

Innovation Amid Pandemic

Construction of a COVID-19 Intensive Care Unit Surge Care Delivery Model

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This article details a shared leadership structure and decision-making processes used to construct an innovative and evidence-based care delivery model for safety and optimal outcomes in the intensive care unit during the novel coronavirus (COVID-19) pandemic. Insights into ways professional development practitioners can facilitate changes in care delivery models, support nurses in their professional roles, and contribute to improved patient care outcomes during the COVID-19 pandemic are provided.

In March 2020, models predicting the COVID-19 pandemic for the Atlanta metropolitan area indicated most local healthcare systems would be stressed beyond capacity with high demand for critical care beds, specialty equipment, and services (Institute for Health Metrics and Evaluation, 2020). To ensure optimal patient care outcomes,

nurse leaders collaborated with incident command response staff to address the 4Ss of disaster preparedness planning: staffing, supplies, space, and systems (Seda & Parrish, 2019). Leaders collaborated to address the impact of COVID-19 on staffing and workflow systems in critical care units, given the increased length of stay and influx of patients experiencing life threatening illnesses, such as respiratory failure and sepsis (Centers for Disease Control and Prevention, 2021; Einav et al., 2014; Kain & Fowler, 2019). This article describes the collaborative development of Emory Healthcare's (EHC) surge care delivery model (CDM) for intensive care units (ICU) based on recommendations from the Society of Critical Care Medicine (SCCM, 2020). Moreover, this article provides insights and opportunities for the roles of nursing professional development (NPD) practitioner as leader, change agent, learning facilitator, and champion for a systems approach to pandemic response. Key elements of the NPD practice model (Harper & Maloney, 2016)—inputs, throughputs, and outputs—are evident throughout, including environmental scanning, assessing learners' needs, and standards of practice to promote optimal care and health.

The National Academy of Medicine identified “the role of nurses in response to emergencies that arise due to natural and man-made disasters” as a key priority in *The Future of Nursing 2020–2030* (National Academy of Medicine, 2020). Strategies needed to accommodate surge capacity in hospitals during an influenza-related pandemic require planning to increase nursing staff trained to provide direct care for critically ill patients (Gabriel & Webb, 2013). Nurses with specialized skills are needed to monitor patients and intervene when they receive complex treatments, such as extracorporeal membrane oxygenation, continuous renal replacement therapy, and mechanical ventilation (Manuell et al., 2011; Society of Critical Care Medicine, 2020). The complexity of care associated with the needs of critically ill COVID-19 patients required leaders to assess and evaluate existing CDMs, as well as processes used to develop and manage human and capital resources to maintain safe working environments. The CDM was designed to maintain patient safety by standardizing a staffing model, enabling the provision of quality care across EHC hospitals. Specifically, the model leveraged

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team-based nursing to optimize the 4Ss during the surge phase of the COVID-19 pandemic.

SHARED LEADERSHIP AMONG STAKEHOLDERS

To develop the surge CDM, a planning team of EHC nurses, led by a NPD practitioner, engaged in shared leadership and decision-making. Environmental scanning was conducted to identify the contextual factors impacting practice and learning environments. The team included clinical nurses, clinical nurse specialists, advanced practice nurses (APRN), unit nurse educators, and executive leadership. Nursing subject matter expertise ranged from critical care, electronic intensive care unit (eICU), medical-surgical, and procedural practice settings, as well as quality improvement and informatics. Emory's eICU featured real-time, in-room audio and video support for communication and continuous patient and data monitoring by certified critical care nurses and ICU intensivists.

Building upon EHC's core purpose of improving lives and providing hope for our patients and our people, the team's aims were to (a) sustain the quality of nursing care, (b) sustain the culture of safety for our patients and workforce, and (c) promote nurse engagement and ownership of the model. The planning team operated under the credo, "Safe nurses equals safe patients." Desired outcomes included decreased COVID-19-related morbidity, mortality, ICU length of stay, and sentinel events, as well as nurse resilience and satisfaction. Goals for surge CDM development are listed in Figure 1. The team's time-sensitive objectives were to work efficiently and collaboratively to develop the CDM and then test operationalization of the CDM, aligning nursing and provider leadership in caring for an influx of patients.

CONSTRUCTION OF THE SURGE CDM

Instead of a primary care staffing model with a nurse providing care to one or two critically ill patients, the developers of the CDM assumed ICU nurses would work with a team,

including redeployed staff, to care for multiple patients during times of surge capacity as shown in Figure 2. Thus, the premise of the CDM was to facilitate the intersection of rapid response and orientation of redeployed nurses to meet patient care demands. Development focused on three central elements for care delivery and performance within the EHC system: how, who, and what. How centered on strategies needed to establish safe team-to-patient ratios and was best clarified by structuring scenarios focused on the "who," meaning our patients and nurses. Factors considered for patients and nurses included patient acuity, clinical ICU situations, and nurse skill level. The "what" element comprised the adaptation of the tiered staffing model recommended by the Society of Critical Care Medicine (2020).

Figure 2 depicts the surge CDM, consisting of patient care scenarios, roles of healthcare professionals participating in the delivery of care, and examples of tasks performed. The CDM planning team identified three patient care scenarios shown as columns in Figure 2. More precisely, ICU teams would care for patients based on their acuity and diagnoses, including the following:

- COVID-19-positive, highly critical patients with one team caring for three patients;
- non-COVID-19, highly critical patients with one team caring for four patients;
- non-COVID-19, lower-acuity patients with one team caring for six patients.

The roles of healthcare professionals essential to operationalizing the model to improve patient safety were listed in color-coded rows in Figure 2. Roles included the following:

- gray row: unit charge nurses, serving as unit-based administration and operational support;
- red outlined box: ICU nurses with current experience, serving as team leaders;

- Establishing ideal, safe team to patient ratios
- Delineating roles and providing examples of task-based care within each role category
- Enhancing the knowledge, skills, abilities, and attitudes of nurses and clinical support staff
- Understanding capacity, workflow, and the potential for burden on the environment of care
- Leveraging leadership capability, availability, and advocacy
- Optimizing the availability and accessibility of scarce human, supply, and capital resources
- Defining when and what criteria would trigger use of the CDM

FIGURE 1. Goals for surge care delivery model.

TEAM ROLES	COVID-19 Positive Highly Critical (3:1 Team)	Highly Critical non-COVID (4:1 Team)	Lower Acuity CC non-COVID (6:1 Team)												
TEAM LEADER	ICU RN	ICU RN	ICU RN												
Unit Charge RN	<ul style="list-style-type: none"> • Patient assignment/team huddles • Crash cart/defibrillator checks 	<ul style="list-style-type: none"> • Patient assignment/team huddles • Crash cart/defibrillator checks 	<ul style="list-style-type: none"> • Patient assignment/team huddles • Crash cart/defibrillator checks 												
Intensive Care Unit (ICU) RN	<ul style="list-style-type: none"> • Goal-directed care • Team communication; delegation • Critical care assessments, including pain, agitation, delirium (PAD), spontaneous awakening trial (SAT), spontaneous breathing trial (SBT) • Managing ventilator bundle; High-flow oxygen (FHO); changes, suctioning, collaborating with respiratory therapy • Critical equipment, e.g., continuous renal replacement therapy (CRRT) • Hemodynamic monitoring, focused vital signs; analyzing intake and output (I&O) • Titrating drips • Central line maintenance 	<ul style="list-style-type: none"> • Goal-directed care • Team communication; delegation • Critical care assessments, including pain, agitation, delirium (PAD), spontaneous awakening trial (SAT), spontaneous breathing trial (SBT) • Managing ventilator bundle; High-flow oxygen (FHO); changes, suctioning, collaborating with respiratory therapy • Critical equipment, e.g., continuous renal replacement therapy (CRRT) • Hemodynamic monitoring, focused vital signs; analyzing intake and output (I&O) • Titrating drips • Central line maintenance • Arterial lines • Medication administration • Obtain lab specimens, results • Peripheral intravenous (PIV) inserts/maintenance; central line maintenance; patient-controlled analgesic (PCA) assessment/monitoring • Workflow and documentation 	<ul style="list-style-type: none"> • Goal-directed care • Team communication; delegation • Critical care assessment(s), including pain, agitation, delirium (PAD), spontaneous awakening trial (SAT), spontaneous breathing trial (SBT) • Managing ventilator bundle; High-flow oxygen (FHO); changes, suctioning, collaborating with respiratory therapy • Critical equipment, e.g., continuous renal replacement therapy (CRRT) • Hemodynamic monitoring, focused vital signs; analyzing intake and output (I&O) • Titrating drips • Central line maintenance • Arterial lines • Workflow and documentation • Patient admissions and documentation • Patient assessments as indicated for clinical situation • Prone/turning/range of motion; restraints • Peripheral intravenous (PIV) inserts/maintenance; central line maintenance; arterial lines (labs; zeroing, and initial set-up) • Patient-controlled analgesic (PCA) assessment/monitoring • Titrating drips per policy/scope of practice and/or direct ICU RN supervision • Medication administration and safety • Oral care (intubated patients) • Enteral nutrition • Foley insert; straight urinary catheterization; bladder scan • Skin/wound care; "It takes Two" • Communicating updates to family every shift* • Patient transfers, discharges, handoff communication, documentation 												
RN whom critical care experience	<ul style="list-style-type: none"> • Post-anesthesia care unit (PACU) RN • Emergency RN • Neonatal intensive care unit (NICU) RN • assessment/monitoring • Workflow and documentation 	<ul style="list-style-type: none"> • Patient admissions and documentation • Prone/turning/range of motion; restraints • Routine oral medications, intravenous medications • Oral care (intubated patients) • Enteral nutrition • Foley insert; straight urinary catheterization; bladder scan • Skin/wound care; "It takes Two" • Communicating updates to family every shift* • Patient transfers, discharges, handoff communication, documentation 	<ul style="list-style-type: none"> • Patient admissions and documentation • Prone/turning/range of motion; restraints • Routine oral medications, intravenous medications • Oral care (intubated patients) • Enteral nutrition • Foley insert; straight urinary catheterization; bladder scan • Skin/wound care; "It takes Two" • Communicating updates to family every shift* • Patient transfers, discharges, handoff communication, documentation 												
Other RNs	<ul style="list-style-type: none"> • Medical-surgical nurse • Operating room or same day procedural area nurse • Pediatric RN 	<ul style="list-style-type: none"> • Patient admissions and documentation • Prone/turning/range of motion; restraints • Routine oral medications, intravenous medications • Oral care (intubated patients) • Enteral nutrition • Foley insert; straight urinary catheterization; bladder scan • Skin/wound care; "It takes Two" • Communicating updates to family every shift* • Patient transfers, discharges, handoff communication, documentation 	<ul style="list-style-type: none"> • Patient admissions and documentation • Prone/turning/range of motion; restraints • Routine oral medications, intravenous medications • Oral care (intubated patients) • Enteral nutrition • Foley insert; straight urinary catheterization; bladder scan • Skin/wound care; "It takes Two" • Communicating updates to family every shift* • Patient transfers, discharges, handoff communication, documentation 												
Clinical Support Staff	<ul style="list-style-type: none"> • Nurse tech, patient care assistant • Surgical tech • Dialysis tech • Transporter • Unit Clerk 	<ul style="list-style-type: none"> • Assist with donning and doffing • Runner; point of care testing (POCT); documentation • Bathing; oral care (intubated patients) • Prone/turning/range of motion (ROM); restraints; activities of daily living (ADLs) • I&O; incontinence care; indwelling urinary catheter care • Assist with meals (food trays and feeding) • Managing/conserving personal protective equipment (PPE) 	<ul style="list-style-type: none"> • Assist with donning and doffing • Runner; point of care testing (POCT); documentation • Bathing; oral care (intubated patients) • Prone/turning/range of motion (ROM); restraints; activities of daily living (ADLs) • I&O; incontinence care; indwelling urinary catheter care • Assist with meals (food trays and feeding) • Managing/conserving personal protective equipment (PPE) 												
Interdisciplinary Team Members	<ul style="list-style-type: none"> • Respiratory Therapist (RT) • Pharmacist • Physical therapist (PT), occupational therapist (OT), speech therapist (ST) • Spiritual Health* 	<table border="0"> <tr> <td>RT</td> <td>Pharmacist</td> <td>PT/OT/ST</td> </tr> <tr> <td>Airway management; respiratory treatments; vent settings; arterial blood gases (ABGs); Hi-flow oxygen; suctioning; Prone</td> <td>IV compatibility Medication inventory medication preparation</td> <td>Bedside swallow, proning, turning, ROM, ambulation</td> </tr> </table>	RT	Pharmacist	PT/OT/ST	Airway management; respiratory treatments; vent settings; arterial blood gases (ABGs); Hi-flow oxygen; suctioning; Prone	IV compatibility Medication inventory medication preparation	Bedside swallow, proning, turning, ROM, ambulation	<table border="0"> <tr> <td>RT</td> <td>Pharmacist</td> <td>PT/OT/ST</td> </tr> <tr> <td>Airway management; respiratory treatments; vent settings; arterial blood gases (ABGs); Hi-flow oxygen; suctioning; Prone</td> <td>IV compatibility Medication inventory medication preparation</td> <td>Bedside swallow, proning, turning, ROM, ambulation</td> </tr> </table>	RT	Pharmacist	PT/OT/ST	Airway management; respiratory treatments; vent settings; arterial blood gases (ABGs); Hi-flow oxygen; suctioning; Prone	IV compatibility Medication inventory medication preparation	Bedside swallow, proning, turning, ROM, ambulation
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Critical Care Advanced Practice Provider Direct Reporters	<ul style="list-style-type: none"> • Certified registered nurse anesthetist (CRNA), physician assistant (PA) • Nurse practitioner: family (FNP), acute care (ACNP) <p><i>This allows the APP to be used across multiple roles, to augment the entire care team based on individual skill sets and resources needed</i></p>	<p>Critical Care APP Lead:</p> <ol style="list-style-type: none"> 1. Determine skillset of CRNA/PA under provider care model (procedures, notes, orders, intubation/extubation, presenting on rounds) 2. Organize CRNA/PA workload for the patient assignment 3. Review CRNA/PA skillset with ICU RN team leader (training model) <ul style="list-style-type: none"> • Goal-directed care assignments informed by CRNA/PA skillset and ICU RN team lead, including, but not limited to: Line assessment and management; infusion management; prone 4. Review CRNA/PA skillset with RT care model <ul style="list-style-type: none"> • Goal-directed care assignments informed by P/ANP skillset and RT, including, but not limited to, vent management, suctioning, etc. 	<p>Unit-Based APP Lead:</p> <ol style="list-style-type: none"> 1. Determine skillset of PNP, ACN under provider care model (procedures, notes, orders, presenting on rounds); review with ICU RN team lead 2. Goal-directed care assignments informed by NP skillset and ICU RN team lead 												

FIGURE 2. Emory Healthcare COVID-19 surge intensive care unit care delivery model. This figure is available in color online (www.jnpdonline.com).

- orange outlined box: redeployed nurses with previous critical care or emergency experience, such as postanesthesia care and emergency neonatal intensive care;
- blue outlined box: redeployed nurses with no critical care or emergency experience, such as medical-surgical and perioperative;
- black outlined box: redeployed clinical support staff, such as nursing or patient care technicians, transporters, and unit clerks;
- purple outlined box: redeployed interdisciplinary team members, including respiratory therapist and pharmacists;
- green outlined box: redeployed advanced practice providers.

Note that this surge CDM shows a scalable approach to caring for critically ill patients during the COVID-19 pandemic, with teams providing care to three to six patients based on factors such as patient acuity. Underlying assumptions include redeployment of nurses to ICU, experienced nurses functioning as team leaders, and partnership with NPD for assistance with timely education and training initiatives.

With the goal of expanding human resources capacity during a pandemic, the CDM was designed to leverage the collective knowledge, skills, and experiences of nurses across specialties. Skills assessments and professional development for current staff and anticipated new hires were recognized as crucial to safe nursing practice. Consequently,

developers of the model assumed leaders who implemented the model would collaborate with professional development practitioners to address the educational gaps of redeployed nurses. NPD practitioners within EHC recognized the throughputs of orientation and onboarding, competency management, and education as priorities to increase knowledge, skills, abilities, and behaviors for nurses working in COVID-19-designated ICUs.

The rows and colors in Figure 2 provide visual differentiation of redeployed nurses' specialty, along with examples of tasks they were expected to perform. Differentiation helped team leaders conceptualize how redeployed nurses, possessing varying levels of healthcare experiences, could help maintain optimal patient care outcomes. The CDM conceptualized the role of experienced critical care nurses as team leaders. In this role, they would lead collaboration with unit charge nurses, unit nurse educators, preceptors, and redeployed nurses to ensure safe patient assignments and the availability of appropriate clinical resources to support staff. Because variability and gaps will exist in each team leader's competencies, education will be needed to improve communication skills, confidence in delegating task, as well as understanding of responsibilities and professional accountability. However, developers of the CDM acknowledged that, during a pandemic, limited opportunities for education and training in leadership skills exist. Therefore, the developers suggest team leaders use inputs received from redeployed nurses' self-assessments and preceptors'

assessment of skills, as well as information about patient acuity and unit workflow to informed decisions about the nurse–patient ratio and team assignments. Where available, certified critical care nurses from Emory’s eICU program would provide subject matter expertise by serving as virtual team members and providing just-in-time training to address redeployed nurses’ knowledge and practice gaps. In Figure 2, arrows in nursing-specific zones illustrate that redeployed nurses could assume more or less responsibilities based on the acquisition of knowledge, skills, experiences, and, ultimately, their performance.

Aligning the CDM with Quality and Safety Education for Nurses (QSEN) competencies and enhancing care delivery through innovation were important considerations for professional development (QSEN Institute, 2020). The QSEN competencies for professional nursing practice include patient-centered care, quality, safety, evidence-based practice, teamwork and collaboration, and informatics. Figure 3 represents how QSEN competencies were reflected in clinical education ideas, strategies, and reflective feedback during CDM development.

DEVELOPMENT OF CDM-RELATED SKILLS CHECKLISTS

Use of the CDM required identification and assessment of redeployed nurses’ core skills. Therefore, the CDM planning team reviewed and revised nursing core competency

checklists, hospital- and system-based nursing education, and informatics resources. Specifically, consolidation of core competency checklists from multiple ICU and acute care practice settings occurred. Producing two novel skills assessment tools, the team prioritized nursing skills based on evidence supporting the treatment of COVID-19 positive and critical care patients.

Even though the checklists accounted for tasks assigned to redeployed nurses working in ICU, one was developed for nurses with critical care or emergency nursing experience, and the other checklist was for nurses without critical care experience. Designed to facilitate collaboration between redeployed nurses and preceptors, the checklists contained a section requiring redeployed nurses to complete their self-assessments. Other sections allow preceptors to document methods used to validate performance of skills and to include quantitative metric “scores” indicating the preceptors’ validation of skills.

COMMUNICATION, SHARED GOVERNANCE, AND OWNERSHIP

Engagement and ownership were strengthened through frequent team and subgroup meetings, as well as utilization of shared governance structures. Specifically, CDM planning committee members engaged nursing stakeholders at the unit, hospital, and system levels. For example, CDM team members presented the proposed model, skills

Quality Of (Nursing) Care	Safety (Culture)	Evidence-Based Practice	Patient-Centered Care	Teamwork and Collaboration	Informatics (Technology)
<p>Staffing</p> <ul style="list-style-type: none"> Knowledge experience skills, personal attitudes of nurses and clinical support staff Availability and accessibility of key human, supply, and capital resources <p>Systems</p> <ul style="list-style-type: none"> Capacity, workflow, and potential for burden on the environment of care Leadership capability, availability, and advocacy 	<p>Staffing</p> <ul style="list-style-type: none"> Planned and just-in-time education; educational resources Skills self-assessments and validation checklists <p>Supplies</p> <ul style="list-style-type: none"> Availability and use of personal protective equipment <p>Systems</p> <ul style="list-style-type: none"> Development of COVID-19 ICU surge care delivery model Team nursing, roles, and task-based care based on clinical situations (scenarios) Safe team: patient ratios in ICU surge crisis Acuity models 	<ul style="list-style-type: none"> Informed clinical education priorities, staffing, supplies, space, and systems planning: Society of Critical Care Medicine (SCCM) Centers for Disease Control and Prevention (CDC) American Association of Critical-Care Nurses (AACN) Association for Nursing Professional Development (ANPD) Other best practices from review of literature 	<p>Systems</p> <p>Responses and resources for:</p> <ul style="list-style-type: none"> Laboring moms End-of-life Patient education Changes in visitation 	<p>Systems</p> <ul style="list-style-type: none"> ICU care delivery model team members, roles, and responsibilities Shared decision-making: key stakeholders, engagement, ownership, and communication Real time, mentoring, coaching, tools and resources for ICU formal and informal leaders Rapid onboarding and orientation Team member groupings for: a) ICU RNs; b) RNs with some critical care or emergency experience; c) Redeployed RNs to ICU - with no critical care experience Resilience: assessment, resources, monitoring, follow-up 	<p>Systems</p> <ul style="list-style-type: none"> Electronic (eICU[®]) Crisis documentation standards <p>Space</p> <ul style="list-style-type: none"> Use of baby monitors for COVID-19 positive patients and patients under investigation (PUI) rooms Exploring safe options for positioning intravenous pumps outside rooms

FIGURE 3. Aligning care delivery model development with Quality and Safety Education for Nurses competencies.

validation checklists and processes, and implementation plans to ICU direct patient care clinicians, unit charge nurses, and unit nurse educators. CDM leadership members collaborated with critical care physicians and APRNs to define the role and contributions of redeployed certified registered nurse anesthetists and adult critical care APRNs. Communication with executive nurses from across the system occurred at each phase of CDM development and implementation planning for information sharing, advocacy, and capacity building. Presentations provided multiple opportunities for dialogue, shared decision-making, and development of mechanisms for follow-up. Collaboration was particularly important because chief nursing officers for each hospital defined the parameters for surge capacity and criteria used to trigger implementation of the CDM. Intra- and interdisciplinary communication with feedback loops within hospitals and across the system improved CDM development and implementation of pilot testing.

CONCLUSION

The CDM was developed as part of EHC's incident command response system during disaster preparedness. The model frames a novel approach to team-based care in the ICU to accommodate surge capacity during the COVID-19 pandemic. Because the COVID-19 crisis did not trigger surge capacity across EHC, the ICU surge CDM represents conceptualization of response measures based on clinical scenarios and professional practice ideals. Still, the strategies used to plan and develop the CDM has been integral to organizing stakeholders around the anticipated communication, education, and implementation work needed to keep patients and staff safe during times of pandemic surge capacity. At the time of this article submission, the confirmed number of cases of COVID-19 locally and nationally had increased significantly. Thus, NPD practitioners continue to lead pilot testing of the model in ICUs across the EHC system to garner feedback, ensure continuous collaborative improvement, and enhance staff preparedness.

Timely development of the surge CDM represents collaboration with EHC's incident command response center and nursing stakeholders to address challenges with COVID-19 pandemic disaster planning. Steps used for iterative development and testing of the COVID-19 ICU surge CDM will assist leaders and nurses across EHC with optimizing nurse staffing and professional development to improve patient outcomes during an influenza pandemic. A critical lesson learned was that effective disaster planning dictates an intersection with NPD to prepare redeployed nurses to contribute to patient safety during a pandemic.

NPD leaders operate at unit, organization, and system levels. Throughout the CDM development process, these

leaders leveraged their relationships with staff to gather timely, comprehensive, and relevant feedback. NPD practitioners served as change agents and fostered shared leadership with interdisciplinary partners, enabling teams to establish aims, delineate roles, and articulate expectations. Inputs from and shared leadership with key stakeholders and interdisciplinary partners were necessary to establish aims and delineate roles and expectations within the team. Based on identified practice gaps and best available scientific evidence and guided by NPD standards of practice, NPD practitioners facilitated development of the CDM to support safe clinical practice and to achieve optimal patient outcomes across COVID-19-designated critical care settings.

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References

- Update the reference please: Centers for Disease Control and Prevention. (2021, March 19). *Healthcare workers: COVID-19 pandemic planning scenarios*. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/planning-scenarios.html>
- Einav, S., Hick, J. L., Hanfling, D., Erstad, B. L., Toner, E. S., Branson, R. D., Kanter, R. K. (2014). Surge capacity logistics: Care of the critically ill and injured during pandemics and disasters: CHEST Consensus Statement. *Chest*, 146(Suppl. 4), e17S–e43S. 10.1378/chest.14-0734
- Gabriel, L. E., Webb, S. A. (2013). Preparing ICUs for pandemics. *Current Opinion in Critical Care*, 19(5), 467–473. 10.1097/MCC.0b013e328364d645
- Harper, M. G., Maloney, P. (Eds.) (2016). *Nursing professional development: Scope and standards of practice* (3rd ed.). Association for Nursing Professional Development.
- Institute for Health Metrics and Evaluation. (2020). *COVID-19 projections*. <https://covid19.healthdata.org/georgia>
- Kain, T., Fowler, R. (2019). Preparing intensive care for the next pandemic flu. *Critical Care*, 23, 337. 10.1186/s13054-019-2616-1
- Manuell, M. E., Co, M. D., Ellison, R. T. (2011). Pandemic influenza: Implications for prep and delivery of critical care services. *Journal of Intensive Care Medicine*, 26, 347–367. 10.1177/0885066610393314
- National Academy of Medicine. (2020, June). *The future of nursing 2020–2030: Charting a path to achieve health equity. A consensus study from the National Academy of Medicine*. https://nam.edu/publications/the-future-of-nursing-2020-2030/?gclid=CjwKCAiAi_D_BRApEiwASslbJ5q9OB8KD-H1rjdk1VXtMgUmM-ACODXzP2OTrdqLOnlKS9LvRG-PxxoC8fYQAvD_BwE
- Quality and Safety Education for Nurses Institute. *QSEN Institute competencies* (2020). <https://qsen.org/competencies/>
- Seda, G., Parrish, J. S. (2019). Augmenting critical care capacity in a disaster. *Critical Care Clinics*, 35, 563–573. 10.1016/j.ccc.2019.06.007
- Society of Critical Care Medicine. (2020, May 12). *United States resource availability for COVID-19*. <https://sccm.org/Blog/March-2020/United-States-Resource-Availability-for-COVID-19>