Using Simulation to Prepare Healthcare Teams During the COVID-19 Pandemic

BACKGROUND
The coronavirus disease 2019 (COVID-19) is forcing healthcare teams to rapidly create and implement new pathways and workflows that protect personnel while maintaining patient safety and quality of care.\(^1\) This may be challenging to effectively operationalize within a health system given the large number of impacted processes and personnel. Simulation may help advance these initiatives by optimizing flow, minimizing risk, and providing opportunities for safe experiential learning. We describe how our institution used simulation for systems integration, assessment, and training during this pandemic.

SYSTEMS INTEGRATION
We used simulation to help our teams better understand their existing processes so that they could more effectively incorporate new COVID-19 workflows. First, we engaged subject matter experts, key stakeholders, and frontline staff. We then ran COVID-19 simulation scenarios in each team’s actual clinical environment. These initial simulations focused on gaining a better understanding of the current state, opportunities for improvement, and details of what methods, equipment, supplies, and associates might be impacted by new COVID-19 workflows. During the debrief that followed, we solicited input and perspectives from all participants, reviewed what transpired during the simulation, and physically walked through involved spaces or pathways to identify barriers and potential. Immediately afterward, we provided each team with written feedback categorized according to methods, equipment, supplies, and associates. We asked stakeholders to assign criticality to each item and suggest potential countermeasures. We reviewed the bidirectional feedback and together developed mitigation strategies that took into account patient and personnel safety, quality of care, and optimal flow. We developed and conducted further simulations with frontline staff; this allowed us to iteratively develop optimal mitigation strategies and processes. Once we achieved consistency in performance and participant feedback, we finalized our recommendations to the team. Leadership translated these findings into reliable methods that we reviewed and edited. Once finalized, the reliable methods were distributed to the respective team members.

Over the span of 8 weeks, we conducted 21.5 hours of these systems integration simulations and contributed to the development of 8 different COVID-19 reliable methods across our institution. Examples of some of our simulation-based systems integration work include the development of a COVID-19 resuscitation process within our pediatric emergency department, development of our emergency department to operating room workflow for COVID-19 patients with life-threatening and non-life-threatening injuries, and development of processes for imaging COVID-19 patients of varying levels of acuity with and without sedation.

ASSESSMENT
During our simulation scenarios, we also assessed our associates’ knowledge of and competence with donning and doffing personal protective equipment (PPE), cleaning equipment and supplies, and patient transport with routine COVID-19 patient care scenarios, after aerosol generating procedures, and with resuscitations. We provided verbal and written feedback to both participants and leadership and further training ensued as needed.

We also used simulation to determine whether work as imagined equaled the work as done.\(^2\) We assessed whether COVID-19 pathways created on paper translated to frontline staff and actual practice. We first reviewed and discussed the created pathways with subject matter experts to ensure our understanding of the desired process. We then created appropriate scenarios and conducted simulations with frontline staff who during the debrief offered suggestions and feedback about the written process. This allowed us to either amend the process or suggest the creation of new processes.

TRAINING
Finally, we used simulation to provide our associates with experiential and immersive training on our new COVID-19 processes, workflows, and associated infection prevention and control measures. Along with leadership, we first provided each team with COVID-19–specific didactic education as well as physical orientation to new spaces, equipment, supplies, processes, and reliable methods. This allowed us to set our teams up for success during the hands-on portion of the training. These hands-on simulations tied all of these concepts together and allowed our teams to have immersive experiences with the new workflows. Participant feedback showed universal increased comfort and confidence with the new information, processes, and spaces and increased understanding of COVID-19 personnel and patient safety measures. This feedback was seen with all simulations in particular our simulations that focused on donning and doffing of PPE and airway and resuscitative management of COVID-19 patients.

CONCLUSIONS
Over the span of 8 weeks, our simulation team conducted 34 COVID-19–related simulations for 474 participants totaling 365.25 participant hours of simulation. Our simulations helped create numerous new COVID-19–related pathways and reliable methods across our institution. Our simulations also helped train numerous associates about the nuances of COVID-19 patient care. Simulation-based education optimizes the efficiency of learning at the individual and team levels by guiding participants through goal-oriented reflections set in safe, encouraging, collaborative environments. By optimizing learning, simulation may help decrease cognitive load.\(^3\) In addition, by promoting deliberate practice with facilitated feedback before actual patient care,\(^4\) simulation may help mitigate errors by increasing individual and team comfort level and performance confidence.

Further analysis is needed to see the impact these simulations have on actual patient care. We encourage other health systems to harness the potential of simulation to help their teams navigate the COVID-19 pandemic.

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