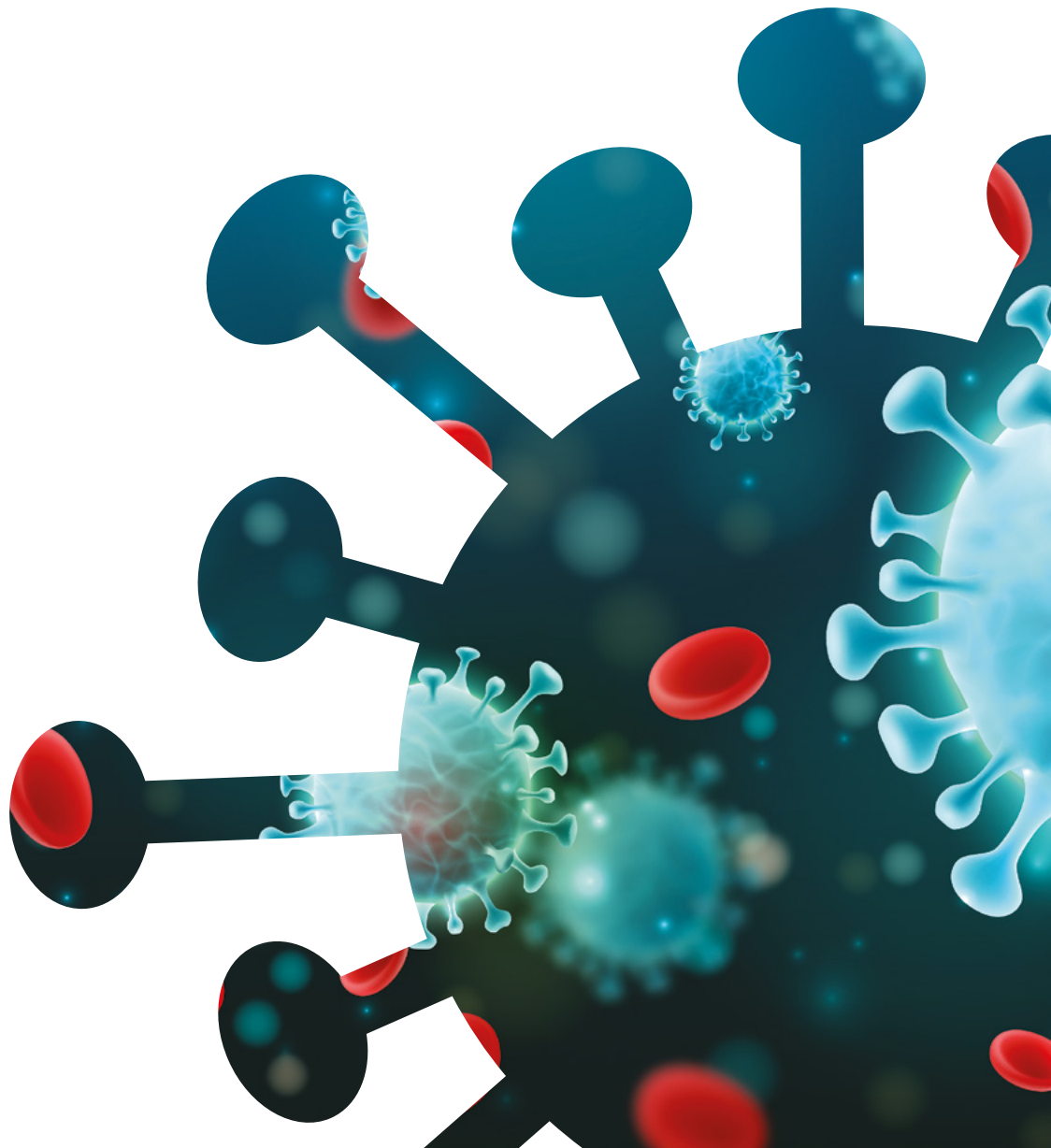


TECHNICAL WORKING GUIDANCE #2

STRENGTHENING THE HEALTH SYSTEMS RESPONSE TO COVID-19

Creating surge capacity for acute and intensive care
(6 April 2020)



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Introduction

This paper is one of a suite of technical guidance papers¹ developed by the WHO Regional Office for Europe to provide practical information and resources for decision-makers on measures to strengthen the health system response to COVID-19.

The focus of this technical guidance paper is how to create surge capacity in acute and intensive care to treat COVID-19 patients while maintaining essential hospital services.

This paper supports the operationalization of the policy recommendations for the WHO European Region on strengthening the health system response to COVID-19 (Table 1). The paper focuses on policy recommendation No. 5, and has links to recommendations No. 4 and Nos. 7–12.

Table 1. Summary of 16 health system recommendations to respond to COVID-19

1. Expand capacity for communication and proactively manage media relations.	2. Bolster capacity of essential public health services to enable emergency response.	3. Clarify first-point-of-contact strategy for possible COVID-19 cases: phone, online, physical.	4. Protect other potential first contact health system entry points.
5. Designate hospitals to receive COVID-19 patients and prepare to mobilize surge acute and intensive care unit (ICU).	6. Organize and expand services close to home for COVID-19 response.	7. Maintain continuity of essential services while freeing up capacity for COVID-19 response.	8. Train, repurpose and mobilize the health workforce according to priority services.
9. Protect the physical health of frontline health workers.	10. Anticipate and address the mental health needs of the health workforce.	11. Review supply chains and stocks of essential medicines and health technologies.	12. Mobilize financial support and ease logistical and operational barriers.
13. Assess and mitigate potential financial barriers to accessing care.	14. Assess and mitigate potential physical access barriers for vulnerable groups of people.	15. Optimize social protection to mitigate the impact of public health measures on household financial security.	16. Ensure clarity in roles, relationships and coordination mechanisms in health system governance and across government.

Source: *Strengthening the health system response to COVID-19: Policy Brief*

¹ WHO. Strengthening the health systems response to COVID-19. In: WHO/Health topics [website]. Copenhagen: WHO Regional Office for Europe; 2020. (<http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance/coronavirus-disease-covid-19-outbreak-technical-guidance-europe/strengthening-the-health-systems-response-to-covid-19>, accessed 3 April 2020).

The guidance will be updated on a regular basis using the best available evidence and emergent country practice in response to the COVID-19 outbreak in the WHO European Region, including knowledge and evidence generated through the joint WHO Regional Office for Europe/EU Commission/European Observatory platform on COVID-19. In addition to drawing on relevant literature, this guidance note is informed by actions taken in WHO Regional Office for Europe's Member States – both those actions that have been formally reported through WHO Country Offices and those reported through informal networks of experts in countries. Other institutions have also issued guidance that is complementary to that issued by WHO, most notably the European Centre for Disease Prevention and Control (ECDC)² and the Organisation for Economic Co-operation and Development (OECD).³

Key issues

There is shared concern in the WHO European Region about capacity of health systems to respond to COVID-19 in countries experiencing large numbers of cases. The data from China suggest that 15–20% of COVID-19 cases require hospitalization, with around 15% of cases presenting with severe symptoms and 5% requiring intensive care.⁴ In Italy and Spain, 40–55% of COVID-19 positive cases have been hospitalized, with 7–12% requiring admission to intensive care units.⁵ Estimates from China also suggest that patients in intensive care units (ICUs) require approximately 13 days of respiratory support,⁶ while data from Italy show that 10–25% of patients will require ventilation, and some patients will need ventilation for several weeks.⁷ The reasons for national variations in hospital admissions, severity and mortality rates point to different population structures, hospitalization guidelines and thresholds, hospital capacities, testing practices, data collation methods, implementation of infection prevention and control (IPC) measures, time to receiving care, as well as the risk factors among the infected persons (age and comorbidities).

Variations in admission rates notwithstanding, these experiences in the COVID-19 outbreak indicate that business-as-usual service delivery approaches are not sufficient to respond once cluster of cases or widespread community transmission is registered and surge capacity will be needed. While WHO advises that aggressive measures to find, isolate, test, treat and trace are the best ways to stop the spread of this virus, public health interventions to “flatten the curve” may slow transmission and mitigate peak capacity needs. Modelling studies point to the impact of nonpharmaceutical interventions (NPIs), such as physical distancing, school and university closures, banning of mass

² ECDC. Preparedness for COVID-19. In: ECDC/COVID-19 [website]. Stockholm: ECDC. (<https://www.ecdc.europa.eu/en/all-topics-z/coronavirus/threats-and-outbreaks/covid-19/preparedness-and-response-covid-19>, accessed 3 April 2020).

³ OECD. Beyond containment: Health systems responses to COVID-19 in the OECD. Paris: OECD. (https://oecd.dam-broadcast.com/pm_7379_119_119689-ud5comtf84.pdf, accessed 3 April 2020).

⁴ Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: Summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. 24 February 2020 [Epub]. doi: 10.1001/jama.2020.2648 (<https://jamanetwork.com/journals/jama/fullarticle/2762130>, accessed 3 April 2020).

⁵ Lazzarini M, Putoto G. COVID-19 in Italy: momentous decisions and many uncertainties. *Lancet Glob Health*. 18 March 2020. pii: S2214-109X(20)30110-8 [Epub]. doi: 10.1016/S2214-109X(20)30110-8. ([https://www.thelancet.com/journals/langlo/article/PIIS2214-109X\(20\)30110-8/fulltext](https://www.thelancet.com/journals/langlo/article/PIIS2214-109X(20)30110-8/fulltext), accessed 3 April 2020).

⁶ Guan WJ et al. Clinical characteristics of coronavirus disease 2019 in China. *New Engl J Med*. 28 Feb 2020 [Epub]. doi: 10.1056/NEJMoa2002032. (<https://www.nejm.org/doi/full/10.1056/NEJMoa2002032>, accessed 3 April 2020).

⁷ SIAARTI. Clinical ethics recommendations for the allocation of intensive care treatments, in exceptional, resource-limited circumstances. Rome: SIAARTI. (<http://www.siaarti.it/SiteAssets/News/COVID19%20-%20documenti%20SIAARTI/SIAARTI%20-%20Covid-19%20-%20Clinical%20Ethics%20Reccomendations.pdf>, accessed 3 April 2020).

gatherings, and remaining indoors, on spreading the number of cases over a longer period to give health systems the opportunities they need to cope with caseloads.^{8,9,10,11} These models have helped to reinforce the message from WHO about the implementation of such measures, alongside widespread testing, to detect cases and break chains of transmission. In addition to these measures, phased plans for creating surge capacity in acute and intensive care will help respond to COVID-19 cases while maintaining essential health services.

Surge capacity is the ability of a health system to manage a sudden and unexpected influx of patients in a disaster or emergency situation. Surge capacity can be created from intrinsic and extrinsic resources. The former covers all local resources that can be used for the response, while the latter involves leveraging resources from outside the affected area (across geography or across specialty). As the COVID-19 pandemic necessitates both in tandem in all countries, this note covers both these aspects together. Creating surge capacity involves a comprehensive approach linking the **four S's** of surge capacity: **space, staff, supplies** and **systems**.¹²

- **Space**, or structure, covers hospitals and beds, but also the facilities that are either already available in those settings or which could be equipped for specific emergency needs; for example, areas for appropriate triage and cohort wards with adequate air ventilation. Space also includes the potential repurposing or requisitioning of structures beyond the hospital setting to provide for excess patient numbers; for example, hotels, community centres, etc.¹³
- **Staff** is about ensuring sufficient numbers of appropriately skilled and supervised health (and social care) workers during the emergency situation. In addition to the number of staff needed, and where staff can be added or repurposed from, surge capacity must account for varying degrees of staff need, specializations needed and, crucially, analysis of potential shortfalls. Potential staff shortfalls can occur for reasons including nonattendance due to stress, overwork, mental health concerns and prospective sickness. In the context of COVID-19, health care workers may have concerns for their own health and, in turn, for their own families and older parents. Sufficient rest and recuperation for staff, as well as their unavailability to work, need to be accounted for in any surge capacity calculation.
- **Supplies** relate to the (stored) availability of specific equipment for emergency deployment, both for patient care and health worker safety. In the context of COVID-19, this covers different types of wards and beds, intubation equipment, mechanical ventilators and essential medications, in

⁸ UK: Ferguson N et al. Impact of non-pharmaceutical interventions (NPIs) to reduce COVID-19 mortality and healthcare demand (16 March 2020). London: Imperial College. doi:10.25561/77482 (<https://www.imperial.ac.uk/media/imperial-college/medicine/mrc-gida/2020-03-16-COVID19-Report-9.pdf>, accessed 3 April 2020).

⁹ Australia: Chang SL et al. Modelling transmission and control of the COVID-19 pandemic in Australia. 2020;arXiv:2003.10218 [q-bio.PE] [ePub]. (<https://arxiv.org/pdf/2003.10218.pdf>, accessed 3 April 2020).

¹⁰ The Netherlands: RIVM. Coronavirus briefing. Bilthoven: RIVM; 2020/ (https://www.tweedekamer.nl/sites/default/files/atoms/files/20200325_briefing_coronavirus_tweede_kamer_presentatie_rivm.pdf, accessed 3 April 2020).

¹¹ Generic tool that is adaptable to any context: NeherLab. COVID-19 scenarios [online model]. Basel: University of Basel; 2020. (<https://neherlab.org/covid19/>, accessed 3 April 2020).

¹² Please note that the four S's in this guidance document (Space, Staff, Supplies, Systems) have been adapted from the original four S's (Staff, Stuff, Structure, Systems) documented in this article: Barbisch DF, Koenig KL. Understanding surge capacity: essential elements. *Acad Emerg Med.* 2020;13: 1098–1102. doi:10.1197/j.aem.2006.06.041. (<https://onlinelibrary.wiley.com/action/showCitFormats?doi=10.1197%2Fj.aem.2006.06.041>, accessed 3 April 2020).

¹³ List of possible facilities: community centres, exhibition halls, hotels, nursing homes (unused), sanatoria, schools and colleges, sports halls, sports arenas/stadiums, student accommodation (halls of residence), tents.

particular supplies of oxygen, extracorporeal membrane oxygenation equipment (ECMO), personal protective equipment (PPE) etc.¹⁴ Most patients hospitalized with severe disease will need oxygen, and a smaller proportion will require ventilation. For the establishment of camp-style hospitals, a range of supplies, including hoses and connectors, will be needed. Insufficient supplies, or procedures to procure them quickly, will severely hinder any surge response. Health workers need to be trained in the use and application of supplies and, for some equipment, specialists will be required.

- **Systems** refer to modes of working to ensure ongoing and proactive coordination for optimum surge capacity response. These modes of working ensure that integrated policies and procedures exist and are activated to develop optimized sustainable surge capacity. Systems are not just the glue that binds all surge elements together, but are also what ensures that these elements work together in practice. Systems covers decision-making, communication, continuity of operations and supply chain management, among others, and must be based on shared values, including teamwork and mutual respect (across settings). Evidence gathered in previous emergencies indicates that poor management systems during surge capacity planning and response have been the weak point of the four S's, resulting in under-utilization of available surge capacity resources during emergency situations.¹⁵

This note provides recommendations and strategic actions to activate surge capacity in line with the four S's drawing on past experiences in emergencies and on the emergent experiences of selected countries in the COVID-19 response (Denmark (DEN), Estonia (EST), France (FRA), Germany (DEU), Ireland (IRE), Italy (ITA), Kazakhstan (KAZ), Portugal (POR), Russian Federation (RUS), Spain (SPA), the United Kingdom of Great Britain and Northern Ireland (UNK), and Ukraine (UKR)). Table 2 provides a summary and Section 3 goes into details and examples.

¹⁴ Guidance on:

- Clinical management: WHO. Clinical management of severe acute respiratory infection when COVID-19 is suspected. Geneva: World Health Organization; 2020. ([https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected), accessed 3 April 2020).

- Infection prevention and control: WHO. Coronavirus disease (COVID-19) technical guidance: Infection prevention and control / WASH. Geneva: World Health Organization; 2020. (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/infection-prevention-and-control>, accessed 3 April 2020).

- Commodities package: WHO. Disease commodity package – novel coronavirus (COVID-19). Geneva: World Health Organization; 2020 ([https://www.who.int/publications-detail/disease-commodity-package---novel-coronavirus-\(ncov\)](https://www.who.int/publications-detail/disease-commodity-package---novel-coronavirus-(ncov)), accessed 3 April 2020).

¹⁵ Fisher D et al. Pandemic response lessons from influenza H1N1 2009 in Asia. *Respirology*. 2011;16(6):876–882. doi: 10.1111/j.1440-1843.2011.02003.x. (<https://www.ncbi.nlm.nih.gov/pubmed/21627715/>, accessed 3 April 2020).

Table 2. Summary of recommendations and strategic actions

Strategic action 1. Create and activate a stepwise plan to expand physical space to care for COVID-19 patients respecting infection prevention and control protocols

- Estimate needed surge capacity for acute and intensive care
- Develop criteria to designate hospitals to receive COVID-19 patients
- Regulate patient flows in designated hospitals to protect both health workers and other patients
- Progressively postpone all but the most urgent elective surgery and internally repurpose space and staff usage
- Accelerate discharge and define stricter criteria for admissions for essential health services to create additional surge capacity for COVID-19 patients
- Optimize current and develop alternative delivery platforms for essential health services: develop remote work solutions, boost home hospitalizations programmes, and rapidly scale up existing e-Health strategies
- Purchase or otherwise acquire additional capacity from the domestic private health sector
- Repurpose nonmedical facilities – facilities of opportunity – and establish temporary medical facilities to accommodate peak demand

Strategic action 2. Identify the health workforce available for surge capacity demands, and repurpose and upskill for rapid deployment to meet surge capacity needs

- Mobilize a temporary health care workforce to enable surge capacity
- Map and expand the pool of critical and intensive care staff
- Upskill health care workers at the frontline of the COVID-19 response
- Ensure the safety and protection of health workers in the frontline of health service delivery through implementing IPC at all times
- Take care of mental health needs of frontline health care workers

Strategic action 3. Ensure adequate supplies to support surge in demand

- Identify and resolve supply chain bottlenecks through whole-of-government solutions to address shortages and logistic challenges in the supply of medicines and technologies for both COVID-19 and essential health services
- Ensure that emergency mechanisms for procurement, registration and accurate stock management are in place
- Assure that products comply with the technical specifications
- Define criteria for the usage of particularly scarce supplies and promote their application

Strategic action 4. Establish systems to manage and align policies to meet surge in demand

- Plan and define clearly the chain of command at national, regional and institutional level to activate surge capacity
- Develop internal management arrangements at facility level
- Rapidly adjust purchasing arrangements to enable activation of surge capacity
- Activate surge capacity for the generation, approval and roll-out of any essential evidence to guide clinical management
- Support providers to adjust priority-setting amid difficult decisions

Recommendations and strategic actions

Strategic action 1. Create and activate a stepwise plan to expand physical space to care for COVID-19 patients respecting infection prevention and control protocols

Estimate surge capacity needed for acute and intensive care. The surge capacity needed can vary significantly depending on the success of public health and physical distancing measures to slow transmission and the sociodemographic characteristics of the affected population. WHO has developed a set of interlinked surge calculators to facilitate surge planning for policy-makers at national, regional and facility levels.¹⁶ Alternative epidemiological scenarios feed into the need for acute and intensive care capacity projected per day during the outbreak. These calculators can be complemented with a sophisticated Human Resources for Health (HRH) surge planner – appropriate for national, regional and facility level planners – that considers different types of health care workers with different levels of competency.

Develop criteria to designate hospitals to receive COVID-19 patients. During the planning phase, it is important to establish minimum criteria for the safe care of COVID-19 patients based on clinical management guidelines, IPC guidance, and the designation of appropriate COVID-19 units. A phased plan is likely to be needed to reflect progressive expansion of the range of designated hospitals as the number of cases grows. Assess the readiness of designated hospitals to receive COVID-19 patients. WHO has developed a hospital readiness assessment tool (checklist) to facilitate this.¹⁷ Where space is an issue, some hospitals have designated “COVID-19 units” and “COVID-19+” units, with additional COVID-19 patients in non-acute inpatient wards and a day surgery unit converted to an ICU unit for non-COVID-19 cases, for example.

Regulate patient flows in designated hospitals to protect both health care workers and other patients. To protect patients and health care workers, designated hospitals should rethink all patient and logistics circuits (e.g. medicines, medical devices, consumables) in the different care areas: emergency department, inpatient, operating rooms, ancillary exams, ambulatory and home care managed from hospitals. Implementation of IPC must remain a priority to ensure the safest possible environment for all patients and health care workers. All areas of the facility should implement administrative controls, environmental/engineering controls, and enable an environment for rational use of PPE. The increasing numbers of patients will require that most COVID-19 designated hospitals will dynamically redefine exclusive COVID-19 areas. The implementation of a colour system can be useful: red, COVID-19 area; yellow, transition area; green, non-COVID-19 safe area.

In the emergency department, the definition of potential COVID-19 patient areas needs to be considered. Some countries have set up field hospitals to avoid mixing COVID-19 patients and other patients. Other countries are managing all mild, and low- to moderate-risk, patients with confirmed

¹⁶ See tools on this page: WHO. Strengthening the health systems response to COVID-19. In: WHO/Health topics [website]. Copenhagen: WHO Regional Office for Europe; 2020. (<http://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/novel-coronavirus-2019-ncov-technical-guidance/coronavirus-disease-covid-19-outbreak-technical-guidance-europe/strengthening-the-health-systems-response-to-covid-19>, accessed 3 April 2020).

¹⁷ WHO. Hospital readiness checklist for COVID-19. Copenhagen: WHO Regional Office for Europe; 2020. (http://www.euro.who.int/__data/assets/pdf_file/0010/430210/Hospital-Readiness-Checklist.pdf?ua=1, accessed 3 April 2020).

disease either in designated community facilities (e.g. hotels, community centres, etc.¹⁸) with access to rapid health advice (i.e. via adjacent dedicated COVID-19 health posts, telemedicine), or at home, according to WHO guidance and national or subnational capacity. Suspected COVID-19 patients who are waiting for laboratory results should be placed in adequately ventilated single rooms; if single rooms are not available, suspected cases can be cohorted with other suspected cases in adequately ventilated rooms.¹⁹ All laboratory-confirmed cases should be placed in adequately ventilated single rooms or cohorted with other confirmed cases. Pavilion-style hospital designs can easily be adapted to this approach. Field hospitals can also be considered. The ancillary exams areas (e.g. radiology) need to be programmed for specific COVID-19 timeslots to reduce opportunities for nosocomial transmission and increasing productivity.

Progressively postpone all but the most urgent elective surgery, and internally repurpose space and staff. This can release significant numbers of beds and staff and enable repurposing operating theatres, recovery rooms and other hospital facilities while maintaining operability to maintain essential health services. For those patients that will still need planned surgery, create an elective-only site. Optimize operating theatre capacity by extending hours, including weekend use. Staff who were previously working in an elective surgery setting will need to be released to work in new locations and will need induction and top-up training to enable them to provide medical care to patients with infectious disease. The release of elective capacity can also allow operating theatre equipment to be repurposed to support ventilated patients while paying attention to IPC.

Accelerate discharge and define stricter criteria for admissions to essential health services to create additional surge capacity for COVID-19 patients. More rapid discharge of patients with non-COVID-19 health conditions will also be necessary and standard protocols to identify cases where there is a good clinical reason for the patient to be in hospital can be used to support this. Improved discharge will require improvements in internal decision-making processes (e.g. twice-daily ward rounds), logistics (e.g. ordering transport, arrangements for medicines and appliances to be available on discharge) as well as coordination with downstream providers of community services. Requisitioning other facilities nearby, such as hotels, community centres, etc.,²⁰ and converting these facilities for patients who have been discharged early could be considered. This is an example of situations in which close collaboration with public health and social services is crucial and ties into the “systems” element of the surge capacity response.

For patients hospitalized for social rather than health reasons, align hospitals and social services to work together to actively find community solutions to assure adequate care for these patients. The adoption of discharge to assess models²¹ can assist in ensuring the rapid and safe transfer of patients to other care modalities. Financial barriers need to be considered and potentially addressed; for example, the costs of home care or residential care. Some countries or providers hospitalize patients for diagnostics, minor surgery or follow-up. All admissions need to be carefully assessed and other solutions should be considered using different approaches in collaboration with other health care providers.

¹⁸ List of possible facilities: community centres, exhibition halls, hotels, nursing homes (unused), sanatoria, schools and colleges, sports halls, sports arenas/stadiums, student accommodation (halls of residence), tents.

¹⁹ For general ward rooms with natural ventilation, adequate ventilation is considered to be 60 L/s per patient.

²⁰ List of possible facilities: community centres, exhibition halls, hotels, nursing homes (unused), sanatoria, schools and colleges, sports halls, sports arenas/stadiums, student accommodation (halls of residence), tents.

²¹ Example from the UK: NHS England. Quick guide: Discharge to assess. London: Department of Health. (<https://www.nhs.uk/NHSEngland/keogh-review/Documents/quick-guides/Quick-Guide-discharge-to-access.pdf>, accessed 3 April 2020).

Optimize current delivery platforms and develop alternative delivery platforms for essential health services: develop remote work solutions, boost home hospitalization programmes and rapidly scale up existing e-Health strategies. The capability of hospital and primary care systems to provide telephone, video or web-based consultations will need to be rapidly stepped-up so no patient needs to attend the hospital unless necessary. Some routine outpatient care can continue through this route. Countries with existing e-prescription systems can expand their use without physical visits, ensuring the automatic renewal of prescriptions for chronic patients and extending the periodicity of needed renewals. The COVID-19 epidemic enhances the development of home treatment for acute care programmes where they exist, releasing acute hospital beds and reducing the risk of nosocomial infections. A critical enabling factor is to ensure that purchasing contracts and provider payment mechanisms rapidly adjust to facilitate these new modalities. It is important to ensure that telemedicine or broadband systems have sufficient bandwidth and security provisions to deal with the increased levels of work. Additional support through user-friendly guides will be needed to ensure the elderly are still able to use the alternative models of care, particularly where technical literacy may be required.

Purchase or otherwise acquire additional capacity from the domestic private health sector. The extra resources secured from the private sector can be used to expand capacity to manage and treat COVID-19 cases, and to deliver other urgent treatments. In the early stages of the outbreak, additional capacity can be sourced from the private sector to ensure that elective operations (such as thyroid, prostate, hernia or gynaecological surgeries) are completed before the predicted surge in demand. During the early stage of the surge, ensure that private hospitals and clinics postpone non-urgent interventions and operations to free-up capacity. In addition, negotiate with them to ensure they make available the capacity that has been freed-up. Ensure that reimbursement for this is at cost, so that no profits are made, and that the financial sustainability of the response is secured. Ensure transparency for public spending through open-book accounting with recourse to external auditors. Alternatively, use emergency legislation to enable national or regional governments to take over management of needed facilities and services, ensuring these are cost-effective and fully available for the national response effort.

Repurpose nonmedical facilities – facilities of opportunity – and establish temporary medical facilities to accommodate peak demand. For times of extreme surge in demand, repurposing non-health facilities, such as hotels, community centres, etc.,²² can be considered. These facilities can be used for clinical care of mild cases or severe cases once they have been discharged after the resolution of symptoms, follow-up of mild and moderate cases, and diagnostics. These facilities will need to be assessed to ensure that they are suitable for infectious patients, in particular regarding water, sanitation and hygiene (WASH) requirements and heating options. These facilities can be used for aftercare of other inpatients to release capacity in main hospitals. In addition, setting up new temporary medical facilities, such as field hospitals, can be considered to quickly increase the hospital capacity. These facilities can be operated by civil or military health professionals and can perform a variety of functions, ranging from emergency care and triage, to hospitalization of severe cases and intensive care.

²² List of possible facilities: community centres, exhibition halls, hotels, nursing homes (unused), sanatoria, schools and colleges, sports halls, sports arenas/stadiums, student accommodation (halls of residence), tents.

Table 3. Early country experiences to create surge capacity (as of 25 March 2020): Space

- Postponing all elective non-urgent procedures, medical appointments and ancillary exams, and non-essential activities, such as training or scientific sessions for health professionals (DEN, FRA, ITA, KAZ, POR, SPA, UKR, UNK).
- Reducing or eliminating beds occupied by delayed-discharge patients and patients with mild conditions (EST, ITA, KAZ, POR, SPA, UNK).
- Removing financial obstacles to discharge for patients requiring ongoing nursing or social care (UNK).
- Repurposing operating and recovery rooms into ICUs and/or repurposing hospital spaces routinely used for other to serve as emergency units for patients with mild symptoms (EST, ITA, POR, RUS, SPA, UKR, UNK).
- Establishing drive-through diagnostic sites in the community to release pressure from health centres (DEU, POR, SPA, UNK).
- Developing remote work solutions and enhancing existing e-Health strategies (e.g. phone and video calls, e-Prescription) (DEN, POR, SPA, UNK).
- Boosting strategies to provide medicines at home for chronic patients, reducing hospitals workload (POR, SPA, UNK).
- Increasing the health phonenumber capacity and the COVID-19 algorithm to control hospital services demand (POR).
- Establishing camp hospitals (military or civil) with a variety of purposes including emergency care and triage, ICU and semi-ICU beds, recovery beds for patients who cannot be discharged (DEN, ITA, POR, SPA).
- Make all private and independent hospital beds available to the public system where relevant (UNK).
- Repurposing nonmedical settings, such as hotels, community centres, etc.,²³ for isolation and follow-up of moderate cases and/or for ICU beds and diagnostic (imaging) services (DEU, ITA, SPA and planned in EST and IRE).
- Purchasing from the private sector (ITA, UNK, planned in IRE) or allowing regions to take over management of private health services as needed (POR, SPA).
- All Armed Forces hospitals made available to treat the general population (POR, SPA).
- Transferring patients to other regions (ITA) or neighbouring countries as appropriate (FRA, DEU).

²³ List of possible facilities: community centres, exhibition halls, hotels, nursing homes (unused), sanatoria, schools and colleges, sports halls, sports arenas/stadiums, student accommodation (halls of residence), tents.

Strategic action 2. Identify the health workforce available for surge capacity demands, and repurpose and upskill for rapid deployment to meet surge capacity needs

Mobilize temporary health workforce to enable surge capacity.²⁴ Planning additional health worker requirements over time and across regions is an important first step in mobilizing surge HRH capacity. WHO has developed a set of surge calculators which are able to provide detailed HRH surge planning at national, regional and facility levels. There are a range options for mobilizing health care workers, including expanding the hours of part time staff, cross-regional mobility, repurposing staff, etc. (see Technical guidance # 1 for comprehensive list). It is essential to provide rapid training to upskill staff to carry out new tasks, including diagnostics, triage, clinical management responsibilities and IPC, and that health care workers are appropriately supervised in the performance of these tasks. To enable rapid mobilization of the health workforce, it is important to ensure that mobilized workers have the legal right to work and are properly indemnified to protect them from risk of litigation (in the normal conduct of the role they have been asked to perform). Where appropriate, consider establishing pathways for accelerated training and early certification of medical, nursing and other key trainee groups. Asking recently retired health care workers to come out of retirement on a voluntary basis to support the response as needed in low-risk roles is an additional consideration.

Map and expand the pool of critical and intensive care staff. The availability of sufficient numbers of fully trained critical care unit (CCU) and ICU staff may become a significant constraint. Options to mitigate this include:

- ICU/CCU trained staff currently working in other settings (including as paediatric infectious disease specialists, specialists in critical care medicine) can be identified from both public and private sectors and redeployed with appropriate refresher training.
- Member States can also consider options to shift care requirements across skills boundaries. This will require the identification of other staff groups who can undergo a rapid period of training to support fully trained staff, thus, increasing the number of patients these staff can support.

Upskill health care workers at the frontline of the COVID-19 response. Ensure that all health workforce in community and hospital-based services are provided with COVID-19 training (online, or in designated community training facilities). Rapid training mechanisms and job aids facilitate appropriate decision-making in key capacities, including diagnosis, triage, clinical management responsibilities and essential IPC. Mobilize adequately supported supervision structures and capacity to reinforce and support rapidly acquired knowledge and skills.

Ensure safety and protection of health care workers in the frontline of health service delivery through implementing infection prevention and control at all times. A key lesson from the Ebola epidemic was that infection-rates among health care workers due to poor and insufficient PPE and guidance and limited or non-existent IPC programmes, combined with an inadequate water supply, poor sanitation, and a weak hygiene infrastructure in health facilities, resulted in a disaster within a disaster. Not only did up to 50% of health care workers who contracted Ebola die, but hospitals themselves became incubators of the disease instead of serving as points where disease was controlled; health

²⁴ This is a summary of the policy issues in this area, for more detailed treatment of all options and issues, see WHO. Technical guidance # 1: Maintaining continuity of essential health services while mobilizing the health workforce for COVID-19 response. Copenhagen: WHO Regional Office for Europe, 2020. (http://www.euro.who.int/__data/assets/pdf_file/0007/436354/strengthening-health-systems-response-COVID-19-technical-guidance-1.pdf?ua=1, accessed 3 April 2020).

care facilities became dangerous places for outbreak amplification among staff and patients and transmission back to communities.²⁵

Although use of PPE is the most visible control used to prevent the spread of infection, it is the last and weakest of the hierarchy of IPC measures and should not be relied on as a primary prevention strategy. In the absence of effective administrative and engineering controls, PPE has limited benefit. Maximally protect health care workers from infection in their frontline duties through ensuring implementation of administrative controls, environmental/engineering controls, and enable an environment for rational use of PPE, adequate use of PPE, and roll-out of aggressive testing. Secure and allocate PPE for the health workforce providing frontline services (in hospitals and communities) and ensure the health workforce is properly trained in terms of the rational use and disposal of PPE. Critical interventions, such as ICU beds and mechanical ventilators, must be made available to health care workers and others supporting the response in terms of services and infrastructure, whose training makes them indispensable.

Consider reassignment of health care workers in the high-risk categories for COVID-19 complications to tasks/settings that reduce risk of exposure, including back-filling arrangements to support continuity of essential health care services, while releasing other health care workers less at risk to provide care for patients with the virus. To conserve PPE use, consider changing traditional medication frequencies and dosages for patients where possible, and visits to non-acute COVID-19 patients can be reduced with health care workers checking up on them using mobile phones.

Take care of mental health needs of frontline health workers. Ensure appropriate hours and enforced rest periods. Consider putting in place optional accommodation arrangements for hospital-based health care workers to reduce time spent travelling to/from home and protect health workers' families from indirect exposure. Identify domestic support measures for health care workers (e.g. travel, childcare, care of ill or disabled family members, with provisions for young families where both parents are health workers) that could enhance staff flexibility for shiftwork. Develop a "buddy system" so that staff always have a colleague with whom they can talk frankly and share concerns, and set up a dedicated mental health hotline for health care workers and given the strain on hospital-based workers in particular, potentially established dedicated on-site counselling services for staff – social and mental health care workers or advisers from civil society and other bodies can help here.

²⁵ Diamond MB, Woskie L. Covid-19: Protecting frontline healthcare workers—what lessons can we learn from Ebola? BMJ Opin. 25 March 2020. (<https://blogs.bmj.com/bmj/2020/03/25/healthcare-workforce-safety-and-ebola-in-the-context-of-covid-19/>, accessed 3 April 2020).

Table 4. Early country experiences to create surge capacity (as of 25 March 2020): Staff

- Relaxing or modifying hiring procedures to quickly recruit health professionals which includes: 1) allowing final year medical and nursing students to enter practice early (including medical doctors training to become specialists); 2) recruiting retired health professionals in low-risk settings; 3) mobilizing and recruiting all health professionals from the military forces. (DEN, ITA, POR, SPA, UNK; point 1 planned in RUS).
- Establishing a “Corona Job Bank”, or equivalent, for volunteers across health and social sectors, and other areas of infrastructure and support (DEN).
- Eliminating legal boundaries to overtime maximum volume (POR) and cancelling or modifying entitlements for vacations, permits, maximum working hours and rests, and leave for training (KAZ, POR, SPA).
- Training and repurposing the health workforce whose regular health care activities have been cancelled to join different aspects of the COVID response, depending on already existing skills and training capacities (DEN, SPA, UNK).
- Develop specific phonedlines and digital interfaces to support medical COVID-19 diagnoses for occupational risk support (eg. psychological and infection) (POR).
- Relocating health professionals across regions according to health care needs (on a voluntary basis in ITA; planned in SPA).

Strategic action 3. Ensure adequate supplies to support surge in demand

Identify and resolve supply chain bottlenecks through whole-of-government solutions to address shortages and logistic challenges in the supply of medicines and technologies for both COVID-19 and essential health services. There may be supply chain problems for essential medicines and health technologies due to the slowdown of production and bottlenecks in the distribution processes. Some countries are banning parallel export and putting restrictions on exports by national manufacturers – this is limiting the availability of products available for procurement and may put existing contracts at risk. One option is to regulate and promote local production of supplies with quality controls. Hand sanitizers,²⁶ cleaning and surface disinfectant products, can be produced by alcoholic beverage companies, laboratories, community and hospital pharmacies. PPE can be produced by textile and plastic producing companies. Car manufacturers have been repurposed to produce and repair mechanical ventilators with the support of various industries and 3D printing.

Ensure that emergency mechanisms for procurement, registration and accurate stock management are in place. To assure flexibility and acquisition clarity, more straightforward procurement procedures are needed. Transparency and accountability countermeasures should also be enacted to reduce risk of misconduct and corruption. Also, quality control mechanisms should be in place to avoid counterfeiting and low-quality products. It remains that case that all medicines and health products supplied during an emergency should comply with the existing national quality standards. Where capacity is limited, it is acceptable if products can be demonstrated to comply with external quality standards. WHO provides additional and specific guidance to the National Regulatory Authorities

²⁶ WHO. Guide to local production: WHO-recommended handrub formulations. Geneva: World Health Organization; 2020. (https://www.who.int/gpsc/5may/Guide_to_Local_Production.pdf, accessed 3 April 2020).

(NRAs) of non-vaccine-producing countries when dealing with pandemic influenza emergencies; these guidelines can be expanded for all medicines (including vaccines) and health technologies in the case of an emergency situation.²⁷ To avoid individual hoarding and price-gouging, some countries have moved for central procurement to assure a nationwide supply chain. Allow that each institution has their own procurement procedure but ensure coordination of processes to mitigate potential overpricing and unequal distribution of goods.

Assure that products comply with the technical specifications. Even though different solutions can be found to produce the supplies needed, technical specifications need to be followed. Specific products²⁸ for emergencies should be procured following minimum quality standards, and should follow WHO technical specifications developed for COVID-19. WHO has developed technical specifications for medical devices to be used for the COVID-19 response²⁹ and other online tools exist to evaluate medical products available to order.³⁰ Medicines procured for COVID-19 should be aligned with the WHO clinical management guidance for severe acute respiratory infection when COVID-19 is suspected.³¹ WHO has received multiple reports regarding falsified in vitro diagnostics and laboratory reagents for the detection of SARS-CoV-2. For a list of diagnostics approved for clinical use, WHO,³² Australia³³ and the United States³⁴ have listings. With regard to oxygen therapy devices, please follow WHO-UNICEF technical specifications and guidance.³⁵ Safe blood supplies are also crucial and WHO has provided interim guidance on blood supply management in response to the pandemic.³⁶

Define criteria for the usage of particularly scarce supplies and promote their application. The rational use of supplies is required to avoid wasting resources. WHO has issued guidance on the rational use of PPE equipment.³⁷

27 WHO. Guidelines on regulatory preparedness for provision of marketing authorization of human pandemic influenza vaccines in non-vaccine-producing countries. WHO Expert Committee on Biological Standardization, Sixty-seventh Report. WHO Tech Rep Ser. 2017;1004:Annex 7. (https://www.who.int/biologicals/WHO_TRS_1004_web.pdf?ua=1, accessed 3 April 2020).

28 COVID-19 disease commodity package: WHO. Disease commodity package – novel coronavirus (COVID-19). Geneva: World Health Organization; 2020 ([https://www.who.int/publications-detail/disease-commodity-package--novel-coronavirus-\(ncov\)](https://www.who.int/publications-detail/disease-commodity-package--novel-coronavirus-(ncov)), accessed 3 April 2020).

29 WHO. Disease commodity packages. In: WHO/Emergencies [website]. Geneva: World Health Organization; 2020. (<https://www.who.int/emergencies/what-we-do/prevention-readiness/disease-commodity-packages/en/>, accessed 3 April 2020).

30 iplusolutions. Taster on quantification of medicines and health. In: iplusolutions/Courses [website]. iplusacademy. (www.iplusacademy.org/course/view.php?id=98, accessed 3 April 2020).

31 WHO. Clinical management of severe acute respiratory infection when COVID-19 is suspected. Geneva: World Health Organization; 2020. ([https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-severe-acute-respiratory-infection-when-novel-coronavirus-(ncov)-infection-is-suspected), accessed 3 April 2020).

32 FIND. COVID-19 diagnostics. In: FIND/Covid-19. Geneva: Find. (<https://www.finddx.org/covid-19/>, accessed 3 April 2020).

33 Therapeutic Goods Administration. COVID-19 test kits included on the Australian Register of Therapeutic Goods (ARTG) for legal supply in Australia. In: Therapeutic Goods Administration/News room [website]. Canberra: Therapeutic Goods Administration. (<https://www.tga.gov.au/covid-19-test-kits-included-artg-legal-supply-australia>, accessed 3 April 2020).

34 US FDA. Emergency use authorizations. In: US FD/Medical devices [website]. Maryland: FDA. (<https://www.fda.gov/medical-devices/emergency-situations-medical-devices/emergency-use-authorizations#covid19ivd>, accessed 3 April 2020).

35 WHO. WHO-UNICEF technical specifications and guidance for oxygen therapy devices. Geneva: World Health Organization; 2019. (https://www.who.int/medical_devices/publications/tech_specs_oxygen_therapy_devices/en/, accessed 3 April 2020).

36 WHO. Maintaining a safe and adequate blood supply during the pandemic outbreak of coronavirus disease (COVID-19). Geneva: World Health Organization; 2020. ([https://www.who.int/publications-detail/maintaining-a-safe-and-adequate-blood-supply-during-the-pandemic-outbreak-of-coronavirus-disease-\(covid-19\)](https://www.who.int/publications-detail/maintaining-a-safe-and-adequate-blood-supply-during-the-pandemic-outbreak-of-coronavirus-disease-(covid-19)), accessed 3 April 2020).

37 WHO. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). Geneva: World Health Organization; 2020. (https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPE_use-2020.1-eng.pdf, accessed 3 April 2020).

Table 5. Early country experiences to create surge capacity (as of 25 March 2020): Supplies

- Centralizing purchase and supply of medicines and medical products and, if needed, establishing a set of prioritization criteria for its prescription (ITA, SPA).
- Repurposing national industry for self-production of medical products and protective devices (ITA, POR, SPA, UNK).
- Repurposing military-owned chemical industry to produce disinfectant and other goods/devices as needed (ITA, POR).
- Commanding military pharmacies (if needed) to prepare medical products or drugs of common use that may be unavailable in pharmacies (POR, SPA).
- Proactively putting out calls to private companies who are able to make products deemed essential for the response (e.g. diagnostics, PPE, soap and spirit sanitizers etc.) or setting up online facilities where companies can sign-up to indicate what they can produce (DEN).
- Suspending compliance on a time-limited basis, with high-quality standards for necessary goods, such as protection masks, providing they comply with medical safety standards (ITA), or relaxing public procurement laws and procedures (POR, UKR) to allow for fast acquisition of such goods.
- Empowering drug authorities to set the prices of drugs and medical products that are not subject to medical prescription, as well as for other products that may be needed for health protection (SPA).
- Establishing national/regional reserve stocks for medicines and PPE (POR).
- Establishing limits on the prescribed and over-the-counter medicines that patients can retrieve from pharmacies, based on the patient's previous (usual) consumption patterns (DEN).
- Obliging all companies that produce or may have stocks of relevant goods for the COVID response to notify the levels of these stocks to central government (SPA).
- Renegotiate and redefine cleaning and security services contracts (POR).
- Local production of handrub in the community and hospital pharmacies (FRA, SPA).
- Production of disinfectants in perfume factories (FRA, ITA).

Strategic action 4. Systems to manage and align policies to meet surge in demand

Plan and define clearly the chain of command at national, regional and institutional levels to activate surge capacity. At each level, a crisis coordination team should be appointed to develop and manage the acute and intensive care surge plan, as an integral part of the overall national governance of the COVID-19 response. Recruitment of adequate leadership is critical. Leadership ability, clinical, technical, institutional and network knowledge are skills that should be considered, as well as total availability. Surge coordination teams should centralize all the clinical and logistics information, preferably within a dashboard. An important role for the surge coordination team is the coordination of regionwide capacity planning and management: since different localities may experience surges at different times, regional and national coordination efforts can redistribute patients or staff to manage capacities and to give overstretched services some relief. Likewise, coordination teams can redistribute available or purchased diagnostic tests, PPE or ventilators, according to health care needs across or within regions. Coordination teams should communicate and be permanently available to different coordination areas, and, ideally, promote daily briefings incorporating feedback and amending the contingency plan.

Develop internal management arrangements at facility level. Hospitals and other large health care providers will need an internal incident management team functioning 7 days a week and which has strong links to other providers, local authorities and, where relevant, regional government. These teams are key to speeding up information sharing and decision-making, and can comprise professionals from all medical specialties involved in the COVID response, such as emergency units, ambulance services, internal medicine, intensive medicine, microbiology, preventive medicine, occupational health or geriatric departments. Understanding that difficult choices need to be, and are being, made in hospitals in many countries, specifically regarding the provision of ICU treatment, consider establishing local ethics committees to either complement or else take the place of any guidance from a higher level. This is important to ensuring that individual health care workers are not making these decisions on their own. Strengthening downstream communication with primary care and social care providers is critical in order to support optimized service delivery modalities. So, too, is it necessary to ensure that patients' families are informed.

Rapidly adjust purchasing arrangements to enable activation of surge capacity. The existing provider contracting and payment mechanisms will need to be quickly reviewed and adjusted to create supportive financial environment for providers. Greater financial flexibility across all care settings enables providers to rapidly re-profile services, initiate new service modalities (e.g. remote work solutions) and to manage stock-outs of key supplies. Contracting private sector providers should be considered to increase surge capacity to maximum. Retrospective volume-related payment methods (case-based, fee-for service) and contracts should be replaced temporarily with prospective payments (salaries, budgets, capitation), and adequate pre-funding to frontline providers should be granted to support timely preparations. Payments should cover necessary costs without making profits to secure the financial sustainability of the response. Proof of expenses should be required from providers without adding an unnecessary administrative burden to ensure transparency for public spending.

Activate surge capacity for the generation, approval and roll-out of any essential evidence to guide clinical management. This requires a dedicated team, regulatory oversight and good data management. Good oversight is key to ensuring that this is part of any surge capacity response and planning. This also includes ensuring that ethical issues are given due consideration in any potential clinical trials

undertaken during the emergency as part of the response; for example the Randomised Evaluation of COVID-19 thERapY (RECOVERY) trial in the the United Kingdom (UK)³⁸ or the Health Research Board of Ireland clinical trial for COVID-19 positive patients in ICUs.³⁹

Support providers to adjust priority-setting amid difficult decisions. In the advanced phase of community transmission, ICUs may be saturated and the usual standards of care may no longer be realistic. Given current and projected case numbers, there are already insufficient numbers of ICU beds and medical equipment in many settings. In the case of respiratory equipment, it is not just the absolute numbers, but the fact that some COVID-19 patients require weeks of ventilation support where in other cases support would be for a more limited time. Based on their availability in the United States, estimates suggest that a single ventilator will need to serve between 1.4–31 patients.⁴⁰

It is essential to support health care providers in any difficult clinical decisions they need to make in these situations, whether on a single patient basis or more collectively. Frontline health care workers must be supported when having to prepare and trigger revised guidelines and clinical decision criteria for prioritizing scarce resources in the advanced phases of community transmission. The professional associations of intensive care staff can provide helpful general guidelines on prioritizing admission criteria, with each facility adjusting to its own stage of saturation, as exists in Italy,⁴¹ Spain⁴² and the UK. This may involve setting up stricter criteria for ICU admissions using objective criteria. Adequate protocols should be also available for limiting life support treatment, which may require support from hospital's health care ethics committees. Finally, existing recommendations for exclusion criteria in the event of mass casualty events can be also revised and applied in case of oversaturation. Fundamental disaster management protocols can be considered by clinical managers to adapt to the surge.

Finally, health systems policies introduced for any of these areas must be flexible. The COVID-19 pandemic is not static, neither in terms of the disease itself nor the health systems actions which it necessitates. Ongoing problem-solving and quickly adaptable system dynamics will therefore be key to effectively managing surge capacity in all contexts.

³⁸ University of Oxford. Recovery: Randomised evaluation of COVID-19 therapy [website]. Oxford: University of Oxford; 2020. (<https://www.recoverytrial.net>, accessed 3 April 2020).

³⁹ Health Research Board. Ireland to participate in global clinical trial for Covid-19. In HRB/News [website]. Dublin: HRB. (<https://www.hrb.ie/news/covid-19-coronavirus/coronavirus-news/article/ireland-to-participate-in-global-clinical-trial-for-covid-19/>, accessed 3 April 2020).

⁴⁰ Truog RD, Mitchell C, Dalay GQ. The toughest triage – allocating ventilators in a pandemic. *N Engl J Med*. 23 March 2020. doi: 10.1056/NEJMp2005689. [Epub]. (<https://www.nejm.org/doi/pdf/10.1056/NEJMp2005689>, accessed 3 April 2020).

⁴¹ SIAARTI. COVID-19 – Strumenti per gli anestesisti-rianimatori. In: SIAARTI/News [website]. Rome: SIAARTI (<http://www.siaarti.it/News/COVID19%20-%20documenti%20SIAARTI.aspx>, accessed 3 April 2020).

⁴² Semiyuc. *Plan de contingencia para los servicios de medicina intensiva frente a la pandemia COVID-19*. Madrid: Semiyuc; 2020. (<https://semicyuc.org/wp-content/uploads/2020/03/Plan-Contingencia-COVID-19.pdf>, accessed 3 April 2020).

Table 6. Early country experiences to create surge capacity (as of 25 March 2020): Systems

- Establishing regional coordination of capacity (POR, SPA, UNK). In Spain, regional coordination committees have been established, chaired by the regional ministers of health and comprising representatives from different medical specialties including emergency units, ambulance service, internal medicine, intensive medicine, primary care, microbiology, preventive medicine, occupational health and geriatric departments.
- Establishing a coordination mechanism led by the central state (Civil Protection) to consult the regional governments on their regional needs (ITA).
- Putting all public administration civil health authorities across the national territory under the direct command of the Minister of Health, while keeping management and coordination functions at the regional level (SPA).
- Establishing emergency purchasing arrangements, such as allowing regions to make contracts with private hospitals that do not have accreditation with the NHS (ITA).
- Establishing emergency governance arrangements to take over staff and equipment of private health services (ITA) or take over management of private health services (POR, SPA)
- Developing COVID-19 ICU networks to manage the surge of patients requiring critical care and establishing a single coordination command for public and the private health systems which entailed creating a centralized function (ITA, SPA).
- Developing a hierarchical and graded hospital network for the first COVID-19 cases, and following this with selected hospitals or buildings which have been dedicated to COVID-19 (POR).
- Establishing a working group in every hospital (public or private) which included representatives of all relevant medical specialties to speed up decision-making and information sharing (SPA).
- Obliging regional health authorities to share with the Ministry of Health (on a daily basis) a set of epidemiological, health care capacity (ICUs, reanimation units, admitted patients) and human resource (numbers of intensive medicine doctors and anaesthesiology and resuscitation specialists, including 4th and 5th year resident doctors) indicators, as well as their needs for masks and diagnostic kits, by filling in a specific table (SPA).

WHO Regional Office for Europe

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