

Specialty guides for patient management during the coronavirus pandemic

Clinical guide for the management of surge during the Coronavirus pandemic: critical care rapid learning

16 May 2020, version 3 (updates to version 2, published 12 April, highlighted in yellow)

The majority of patients recover from coronavirus infection following an uncomplicated clinical course. However, a small but significant number will deteriorate due to a rapidly evolving respiratory disease. Because of the high infectivity of this virus and the scale of the population at risk, this can result in surges of patients presenting at hospitals over a short period of time. The rate and number of patients associated with these surges can significantly challenge hospital capacity. A number of NHS England hospitals have already experienced a surge of this type and we must rapidly learn from their experience.

Every hospital has a unique service configuration, geographical and population context. This document describes some of the challenges faced by critical care units in surge and shares the experiences, innovations and adaptations that have been employed to mitigate those challenges. These may be useful in informing preparations in other hospitals and healthcare facilities.

This is a live document and will be routinely updated. Please send any comments or local insight to england.rapid-learning@nhs.net.

Key learning points

- **COVID-19 surge** can be extremely rapid. The rate of increase in critical care admissions can significantly challenge capacity of an ICU within a 48-72hr period. Not all hospitals in a region will surge at the same time. There will be great geographical variation.

- **Expansion of critical care capacity** depends on many factors beyond ventilator and bed capacity. These include staff skill mix, staff absence, training and ancillary equipment (eg syringe drivers, patient monitors).
- **Critical care nursing workforce capacity** needs to be increased to meet demands of critical care expansion using [principles for increasing the nursing workforce](#). **This is often the main factor to limiting the effective expansion of critical care capacity during a surge.**
- **CPAP** use can be utilised in early patient management. Further information is available in [Guidance for the role and use of non-invasive respiratory support in adult patients with coronavirus \(confirmed or suspected\)](#).
- **Proning** patients early in medical management both on the ward and in critical care may reduce the requirement for more aggressive respiratory support.
- **Oxygen delivery** within a hospital will be under strain due to increased demand during a surge. Prior planning with the hospital estates department is crucial to prevent shortages. Please see the CAS-MHRA alert on [oxygen usage](#).
- **Oxygen consumption** varies according to clinical use and is important to monitor as the provision of respiratory support increases during a surge. On average, a standard face mask uses 5 l/min; a formal ICU ventilator 10 l/min; and standard CPAP/NIV can use 40-60 l/min. Please see the CAS-MHRA alert on [use of high flow oxygen therapy devices](#).
- **Increased demand for medications and equipment** during a surge can lead to unexpected shortages of anaesthetic drugs and consumables such as ET tubes, syringe drivers, central line insertion kits. Guidance is available on alternative drug usage in [anaesthetics](#) and [critical care medicine](#).
- **Extensive training** in COVID-19 procedures is needed before surge and can be achieved through online resources, simulation and hands on drills. This includes the performance of anaesthetic induction, donning and doffing of personal protective equipment (PPE) and intra-hospital patient transfer.
- **Regional emergency preparedness response and resilience (EPRR)** teams are key to assisting hospitals in the management of acute surge. Clinicians and managers should understand how and when to communicate with and escalate concerns to EPRR. Begin dialogue with regional EPRR before the consequences of surge begin to limit the capacity of the hospital to deliver care.
- **Early warning triggers** to help anticipate the consequences of surge should be put in place. This allows the hospital to recognise impending difficulty and provides an opportunity to begin dialogue with EPRR **before** staffing issues become impossible to manage or equipment and consumables have been exhausted.

- **Early dialogue** in the face of COVID-19 surge is useful. It gives time for an appropriately tailored responses to be put in place. These might include equipment resupply, temporary ambulance diversion and interhospital transfer to decompress the intensive care capacity.
- **Interhospital transfers** to other hospitals in the same critical care network can reduce the impact of the peak of the surge. Ensure that inter-hospital transfer networks are properly established and reinforced.
- **Retrieval of COVID-19 patients** should ideally be performed by staff from the receiving – rather than the originating – hospitals.
- **An in-reach system** may be useful. Where acute surge acutely challenges the local availability of anaesthetic and intensive care staff, temporary assistance using staff from neighbouring hospitals may help to manage immediate surge.
- **Patterns of work and staff absences:** rotas need substantial revision, in terms of pattern and intensity, to deal with acute COVID-19 surge.
- **Supporting staff is essential.** Consider the following:
 - Placing more senior staff on night shifts to lead key decision making in patient care.
 - Provide a forum for all staff to ask questions (particularly redeployed staff).
 - Psychological support for all [critical care](#) staff.
 - Recognise that the work pace will be slower (lower turnaround of patients).
 - More time is required for tasks; moving between patients and rooms, getting dressed/undressed in PPE.
 - Address issues around limited capacity for staff showers, locker rooms and break rooms.
 - Maintain confidence of the workforce through due attention to PPE supply, as well as training and procedures for doffing and donning.

Workforce reorganisation

Challenge	Change
<p>Principle: Flexibility and skill mix need consideration: see published guidance on staffing framework for adult critical care and principles for increasing the nursing workforce.</p>	
<p>Workforce reorganisation</p> <p>Capacity will be limited by staff absence due to illness</p>	<ul style="list-style-type: none"> • Converting all shifts to long day or night shifts. • Increase flexibility in rota. • Stratify potential trust staff to redeploy into critical care based on competency (for example, using postgraduate department) to expand workforce. • Employ any extra staff on rolling/ short-term contracts not locums to provide job security and rota predictability. • Trainee-led rota design to get buy-in. • It is vital to manage staff expectations for redeployment and provide adequate pastoral support. • Clinical staff who are otherwise not being used in delivery of patient care may be utilised in a supporting role to the nursing workforce. This needs to be agreed by the relevant responsible manager (Educational Supervisor, Consultant or Line Manager) to ensure it is appropriate in the context of overall hospital strategy. • Consider the role that staff who are unable to have patient contact could play in supporting staff remotely.
<p>Leadership and teams</p>	<ul style="list-style-type: none"> • Lead co-ordinators of medical, nursing and AHP teams without direct responsibility for patient care can facilitate the effective management of an expanded critical care unit during a surge. • Team based rotas encourage staff familiarity, continuity of working practices and increase workforce resilience.

Resource management

Challenge	Change
<p>Principle: Utilisation of hospital facilities to accommodate increasing numbers of patients requiring mechanical ventilation and NIV needs to take into account local resources and regional escalation pathways.</p>	
<p>Expansion of critical care capacity</p>	<ul style="list-style-type: none"> • A surge of COVID-19 patients will require rapid expansion of critical care capacity. • Conversion of clinical areas into critical care bed spaces needs to consider the location of ward in hospital and the ability to extend into adjacent clinical areas. Further information regarding this can be found in the Estates and facilities standard operating procedure: COVID-19 ward for intubated patients. • Designated non-COVID-19 critical care areas need to be maintained and have sufficient segregation from COVID-19 patients to prevent nosocomial transmission.
<p>Resource allocation and supply</p>	<ul style="list-style-type: none"> • Oxygen delivery within a hospital will be strained during a surge primarily due to the substantially increased proportion of patients requiring supplemental oxygen, and increased CPAP and ventilation activity. Preparation for increasing provisions in collaboration with the estates department is essential to prevent shortages during a surge. CAS-MHRA alerts have been issued on oxygen usage and use of high flow oxygen therapy devices.

Clinical process

Challenge	Change
<p>Principles: Spread burden of work, efficiently use resources, draw on prior expertise of staff and reduce of exposure to contamination. Processes must be adapted for local practice.</p>	
<p>Teams-based approaches See published guidance on staffing framework for adult critical care</p>	<p>Designated teams drawing on competencies of the expanded workforce for specific phases of care can streamline these processes:</p> <ul style="list-style-type: none"> • Emergency intubation teams using anaesthetic staff • Proning teams using surgeons and theatre staff

	<ul style="list-style-type: none"> • Transfer teams traditionally using a senior anaesthetist and ICU nurse
Organisation of care delivery	<ul style="list-style-type: none"> • Protocols that are locally devised for COVID-19 will increase efficiency in critical care practice (eg ward round proformas, weaning protocols, prescription bundles). • Cohorting patients according to stage of disease can assist critical care management and aid decision making.
Locations	Some teams have decided to use the theatre environment as a place to perform procedures and store equipment before deciding where further care is to be delivered.
Communication with relatives	<ul style="list-style-type: none"> • Process of regular phone updates (usually daily) to named relative who disseminates information to the rest of the family. • Staff allocated to the conversation depending on complexity and appropriateness: can be doctor or nurse. • Family relationship teams comprised of senior non-critical care medical staff have been utilised successfully. Robust channels of communication between these teams and the clinical care staff ensures an accurate message regarding patient status is conveyed and enables a compassionate means of communication with relatives.

Equipment

Challenge	Change
<p>Principles: Existing resources must be optimally utilised to meet demand. Innovative and flexible use of equipment may be required to achieve this whilst maintaining patient safety. However, if potential equipment shortages are identified, this should be escalated early to the region and if necessary to the National Loan Programme.</p>	
Intubation teams	<ul style="list-style-type: none"> • All necessary equipment in single grab bags/kits. • Use of disposable grab bags. • Pre-loading an endotracheal tube onto a bougie to reduce apnoea time.

Ventilation	<ul style="list-style-type: none"> • Maximise existing capacity. • Play to the existing strengths of staff <ul style="list-style-type: none"> – Considering what theatre and critical care staff are used to doing (familiarity with ventilators, managing infusions) and separating tasks accordingly. • Innovative use of resource: <ul style="list-style-type: none"> – Using CPAP where appropriate in COVID 19 patient management. – Proning patients early in management may reduce the requirement for higher ventilatory settings. Using anaesthetic theatre machines for ventilating patients (Note: need to understand limitations of machines, for example, not designed for weaning of patients and may not deliver PEEP). – To meet increased demand for CPAP capacity, can utilise BiPAP machines with supplemental oxygen in non-acute phase, particularly for ventilatory weaning.
Renal replacement therapy and other equipment	<ul style="list-style-type: none"> • 20% of critical care COVID-19 patients require renal replacement therapy. This can place strain on the availability of haemofiltration devices and their associated consumables. However, clinical staff must be cautious of off label modifications of haemofiltration devices that may cause patient harm. • To meet increased demand and prevent shortages of pumps/syringe drivers consider: <ul style="list-style-type: none"> – Mixing anaesthetic medications (eg morphine and midazolam) into single syringe using protocols created in collaboration with pharmacy. – Using alternative administration routes (eg nasogastric delivery of electrolytes, intradermal insulin injections)

Personal protective equipment (PPE)

Challenge	Change
Principle: Create a single local message based upon the most recent PHE guide and teach principles rather than strict procedures.	
Multiple resources specific to multiple variants of equipment creates multiple versions of the truth	<ul style="list-style-type: none"> • Create a single, locally-specific message that is specific to the equipment you have available. This instils confidence in staff and ensures safety and efficient use of equipment. Staff are neither over, nor under, protected. • Teach the basic principles (rather than a strict procedure) of avoiding self-contamination with local PPE, allowing staff to modify their technique allowing for 'real life' scenarios, for example glove-breaking.
FIT testing a large number of staff in a short time	<ul style="list-style-type: none"> • Requires flexibility and goodwill on behalf of health and safety team. • Train critical care and theatre senior staff to FIT test. • Ensure FIT testing strategy takes account of current and predicted stock levels of masks, and prioritises critical care staff, anaesthetists, A&E staff and arrest teams.

Training

Challenge	Change
Principles: Training takes time and therefore should commence as long as possible before clinical need increases.	
Simulation training is essential but time and resource consuming	<ul style="list-style-type: none"> • Preserve equipment during training due to limited resource. • Be flexible during simulation in roles to reflect real world environment.
Staff redeployed into unfamiliar roles	<ul style="list-style-type: none"> • Streamlined induction processes. • Buddy system at the start of redeployment and pastoral support system. • Refresher sessions and bespoke guidelines produced by critical care staff for those adapting to work in critical care environment.

Communication/information dissemination

Challenge	Change
<p>Principles: Efficient channelling of information to save time and create single version of truth. Specific streams of communication for particular areas.</p>	
<p>Information overload</p>	<ul style="list-style-type: none"> • Limit use of multiple email chains and consolidate information delivery through one channel. • Use of technology to streamline communication, for example: <ul style="list-style-type: none"> – Departmental Dropbox accounts – Publication of guidelines on apps, for example, Induction and Clinibee • Bespoke social media messaging groups for specific purposes.
<p>Documentation regarding patient management is very difficult to maintain accurately and keep up to date during a surge</p>	<ul style="list-style-type: none"> • Non-critical care clinicians can help co-ordinate documentation and administration tasks (eg make referrals to critical care network for transfers) and therefore free critical care staff for clinical work • Consider using medical students and foundation year 1 doctors to document onward rounds.
<p>Connection difficulties using bleep/mobile systems due to volume, connection or answering in PPE</p>	<ul style="list-style-type: none"> • Intensive care DECT/WIFI phones or walkie talkies which can be heard while in PPE.

Wellbeing

Challenge	Innovation
<p>Principles: Ensure the health and wellbeing of staff is a priority. Provide the resources staff need to develop their own local solutions.</p>	

<p>Ensuring adequate rest facilities exist</p>	<ul style="list-style-type: none"> • Modify existing areas which are unsuitable for inpatients, for example, elective pre-assessment areas due to lack of piped oxygen, into areas for rest. • Tired staff are at more risk of PPE failure. • Tired staff removing PPE at the end of a long shift is a particularly risky moment. Can be assisted by buddying with colleagues, or staff member responsible to oversee the process for colleagues
<p>PPE hinders hydration and nutrition</p>	<ul style="list-style-type: none"> • Dedicated wellbeing area which provides privacy, food, hot drinks, toiletries, and access to psychological first aid and mindfulness apps.
<p>Psychological strain</p>	<ul style="list-style-type: none"> • Wellbeing hubs supported by hospital staff that are used to providing emotional support (eg cancer support teams, chaplaincy) • Make psychological support available to staff.

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