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Letter to the Editor

Resuscitation during the COVID-19 pandemic: Lessons learnt from high-fidelity simulation

To the Editor

The coronavirus disease 2019 (COVID-19) pandemic has caused an unprecedented global healthcare crisis, creating challenges to resuscitative efforts. Cardio-pulmonary resuscitation (CPR) confers additional risks to healthcare workers due to exposure to aerosol generating procedures (AGPs) like chest compressions, face mask ventilation and intubation. The emergent and high-intensity situation may also result in lapses in infection control practices.[1] High-fidelity simulation sessions were conducted in our institution to identify latent threats in existing workflows, and to formulate modified life support protocols focusing on: protection of healthcare workers (HCW) and patients, minimizing aerosolization and reducing delays in resuscitation.

Sengkang General Hospital, one of Singapore's largest regional hospitals, comprises an acute care 1000-bedded facility and a 400-bedded community care hospital. Suspected or confirmed COVID-19 patients are managed in negative pressure, single-bedded rooms in the acute care hospital. In the community hospital, such patients are managed in cohort wards (4–6 bedded bays) with natural cross ventilation through large open windows. A single code blue team, based at the acute hospital, provides resuscitation services at both facilities. Due to geographical reasons, the mean (SD) code blue response time to the acute and community care wards were 3.28 (1.76) and 6.67 (2.06) min, respectively. These timings were validated from actual code blue events pre-COVID-19.

In simulations, we adhered to hospital and COVID-19 guidelines of full PPE (including N95 mask or powered air-purifying respirator (PAPR), gown, gloves, goggles and face shield or visor).[2] A donning and doffing supervisor, or a buddy system can reduce self-contamination amongst HCW.[3] The mean (SD) time taken by 19 HCW during simulations, for donning full PPE including CleanSpace®

Table 1 – Summary of our recommendations between acute and community hospitals.

	Acute care hospital	Community hospital
Set up	Isolation, negative pressure room	Cohorted ward with 4–6 beds
Physical barriers to reduce aerosolization and exposure	Placement of a non-porous sheet (e.g. plastic drape) or a wet gauze over the patient's mouth and nose	Waterproof shields/partitions to cordon off the resuscitation area and evacuate ambulant patients within the same area Placement of a non-porous sheet (e.g. plastic drape) or a wet gauze over the patient's mouth and nose
Limit staff present	Maximum of 5 HCW to minimize exposure; dedicated staff (with PPE) outside the room to render immediate assistance	
Donning & doffing of PPE	Buddy system or supervisor	
First responder	PPE including N95 (leave resus scene once CB team arrives)	PPE including PAPR
Second responder	PPE including PAPR	
Code blue team	Full PPE including PAPR	
CPR	Compression-only CPR till code blue team arrives	CPR including face mask or SAD ventilation till code blue team arrives
Intubation	Early intubation by experienced personnel using videolaryngoscope	
Equipment	Attachment of a HEPA filter to the resuscitation ventilator bag; capnography to confirm tracheal tube placement; use 2nd generation SAD if required	
Patient transfer	Clamp tracheal tube prior to disconnection; dedicated transport ventilator with appropriate filters attached	
Communication	Concise, closed-loop communication, especially via intercom	

CB, code blue; HCW, healthcare worker; HEPA, high efficiency particulate air; PAPR, powered air-purifying respiratory; PPE, personal protective equipment; SAD, supraglottic airway device

PAPR was 3.33 (0.73) min. Our timings were comparable to donning full PPE that included N95 mask, which were 3.28 (1.15) min.[4]

We identified two latent threats on two separate simulation sessions: (1) A participant, designated as the second responder, entered the resuscitation room without eye protection; (2) A participant tripped and fell while retrieving equipment, possibly contributed by impaired peripheral vision when wearing goggles. Learning points from these include adopting a buddy system for donning and doffing of PPE, removing hazardous items and ensuring adequate resuscitation space.

From our simulations in the community hospital where isolation facilities are unavailable, we observed that precautions to protect surrounding patients in the cohorted wards were required. These include use of waterproof shields or partitions to cordon off the resuscitation area, prompt evacuation of ambulant patients and minimizing aerosol generating procedures. Due to the potential delay in response times, manual ventilation via SAD[2] (preferred if HCW is trained and competent in SAD insertion) or a well-fitting mask with a good seal may be required prior to code blue team arrival. We summarized our recommendations for resuscitation in acute and community hospital settings in Table 1.

Frequent training and simulation sessions including PPE familiarization minimizes delays in resuscitation, reduces risk of viral transmission, enhances communication, teamwork and coordination, and allows latent threats identification and workflow refinement.

Conflicts of interest

None declared.

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Not applicable.

Author's contribution

WYL and PW: Conception of work, acquisition of data, drafting manuscript and revisions. LMT and VKH: Conception of work, acquisition of data, revision of manuscript.

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