkologie*, 196(12), pp. 1080–1085. doi: 10.1007/s00066-020-01698-6. | Singlecountry non-modelling |

| 10 | Whiteside, T. et al. (2020) | Whiteside, T. et al. (2020) 'Redesigning emergency department operations amidst a viral pandemic', American Journal of Emergency Medicine, 38(7), pp. 1448–1453. doi: 10.1016/j.ajem.2020.04.032. | Singlecountry non-modelling |
| --- | --- | --- | --- |
| 11 | Lacasa, L. et al. (2020) | Lacasa, L. et al. (2020) 'A flexible method for optimising sharing of healthcare resources and demand in the context of the COVID-19 pandemic', PLoS ONE, 15(10 October). doi: 10.1371/journal.pone.0241027. | Singlecountry non-modelling |
| 12 | Al-Dorzi, H. M. et al. (2021) | Al-Dorzi, H. M. et al. (2021) 'Managing critical care during COVID-19 pandemic: The experience of an ICU of a tertiary care hospital.', Journal of infection and public health, 14(11), pp. 1635–1641. doi: 10.1016/j.jiph.2021.09.018. | Singlecountry non-modelling |
| 13 | Nogués, X. et al. (2021) | Nogués, X. et al. (2021) 'Hospital-at-Home Expands Hospital Capacity During COVID-19 Pandemic.', Journal of the American Medical Directors Association, 22(5), pp. 939–942. doi: 10.1016/j.jamda.2021.01.077. | Singlecountry non-modelling |
| 14 | Kim, S. W. et al. (2020) | Kim, S. W. et al. (2020) 'A Brief Telephone Severity Scoring System and Therapeutic Living Centers Solved Acute Hospital-Bed Shortage during the COVID-19 Outbreak in Daegu, Korea.', Journal of Korean medical science, 35(15), pp. e152–e152. | Singlecountry non-modelling |
| 15 | Chen, Y. et al. (2020) | Chen, Y. et al. (2020) 'Emergency reconstruction of large general hospital under the perspective of new COVID-19 prevention and control', Wiener Klinische Wochenschrift, 132(21), pp. 677–684. | Singlecountry non-modelling |
| 16 | Witcher, T. R. (2020) | Witcher, T. R. (2020) 'Swift Support', Civil Engineering Magazine Archive, pp. 76–79. doi: 10.1061/ciegag.0001494. | Singlecountry non-modelling |
| 17 | Van Goethem, N. et al. (2020) | Van Goethem, N. et al. (2020) 'Rapid establishment of a national surveillance of COVID-19 hospitalizations in Belgium.', Archives of public health = Archives belges de sante publique, 78(1), p. 121. doi: 10.1186/s13690-020-00505-z. | Singlecountry non-modelling |
| 18 | Aziz, S. et al. (2020) | Aziz, S. et al. (2020) 'Managing ICU surge during the COVID-19 crisis: rapid guidelines', Intensive Care Medicine, 46(7), pp. 1303–1325. doi: 10.1007/s00134-020-06092-5. | Country-not-specified non-modelling |
| 19 | Bamias, G. et al. (2020) | Bamias, G. et al. (2020) 'The Greek Response to COVID-19: A True Success Story from an IBD Perspective', INFLAMMATORY BOWEL DISEASES, 26(8), pp. 1144–1148. doi: 10.1093/ibd/izaa143. | Singlecountry non-modelling |
| 20 | Borgen, I. et al. (2021) | Borgen, I. et al. (2021) 'From Hospital to Home: An Intensive Transitional Care Management Intervention for | Singlecountry non-modelling |

| | | Patients with COVID-19.', Population health management, 24(1), pp. 27–34. doi: 10.1089/pop.2020.0178. | |
|---|---|---|---|
| 21 | Tan, Y. H. et al. (2021) | Tan, Y. H. et al. (2021) 'Application of a Machine Learning Algorithms in a Wrist-Wearable Sensor for Patient Health Monitoring during Autonomous Hospital Bed Transport.', Sensors (Basel, Switzerland), 21(17). doi: 10.3390/s21175711. | Singlecountry non-modelling |
| 22 | Hron, J. D. et al. (2020) | Hron, J. D. et al. (2020) 'Rapid Implementation of an Inpatient Telehealth Program during the COVID-19 Pandemic.', Applied clinical informatics, 11(3), pp. 452–459. doi: 10.1055/s-0040-1713635. | Singlecountry non-modelling |
| 23 | Luo, H. et al. (2020) | Luo, H. et al. (2020) 'Ultra-rapid delivery of specialty field hospitals to combat COVID-19: Lessons learned from the Leishenshan Hospital project in Wuhan', Automation in Construction, 119. doi: 10.1016/j.autcon.2020.103345. | Singlecountry non-modelling |
| 24 | Perondi, B. et al. (2020) | Perondi, B. et al. (2020) 'Setting up hospital care provision to patients with COVID-19: lessons learnt at a 2400-bed academic tertiary center in São Paulo, Brazil', Brazilian Journal of Infectious Diseases, 24(6), pp. 570–574. doi: 10.1016/j.bjid.2020.09.005. | Singlecountry non-modelling |
| 25 | Af Ugglas, B. et al. (2020) | Af Ugglas, B. et al. (2020) 'Emergency department crowding and hospital transformation during COVID-19, a retrospective, descriptive study of a university hospital in Stockholm, Sweden.', Scandinavian journal of trauma, resuscitation and emergency medicine, 28(1), p. 107. doi: 10.1186/s13049-020-00799-6. | Singlecountry non-modelling |
| 26 | Raith, E. P. et al. (2021) | Raith, E. P. et al. (2021) 'Repurposing a neurocritical care unit for the management of severely ill patients with COVID-19: A retrospective evaluation', Journal of Neurosurgical Anesthesiology, 33(1), pp. 77–81. doi: 10.1097/ANA.0000000000000727. | Singlecountry non-modelling |
| 27 | Brown, D. R. et al. (2020) | Brown, D. R. et al. (2020) 'Vancouver Convention Health Centre (COVID-19 Response): Planning, implementation, and four lessons learned', American journal of disaster medicine, 15(2), pp. 143–148. doi: 10.5055/ajdm.2020.0365. | Singlecountry non-modelling |
| 28 | Kim, M. et al. (2020) | Kim, M. et al. (2020) 'Lessons from a covid-19 hospital, republic of korea', Bulletin of the World Health Organization, 98(12), pp. 842–848. doi: 10.2471/BLT.20.261016. | Singlecountry non-modelling |
| 29 | Marcon, E. et al. (2020) | Marcon, E. et al. (2020) 'Schiavonia Hospital response to COVID-19 outbreak: a first single-center experience', Annali dell'Istituto Superiore di Sanita, 56(3), pp. 365–372. doi: 10.4415/ANN_20_03_15. | Singlecountry non-modelling |

| 30 | Joshi, M. and Kulkarni, M. (2021) | Joshi, M. and Kulkarni, M. (2021) 'Evaluation and Planning for a 250 Bedded COVID-19 Healthcare Infrastructure in City of Gurgaon, India', Hospital topics, 99(2), pp. 92–100. doi: 10.1080/00185868.2020.1859343. | Singlecountry non-modelling |
|---|---|---|---|
| 31 | Franke, G. et al. (2021) | Franke, G. et al. (2021) 'An automated room disinfection system using ozone is highly active against surrogates for SARS-CoV-2', Journal of Hospital Infection, 112, pp. 108–113. doi: 10.1016/j.jhin.2021.04.007. | Singlecountry non-modelling |
| 32 | Yang, Y., Kim, H. and Hwang, J. (2020) | Yang, Y., Kim, H. and Hwang, J. (2020) 'Quarantine Facility for Patients with COVID-19 with Mild Symptoms in Korea:    Experience from Eighteen Residential Treatment Centers.', Journal of Korean medical science, 35(49), p. e429. doi: 10.3346/jkms.2020.35.e429. | Singlecountry non-modelling |
| 33 | Christen, P. et al. (2021) | Christen, P. et al. (2021) 'The J-IDEA Pandemic Planner: A Framework for Implementing Hospital Provision Interventions During the COVID-19 Pandemic.', Medical care, 59(5), pp. 371–378. doi: 10.1097/MLR.0000000000001502. | Multicountry non-modelling |
| 34 | Zhang, Y. et al. (2021) | Zhang, Y. et al. (2021) 'Wuhan mobile cabin hospital: A critical health policy at a critical time in China', Medicine, 100(3), p. e24077. doi: 10.1097/MD.0000000000024077. | Singlecountry non-modelling |
| 35 | Chen, S. et al. (2020) | Chen, S. et al. (2020) 'Fangcang shelter hospitals: a novel concept for responding to public health emergencies', The Lancet, 395(10232), pp. 1305–1314. doi: 10.1016/S0140-6736(20)30744-3. | Singlecountry non-modelling |
| 36 | Zhu, W. et al. (2020) | Zhu, W. et al. (2020) 'Establishing and Managing a Temporary Coronavirus Disease 2019 Specialty Hospital in Wuhan, China', Anesthesiology, 132(6), pp. 1339–1345. doi: 10.1097/ALN.0000000000003299. | Singlecountry non-modelling |
| 37 | Cai, Y. et al. (2020) | Cai, Y. et al. (2020) 'The effects of "Fangcang, Huoshenshan, and Leishenshan" hospitals and environmental factors on the mortality of COVID-19', PeerJ, 8, p. e9578. | Singlecountry non-modelling |
| 38 | Barasa, E. et al. (2020) | Barasa, E. W., Ouma, P. O. and Okiro, E. A. (2020) 'Assessing the hospital surge capacity of the Kenyan health system in the face of the COVID-19 pandemic.', PloS one, 15(7), p. e0236308. doi: 10.1371/journal.pone.0236308. | Singlecountry non-modelling |
| 39 | Poeran, J. et al. (2020) | Poeran, J. et al. (2020) 'Cancellation of Elective Surgery and Intensive Care Unit Capacity in New York State:    A Retrospective Cohort Analysis.', Anesthesia and analgesia, 131(5), pp. 1337–1341. doi: 10.1213/ANE.0000000000005083. | Singlecountry non-modelling |

| 40 | Winkelmann, J. et al.(2022) | Winkelmann, J., Webb, E., Williams, G. A., Hernández-Quevedo, C., Maier, C. B., & Panteli, D. (2022). European countries' responses in ensuring sufficient physical infrastructure and workforce capacity during the first COVID-19 wave. Health Policy, 126(5), 362-372. | Multicountry non-modelling |
|---|---|---|---|
| 41 | López-Cheda, A. et al. (2021) | López-Cheda, A. et al. (2021) 'Estimating lengths-of-stay of hospitalized COVID-19 patients using a non-parametric model: A case study in Galicia (Spain)', Epidemiology and Infection. doi: 10.1017/S0950268821000959. | Singlecountry modelling |
| 42 | Bentout, S. et al. (2021) | Bentout, S. et al. (2021) 'Age-Structured Modeling of COVID-19 Epidemic in the USA, UAE and Algeria', Alexandria Engineering Journal, 60(1), pp. 401–411. doi: 10.1016/j.aej.2020.08.053. | Multicountry modelling |
| 43 | Rivera-Rodriguez, C. and Urdinola, B. P. (2020° | Rivera-Rodriguez, C. and Urdinola, B. P. (2020) 'Predicting Hospital Demand During the COVID-19 Outbreak in Bogotá, Colombia', Frontiers in Public Health, 8. doi: 10.3389/fpubh.2020.582706. | Singlecountry modelling |
| 44 | Gitto, S. et al. (2021) | Gitto, S. et al. (2021) 'Forecasting national and regional level intensive care unit bed demand during COVID-19: The case of Italy.', PloS one, 16(2), p. e0247726. doi: 10.1371/journal.pone.0247726. | Singlecountry modelling |
| 45 | Zhao, Ch. et al. (2020) | Zhao, Ch. et al. (2020) 'icumonitoring.ch: a platform for short-term forecasting of intensive care unit occupancy during the COVID-19 epidemic in Switzerland' Swiss Medical Weekly 150, doi: 10.4414/smw.2020.20277 | Singlecountry modelling |
| 46 | Capistran, M. et al. (2021) | Capistran, M. et al. (2021) 'Forecasting hospital demand in metropolitan areas during the current COVID-19 pandemic and estimates of lockdown-induced 2nd waves ' PLoS ONE 16(1): e0245669. https://doi. org/10.1371/journal.pone.0245669 | Singlecountry modelling |
| 47 | T. Mokhele et al. (2021) | T. Mokhele et al. (2021) 'Spatial analysis of perceived health system capability and actual health system capacity for covid-19 in south africa' Open Public Health J., vol. 14, no. 1, pp. 388–398, 2021, doi: 10.2174/1874944502114010388. | Singlecountry modelling |
| 48 | Moss, R. et al. (2020) | Moss, R. et al. (2020) 'Coronavirus Disease Model to Inform Transmission-Reducing Measures and Health System Preparedness, Australia' doi.org/10.3201/eid2612.202530 | Singlecountry modelling |
| 49 | Tembine H. (2020) | Tembine H. (2020) 'COVID-19: Data-Driven Mean-Field-Type Game Perspective' Games 2020, 11, 51; doi:10.3390/g11040051 | Multicountry modelling |

| 50 | Gel, ES., et al. (2020) | Gel, ES., et al. (2020) 'COVID-19 healthcare demand projections: Arizona' PLoS ONE 15(12): e0242588. https://doi.org/10.1371/journal. pone.0242588 | Singlecountry modelling |
|---|---|---|---|
| 51 | Bayraktar Y., et al. (2020) | Bayraktar Y., et al. (2020) 'Role of the Health System in Combating Covid-19: Cross-Section Analysis and Artificial Neural Network Simulation for 124 Country Cases' doi.org/10.1080/19371918.2020.1856750 | Multicountry modelling |
| 52 | Wells, C. M. et al (2021) | Wells, C. M. et al (2021) 'Tiered model of nurse staffing for critical care and emergency departments in the wake of a pandemic," J. Nurs. Adm., vol. 51, no. 2, pp. E1–E5, 2021, doi: 10.1097/NNA.0000000000000979. | Singlecountry modelling |
| 53 | Gambos, K., et al (2021). | Gambos, K., et al (2021). 'Translating Scientific Knowledge to Government Decision Makers Has Crucial Importance in the Management of the COVID-19 Pandemic' DOI: 10.1089/pop.2020.0159 | Singlecountry modelling |
| 54 | Bhowmik T., et al. (2021) | Bhowmik T., et al. (2021) 'A comprehensive county level model to identify factors affecting hospital capacity and predict future hospital demand' doi.org/10.1038/s41598-021-02376-y | Singlecountry modelling |
| 55 | Stern, R. H. (2020) | Stern, R. H. (2020) 'Locally Informed Simulation to Predict Hospital Capacity Needs During the COVID-19 Pandemic.', Annals of internal medicine. United States, pp. 679–680. doi: 10.7326/L20-1061. | Singlecountry modelling |
| 56 | Smith, D. R. M. et al. (2020) | Smith, D. R. M. et al. (2020) 'Optimizing COVID-19 surveillance in long-term care facilities: a modelling study', BMC Medicine, 18(1). doi: 10.1186/s12916-020-01866-6. | Singlecountry modelling |
| 57 | Qian, Z.et al. (2021) | Qian, Z., Alaa, A. M. and van der Schaar, M. (2021) 'CPAS: the UK's national machine learning-based hospital capacity planning system for COVID-19', Machine Learning, 110(1), pp. 15–35. doi: 10.1007/s10994-020-05921-4. | Singlecountry modelling |
| 58 | de Barros Braga, M. et al. (2021) | de Barros Braga, M. et al. (2021) 'Artificial neural networks for short-term forecasting of cases, deaths, and hospital beds occupancy in the COVID-19 pandemic at the Brazilian Amazon', PLoS ONE, 16(3 March), p. e0248161. doi: 10.1371/journal.pone.0248161. | Singlecountry modelling |
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**Table S7. Results of five included review studies.**

| Author(s) | Publication date | Type of review | Review objective | Number of sudies included | Adaptations proposed during COVID-19 | Applicability to long-term/ planning |
|---|---|---|---|---|---|---|

| Rees, E. M. et al.[15] | 2020/09 | Systematic Review | Reviewing early evidence on the length of stay (LoS) of patients with COVID-19 in hospitals and in ICUs. | 52 | Monitoring the distributions of total hospital and ICU LoS. | Important to project future demand and make early estimates of how long patients need to stay in hospitals. |
|---|---|---|---|---|---|---|
| Ravaghi, H. et al.[17] | 2020/03 | Scoping Review | Identifying and characterizing existing models and methods for determining the required number of beds at the hospital and regional levels, as well as comparing their benefits and drawbacks. | 23 | Authors suggested considering alternative approaches to planning hospital capacity, like care pathways, to fix the limitations of "bed numbers". | Decision-making about the optimal number of hospital beds at the hospital or regional levels. |
| Sim, S. S. et al.[121] | 2021/02 | Literature Review | The review looked at how pressures created by COVID-19 in health systems and hospital infrastructures have encouraged the acceptance and speed of adoption of digitalization. | 15 | Implementation of artificial intelligence and "virtual clinics" in screening, diagnosis, monitoring, and treatment; home monitoring devices in self-monitoring approaches. | Digitalization in healthcare delivery (in the post-COVID-19 new normal where digital platforms may be routine, standard, and expected in healthcare delivery). |
| McCabe, R. et al.[14] | 2020/10 | Analysis of National Health Service (NHS) datasets and Literature Review | Estimating hospital care capacity before the pandemic and quantifying the impact of interventions (cancellation of elective surgery, field hospitals, use of private hospitals, | 37 | Cancellation of elective surgeries; set-up of field hospitals; use of private hospitals; redeployment of former healthcare staff and deployment of newly qualified and final year nursing and medical students. | Authors developed a model to quantify hospital capacity for general and acute and critical care considering three crucial resources: staff, beds, and ventilators. |

| | | | deployment of former medical staff and deployment of newly qualified medical staff) for treatment COVID-19 patients. | | | |
|---|---|---|---|---|---|---|
| Klein, M. et al.[16] | 2020/10 | Systematic Review | Highlighting the models that project both caseload and hospital capacity requirements. | 6 | Using projection models to manage hospital capacity: including length of stay (LOS), occupancy, mortality, and ventilator capacity. | Adoption of models that help with both caseload projection and hospital capacity management |