

Reflections on Nursing Ingenuity During the COVID-19 Pandemic

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Abstract

INTRODUCTION: This reflections article provides insight toward nursing innovations to reduce the overuse of personal protective equipment while maintaining a safe environment for staff taking care of COVID-19 patients. The secondary aim of this paper to capitalize on recent advances in mass electronic communication through social media to encourage nurses across the globe to share their knowledge and expertise during this pandemic. **INNOVATIONS:** The many innovations that have been implemented fall into 3 categories of: reducing unnecessary use of personal protective equipment (PPE), promoting staff safety and readiness, and reducing foot traffic. **SUMMARY:** These strategies are being shared to promote dissemination of innovative nursing interventions that will save lives during the COVID-19 pandemic.

Introduction

This reflections article has two aims. The first aim is to share recent tips, tricks, modifications, and techniques that we have found useful during the COVID-19 pandemic. The second and perhaps more important aim is to facilitate the nursing communication network that is sharing the wealth of nursing knowledge and experience. During the COVID-19 pandemic the World Health Organization¹ has outlined a four-pronged strategy to 1) prepare and be ready; 2) detect, prevent, and treat; 3) reduce and suppress; and 4) innovate and improve. Registered Nurses (RNs) on the front-lines have been working for weeks with limited resources and they have been instrumental in all four prongs outlined by the WHO.

Nurses are innovative out of necessity; the phrase “where there’s a nurse around – there’s a work-around...” embodies that we find ways to improve the process of care at every opportunity.^{2,3} Florence Nightingale was born in 1820, and during her lifetime she revolutionized care by sharing nursing knowledge during a war.⁴ Through information dissemination and nursing actions, the spread of disease was reduced and lives were saved. 200 years later, during a pandemic, nurses are once again tasked to reduce contamination. A vital key to Nightingale’s success was her ability to disseminate her observations. Clearly, one truth is that there is no single intervention, modification, or tip that only one hospital in the world has discovered. Unique to 2020 is the rapidity through which these ideas can be shared.⁵

Innovations

The nursing response to COVID-19 can be summarized as strategies which are aimed to reduce the use of personal protective equipment (PPE); reduce transmission of the disease, and promote the readiness while maintaining a safe environment (Table 1). A short description of various innovations is provided in Table 2.

The COVID-10 pandemic has created a shortage of personal protective equipment (PPE) and **nurse-driven strategies aimed to reduce use of PPE** addresses the WHO need for preparedness, prevention, and innovation. Only by judicious use of resources can we extend the window of protection for front line staff. Improved staffing ratios has already been shown to reduce cost and outcomes.⁶⁻¹⁰ increasing the staffing ratio, clumping activities, and designating an RN to be a ‘runner’ and not be in an isolation room, enables that a nurse can stay in a COVID-19 room without the need to doff PPE to retrieve supplies or medications, nor overstock/oversupply the room. Videoconferencing and digital stethoscopes allow staff to assess the patient without being in the room (this is functionally similar to an RN in the room performing the NIHSS while the neurology team observes). In some cases the video link (secure) can be shared with family to further reduce foot traffic while facilitating family *virtual* presence.

Relocating equipment such as intravenous (IV) pumps, ventilator control panel, and the bed to facilitate the safe removal of equipment outside the room, all have the benefit of reducing the number of times an RN needs to go into the room (see Supplemental Digital Content 1, available at <http://links.lww.com/JNN/A252>). This reduces the unnecessary use of PPE and increasing staff safety. We found that relocating equipment had the downstream effect of

creating a tripping hazard (IV tubing) and also a risk that the tubing would kink and obstruct flow. An innovation and simple solution was to repurpose a urinary catheter stabilizing device (StatLock, CRBard inc) to secure the tubing to the patient and to an IV pole. This was further enhanced by a roll of tape (see Supplemental Digital Content 2, available at <http://links.lww.com/JNN/A253>) that prevents the IV tubing from occluding. This also ensures the IV extension tubing utilized does not touch the floor, reducing the risk of contamination.

Nurse-driven strategies aimed to promote staff safety and readiness. Readiness can be interpreted in many ways.¹¹ One can be ready (prepared) mentally and physically; or one can be willing (ready) to take action. Both are vital for successful response.¹² Having a designated space for staff to, eat, drink, and relax (even if only for a few minutes) is vital to preparedness. By creating a makeshift breakroom, we further reduce foot traffic while simultaneously promoting staff wellness. Staff ingenuity such as clumping activities and moving IV pumps outside the room helps decrease the risk of exposure. The use of a dedicated person to observe doffing (spotter) is vital; this person not only helps ensure the proper steps are followed in the proper order, but can act as a set of eyes to monitor for accidental exposure risk (e.g., the outside of the gown touches the RNs skin).

Additional visual cues are provided using dressing tape. Because rooms are being repurposed during high census, there are often rooms without ante room. Tape is placed to mark an area inside the room and 6 feet from the bed where the initial doffing (mask and face shield) takes place before the RN exits the room to another area outside the room (also marked by tape)

to finish the doffing procedure (see Supplemental Digital Content 3, available at <http://links.lww.com/JNN/A254>).

Nurse-driven strategies aimed to reduce foot traffic. Foot traffic refers to both the number of people who are entering an isolation room or an isolation ward, and also to the number of times the area is entered. This can be operationalized as the number of times any door is opened for passage and thereby increases the risk of contamination. As described earlier, adequate staffing to support a 1:1 or 2:1 ratio decreases the number of times a nurse needs to go in and out of a room. After engineering adjustments, the entire nurses station ventilation was adjusted to increase positive pressure while each patient room in the ward became negative flow. Designating a break area within the ward decreased the need for staff to leave the ward and further reduced door opening.

Protecting the environment of care does not end at the bedside and staff have tapped into their gaming skills to design new intra-hospital transport routes. In our hospital, there is 1 floor that has zero patients and wider than average hallways. Although this is a less direct route, patients with known or suspected COVID-19 are transported through this area to reduce the risk of exposure to other patients.

Summary

Nightingale was very likely not the first person to consider hand hygiene. And, her innovations, in themselves, were not revolutionary: don't put too many people in one room, clean and change dressings, circulate fresh air, etc. What Nightingale did that was revolutionary

was to share her ideas. Basing their work in large part on Nightingales' founding principles, Pope et al.¹³ described that as nurses we should become part of a cadre of professionals who are responsible for the dissemination of knowledge. We believe that if Florence had a Facebook or Twitter account, she would have been posting daily from the Crimean battlefield. During this worldwide event, we share our knowledge in the hopes that this will encourage other nurses to share their tips, their innovations, and their ingenuity.

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Supplemental Digital Content 2. PPE codebox and repurposed securement device on IV pole.

Supplemental Digital Content 3. Nurse and spotter coordinate care and communication.

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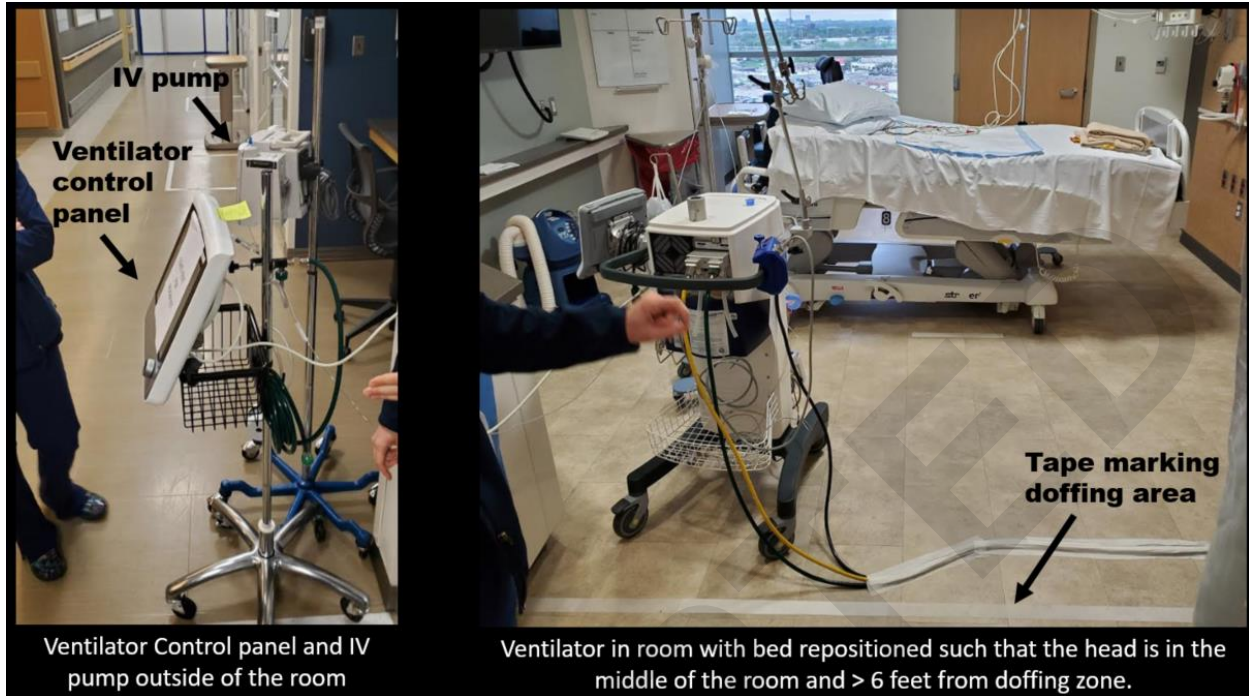
Table 1. Early innovations and actions implemented during COVID-19 pandemic

Innovation	Reduce use of PPE	Staff Safety and readiness	Reduce foot traffic
Improved staffing ratio	X	X	X
Runner	X	X	X
Clumping of activities	X	X	X
Mock-up rooms and practice items	X	X	
Ventilator control panel is outside the room	X	X	
IV pump outside room	X	X	
Use tape roll as IV tubing pivot point	X	X	
Stabilizing device to secure IV tubing	X	X	
Write on glass with dry erase marker	X	X	
Videoconferencing	X	X	X
Redefined roles for resuscitation	X	X	
Digital stethoscope	X		X
Reposition beds for ventilator management	X		
Relocating a break room nearer the COVID unit		X	X
Visually define clean vs dirty counter in room		X	
Tape on floor to denote 6 feet from bed		X	
Spotter for donning and doffing		X	
Negative Flow Ward		X	
Designated PPE code box for in-house exposure		X	

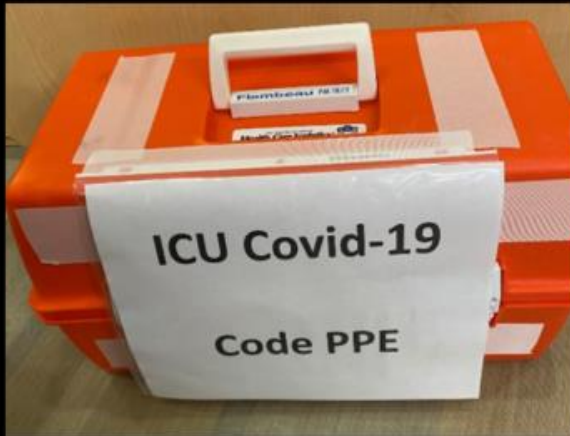
Table 2. Brief description of innovations.

Innovation	Brief description
Improved staffing ratio	Isolation patients are all 1:1
Runner	A nurse who is not assigned a patient is designated to help 2-3 other direct care nurses
Clumping of activities	Performing tasks at one time allows the patient to rest, but also reduces the number of times a nurse must enter the room.
Mock-up rooms and practice items	Provides a safe space for staff to practice donning and doffing. This is done with mock PPE to reduce waste.
Ventilator control panel outside the room	Although the ventilator remains in the room near the head of the bed, but control panel is removed and repositioned outside the room.
IV pump outside room	Bag changes, IV rate changes, and medication administration using extension tubing allows the IV pump to be placed outside the room
Use tape roll as IV tubing pivot point	Use of longer tubing creates a hazard for kinking tubing and tripping hazard. Looping IV tubing around a roll of tape placed high on an IV pole increases visibility but also reduces the risk of kinking.
Stabilizing device to secure IV tubing	To reduce positional kinking and patient self-device removal, a stabilizing device usually used for urinary catheters was repurposed to provide a more flexible alternative.
Write on glass with dry erase marker	Dry erase markers can be used to communicate when PPE and sealed doors act as a sound barrier
Videoconferencing	A camera in the room enables that multiple team members can assess the patient without being physically in the room. Secure access can be provided family to “check in” so they can see and talk with the patient.
Redefined roles for resuscitation	Fewer staff in the room during cardiopulmonary resuscitation requires redefining roles to include persons outside the room on videoconference
Digital Stethoscope	Breath sounds, heart sounds, etc can be amplified to be audible to staff (RNs and MDs) outside the room
Reposition beds	For rooms with doors that open to the foot of the bed, we rotated the bed so the head is positioned closer to the door (and to the ventilator).
Relocating a break room in the COVID unit	A nearby breakroom allows staff a mental break and nutritional break without leaving the ward.
Visually define clean vs dirty counter in room	Taping off counter space and floor space as designated clean and dirty areas improves consistency and decreases the reliance upon memory.
Tape on floor to denote 6 feet from bed	For rooms without an ante room, a designated doffing area is marked 6’ from the bed. A secondary doffing area is designated outside the room.
Spotter for donning and doffing	At least one person is responsible to watch donning and doffing process to ensure that every step is followed and performed in the correct order.
Negative Flow Ward	Due to a limited number of negative flow isolation rooms, engineering sealed off an entire ward to create additional negative flow isolation beds.
Designated PPE code box	A single box that contains all the correct PPE for an event in which a patient previously admitted for something else is found to be COVID positive.

Supplemental Digital Content 1



Supplemental Digital Content 2



Code box with PPE equipment for in-hospital COVID-19 patients

Secure IV extension tubing around taped roll to prevent kinking and dislodgement, while ensuring IV tubing does not touch the floor



Supplemental Digital Content 3



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