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Evidence Snapshot

Physical density to reduce transmission of COVID-19 in hospital wards

An Evidence Snapshot brokered by the Sax Institute for the Australian Commission on Safety and Quality in Health Care.
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Disclaimer:

This Evidence Snapshot was produced using the Evidence Snapshot methodology in response to specific questions from the commissioning agency.

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Introduction

This Evidence Snapshot was commissioned by the Australian Commission on Safety and Quality in Health Care (The Commission) and prepared by the Sax Institute. Note that the review was completed within 7 days, so while a rigorous process for searching was followed it is possible that some peer reviewed or grey literature may have been missed.

The Evidence Snapshot includes studies on the effectiveness of physical distancing in hospital wards to prevent or reduce transmission of COVID-19. Because we found little in the peer reviewed literature, the grey literature search and extracted data were significantly expanded to capture information of relevance to the Commission.

Purpose and audience

The purpose of the Snapshot is to identify evidence that will support decision making at a local level on management of hospital inpatients to reduce transmission of COVID-19. The review will be used by the Commission to inform infection prevention and control guidance regarding infections spread by the droplet and/or airborne routes, focusing on COVID-19.

This review does not consider physical density or distancing outside of hospital wards.

Review question

What is the evidence that physical distancing between people in hospital wards is effective in preventing or reducing transmission of COVID-19?

Methods

We searched Medline, Emcare, and Google Scholar as well as nosocomial infection journals, environmental journals and collections of COVID-19 related research (Oxford University Centre for Evidence Based Medicine, CDC, Cochrane, ScienceDirect, Lancet, BMJ) as well as an extensive grey literature search including jurisdictions and major international organisations from Australia, New Zealand, UK, US and Canada. We reviewed the title and abstracts of 1,145 peer reviewed papers and conducted a full text review of 37. The searches were undertaken between 21 and 28 September 2020. Grey literature was sourced by 16 October 2020. We report the peer reviewed literature in Table 1 and full results in Appendix 1-7.

Summary of findings

Findings

We identified 5 peer reviewed studies and 29 commentary articles and agency or jurisdictional reports. We found no strong evidence that physical density was effective in reducing transmission of COVID-19.

Key Messages

Peer reviewed literature

- We found **no high-level evidence** of the effectiveness of physical density in preventing or reducing transmission of COVID-19.
- All 8 studies(1-8) addressed physical density or distancing as part of a broader infection prevention and control (IPC) strategy. The additional IPC components of the included studies are presented in Table 1 and in more detail in Appendix 4.
- Study designs included surveys(1, 5), a prospective observational study(2), a retrospective study(6), a cross-sectional study(8), a descriptive study(7), a case report(4), and a modelling study.(3)
- Three peer reviewed papers(2, 7, 8) and one modelling study(3) examined physical density in wards dedicated for suspected cases of COVID-19.
- Studies were conducted in the US(1, 4), Italy(2, 6), Singapore(7, 8), UK(3) and Taiwan(5).

Physical distancing to reduce patient-to-health care worker transmission

- In three studies of dedicated wards for people with suspected COVID-19, no transmission occurred. Cattelan et al studied transmission of COVID-19 in an advanced triage area. Health care workers were regularly tested with nasopharyngeal swabs, symptoms monitored and temperatures taken daily. 72% of patients and no staff tested positive for COVID-19.
- Wee et al(a) conducted two studies of respiratory surveillance wards where symptomatic patients were tested for COVID-19. Bed density was reduced with 2m between beds and partitions. High risk suspected cases were admitted to airborne isolation rooms. Upon detection of a case, all patients in the ward and staff close contacts were placed on 14-day surveillance and close contacts and patient environments tested. In the second study, patients were required to wear masks and to test negative on two consecutive occasions. Extensive surveillance of staff was maintained. No patient-to-health care worker transmission occurred. Authors note that the strategy is resource intensive and non sustainable in the long term.
- The modelling study (Evans) indicated that placing suspected COVID-19 patients in single rooms or dedicated bays has the potential to reduce hospital acquired infections in patients by up to 80%. Eighty-nine percent of infections in health care workers and 20% in patients were due to nosocomial transmission.

- Tosoni et al report on COVID-19 dedicated hospital pathways with total separation of staff, modification of workflow and management of staff with particular regard to non-intensive and intensive environments. Across two hospitals, 0.35% of staff in the non-intensive ward tested positive and 1.7% of staff in the intensive ward.

Strategies to support physical distancing

- Calderwood et al surveyed 69 hospitals to determine their COVID-19 procedures. The survey reported on PPE, testing, healthcare personnel policies and **visitors** of COVID-19 patients and had a 74% response rate. Twenty-four percent of respondents reported that visitors were not allowed, 76% reporting that some or all visitors were allowed.
- Hsu et al conducted a scan of visiting policies for 76 hospice wards in Taiwan, to assess changes in response to COVID-19. Policies were categorised as restricted (visitors not allowed); structured (flexible approach) or open policies (no restrictions at all). All 76 hospice wards had changed their visiting policies in response to COVID-19. Only one ward used an open policy, 9 wards used restricted visits, and the remaining 66 used a structured policy.
- Hron et al studied an intrahospital inpatient telehealth (ITH) program in a university health network in Toronto. During the 7-week study 1,820 telehealth sessions were held in in a medical, surgical, or critical care unit. Further work is needed in care coordination to support clinician communication and workflows.

Grey literature and jurisdictions

- Nineteen peer reviewed commentaries and 7 agency reports were identified. Most focused on bed, ward, and patient placement, as well as staffing arrangements such as cohorting. The placement of others such as visitors and cleaners was reported to a lesser extent. The grey literature and jurisdictional advice is provided in Appedix 5.
- IPC strategies appear to be related to the level of community transmission of COVID-19. Where community transmission exists, at any level, then hospitals (and wards within) tend to follow strict cohorting and PPE protocols as it is assumed that any individual could be COVID-19 positive on presentation to hospital.
- The need to train staff in apprioriate PPE use and etiquette was consistently highlighted.
- WHO recommends a distance between beds of at least one(9) or at least two metres.(10) Patients with suspected or confirmed COVID-19 should be in designated single rooms(9-14). Where single rooms are not available, cohorting patients with suspected COVID-19 together is advised.(9, 10, 13, 14)
- Three peer reviewed commentaries reported on risk stratification measures where wards were divided into separate sections based on COVID-19 status/risk, for example high risk areas for confirmed COVID-19 patients, intermediate risk areas for patients with acute respiratory symptoms and low risk areas for those with no respiratory symptoms.(15-17)
- One agency report (CDC) and one peer reviewed commentary (Randelliu) discussed the distance between health care workers and patients.
- The CDC(11) recommended providing spaces for health care workers to take breaks where a distance of six feet between staff could be maintained.
- Several reports limited or disallowed visitors to hospitals or to COVID-19 patients. (9, 12, 15, 16, 18)

- Several agencies and jurisdicitons recommended cohorting staff*(9, 10, 12)*
- Several commentaries(19) recommended that all medical institutions complete temporary ward transformation to meet the requirements of an infectious ward.

Examples of guidance documents

- Two peer reviewed commentaries(20-22) described physical arrangements across wards. One designated areas of risk around individual patient rooms, signed as high (e.g. close to patient room), intermediate (e.g. hallways) and lower risk (e.g. nurses stations). The second recommended COVID-19 positive wards, suspected COVID-19 isolated in single rooms with buffer zones to allow for false negatives. Positive cases are isolated in dedicated wards.
- Li et al developed guidance for burns wards based on their clinical experience. In terms of physical density, access to the wards was controlled and within wards, areas were designated as “clean, potentially polluted and polluted”. Guidance recommended additional practices about visitors, isolating new patients in single rooms for 14 days, natural ventilation, consultations via technology and staff surveillance.
- Pietrasanta et al report placing beds 6 feet apart with curtain between mother and baby, transfers through dedicated routes, no visitors and 1 midwife to every 4-6 patients per shift.

Table 1: Integrated infection prevention and control

				PPE		Patients				Beds			Staff				Visits	Environmrnt	
First author, year	Study design	Unit of analysis	Main intervention	PPE use monitored	PPE education	Patients masked	Patients do not leave room	Patients use own device	Close contact monitoring	Bed placement	Bed partitions, curtains, floor marking	Staff COVID testing	Temperature checks	Daily report on health status	Modified workflow/protocols	Technology communication	Visitor policies	Environmental sampling	Natural ventilation
Calderwood	Survey	Hospital	Distancing visitors	x													x		
Cattelan	Prospective observational	Ward	Intensive staff surveillance	x								x	x						
Tosoni	Retrospective analysis	Hospitals	Distancing of staff	x	x								x		x				
Wee	Cross sectional	Ward	Respiratory surveillance wards	x		x	x			x	x						x	x	
Wee	Descriptive	Ward	Respiratory surveillance wards	x		x	x			x	x								
Evans	Modelling	Ward	Ward vs bays							x		x						x	
Hsu	Survey	Ward	Visitor policies (3 tiers)										x	x			x		
Hron	Case report	Hospital	Telehealth program					x								x			

Appendices

Appendix 1: Included publications

Peer reviewed literature

Calderwood MS, Deloney VM, Anderson DJ, Cheng VC, Gohil S, Kwon JH, Mody L, Monsees E, Vaughn VM, Wiemken TL, Ziegler MJ. Policies and practices of SHEA Research Network hospitals during the COVID-19 pandemic. Infection Control & Hospital Epidemiology. 2020 Oct;41(10):1127-35.

Cattelan AM, Sasset L, Di Meco E, Cocchio S, Barbaro F, Cavinato S, Gardin S, Carretta G, Donato D, Crisanti A, Trevenzoli M. An Integrated Strategy for the Prevention of SARS-CoV-2 Infection in Healthcare Workers: A Prospective Observational Study. International journal of environmental research and public health. 2020 Jan;17(16):5785.

Evans S, Agnew E, Vynnycky E, Robotham JV. The impact of testing and infection prevention and control strategies on within-hospital transmission dynamics of COVID-19 in English hospitals. medRxiv. 2020 Jan 1.

Hron JD, Parsons CR, Williams LA, Harper MB, Bourgeois FC. Rapid Implementation of an Inpatient Telehealth Program during the COVID-19 Pandemic. Applied Clinical Informatics. 2020 May;11(03):452-9.

Hsu YC, Liu YA, Lin MH, Lee HW, Chen TJ, Chou LF, Hwang SJ. Visiting Policies of Hospice Wards during the COVID-19 Pandemic: An Environmental Scan in Taiwan. International Journal of Environmental Research and Public Health. 2020 Jan;17(8):2857.

Tosoni A, Rizzatti G, Nicolotti N, Di Giambenedetto S, Addolorato G, Franceschi F, Zileri Dal Verme L. Hospital reengineering against COVID-19 outbreak: 1-month experience of an Italian tertiary care center. Eur Rev Med Pharmacol Sci. 2020 Aug 1:8202-9.

Wee LE, Sim XY, Conceicao EP, Aung MK, Tan KY, Ko KK, Wong HM, Wijaya L, Tan BH, Venkatachalam I, Ling ML. Containing COVID-19 outside the isolation ward: The impact of an infection control bundle on environmental contamination and transmission in a cohorted general ward. American Journal of Infection Control. 2020 Sep 1;48(9):1056-61.

Wee LE, Hsieh JY, Puah GC, Tan Y, Conceicao EP, Wijaya L, Tan TT, Tan BH. Respiratory surveillance wards as a strategy to reduce nosocomial transmission of COVID-19 through early detection: the experience of a tertiary hospital in Singapore. Infection Control & Hospital Epidemiology. 2020 May 8:1-6.

Commentary and grey literature reports

Adams JG, Walls RM. Supporting the health care workforce during the COVID-19 global epidemic. Jama. 2020 Apr 21;323(15):1439-40.

Agostini et al. 2020. Cardiac patient care during a pandemic: how to reorganise a heart failure unit at the time of COVID-19. Preventive Cardiology. Vol. 27(11) 1127–1132

Chowdhury JM, Patel M, Zheng M, Abramian O, Criner GJ. Mobilization and Preparation of a Large Urban Academic Center During the COVID-19 Pandemic. Annals of the American Thoracic Society. 2020 Apr 21(ja).

Correa DJ, Labovitz DL, Milstein MJ, Monderer R, Haut SR. Folding a neuroscience center into streamlined Covid-19 response teams: Lessons in origami. Neurology. 2020 Sep 29;95(13):583-92.

Frost DW, Shah R, Melvin L, de Juana MG, MacMillan TE, Abdelhalim T, Lai A, Rawal S, Cavalcanti RB. Principles for clinical care of patients with COVID-19 on medical units. CMAJ. 2020 Jan 1.

Konda SR, Dankert JF, Merkow D, Lin CC, Kaplan DJ, Haskel JD, Behery O, Crespo A, Ganta A. COVID-19 response in the global epicenter: converting a New York City level 1 orthopedic trauma service into a hybrid orthopedic and medicine COVID-19 management team. Journal of Orthopaedic Trauma. 2020 Apr 29.

Król Z, Szymański P, Bochnia A, Abramowicz E, Płachta A, Rzepliński R, Sługocki M, Nowak B, Zaczyński A, Kozłowski K, Posobkiewicz M. Transformation of a large multi-speciality hospital into a dedicated COVID-19 centre during the coronavirus pandemic. Ann Agric Environ Med. 2020 Jun 19;27(2):201-6.

Li N, Liu T, Chen H, Liao J, Li H, Luo Q, Song H, Xiang F, Tan J, Zhou J, Hu G. Management strategies for the burn ward during COVID-19 pandemic. Burns. 2020 Apr 2.

Lin Z, Shu H, Jiang D, He Y, Xia H, Liu Y, Xie N. Ward renovation and PPE use procedures to protect medical staff from COVID-19 infection. The Journal of Infection in Developing Countries. 2020 Jun 30;14(06):554-8.

Pezzulla D, Macchia G, Taccari F, Sticca G, Deodato F. Radiotherapy in Southern Italy at the time of COVID-19: options for radiation oncology units.

Pietrasanta C, Pugni L, Ronchi A, Schena F, Davanzo R, Gargantini G, Ferrazzi E, Mosca F. Management of the mother-infant dyad with suspected or confirmed SARS-CoV-2 infection in a highly epidemic context. Journal of Neonatal-Perinatal Medicine. 2020 May 20(Preprint):1-5.

Randelli PS, Compagnoni R. Management of orthopaedic and traumatology patients during the Coronavirus disease (COVID-19) pandemic in northern Italy. Knee Surgery, Sports Traumatology, Arthroscopy. 2020 Apr 25:1.

Scherer MA, von Freyburg A, Brücher BL, Jamall IS, Schmidt A, Hagedorn H. COVID-19: SARS-CoV-2 susceptibility in healthcare workers–cluster study at a German Teaching Hospital. 4open. 2020;3:6. https://www.4open-sciences.org/articles/fopen/abs/2020/01/fopen200018/fopen200018.html

Sim et al. 2020. How to safely and sustainably reorganise a large general radiography service facing the COVID-19 pandemic. Radiography. 26 e303-e311

Tahmassebi R, Bates P, Trompeter A, Bhattacharya R, El-Daly I, Jeyaseelan L, Pearse M. Reflections from London's Level-1 Major Trauma Centres during the COVID crisis.

Tao J, Song Z, Yang L, Huang C, Feng A, Man X. Emergency management of 2019 novel coronavirus: implications for the dermatology department. British Journal of Dermatology. 2020 Jun;182(6):e195-.

Wang et al. 2020. Providing uninterrupted care during COVID-19 pandemic: experience from Beijing Tiantan Hospital. Stroke and Vascular Neurology

Zhou Q, Yu H, Liang ZA, Yao R, Luo FM, Liu D, Wang T, Ni Z, Zhong CJ, Jin XD. Prevention and treatment system of novel coronavirus infection in medical and health institutions: experience in West China Hospital of Sichuan University. Emergency Medicine Journal. 2020 Oct 1;37(10):639-41.

Zuliani et al. 2020. Organisational challenges, volumes of oncological activity and patients' perception during the severe acute respiratory syndrome coronavirus 2 epidemic. European Journal of Cancer

Jurisdictional and agency websites

Centers for Disease Control and Prevention (CDC): Infection Control Guidance 15 July 2020 https://www.cdc.gov/coronavirus/2019-ncov/hcp/infection-control-recommendations.html

Government of Canada: Infection prevention and control for COVID-19: Second interim guidance for acute healthcare settings 30 April 2020 https://open.canada.ca/data/en/dataset/5e12e5a4-1b70-4f39-96f0-b4249f92e561

L*VE by Epistemonikos COVID-19: SARS-CoV-2 susceptibility in healthcare workers – cluster study at a German Teaching Hospital. https://www.4open-sciences.org/articles/fopen/abs/2020/01/fopen200018/fopen200018.html

National Collaborating Centre for Methods and Tools: COVID-19 Scientific Advisory Group Rapid Response Report https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-sag-outbreak-management-strategies-rapid-review.pdf

NHS COVID-19: Guidance for the remobilisation of services within health and care settings Infection prevention and control recommendations 20 August 2020 https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control

WHO Technical Guidance – Coronavirus disease (COVID-19), COVID-19: Critical preparedness, readiness and response. 2020 (WHO/2019-nCoV/SARI_treatment_centre/2020.1) 28 March 2020

WHO Technical Guidance – Coronavirus disease (COVID-19), COVID-19: Clinical care - Clinical management of COVID-19 – interim guidance 27 May 2020

WHO Technical Guidance – Coronavirus disease (COVID-19), COVID-19: Clinical Care - Infection prevention and control during health care when COVID-19 is suspected – Interim guidance19 March 2020

Appendix 2: Search strategy

Key concepts

Concept 1	Concept 2	Concept 3	Concept 4	Concept 5
Coronavirus	Transm*	Density	Hospital	Effectiv*
COVID*	Prevention	Distanc*	Ward	Evaluat*
CoV	Infect*	Spacing	Nosocomial	Implement*
	Contagion	Bed		Case study

Timeframe

This update review includes peer reviewed and grey literature published in the 12 months to 29 September 2020 (peer reviewed) and 20 October, 2020 (grey literature).

Inclusion and exclusion criteria

We **included** studies which described physical density within wards such as layout, ward design, distance between beds, numbers of beds, protections to increase protection such as curtains. We included studies of physical density across wards e.g. ante-rooms, entry points, and isolation rooms. We included shared spaces such as ensuites or kitchen facilities. Where stated, we reported specific measures of distancing such as numbers or bed or distance between beds.

For distancing between people, we included studies which mentioned distance between patient and health worker, health worker and health worker, for clinical and non-clinical staff (e.g. cleaners, food providers). We included studies about visitors and about technology where these related to wards or had implications at the ward level. We included studies conducted at hospital level whose findings included or were applicable to physical density at ward level, such as COVID positive units on or post-admission. We included all ward designations, for examples general, cardiac, maternity, and orthopaedic wards.

We noted supplementary management strategies mentioned in the selected studies articles including cohorting, management arrangements such as meetings, patient rounds, and communication, and the use of technology for clinical consultations, rounds and visitors. We included all study types, prioritising those with the strongest evidence. Where mentioned, we reported testing for COVID for staff or patients and the use of PPE.

We **excluded** studies about ICU, ED, operating theatres, radiotherapy centres and paediatric wards.

Sources

1. Medline

   Search1 : (((Bed or patient) adj3 (density or distanc$ or spac$ or close$ or separate$ or partition or interval or gap or placement or precaution$ or "infection control " or prevention)).mp. or ("Patient Isolators" or "Patient Harm" or "Infectious Disease Transmission, Patient-to-Professional" or "Infectious Disease Transmission, Professional-to-Patient" or "Infection Control").sh.) AND ((hospital or ward or nosocomial) AND (Transmi$ or infect$ or contagion or prevent$)).mp.AND
   Limits: English, humans, last 2 years, COVID-19

   - Limited to articles published from 29 September 2019 to 29 September 2020.
   - Excluded editorials, news, correspondence, letters, communiques

   Search 2: ((hospital or ward or nosocomial).mp AND “transmission efficiency”.mp AND
   Limits: English, humans, last 2 years, COVID-19

2. Google Scholar

   - Keywords:
   - COVID, OR hospital OR ward OR nosocomial ‘bed density’ n=1
   - COVID, hospital OR ward OR nosocomial “infection control”
   - COVID, distance OR closeness OR separation OR placement OR precaution ‘hospital’
   - COVID, transmission OR ward OR efficiency
   - COVID-19 OR coronavirus OR SARS-CoV-2 "transmission efficiency”

3. Nosocomial infection journals

   Journal of Hospital Infection; Hospital Infection Control and Prevention; Infection Control and Hospital Epidemiology

   Search:

   (ISSN (15322939 OR 0098180x OR 15596834) AND TITLE ((covid OR sars-cov-2 OR coronavirus)) AND TITLE-ABS-KEY (distanc* OR density OR spac* OR close* OR separate* OR partition OR interval OR gap OR placement OR precaution* OR "infection control " OR prevention)) AND PUBYEAR > 2018

4. Environmental journals

   The Science of the Total Environment; mSystems; Journal of Exposure Science & Environmental Epidemiology; Environmental Science & Technology; International Journal of Environmental Research and Public Health; Environment International

   (ISSN (18791026 OR 23795077 OR 15590631 OR 0013936x OR 16617827 OR 01604120) AND TITLE ((covid OR sars-cov-2 OR coronavirus)) AND TITLE-ABS-KEY (hospital OR ward OR nosocomial OR (health* W/3 facilit*))) AND PUBYEAR > 2018

Appendix 3 Search results

A Database	B Results	C Remove duplicates	D Excluded after title & abstract screening	E Full text review	F Excluded after full text review	G FINAL INCLUDED
	n=	n=	n=	n=	n=	n=
1 MedLine	524					
2 Emcare	329					
3 Google Scholar	35					
4 Nosocomial infection journals	135					
5 Environmental journals	117					
6 Other sources	5					
TOTAL	1,145	1,092	1,055	37	29	***n=8***

Appendix 4: Peer reviewed literature

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
Calderwood et al. 2020 (SHEA research network) US and international	Survey N=69 (64 responded to section on visitors)	Hospitals	Relevant to this review: Physical distancing – entry of visitors to suspected or confirmed COVID-19 patients Overall focus of the paper: Survey of the SHEA[1] network to assess policies and practices around the optimisation of PPE, testing, healthcare personnel policies, visitors of COVID-19 patients in	Visits to suspected or confirmed COVID-19 patients allowed or not	a) Visitors not allowed=15/64 b) Some or all allowed=49/64 c) Allowed for all COVID-19 patients=5/64 d) Allowed for end-of-life=45/64 e) Allowed for birthing partners 37/63 (1 not answered) f) Allowed for paediatric	d) End of life: 41/45 required PPE 31/45 allowed 1 visitor 17/45 allowed 2 visitors 1/45 allowed 3 visitors 4/45 allowed >1 depending on case e) Birthing partners: 28/37 required PPE 36/37 allowed 1 visitor		

[1] SHEA - The Society for Healthcare Epidemiology of America

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
			relation to procedures and types of patients		patients 40/63 (1 not answered)	1/37 allowed 2 visitors g) Paediatric: 31/40 required PPE 34/40 allowed 1 visitor 6/40 allowed 2 visitors		
Cattelan et al. 2020 Italy	Prospective observational N=60 health care workers	Padua University Hospital	Creation of an 'advance triage' area and implementation of an integrated infection control surveillance system directed to all personnel involved in the advanced triage area. Healthcare workers (HCWs) were regularly tested, temp and symptoms checked at each duty, PPE use was recorded	Symptomatic infection (primary endpoint) and asymptomatic infection (secondary endpoint) with confirmed detection of SARS-CoV-2	All tests (naspharyngeal swabs) were negative, none of the HCWs reached primary or secondary endpoint		*"An integrated hospital infection control strategy, consisting of dedicated areas for infected patients, strict measures for PPE use and mass surveillance, is successful to prevent infection among HCWs*"	

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
Tosoni et al. 2020 Italy	Retrospective	Two hospitals which share the same ED. Policlinico Agostino Gemelli Foundation of Rome (Tertiary hospital), and Columbus Integrated Center	Including identification and set-up of a COVID-19 dedicated hospital pathway with total separation of staff, modification of workflow and processes, and management of staff, with particular regard to the non-Intensive Care (non-IC) environment. Columbus Center converted to a COVID-19 dedicated hospital	COVID test	3.8% of staff tested positive (1.7% of COVID-pathway staff and .35% of non-IC COVID-ward staff)	Education in use of PPE, testing of hospital staff with symptoms or exposed, screening personnel in COVID-wards		
Wee et al. 2020 Singapore	Cross-sectional (3 months)	Singapore General Hospital (1,785 beds) tertiary hospital	'Infection control bundle' comprising of infrastructural enhancements, improved PPE and social distancing. Patients with COVID like symptoms were placed in a respiratory surveillance ward (RSW) (mix of single and shared rooms). High risk suspected cases were admitted to airborne infection isolation rooms	PCR COVID-19 tests	No staff close contacts developed COVID-19 postexposure. 24/45 exposed patients developed symptoms within the 14-day observation period but only one of these tested positive	RSW: increased disinfection full PPE use by staff. Environmental sampling done in case of a positive patient		

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
			(AIIRs) in the isolation ward in single rooms In RSW bed density was reduced to 3 in shared rooms with 2m between beds and partitions between beds. Patients were to wear surgical masks at all times and were advised to remain in their room at all times. No visitors allowed. If a case was detected the room was locked down and the patient (and the other patients in shared room) transferred to IW. Staff close contacts were monitored by phone for 14 days and followed up at 28					
Wee et al. 2020a Singapore	Descriptive 6 weeks N=1178 patients (5 tested positive for COVID-19),	Singapore General Hospital, 1,785 bed tertiary hospital	Respiratory surveillance wards (RSWs) (115 beds; 38 single rooms, 77 beds in shared rooms of 2-3 beds). All admissions with concomitant respiratory	PCR COVID-19 tests. 1,739 patients tested (446 initially admitted to isolation ward, 1,178 to RSW, 115 to ICU)	Of 510 patients in RSW with a final diagnosis of pneumonia or URTI, 5 tested positive for COVID-19.	PPE	The study *"reflects the practicality and costs of such a resource-intensive effort.*	

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
	126 potentially exposed staff		syndromes, without a travel history in the past 14 days or epidemiologic risk factors, were first admitted to the RSWs. In RSWs bed density was reduced to 3 in shared rooms with 2m between beds and partitions between beds. Patients were to wear surgical masks at all times and advised to remain in their room at all times. No visitors allowed High risk suspected cases were admitted to isolation ward		15/446 patients admitted to isolation ward tested positive for COVID-19 126 HCWs were potentially exposed, of these none developed COVID-19		*Beds set aside for the RSW comprised almost 10% of our institution's bed capacity. Beds were freed up by reducing elective surgery; however, this method would not be sustainable in the long run. Almost two-fifths of patients entering the RSW were subsequently deemed not to have pneumonia or URTI, despite being originally triaged to these*	

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
							wards from the ED"	
Evans et al. 2020 NA	Modelling study (SEIR), run for 8 weeks	Setting was 'a typical UK hospital'. Model validated against empirical data from NHS and population data	Two main scenarios: a) Suspected cases cohorted together in wards b) Suspected cases placed in single-patient rooms or bays (therefore pt-to-pt transmission reduced; the factor is varied in scenario analyses)	Infection rates	*".. approximately 20% of infections in inpatients, and 89% of infections in HCWs were due to nosocomial transmission"* *"Placing suspected COVID-19 patients in single rooms or bays has the potential to reduce hospital acquired infections in patients by up to 80%."*	*"Periodic testing of HCWs has a smaller effect on the patient burden of COVID-19 but would .. reduce infection in HCWs by as much as 64% and result in only a small proportion of staff absences (approx. 1% per day). This is considerably fewer than currently observed due to suspected COVID-19 and self-isolation."*	*The management of suspected cases on admission to hospital has the potential to dramatically reduce the burden of nosocomial infection. Our model suggests that managing symptomatic patients in single rooms or bays that are fully disinfected in between patients could reduce*	

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
							nosocomial infection rates by up to 80%. “”	
Hsu et al. 2020 Taiwan	Survey 76 hospital wards	Hospital The ward size (less than seven beds was classified as a small ward, 7–10 beds as a medium ward, and more than 10 beds as a large ward)	Implementing visiting policies. Three polices were discussed. Restricted: Visitors are not allowed. Structured: Flexible approach. Open: No restrictions at all	Change in visiting policies (number of visits, visit time and number of visitors) for all 76 hospital wards	9 hospital wards used restricted visits while only 1 ward used open policy and rest of 66 have implemented the structured policy. 68.6% hospital wards allowed 2 visitors and 47.8% allowed one visiting time/day and 43.3% allowed one visitor per day	Study also reported requisites for entry to the ward such as checking of recent travel, occupation, contact and cluster information (TOCC history), monitoring body temperature by infrared thermal devices, and using hand sanitiser for hand hygiene	All hospital wards implemented changes to their normal liberal visiting policies	
Hron et al. 2020 US	Case report N=404-bedquaternary care facility	Boston Children’s Hospital	Intrahospital inpatient telehealth (ITH) program	Decrease the clinician face-to-face time in the room with patients.	During 7-weeks of live study, 1,820 ITH (13.3 sessions per 100 bedded days) sessions in a medical, surgical, or critical care units were conducted and	To limit the risk of contaminated devices being shared across patients, the program was transitioned to a bring-your-own-device (BYOD) model for patient/family as well	Further work is needed to streamline initial setup for patients and families as well as care coordination to	

Author, year Country	Study design n=	Setting or type of hospital ward Density if stated	Main intervention(s) tested or implemented	Outcome measures	Results	Concurrent strategies mentioned	Conclusions	Comments
					clinicians were able to build rapport and perform a reasonable physical exam (patients' general appearance, skin findings, indwelling lines/tubes/drains, and even urine and stool appearance)		support clinician communication and workflows	

Appendix 5: Grey literature

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
WHO Technical Guidance – Coronazhouvirus disease (COVID-19), COVID-19: Critical preparedness, readiness and response Severe acute respiratory infections treatment centre: practical manual to set up and manage a SARI treatment centre and SARI screening facility in health care facilities. Geneva: World Health Organization; 2020 (WHO/2019-	For suspected cases, place beds at least 2 m apart	• Immediate isolation of people with suspected COVID-19 in an area separate from other patients • Patients should be placed in adequately ventilated single rooms if possible • When single rooms are not available, people suspected of having COVID-19 should be cohorted together • Do not cohort people with confirmed COVID-19 with people with suspected COVID-19 • Do not cohort people with respiratory infections caused by other pathogens	• Where possible, cohort health-care workers to care exclusively for people with COVID-19 to reduce the risk of transmission due to inadvertent infection control breaches	• Make every effort to ensure sufficient staff available • Limit the number of health-care workers, family members and visitors in contact with suspected or confirmed COVID-19 patients (for COVID positive) • Perform procedures in an adequately ventilated room: use natural ventilation with airflow of at least 160 litres per second per person; or ensure a negative-pressure room has at least 12 air changes per hour and controlled direction of airflow when using mechanical ventilation			

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
nCoV/SARI_treatment _centre/2020.1) 28 March 2020		• Avoid the movement and transport of patients out of the room or area unless medically necessary • Maintain distance of at least 1m between patients					
WHO Technical Guidance – Coronavirus disease (COVID-19), COVID-19: Clinical care Clinical management of COVID-19 – interim guidance 27 May 2020		• Persons with symptoms (see Table 1) that meet the case definition for suspected COVID-19 enter into the COVID-19 care pathway and should immediately be given a medical mask and directed to a single room • If a single room is not possible, then group patients with similar clinical diagnosis and based on epidemiological risk factors, with a spatial separation (at least 1 m between patients) • Suspected cases should not be cohorted together with confirmed cases • Keep at least 1m spatial separation between suspected cases					

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
WHO Technical Guidance – Coronavirus disease (COVID-19), COVID-19: Clinical Care Infection prevention and control during health care when COVID-19 is suspected – Interim guidance 19 March 2020	All patients' beds should be placed at least 1 metre apart regardless of whether they are suspected to have COVID-19	• Patients should be placed in adequately ventilated single rooms When single rooms are not available, patients suspected of having COVID-19 should be grouped together;	Where possible, a team of HCWs should be designated to care exclusively for suspected or confirmed cases to reduce the risk of transmission				
NHS COVID-19: Guidance for the remobilisation of services within health and care settings Infection prevention and control recommendations https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control		If the patient/individual has symptoms or a history of contact with a case, they should be prioritised for single room isolation OR cohorted (if an isolation room is unavailable) until their test results are known, for example use privacy curtains between bed spaces to minimise opportunities for close contact between patients/individuals	If prevalence/incidence rate for COVID-19 is high, where possible, assign teams of medical/nursing and domestic staff to care for individuals in isolation/cohort rooms/areas/pathways			Where possible and clinically appropriate remote consultations rather than face-to face should be offered to patients/individuals	• Describes care pathways for organisations as mild, moderate high-risk. Where community transmission is happening, it basically groups all public

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
20 August 2020							hospitals as high-risk because of the possibility that untriaged, positive cases could present to the facility • The High-risk pathway is defined as follows: This pathway applies to any emergency/ urgent care facility where: a) untriaged individuals present for assessment or treatment (symptoms unknown*)

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
							OR b) confirmed SARS-CoV-2 (COVID-19) positive patients are cared for OR c) symptomatic or suspected COVID-19 individuals including those with a history of contact with a COVID-19 case who have been triaged / clinically assessed and are waiting test results OR d) symptomatic individuals

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
							who decline testing This could be a model of interest to ACSQHC
National Collaborating Centre for Methods and Tools COVID-19 Scientific Advisory Group Rapid Response Report https://www.albertahealthservices.ca/assets/info/ppih/if-ppih-covid-19-sag-outbreak-management-strategies-rapid-review.pdf		If all individuals are tested, then a COVID-19 positive individual should wear a medical mask in a setting where self-isolation is not possible, and COVID-19 negative persons are present. Similarly, COVID-19 negative contacts (or caregivers) should wear a medical mask when quarantine is not possible, and COVID-19 positive persons are present		One review study also suggested other enhancements to the built environment, namely, increased ventilation and increased use of UV light	For outbreaks occurring in association with places of work, WHO, CDC, and federal and provincial guidelines recommend symptom screening for staff/employees and enhanced physical distancing measures (i.e. staggered lunch-time shifts or changes to production lines) for COVID-19 outbreak control		Outside of practical and common recommendations around symptom-based screening, physical distancing, rigorous handwashing and enhanced cleaning, there is a lack of high-quality evidence to determine the best methods of containing outbreaks

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
L*VE by Epistemonikos Scherer et al. 2020. COVID-19: SARS-CoV-2 susceptibility in healthcare workers – cluster study at a German Teaching Hospital https://www.4open-sciences.org/articles/fopen/abs/2020/01/fopen200018/fopen200018.html			Despite prior proper preparation, a COVID-19 positive patient load of up to 34.8% (46 of 132 hospital beds) resulted in a 10- to 20-fold increase in risk for healthcare workers for SARS-CoV-2 compared to the general population. Because of asymptomatic carriers, a COVID-19-free hospital cannot be expected to exist. Based on our experience, repeated testing of all staff members with patient contact is necessary and is the best option to effectively contain the virus. Those having the most contact with patients had the highest risk				

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
			of becoming infected (10- to 20-fold higher risk), with nurses being at the highest risk				
Agostini et al. 2020. Cardiac patient care during a pandemic: how to reorganise a heart failure unit at the time of COVID-19. *Preventive Cardiology*. Vol. 27(11) 1127–1132 Italy	• In the red zone, a total of eight fully equipped beds with ECG and peripheral oxygen capillary saturation (SpO2) monitoring were dedicated to definite COVID-19 patients In the 'pink' area, in the absence of a positive swab, patients were housed in full monitored (ECG, oxygen saturation, respiratory rate) double door single-bed rooms with limited contact with the staff. A cordless telephone	• All suspected and confirmed COVID-19 cases were isolated in dedicated single rooms and wore surgical face masks. • Separated 'clean' and 'dirty' pathways were organised for investigations such as chest computed tomography (CT) which needed immovable instruments • The heart failure unit was divided into three separate sections: a 'green' area in which all COVID-19-negative patients were collected, a 'pink' area in which suspected patients but with no clear biological evidence of SARS-CoV-2 infection were isolated, and a 'red' zone in which		• Reduced, and eventually ban, caregiver visits of hospitalised patients • They tried to phone caregivers daily to keep them up to date on the clinical condition of loved ones All healthcare workers started wearing surgical masks during all hospital activities while head covers, eye protection, gloves, gowns and FFP2/FFP3 masks (available in case of aerosol-generating procedures) became fundamental for providing care to infected patients	• Suspension of all non-urgent in-hospital activities • Management by phone calls or emails of all non-urgent outpatient visits • As contagion among healthcare workers became a reality, they started measuring staff temp every day at the hospital entrance. They also reduced the presence of personnel to guarantee daily activities (i.e. keeping some staff at home, well and ready to work if needed)		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	was provided in every room to facilitate communication with the patients	definitive COVID-19 patients were gathered, thus creating a dedicated cohort isolation • A similar grouping strategy was done in the intensive care unit Patients who experienced COVID-19 pneumonia and were stable enough to be discharged home, were provided with a home monitor device, a T shirt with sensors able to detect heart rate, a full 12-lead ECG, respiratory rate and track respiratory motions			Younger staff self-selected to care in the red zones due to lower risk of severe COVID complications		
Li et al. 2020. Management strategies for the burn ward during COVID-19 pandemic. *Burns*. 756–761 China		• Outpatients, the emergency department, ordinary wards and ICU were divided into clean areas, potentially polluted areas and polluted areas respectively. Signs and instructive lines among the three different zones were established • The emergency department in was set up as a separate	Flexible scheduling for staff was implemented which required some to stay at home and some to work in the ward to reduce the risk of transmission	• The wards were sterilized and ventilated with circulating air sterilizer 3 times a day, more than 30 min for each time. • Central air conditioning was not made available to wards to reduce risk • Infrared burn treatment equipment was used to keep patients warm and		• Outpatients were not encouraged to return to the ward for rehabilitation treatment, they were encouraged to do this remotely via	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		area for emergency treatment and admission of new patients. All new inpatients including paediatric burns were isolated in a single room of the ward for 14 days without leaving the ward • The severe burn patients were admitted to ICU, and managed as suspected COVID19 • After new patients have been in a ward for more than 14 days and COVID has been excluded, the patients were cohorted in an ordinary ward Public areas in the ward such as rehabilitation centre, wound repair centre and scar treatment centre were only provided for patients who were hospitalised for more than14days		maintain good natural ventilation • 1000 mg/L Chlorine containing disinfectant or 75% alcohol was used for table disinfection • 1000 mg/L chlorine-containing disinfectant was used for floors • Disinfecting public air was done 3 times a day without people on site using acid peroxide and hydrogen peroxide • No visitors from outside were allowed to enter the ward and caregivers were not allowed to leave the ward. A food delivery system was used to deliver daily food and groceries • Only one caregiver in the ward is allowed to accompany each adult patient; two for paediatric patients		telehealth facilities Videoconferencing was available for patients to see visitors to reduce the emotional impact	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
				Regular temperature checks and registration of each caregiver was required			
Zhou et al. 2020. Prevention and treatment system of novel coronavirus infection in medical and health institutions: experience in West China Hospital of Sichuan University. *Emergency Medicine Journal.* 37(10) China		• Three floors of one building were designated as confirmed COVID-19 wards, two floors of another building as suspected wards and one floor of the third building was used for buffer wards • All suspected cases waiting for nucleic acid results were isolated in single rooms in the suspected COVID-19 wards. If at least one of the two nucleic acid results was positive, the patient was transferred to the confirmed wards (even if they were asymptomatic), in either a single or double room. Otherwise they were transferred to the buffer wards • Close contacts of patients were immediately required to isolate in single rooms in			Two 24-hour fever clinics were set-up to assess possible COVID-19 patients	• The hospital provided an online consultation and psychological intervention hotline Due to the geographically dispersed nature of Sichuan Province, wireless, remote multidisciplinary consultation was set up to treat severe and critically ill patients in other hospitals in the region	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		the suspected wards, and received nucleic acid testing twice (not less than 24hours apart) All suspected cases, especially those with pulmonary imaging lesions and clinical symptoms, with two consecutive negative nucleic acid test results were placed in the buffer wards					
Zuliani et al. 2020. Organisational challenges, volumes of oncological activity and patients' perception during the severe acute respiratory syndrome coronavirus 2 epidemic. *European Journal of Cancer* Italy		• Previous day' telephone triage to identify flu-like symptoms and/or contact with a confirmed or suspected case ofSARS-CoV-2 • Triage at oncology facilities' entrance (performed by a healthcare professional): symptomatic patients are immediately referred to ER for evaluation; patients with clinical suspicion of infection follow a personalised, 'protected' path		No caregiver allowed for outpatients scheduled for treatment, except in the case of documented need of continuous assistance		• Non-urgent FU visits suspended • Email and phone contact with patients organised to allow examination of laboratory and imaging exams Maintained virtual	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		Social distancing between patients in waiting areas and in therapy areas (time-scheduled access)				multidisciplinary meetings on a weekly basis	
Sim et al. 2020. How to safely and sustainably reorganise a large general radiography service facing the COVID-19 pandemic. *Radiography*. 26 e303-e311 Singapore		• The Department of Emergency Medicine converted a nearby multi-storey car park into a temporary fever isolation area with a bed capacity of 64. Additionally, they equipped the multi-storey car park with a lead-lined room which served as the isolation chest radiography room • Inpatient wards were reorganised into three different risk levels that were segregated from one another: high-risk areas for suspected and confirmed COVID-19 patients, intermediate-risk areas for patients with acute respiratory symptoms but with less epidemiological		• All medical imaging equipment and accessories such as mobile radiography units, digital radiography (DR) detectors or positioning aids were thoroughly cleaned after every case to avoid the possibility of fomite-mediated transmission (with an agent such as sodium dichloroisocyanurate) • For the mobile unit, DR detectors and lead apron, we use WIP'Anios Excel disinfectant wipes. It is non-alcohol based, and it does not degrade the surface coating of the imaging equipment • Additional cleaning protocols for radiography	• They developed a manpower status board that allowed them to monitor the daily workforce status of the entire department. Based on the different staffing levels, the department was able to promptly redeploy workers from areas of excess manpower to those areas in need to ensure the smooth operation of daily services • Segregation of radiographer workforce into multiple independently functioning subunits	• They have leveraged on technologies with the use of various web conferencing platforms such as Zoom and WebEx to host teleconference meetings in place of the large group meetings The department leveraged secure	• This paper includes useful information about managing a radiography unit/staff during COVID • It also has interesting insights into how to manage an increased demand for in-hospital radiography services due to an increase in COVID

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		risk factors, and low-risk areas (general wards) for those with no suspicious symptoms • There was one designated mobile unit stationed in the high-risk isolation wards to provide dedicated mobile imaging services for COVID-19 cases • Mobile machines were segregated into 'clean' and 'dirty' units based on their respective clinical locations • Patients who present to the outpatient setting with a positive travel history or relevant symptoms suspicious for COVID-19 were promptly isolated in a negative pressure isolation room. A chest radiograph can be requested on-site and performed immediately in the adjacent radiography room If there was a need for further investigation, arrangements		room surfaces twice a day: once before the start of the shift and the second after meal breaks • The surface cleaning is performed using Medipal ® Disinfectant Wipes Apart from the routine cleaning regime, the hospital's environmental services perform terminal cleaning for all radiography rooms twice a day using Sodium hypochlorite 1000 ppm	to ensure continuous general radiography services in the event of a quarantine situation to any one team • The different teams were segregated based on clinical location. i.e. the emergency and inpatient locations were considered high-risk working areas where COVID-19 patients are more likely to aggregate, whereas outpatient areas were deemed lower risk • Staff were prohibited from moving between segregated teams or from high-risk areas to low-risk areas, and vice versa • Teams were not allowed to meet or to	messaging applications such as TigerText messaging for dissemination of workplace information	related chest x-rays (p304) Interesting insight for management at a 'whole-of-hospital' level: the hospital-level central command outbreak task force created and routinely updates a consolidated routine instruction (RI) which is disseminated to the entire hospital staff daily. This RI ensures staff receive the latest updates and contains information such as

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		were made for urgent admission, and the patient was escorted by security to the assigned isolation ward			swap shifts with one another • There were four teams of eight radiographers which allowed a sustainable schedule in the event of a prolonged outbreak • The four-team setup allows a rotating 12-h day shift, 12-h night shift, and two-day consecutive rest period before repeating the cycle • Staffing were decided based on the average workload of 10 cases per hour in the respective clinical areas • The staffing needs were decided based on the average workload of 10 cases per hour in the respective clinical areas		infection control and PPE guidelines, suspect case definition, patient management and administrative instructions. The RI serves as an official guideline to harmonise different practices across departments

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					• Roster pattern were fixed and synchronised with the rosters of the nurses and radiologists in the department for ease of contact tracing • They reorganised staff rest areas to facilitate physical distancing and rostered a smaller group of staff for staggered breaks at any one time. For example, seating facilities in the rest areas have been rearranged to provide gaps of one to two metre between tables with a maximum of one staff per table. • During meal breaks, staff were encouraged to leave immediately after meals and refrain from engaging		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					in conversations with others • They developed a manpower status board that allowed them to monitor the daily workforce status of the entire department. Based on the different staffing levels, they could promptly redeploy workers from areas of excess manpower to those areas in need to ensure the smooth operation of daily services		
Wang et al. 2020. Providing uninterrupted care during COVID-19 pandemic: experience from Beijing Tiantan Hospital. *Stroke and Vascular Neurology* China	• They designated a number of 340 beds for COVID-19 (reduced demand for other wards due to COVID meant they could combine units/wards if need be)	• A designated location, separated from other clinical areas, was established for the admission of patients with possible COVID-19 **Outpatient management** • All patients were required to make an appointment in					This article has useful info on incident management systems at a 'whole-of-hospital' level

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	Each department designated 3 inpatient rooms for care of suspected COVID-19 cases that needed ventilator support: one room for quarantine, next for buffering and the third for sanitising	the clinic, and for those urgent and life-threatening cases, patients were advised to go to the emergency room. On checking in, a patient would have their body temperature checked, and questionnaires on any possible COVID-19 exposure and recent travelling history were filled out before going into a room. The respiratory clinic was separated from other clinics. An isolation area was set up in every clinic for patients with suspected COVID-19. All febrile patients were sent to the fever clinic for further evaluation and therapy • Outpatient operations were performed only after COVID-19 screening was negative. All operations on patients with suspected COVID-19 were done in a negative pressure					

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		operating room with strictly controlled air flow **Fever clinic** The fever clinic was located in the infection prevention and control building, separate from all other clinics. It was in charge of the screening, diagnosis and treatment of all febrile patients. Nucleic acid testing was used to confirm the diagnosis of COVID-19 when suspected based on physical signs and symptoms. The confirmed cases were then transferred to the COVID-19 designated hospitals. The patients who had been released from quarantine were required to undergo self-isolation and were followed up for further evaluation					
Lin et al. 2020. Ward renovation and PPE use procedures to protect medical staff	**Ward transformation** • Recommends non-infectious disease	The routes through which infected patients would be transported were separated in order to reduce the risk of		The environment and surfaces of each room were strictly disinfected daily	• This paper recommends that all medical institutions complete ward		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
from COVID-19 infection. *The Journal of infection in developing countries* China	hospitals may need to temporarily transform general wards in accordance with the standards of infectious disease wards • Divide the staff passage into a 'clean region', 'potentially contaminated region' and 'contaminated region' according to the standards of infectious disease wards. • The floor of each region was marked with a colour, with green representing a clean region, yellow representing a potentially contaminated region and red	infections among the staff, to provide an uninterrupted supply of medicaments, materials and food, and facilitate the transport of samples to laboratories			reconstruction, so that building layout meets the requirements of an infectious ward, before an outbreak to cope with the rapid increase in COVID-19 cases • they limited the number of entries into hospital to 6 (from 34) • They used Level 1 of hospital exclusively for transporting patients and Level -1 to transport necessities and as a communication route for the staff. Specific lifts were dedicated and marked with the word 'COVID' for patients and others, and 'clean' lifts for staff and materials. Additionally, exits from the 'clean' lifts on Level 1 and limited exits from the 'COVID'		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	representing a contaminated region • To accommodate needs, they sealed some doors and temporarily built new doors in the ward and aligned two doors in the same room diagonally to reduce air flow in different areas The isolation ward and staff passage area were equipped with a negative pressure system and air sterilizer according to the conditions of the hospital				lifts on Level -1 were blocked • COVID' lifts were also used during specific hours to transport waste and corpses. After each use, the lifts and routes were disinfected. The disinfection process was carried out 3 times a day, and each time it was reported by the staff		
Krol et al. 2020. Transformation of a large multi-speciality hospital into a dedicated COVID-19 centre during the	• Wards were rearranged in a way to relocate the administrative and social spaces, such as physicians' and	Every patient in observation ward was placed in a separate room in order to avoid cross-infections. Sickrooms were regarded as			• Maximum duration of work in the 'red' zone was set at 4 hours, which allowed employees to take 2 breaks during each	• Communicati on between the isolation zones and relocated administrativ	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
coronavirus pandemic. *Annals of Agriculture and Environmental Medicine* Poland	nurses' offices outside the isolation areas and separate isolation zones by airlocks • They divided existing wards into observation and isolation wards. The former were units where patients suspected of COVID-19, but whose condition was too severe for them to remain in home quarantine, awaited results of their tests for SARS-CoV2 • In the isolation wards, the patients' rooms, corridors and procedure rooms were regarded as the 'red' zone. This dictated the PPE staff used (see	'red' zones and corridors as 'yellow' zones			12-hour shift, and allowed for predictable calculation of PPE usage	e areas was established via visual systems and walkie-talkie radios	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	paper for more info re PPE) • The Dept of Cardiac Surgery made use of both of their operating theatres during one surgery – the first for induction of anaesthesia and intubation and the second for the main surgical procedure. The rationale was to provide a separate space for carrying out aerosol-generating procedures. The operating team were also able to prepare for the surgery in one scrub room and remove PPE in another, which divided the 'clean' and 'dirty' procedures, thus allowing one-way						

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	movement in the surgical block Isolation wards, in turn, were dedicated exclusively to patients with confirmed COVID-19						
Tao et al. 2020. Emergency management of 2019 novel coronavirus: implications for the dermatology department. *British Journal of Dermatology* China		• Nurse-led triage, to identify patients with possible COVID-19, at the entrances of hospital and skin clinics directs patients with a cough or fever to a specific COVID-19 area and a dermatologist is consulted if the fever might be related to skin disease Patients are admitted to a ward only if routine blood tests and chest CT scans exclude COVID-19				• Online consultation for non-urgent patients reduces the numbers of patients attending clinics	
Adams et al. 2020. Supporting the Health Care Workforce During the COVID-19		Those patients with symptoms of suspected COVID-19 should be rapidly triaged and separated from		Clinical staff should clean workspaces and personal items such as stethoscopes, mobile phones, keyboards,			

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
Global Epidemic. *JAMA* US		the general population ideally in a well-ventilated space with a distance of at least 6 feet from others until they can be placed in an isolation room		dictation devices, landlines, nametags, and other items with hospital-provided disinfectants or alcohol-based disinfectants			
Pietrasanta et al. 2020 Management of the mother-infant dyad with suspected or confirmed SARS-CoV-2 infection in a highly epidemic context Italy	• Five maternity hospitals with NICU facilities were assigned all cases of suspected or confirmed SARS-CoV-2 infection in pregnant mothers and neonates, up to 28 days of life • Within each 'COVID19 maternity centre', dedicated spaces and routes to assist mothers and infants with suspected or proven SARS-CoV-2 infection were identified. In obstetric triage, paediatric triage, and delivery wards	• The neonate is not separated from the mother even in case of discordant results (mother positive, neonate negative at birth screening) • Positive neonates are cohorted in dedicated COVID-19 areas within the NICU or nursery • Negative neonates at birth screening remain cohorted with suspected cases, given the actual paucity of data regarding the possibility ofSARS-CoV-2 vertical transmission and viral shedding • Neonates accessing the paediatric triage with suspected infection are isolated with parents in the dedicated COVID-19 area.			Every staff member who enters a room hosting a patient with suspected or proven SARS-CoV-2 infection, either a woman or a neonate, always dons full personal protective equipment (PPE: N95 or superior respirator, double gloves, splash-proof gown and head cuff, goggles or face shield, and shoe covers)		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	one or more (depending on availability) rooms with negative pressure and ensuite toilet were dedicated to assist women and neonates with suspected or proven infection • Similar rooms were identified and equipped in the nursery, to assist non-critical neonates whose mothers were not in sufficient condition for rooming-in One-way routes for healthcare-providers and materials were identified, and both entrances were equipped with double doors and stations for donning and doffing of	Screening for SARSCoV-2 infection (nasopharyngeal swab) is performed in the paediatric triage. In case of positive test, the neonate is admitted to the appropriate COVID-19 area of the neonatal ward Both parents are tested as well and quarantined at home if not in need for immediate medical assistance. Parental visit to the admitted baby is not permitted					

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	PPE. When necessary, and elevator was removed from public availability, locked and dedicated to the COVID-19 course						
Correa et al. Folding a neuroscience centre into streamlined COVID-19 response teams. *Neurology* US	• The Neuro department previously operated in a typical silo model, that model was entirely impractical during the public health emergency • They reduced their neuroscience beds from 4 wards to just 1, while delivering care to over 600 hospitalised patients with neuro-COVID and over 1,742 total neuroscience hospital bed days • epilepsy monitoring unit was closed, and	• They initiated network-wide stroke cohorting, with automatic transfer of all ED patients with stroke from our legacy hospitals to our inpatient stroke service. This increased efficiency and reduced wait time for beds at the other legacy hospitals	• When feasible, attendings performed any bedside procedures to limit exposure of house staff and physician assistants and to conserve PPE This system required the development of a robust E-consult neurology service. To facilitate E-consult, templates were developed for our electronic medical record. The E-consult team was staffed with	• Redeployed staff to reduce the number of individuals entering the hospital and clinics to mitigate potential nosocomial spread • Consolidated inpatient neuroscience services from 3 hospitals to the Montefiore Medical Centre • A list of departmental staff and house staff with high-risk conditions (hypertension, diabetes, immunosuppression, and/or age >65 years or an immunosuppressed cohabitant) was identified privately by self-report to designated senior leadership. High-risk staff were removed from the	• They formed a COVID-19 neurology leadership task force. This group consisted of clinical leaders representing Stroke, Neurohospitalists, Epilepsy, and Paediatric Neurology, and our Service Chiefs, Residency Director, Department Chair, and Unified Administrator • To decrease the burden of increased hours, our hospital system and department supported staff with free parking, free meals,	• All logistics and department meetings were converted to virtual meetings • All outpatient stroke centre visits were transitioned to telehealth • Where possible, teams conducted rounds virtually, and met in person only	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	elective neurosurgeries were cancelled • They launched an ED bypass protocol modelled on the pathway to mechanical thrombectomy, where patients with stroke with acute large vessel occlusions travel directly from CT to angiography suite to the NSICU without entering the ED • Patients arriving from EDs of other hospitals also went directly to the stroke unit without passing through the Moses ED • For this model to be effective, single-room crash beds capable of accepting patients		experienced residents (postgraduate year 3-5) going to the bedside when necessary. Supervision and teaching were staffed remotely by at-risk faculty to shield them from patient-facing care. In rare situations, inpatient attendings were used as backup to answer more complex bedside questions	patient contact care and placed into a pool for remote clinical, administrative, and teaching services • The hospital system excluded all visitors, with rare, prespecified, exceptions (such as non-COVID end-of-life care)	reimbursed travel, and partnerships with regional hotels • The department identified non-frontline health care workers who could transition to remote support, or those whose standard responsibilities were substantially reduced, and assigned them support roles for our teams • A daily departmental email COVID-19 update was sent out that included the following sections: general hospital updates, neurology-specific clinical updates, COVID-19 protocol/treatment updates, PPE availability, training/education updates, and wellness corner	when necessary for patient care • Deployed telemedicine resources using phone or video conferencing at the preference of the individual/family to avoid unnecessary exposure while still providing robust outpatient neurology care A text group using popular CMS-approved encrypted texting	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	with unknown COVID status had to be available at all times. Two single-room negative pressure rooms were reserved for patients requiring aerosolizing procedures or oxygen via a high-flow nasal cannula • The general neurology teaching service, epilepsy monitoring beds, neurosurgery, and stroke unit were converted to a neuro–COVID-19 unit				The high medical acuity of the neuroscience cases required a coordinated stroke team coverage plan, which we called the triple-double. Teams consisted of 3 work pairs working 7-on/ 7-off: 2 stroke attendings covering the day, with 1 stroke fellow covering in-house at night	software was formed to facilitate movement of neuroscience patients	
Chowdhury et al. 2020. Mobilization and Preparation of a Large Urban Academic Centre during the COVID-19 Pandemic		• Structured wards according to: COVID-19 positivity, probability of COVID-19 infection of those awaiting test results • They determined that three hospital units were	• We also took measures to reduce the frequency of unnecessary physical patient–healthcare	• A strict no-visitor policy is enforced at our hospital. However, to keep family members updated, nurses and physicians spend time daily in updating families	• All staff were required to report symptoms via an online application and to undergo aural temperature	• We converted all scheduled in-person outpatient appointments to	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
US		necessary. First, an isolated unit in a building separate from the main hospital was created. The unit comprised two floors with a total of14 medical-surgical and 10 intensive care beds on each floor. All medical-surgical beds had the capability to be turned into ICU beds if necessary. This unit was designed for patients with intermediate to high probability of COVID-19 and was staffed only by pulmonary faculty and fellows • The second unit was designated for patients with low probability of COVID-19 (100-bed unit) As the census increased, they converted all floors into COVID-19 medical-surgical units. They also arranged extra beds in the lobby and operating areas if necessary. The entire building had a capacity of	provider contact. Unnecessary blood draws and portable imaging have been discouraged in clinically stable patients. In-room tablets are available primarily for non–English speaking patients so that in-room translation can be facilitated without using phones, which may lead to contamination. As with other institutions, it has been difficult to find an available tablet for every patient who needs it	• Employees in the COVID-19 unit receive one N95 mask and one surgical mask per shift. They also receive a protective face shield that they can reuse with specific instructions on doffing. Each of our nursing units has an ultraviolet light disinfection box for solid objects such as phones, glasses, and pens	monitoring before and after shifts • A daily departmental teleconference with involved staff has been integral in maintaining a uniform and consistent stream of evolving information. • In addition, daily updates have kept remote individuals effectively informed of new protocols and contingencies • Staff members who are not on essential inpatient services are asked to remain at home on reserve to make up for these staffing shortages • They developed a model in which several teams work together in a shift-based model with remote help. This	telemedicine visits • All non-emergent pulmonary tests/procedures were cancelled	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		250 total beds. Once patients were ruled out for SARSCoV-2 infection, they were transferred to a general medicine service or discharged • Established a dedicated CT scanner in this unit • A third unit functioned as an outpatient COVID-19 screening unit • All patients triaged at the emergency department main entrance with mild symptoms suspicious of COVID-19 are also referred to this clinic using a separate main hospital entrance			applied to all essential departments, such as physicians, nurses, and respiratory therapists. This strategy helps minimize staff exposure and PPE use		
Tahmassebi et al. 2020. Reflections from London's Level-1 Major Trauma Centres during the COVID crisis UK					• The workforce was reorganised into smaller teams each with designated leaders and with a full spectrum of subspecialties represented (pelvis, upper/lower limb etc.).	All centres rapidly introduced virtual meeting software and staff adapted well to its use. Platforms such as Zoom,	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					Smaller teams allowed agile, senior led responses, particularly in the polytrauma situation • The importance of clear, well considered, centrally driven directives cannot be overstated in any crisis and hospital leadership consistently struggled to support guidance from governing bodies with the real-time feedback from clinicians at ground level. In the initial phase of rapid change, this juxtaposition of conflicting advice (central vs on-the-ground) was difficult to manage and presented a major source of anxiety	Gotomeeting and Microsoft Teams were widely adopted	

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					• Clinicians were presented with swathes of documents with no peer review or sense of authenticity, which had a destabilising effect when trying to instigate plans Humorous posts and angry outbursts were aired over the same channels as important updates, which clouded the sharing of genuinely important information. Only once a sense of responsibility and a level of self-discipline around social media behaviour was established, could the value of real-time electronic communication be maximised		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
Frost et al. 2020. Principles for clinical care of patients with COVID-19 on medical units Canada	Created COVID-only units, which delineated zones by risk of contamination using floor markings and signage, restructured medical teams and optimized use of personal protective equipment (PPE)		A 2-clinician 'buddy system' allows separation of tasks, with attendant advantages for infection control. For example, clinician 1 may perform all physical examinations of patients and enter only red zones (with careful donning and doffing of PPE), whereas clinician 2 would stay in the green zone, serve as a PPE spotter and perform other tasks (e.g. documentation, checking results, and ordering medications and tests), and would be available to offer or call for help				

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
Randelliu et al. 2020. Management of orthopaedic and traumatology patients during the Coronavirus disease (COVID-19) pandemic in northern Italy Italy	• Four operating rooms were organised for trauma cases or non-deferrable orthopaedic surgery. An operating theatre with specific pathways for nurses and surgeons was organised for the treatment of positive or potentially positive patients • They converted a hospital ward to a COVID-19 exclusive patient ward. This included the use of dedicated corridors, an elevator and an isolated operating room with limited access to personnel The clinical pathway started with body temperature screening and evaluation of flu-		• Healthcare workers working in emergency triage had to stay at least 1 m from the patients, wear surgical protection mask and use an intercom or a working station with a partition glass		• Only one gateway was maintained, with body temperature screening and a station for hand washing with an alcoholic solution. Access was only permitted to people with a booked appointment or medical test. In visiting hours, access was only permitted to one relative for hospitalised patients and was not possible for COVID patients		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	like symptoms. An oropharyngeal swab was performed in all patients admitted, using the PPE previously described (FPP2 mask, protective disposable gown, gloves and protective glasses). Patients were then moved to the operating theatre and the surgical procedure was performed. At the end of the procedure, the patients were moved to the dedicated ward, waiting in a single room for the result of the oropharyngeal swab. In the case of a negative result, the patients were moved to the usual ward. In the case of a positive result, the patient was moved to the						

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
	dedicated COVID-19 ward						
Konda et al. 2020. COVID-19 Response in the Global Epicentre: Converting a New York City Level 1 Orthopedic Trauma Service into a Hybrid Orthopedic and Medicine COVID-19 Management Team US	• They opened up unused wards, turning specialty wards into COVID-19 wards (e.g. paediatric ward converted to COVID-19 ward), and deploying outdoor open-ward tents		• Health care personnel with confirmed or suspected COVID-19 infection quarantines themselves for 7 days after illness onset and remains fever-free for at least 72 hours before returning to work • Asymptomatic but tested positive health care personnel must also quarantine for at least 7 days from the date of the test. After returning to work, these personnel were expected to wear a facemask for at least 14	• Team members were provided with an extra surgical mask, gowns, protective eye equipment, head protection, and gloves in the call room before rounds would start. PPE was donned in the call room together as a team. As N95 masks were in short supply, each team member received new N95 masks at the beginning of each week, which they would keep in a brown paper bag when not being actively used. The attending and chief residents confirmed that each member of the team had proper PPE in place before leaving the room • Hand sanitizer was applied to the inner glove before application of the second layer glove. Doffing of PPE	• The Ortho-COVID-19 team was structured to allow for efficiency while maintaining adequate oversight and accountability. A family medicine or internal medicine attending was at the top of the hierarchy and acted as the point of contact if the orthopaedic surgery team encountered complex medical questions • Each rounding team functioned with an orthopaedic surgery attending at its head to split the floor of up to 20 patients. The goals of the rounding teams were to evaluate patients for any acute issues,		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
			days after symptoms onset	would occur after medicine rounds concluded and would be performed at the exit of the COVID isolation unit • Gowns, outer surgical masks, face shields, gloves, and head gear were discarded before returning to the workroom	identify patients with worsening clinical status to escalate oxygen requirement, and wean oxygen supplementation in stable patients to move these individuals closer to discharge from the hospital. Because oxygen adjustments often required several minutes of monitoring with a pulse oximeter to ensure that the algorithm policies were being met, members of the rounding team were assigned specific roles to expedite morning rounds in what we have termed the "*Agriculture Model*" • Sower: a junior resident who would work several rooms		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					ahead of the 'reaper team' with a portable pulse oximeter and record the current oxygen supplementation level and oxygen saturation on the patient's board • Reaper team: a chief resident along with a junior resident who would follow the 'sower' by a few minutes to recheck the new oxygen saturation and titrate the oxygen • Farm: a junior resident (Farmer) with a portable electronic medical record workstation [computer-on-wheels (COW)] that remained outside of patients' rooms. This resident would record new oxygen requirements for patients, make any		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
					notable updates, and write the progress note		
Pezzulla et al. 2020. Radiotherapy in Southern Italy at the time of COVID-19: options for radiation oncology units Italy	• The internal layout of the clinics and waiting rooms have been re- adjusted in order to maintain social distancing (at least 1 meter)	• Screened and respiratory symptoms have been reported is given to them. In this case, the ticket is shown to the radiotherapy staff before therapy, representing a warning that might prompt staff to use more precautions (disposable gowns and goggles) • Patients with fever have to be evaluated at reception by a radiation oncologist. In the case of a first clinical consultation or if the patient has not already started radiation treatment, the physician evaluates when to reschedule oncologic services. If radiotherapy is already ongoing and there are no clinical reasons to stop it, the patient has to wear PPE through a	• A 'clean' team has been established consisting of two doctors, two radiation therapists, and one nurse who are kept out of the operative unit for 2 weeks • The locations of workstations have been modified, creating separate work areas in order to reduce the number of direct contacts among the staff, with supervision to ensure that in each area there are only the essential	• Entry of accompanying persons is restricted • Each member of staff wears PPE consisting of a disposable facemask and impermeable, disposable gloves; moreover, eye protection, such as goggles or a disposable face shield that covers the front and sides of the face			

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
		specific path organised by the Crisis Unit to minimize social contact • COVID-19 confirmed or suspected patients follow the same instructions as described above. In this case the staff involved also wear a fluid- resistant, impermeable, disposable gown and a filtering face piece 2 (FFP2) respirator, rather than a surgical mask. These patients are treated at the end of the workday to allow an immediate and thorough sanitization of the environment afterwards	personnel and the patient				
Government of Canada Infection prevention and control for COVID-19: Second interim guidance for acute healthcare settings		• People who are determined to be potentially symptomatic with COVID-19 should be met by a HCW and immediately escorted to a private room or designated COVID-19 waiting area. If neither are available, patients should		Limit visitors to only those who are essential (e.g. immediate family member or parent, guardian or primary caregiver). Visitors with signs or symptoms of infection should not enter the hospital	• Only patients who are confirmed to have COVID-19 should be cohorted • HCWs should be cohorted to work only with COVID-19 patients		

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
30 April 2020		be escorted to a waiting area where a space of at least 2 metres between patients can be ensured • A patient with suspect or confirmed COVID-19 infection should be cared for in a private room, if available, with a private toilet and sink for designated use. • A specific unit or area should be designated for COVID-19 patients. This area should not be located adjacent to or near units with high risk patients (e.g. acute oncology) • A patient with suspect or confirmed COVID-19 should have access to a private toilet and sink for designated use.					
Centers for Disease Control and Prevention (CDC) Infection Control Guidance		• Place patients with suspected or confirmed COVID-19 infections in a single-person room with the door closed	• Where possible, maintain 6 feet of distance between HCW and patient	Arrange seating in waiting rooms so patients can sit at least 6 feet apart			

Source	Bed or ward placement	Patient placement	HCW placement	Others e.g. cleaners, food staff, visitors	Management arrangements e.g. staffing, cohorting	Telehealth (for patient consults and management)	Comments or conclusions
15 July 2020		• Only house patients with the same respiratory pathogen in the same room, e.g. a patient with COVID-19 should not be housed in the same room as a patient with an undiagnosed respiratory infection, even though they may be cohorted in the same unit • Patients with suspected or confirmed COVID-19 infections should have a dedicated bathroom in a single person room	Provide designated areas for HCWs to take breaks, eat and drink that allow them to remain at least 6 feet apart from each other				

Appendix 6: McMasters guide to COVID-19 evidence sources

Webpage and link	Summary of contents
World Health Organization	Technical guidance
National Institutes of Health	Treatment guidelines
National Institute for Health and Care Excellence	Rapid guidelines
BIGG	International database of GRADE guidelines
National COVID-19 Living Evidence Task Force	Guidelines for healthcare professionals
Johanna Briggs Institute	Infection control and prevention measures for health professionals and for health organisations
Cochrane systematic reviews	Specialised collection of COVID-19
US Veterans' Affairs (VA) Evidence Synthesis Program	Inventory of systematic reviews (completed and in progress) focused on COVID-19, with flags for reviews meeting minimum quality standards and for living reviews
Evidence Aid	Summaries of systematic reviews that may be relevant to COVID-19 in eight broad areas (infection prevention and control; clinical characterization and management; therapeutics and vaccines; public-health interventions; health systems and services; epidemiology; ethical considerations; and social science in response)
New South Wales' Agency for Clinical Innovation	COVID-19 Critical Intelligence Unit
National Collaborating Centre for Methods and Tools	COVID-19 Rapid Evidence Review
Ontario Health's Quality Business Unit	Special Reports: Health Quality Ontario's reports and publications.
SPOR Evidence Alliance	Methods and Applications Group in Indirect Comparisons (MAGIC) Network Meta-Analysis team (part of the CIHR Drug Safety and Effectiveness Network) – Coming soon, but with existing rapid reviews listed below
Knowledge to Policy Center	Knowledge to Policy Centre - Lebanon
Norwegian Institute of Public Health	Live map of COVID-19 evidence

National Institute for Health and Care Excellence (NICE)	COVID-19 related material
COVID-NMA	Living evidence map and living network meta-analysis
EPPI Centre	Living evidence map of human studies organised by 11 areas of focus
Norwegian Institute of Public Health	Living evidence map of human, animal, in vitro and in silico studies organised by eight areas of focus,
COVID-19+ by McMaster PLUS	Critically appraised systematic reviews and single studies organised by quality level and document type
DistillerSR	Curated, tagged and downloadable references to single studies
L*VE by Epistemonikos	Existing systematic reviews of effects and the primary studies, including trials, that were included in the reviews
LitCovid from PubMed	Systematic reviews and single studies organised by mechanism, transmission, treatment, case report, and epidemic forecasting
TRIP database	Includes systematic reviews and single studies organised by document type
World Health Organization database	Single studies
BMJ	Coronavirus Hub
CellPress	Coronavirus Hub
EBSCO	COVID Information Portal
Elsevier	Novel Coronavirus Information Centre
Lancet	COVID Resource Centre
New England Journal of Medicine	A collection of articles and other resources on the Coronavirus (COVID-19) outbreak, including clinical reports, management guidelines, and commentary
Sage	COVID-19 specific research
SpringerNature	COVID-19 specific research
SSRN	Coronavirus and Infectious Disease Research page
Wiley	COVID-19: Novel Coronavirus Content
Wolters Kluwer	COVID-19 Resources & Tools (Coronavirus Resources)
Centers for Disease Control and Prevention	Sources of data contained in systematic reviews and single studies

COVID-19 Open Research Dataset Challenge (CORD-19)	Articles from a broader range of sources presented in a way that supports natural-language processing
Doctor Evidence	Articles from a broader range of sources presented in a way that supports natural-language processing
Rayyan	Articles from similar sources and presented in a way that supports natural-language processing
EPI-WIN	WHO Information for Network for Epidemics
Africa Evidence Network	COVID-19 related content
WHO Regional Office for Europe	Technical guidance
Government of Canada	COVID information for Canada
CanCOVID	COVID information for Canada
Government of Ontario	COVID information for Ontario, Canada
Public Health Ontario	Information from Public Health Ontario on COVID.
Chinese Center for Disease Control and Prevention	COVID information
Health Information and Quality Authority	COVID related publications
American University of Beirut	COVID related material
CHAIN	COVID related material
Public Health England	Collection of COVID material
Center for Disease Control	COVID communication resources
Johns Hopkins Medicine POC-IT Guide	Collection of COVID material

Appendix 7: Jurisdictions

National Governments	
Australia	https://www.health.gov.au/resources/publications/coronavirus-covid-19-information-on-the-use-of-surgical-masks
Canada	https://www.canada.ca/en/public-health/services/diseases/2019-novel-coronavirus-infection/prevention-risks/about-non-medical-masks-face-coverings.html
New Zealand	https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-novel-coronavirus-health-advice-general-public/covid-19-face-mask-and-hygiene-advice
United Kingdom (Scotland)	https://www.gov.scot/publications/coronavirus-covid-19-public-use-of-face-coverings/
United Kingdom (Ireland, England and Wales)	Nil.
United States CDC	https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/cloth-face-cover.html https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html
Other jurisdictions and organisations	
European Centre for Disease Prevention and Control	https://www.ecdc.europa.eu/sites/default/files/documents/COVID-19-use-face-masks-community.pdfhttps://www.ecdc.europa.eu/en/publications-data/using-face-masks-community-reducing-covid-19-transmission
World Health Organization	https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public/when-and-how-to-use-masks
Singapore	https://www.gov.sg/article/when-should-i-wear-a-mask

Hong Kong	https://www.coronavirus.gov.hk/eng/health-advice.html
NZ	https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-novel-coronavirus-health-advice-general-public/covid-19-face-mask-and-hygiene-advice
Germany	https://de.usembassy.gov/german-mask-regulations-state-by-state/

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Potentially useful resources from the grey literature

WHO Technical Guidance – Coronazhouvirus disease (COVID-19), COVID-19: Critical preparedness, readiness and response/ Severe acute respiratory infections treatment centre: practical manual to set up and manage a SARI treatment centre and SARI screening facility in health care facilities. Geneva: World Health Organization; 2020 (WHO/2019-

NHS COVID-19: Guidance for the remobilisation of services within health and care settings Infection prevention and control recommendations. https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control

Sim et al. 2020. How to safely and sustainably reorganise a large general radiography service facing the COVID-19 pandemic. *Radiography*. 26 e303-e311

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