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Specialty guides for patient management during the coronavirus pandemic

Clinical guide for the management of critical care patients during the coronavirus pandemic

16 March 2020 Version 1

As the UK enters the 'Delay' phase of the coronavirus pandemic, hospitals can take action to prepare for super-surge capacity and the peak in demand for invasive mechanical ventilation.

Operational and clinical guidance are outlined below.

Operational		
Develop an operational delivery team combining expertise from the clinical multidisciplinary team (MDT) and site management team		
Oxygen	*	Assessment should be made of the number of outlets that can be simultaneously supported by the VIE, and the location of those outlets.
	*	The hospital engineering team can determine the flow rates that can be achieved, and types of ventilator supported.
	*	Ensure any portable oxygen concentrator capacity is ready for use in wards or high dependency units.
	*	Communicate to all staff about the requirement to reduce oxygen consumption through avoiding hyperoxia and eliminating waste.
	*	Cylinders are unlikely to be able to sustain an efficient supply of oxygen for ventilation; however all cylinders should be located and filled to facilitate transfers and emergency use.
Air	*	Assessment of the piped air supply, number of outlets and location
	*	Note that portable ICU ventilators will not require a piped air supply
Power	*	Assessment of the power supply and maximum number of devices that can be supported in a sustained manner

Ventilators	*	Ensure all ventilators are operational, including those in ICU, portable machines, anaesthetic machines and any in storage
	*	Work through any outlet: ventilator gap based on maximum calculated capacity and liaise with procurement through the NHS Supply Chain
Equipment	*	Identify the equipment gap for maximum proposed capacity, e.g. critical care beds, infusion pumps, multi-channel monitors, feed pumps, suction machines, bowel management systems, haemofilters, blood gas analysers, line insertion ultrasound machines, bedside trolleys, consumables, resuscitation trolleys and difficult airway trolleys
	*	Identify any equipment that can be relocated from non-critical care areas, e.g. wards and recovery, and house in a single site which is known to senior nursing and medical staff
	*	Use the NHS supply chain to procure further equipment as required
Staff	*	Identify availability and expertise in staffing groups allied to critical care, e.g. anaesthesia, surgical & medical specialties, specialist nursing, ex-critical care staff, rotating junior doctors
	*	Redeploy those within practice development, audit, research and training or mentorship roles to clinical duties where appropriate
	*	Redeploy clinicians with non-essential managerial roles
	*	Consider reorganising team-working and patient management predicated on relevant skills and expertise than on seniority
	*	Staff groups with critical care expertise may need to move to supervisory roles rather than bedside clinical care
	*	Institute top-up training in core skills (ventilation, sedation, nutrition, antimicrobial policies, VTE avoidance, anticoagulation and transfusion policies, and investigation panels) with the support of local e-solutions with brief protocols and clinical information summary sheets
	*	Institute leads for redeployment and rostering
	*	Any staff member can assist with moving equipment, restocking units, resupplying bed areas and completing administrative tasks
Mobile emergency rapid intubating team	*	In addition to any critical care response or outreach team, develop a mobile emergency rapid intubating team (MERIT) which should include as a minimum an anaesthetist and operating department assistant or anaesthetic nurse
	*	It may be necessary to identify a fixed location in close proximity to any coronavirus confirmed cohort ward or emergency department for intubation and stabilisation
	*	Institute a low aerosol-generating intubation (see below), and extubation pathway
Team Communication & Working	*	Schedule regular short meetings with clinical team leaders to discuss operational issues
	*	Leadership in a crisis is stressful and demanding. Support each other
	*	

	*	Leadership must be shared – the clinical director alone cannot do everything!
	*	Encourage open dialogue from all members of the team, with a focus on problem-solving and pragmatic solutions
	*	Ensure strong support of physical and mental wellbeing, focusing on emotional support, nutrition, hydration and sleep
	*	Direct staff to occupational health protocols and develop a pathway for rapid testing for staff with suspected coronavirus prior to self-isolation
		Support staff who are in higher risk groups e.g. immune suppressed, with significant co-morbidities, or nearing retirement
Imaging	*	Liaise with the imaging team and provide details on the super-surge capacity
	*	Detail the proposed chest x-ray, cross-sectional imaging and ultrasound requirement
	*	IPC team to guide cleaning of contaminated bedside imaging equipment
	*	Cross-sectional imaging, if absolutely necessary, requires close liaison with the IPC team
Location	*	Conduct hospital walkrounds (medical, nursing, infection prevention control and engineering) to identify ward, theatre and recovery areas that can be used to cohort invasively ventilated patients
	*	Determine environmental ventilation specifications (neutral or positive pressure) and air circulation, oxygen and electricity to determine if able to cope with super-surge capacity
	*	Identify air handling exhaust location and if HEPA filtered
	*	Develop a roll-out capacity plan with a focus of cohorting patients to reduce risk of spread of infection
Elective activity	*	Early and prompt reduction in elective work, beginning with cases likely to require prolonged inpatient admission and/or critical care
	*	This will increase availability of staff members for training and redeployment
	*	If elective surgery continues limit to ASA-1 cases unless cancer or urgent
Transfer of patients from other hospital	*	Whilst elective activity is still ongoing, consider, where possible, testing for coronavirus prior to transfer
Medical Records	*	Work through an e-solution or paper solution for contemporaneous note taking and recording
	*	Work with the hospital IT team to develop
Pharmacy	*	Pharmacy leads should make assessments of medication requirements based on maximum surge critical care capacity
	*	Consideration should especially be given to sedatives, opioids, vasopressors, muscle relaxants, enteral feed, VTE and gastric ulcer prophylaxis, electrolyte supplementation, renal replacement fluids, diuretic agents and crystalloid fluids

	*	It may be necessary to consider bolus dosing of long-acting muscle relaxants and sedatives depending on maximum infusion pump availability
	*	Pharmacy leads should investigate and ensure supply chains of critical care medications to non-critical care areas
	*	Pharmacy leads should work through any e-solution or paper solution to a large expansion in critical care patients
	*	Pharmacy leads should be part of any oxygen operational delivery group which should include both static and mobile oxygen
Infection prevention and control	*	Infection prevention and control (IPC) leads should ensure appropriate controls are in place in areas repurposed for critical care
	*	Personal protective equipment (PPE) programmes of education and training utilising local intranet supported by rapid roll-out by IPC team, including a mask fit-testing programme
	*	The IPC team should be embedded into the operational delivery team and advise on all potential contaminating procedures
Isolation facilities	*	Review any isolation room (negative or neutral pressure) air handling functionality and operation in terms of pressures and air exchanges per hour, to ensure installation specifications are currently being met
Investigations	*	Devise daily laboratory investigation safe order sets designed to minimise number of samples, the range of tests and to eliminate any that are non-essential
	*	Consider increasing point of care testing if available
Access to patients	*	Restrict access to critical care areas for non-essential staff and any families or friends
	*	Discuss using mobile devices and video-calling with the local Caldicott Guardian, particularly on compassionate grounds during end-of-life processes
Procurement	*	Procurement leads should provide a simple procurement process for authorisation requests
Clinical		
Conservation of oxygen	*	Avoid hyperoxia in patients receiving supplemental oxygen
	*	Generally aim for SpO_2 92-96%, although the target may be lower in some patient groups
	*	Avoid high flow oxygen delivery devices (see below)
	*	Eliminate waste by ensuring oxygen flowmeters are switched off when not attached to patients
High Flow oxygen delivery devices	*	High Flow Nasal Oxygen or similar devices should be avoided. There is no survival benefit compared to conventional oxygen therapy, and the risk of environmental viral contamination may be higher

Non-invasive Ventilation devices	*	Use of CPAP or NIV should be confined to short periods using a well-fitting interface (full face mask or helmet) as a bridge to invasive mechanical ventilation
	*	For some patients, NIV will form the appropriate ceiling of care. In these cases, due to the risk of environmental viral contamination, it is preferable to deliver NIV in an isolated environment (negative or neutral pressure room)
	*	Use of NIV following extubation in the recovering patient should be informed by repeat testing of coronavirus status
	*	If possible, an antimicrobial filter should be located on the expiratory limb of any NIV device
Location	*	Negative pressure or neutral pressure room facilities are often limited in number. It may be necessary to cohort ventilated patients in areas on units and wards.
	*	Single occupancy rooms could be reserved for those receiving NIV (as above) or for non-coronavirus patients, or for those with suppressed or compromised immune systems
Endotracheal intubation	*	Follow intubation guidance from
	*	https://icmanaesthesiacoronavirus.org
	*	Intubation should be performed by a skilled operator wearing appropriate PPE for an aerosol-generating procedure (link to PHE)
		Development of MERIT (see above) with appropriate portable equipment, PPE and protocols is advised
Sedation	*	Follow established protocols for sedating critically ill patients with hypnotic infusions
	*	For patients ventilated on an anaesthetic machine, low dose (MAC 0.2– 0.5) inhalational anaesthesia may be used to maintain sedation with a volatile agent in a low-flow (circle) system
Ventilation	*	Ensure use of an antimicrobial filter within the circuit or placed on the expiratory limb or ventilator exhaust. Note that filters represent an airflow obstruction risk when saturated and routine exchange is advised
	*	Use in-line suction catheters where possible
	*	Avoid inadvertent ventilator circuit disconnections by ensuring all connections are ‘tight’
	*	Manual ventilation, or ‘hand-bagging’ is not advised
	*	Ensure the endotracheal tube is clamped during any planned circuit disconnection, eg switching between ventilators, replacing the antimicrobial filter, or inserting a bronchoscope into the tube
Management of ARDS	*	Follow established management guidelines including: - lung protective ventilation - conservative fluid management strategy - neuromuscular blockade - lung recruiting manoeuvres and ventilator modes (eg APRV)

Prone positioning	*	Recent experience with coronavirus in Italy suggests a beneficial response to prone positioning
	*	Utilising prone positioning to improve oxygenation is advised in patients failing conventional supine ventilation
	*	Development of a 'proning team' is advised to improve efficiency
Aerosol-generating procedures	*	AGPs such as intubation, facemask ventilation, circuit disconnection, bronchoscopy and physiotherapy may increase the risk of environmental viral contamination. Please see the PHE website for guidance on appropriate PPE (link)
	*	Nebulisers should be confined to use within a closed ventilator circuit
Corticosteroids	*	Routine high-dose corticosteroid use in coronavirus in not advised
	*	High-dose steroids appear to be associated with a worse outcome and prolonged viral shedding in patients with coronaviruses
	*	Low-dose steroids may be considered as part of a clinical trial
Cardiac arrest	*	Appropriate PPE must be worn as with aerosol-generating procedures (see above). Facemask ventilation should be avoided
	*	where possible
	*	Compression-only CPR is advised until airway-experienced personnel are available
	*	Use of an automated chest compression device may be used
	*	Early intubation by an experienced operator is advised
		The Resuscitation Council statement on coronavirus CPR can be found here
ECMO	*	Follow established guidance and thresholds for referral to the ECMO network
	*	Trials of PEEP recruitment, recruiting ventilator modes, eg APRV, and proning will be necessary prior to consideration for mechanical support
Patients receiving home mechanical ventilation	*	It may be necessary to quarantine the home ventilator and dispose of any consumable components
	*	To avoid aerosol generation and prevent droplet spread and minimise exhaled leak dispersion, a well-fitting facemask is advised
	*	Change the circuit if switching from a vented mask to a non-vented mask and an exhalation port
	*	Include an expiratory antimicrobial filter
	*	If long-term tracheostomy ventilation, the tracheostomy tube should be exchanged for a cuffed tube to reduce leak dispersion
	*	Patients should preferably be ventilated in an isolation room (as in NIV above)
	*	Employ a low threshold for conversion to invasive mechanical ventilation where appropriate
	*	Cough assist devices should be avoided
	*	Escalation of care discussion which may be now different from advanced directive

DNAR status and ceilings of care	*	Routine practice should include discussion and documentation of DNAR status and appropriate limits of effective therapy, on admission to the hospital
Well-being	*	Please try and ensure all team members are sufficiently rested, supported and have adequate breaks from clinical duty