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Simulation during COVID-19 pandemic in the Spanish pediatric intensive care units: New challenges in medical education☆

Uso de la simulación durante la pandemia COVID-19 en las UCIP españolas. Nuevos retos en educación médica

Dear Editor:

Simulation-based medical education, which allows clinicians to develop skills to manage serious and infrequent situations without detriment of patient safety,[1] is even more important during unexpected public health emergencies like the pandemic we are currently experiencing.[2]

The coronavirus disease 2019 (COVID-19) pandemic has brought on numerous adjustments that have limited the pursuit of medical education activities,[3] including the development of simulation programmes. Therefore, we need to contemplate the development of other modalities of simulation, such as remote simulation, to substitute or supplement in situ simulation training to be able to continue implementing educational programmes.[4–6]

We present the results of a cross-sectional, observational survey-based study aimed at assessing the use of simulation for preparing clinicians to manage COVID-19 during the first and second waves of the pandemic at paediatric intensive care units in Spain, as well as the the simulation modalities used, and the continuation of simulation activities unrelated to COVID-19.

Nineteen Spanish paediatric intensive care units (PICUs) of different levels of care (Appendix A) submitted responses to the survey in December 2020. Ten of these units had simulation training programmes as part of their regular educational curriculum prior to the COVID-19 pandemic. More than half started implementing the COVID-19 trainings in March 2020, 8 were able to start the trainings before starting to manage COVID-19 patients, 2 started the trainings at the same time they started managing patients, and 9 after starting to manage patients. In 9 PICUs, the COVID-19 training programme was an initiative of the unit itself.

Table 1 presents the equipment and technology available to the units to deliver the training programmes, with a predominance of low-cost equipment. Only 2 units had access to the technological resources required to offer remote simulation, and none had access to virtual reality simulators.

The scenario covered most frequently in these trainings was the correct donning and doffing of personal protection equipment (PPE), followed by airway management and cardiopulmonary resuscitation (CPR) (Table 1). Most trainings were conducted in situ (in the patient care setting): 73.7% of trainings on the donning of PPE, 57.1% of trainings on airway management, 61.5% of CPR trainings and 63.6% of trainings on other scenarios. Less frequently, simulation trainings were delivered outside the unit in specific facilities or centres. A substantial proportion of units (13/19) delivered multidisciplinary trainings and 12/19 of the units included other departments in their training programme.

Table 1 presents the barriers identified by participating units in delivering the trainings, with a high percentage reporting logistic problems, a lack of time and a lack of staff. Have the units reported lack of previous training and concerns regarding infection. Social distancing measures affected training programmes in nearly 60% of units, and the lack of alternatives like remote simulation was another of the identified barriers. Units also frequently reported problems related to material resources and funding.

The main problems reported by participants regarding group dynamics were difficulty communicating due to wearing PPE in 12 of the 19 units, anxiety or concerns in the care team in 12, lack of knowledge of COVID-19 care practices in 9 and lack of knowledge of COVID-19 teamwork in 8. Compared to simulation-based training programmes offered prior to COVID-19, engagement of the team in trainings during the pandemic was the same in 9 of the units and greater in 7.

When it came to the continuation of simulation-based activities unrelated to COVID-19, 14 of the 19 units continued implementing simulation-based activities, although less frequently and with fewer participants. Only 5 of the units were able to continue the regular simulation-based training programme without significant adjustments. Only 3 units used remote simulation to offer simulation-based trainings unrelated to COVID-19.

Participants considered the training programme useful to improve the management of patients with COVID-19 (Table 2).

Despite the potential limitations of the study, including the subjectivity of survey-based designs and that responses were only submitted by half of the PICUs in Spain, it reflects the use of simulation in this care setting during the COVID-19 pandemic. Simulation has been used to train in different scenarios related to COVID-19, mainly with low-cost technology and in situ trainings. Emerging modalities like remote simulation[3,4] using different applications, including some inexpensive options,[5–7] are still rarely used by Spanish PICUs. Despite the reported barriers, participants found the training programmes very useful.

Simulation-based medical education must be established as part of the regular training curriculum of all units deliver-

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Table 1 Available technology, scenarios included in trainings and barriers identified by hospitals during the development of the COVID-19 simulation training programme expressed in number of hospitals over the total of 19 that participated.

Technological resources available for COVID-19 simulation training	Low-cost mannikins	8/19
	High-end mannikins	6/19
	Low-cost monitors	2/19
	High-end monitors	4/19
	Low-cost devices/simulators	6/19
	High-fidelity devices/simulators	0/19
	Remote simulation	2/19
	Virtual reality	0/19
Scenarios covered in training	Personal protection equipment	16/19
	Airway management	8/19
	Cardiopulmonary resuscitation	8/19
	Initial assessment of COVID patient	7/19
	Transport	5/19
Barriers identified during the implementation of the training programme	Logistic problems	12/19
	Lack of time	12/19
	Social distancing	11/19
	Lack of previous training	10/19
	Supply/equipment problems	10/19
	Concerns about infection	9/19
	Staffing problems	8/19
	Funding problems	7/19
	Lack of alternatives (remote simulation)	4/19

Table 2 Assessment by participants of COVID-19 simulation training programme, rated on a scale of 1 to 10 (expressed as median and interquartile range).

The training programme is useful to improve the management of patients with COVID-19	9 (8–9)
Simulation activities helped increase self-competence/confidence	8 (7–9)
Simulation activities helped reduce errors	8 (8–9)
Simulation activities helped reduce the risk of transmission	8 (8–9)
Simulation activities helped improve teamwork	8 (6–9)
Our unit had appropriate supplies, equipment and facilities to carry out the COVID-19 training programme	5 (2–9)

ing care to complex patients, such as PICUs. However, only half of the units had an established educational programme, and trainings on COVID-19 were mostly an initiative of the units themselves. It may be necessary to provide greater financial and material support and increase awareness of the usefulness of simulation-based medical education, as failing to do so could have a significant negative impact on the training of clinicians and patient safety.

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Conflicts of interest

The authors have no conflicts of interest to declare.

Appendix A. Participating hospitals

Hospital Sant Joan de Déu, Hospital Universitario Fundación Jiménez Díaz, Complejo Hospitalario de Jaén, Hospital Clínico San Carlos, Hospital Universitario Central de Asturias, Hospital Universitario de Cruces, Hospital Universitario de Burgos, Complejo Asistencial Universitario de León, Complejo Hospitalario de Toledo, Hospital Virgen del Rocío, Hospital Universitario Gregorio Marañón, Hospital Universitario de Donostia, Hospital Universitario Puerta del Mar, Complejo Hospitalario Universitario de A Coruña, Hospital Clínico Universitario de Santiago de Compostela, Hospital Regional Universitario de Málaga, Hospital Clínico Universitario de Valladolid, Hospital Universitario Nuestra Señora de Candelaria.

References

1. Okuda Y, Bryson EO, DeMaria S, Jacobson L, Quinones J, Shen B, et al. The utility of simulation in medical education: what is the evidence? Mt Sinai J Med. 2009;76:330–43.
2. Nair SS, Kaufman B. Simulation-based up-training in response to the COVID-19 pandemic. Simul Healthc. 2020;15:447–8.
3. Thakur A, Soklaridis S, Crawford A, Mulsant B, Sockalingam S. Using rapid design thinking to overcome COVID-19 challenges in medical education. Acad Med. 2021;96:56–61.
4. Patel SM, Miller CR, Schiavi A, Toy S, Schwengel DA. The sim must go on: adapting resident education to the COVID-19 pandemic using telesimulation. Adv Simul. 2020;5:1–11.
5. Thomas A, Burns R, Sanseau E, Auerbach M. Tips for conducting telesimulation-based medical education. Cureus. 2021;13:4–9.

6. Trastoy-Quintela J, Moure-González JD, González-Fernández L, Rey-Noriega C, Rodríguez-Núñez A. Formación multinivel (atención primaria-hospital) mediante simulación con conexión en tiempo real en tiempos de COVID-19. Una herramienta a considerar. An Pediatr. 2021;94:259–60.
7. Ikeyama T, Shimizu N, Ohta K. Low-cost and ready-to-go remote-facilitated simulation-based learning. Simul Healthc. 2012;7:35–9.

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SARS-CoV-2 and prematurity. Any evidence of vertical transmission?☆

SARS-CoV-2 y prematuridad. ¿Existe evidencia de transmisión vertical?

Dear Editor,

Infection by the novel coronavirus (SARS-CoV-2) initially detected in 2019 in Wuhan, China, is the causative agent of the coronavirus disease 2019 (COVID-19), currently responsible of a global pandemic with significant repercussions in Spain.

Vertical transmission of SARS-CoV-2 remains unknown to date. Different authors have suggested that SARS-CoV-2 may be transmitted in utero, but it is not clear whether transmission occurs by crossing the placenta, through the birth canal or during the immediate postpartum period.[1] Isolated case reports, case series[2,3] and guidelines developed by experts of different scientific associations[4,5] have been published, with significant heterogeneity in the definition of vertical transmission, types of samples used for investigation and clinical manifestations documented in newborn infants.

We present the case of a preterm neonate born to a mother positive for COVID-19 that came to the emergency department after going into labour at 29 + 6 weeks of gestation. 9 days before delivery she had a positive result for SARS-CoV-2 antigen test in respiratory swab, performed on account of close contact with a positive case (household partner). Polymerase chain reaction (PCR) test from nasopharyngeal swab before delivery was positive. The mother was asymptomatic. She had a normal course of pregnancy and attended prenatal care visits, with normal ultrasound and laboratory outcomes. Drugs for tocolysis and fetal lung maturation were administered, but it was not possible to stop preterm labour.

A male boy was born by vaginal delivery at 29 + 6 weeks, (1455 g birth weight) Intrapartum amniorrhexis. Apgar score 6/8. The preterm neonate required intubation at birth due to ineffective breathing, conventional mechanical ventilation and surfactant administration in the first hour of life. Chest radiograph revealed a bilateral reticular interstitial pattern suggesting neonatal respiratory distress syndrome. The neonate was admitted to the NICU into an individual room under contact and droplet isolation measures in the incubator, according to current recommendations.[4,5] Respiratory secretion samples obtained at birth and on day 3 were tested positive for SARS-CoV-2 using PCR, with low cycle threshold (Ct) values (Table 1). Blood test results were normal, without lymphopenia or increased inflammatory markers (Table 2). The patient was extubated on day 2 and exhibited improvement, with no symptoms other than apnoea of prematurity. Polymerase chain reaction tests in nasopharyngeal samples at 7, 12 and 15 days remained positive. Extended analytical study at 7th day revealed no evidence of increased systemic inflammatory markers (Table 2) except for D-dimer levels (4788.00 ng/mL). At 10 days, PCR blood test was negative with no detectable viral load in blood even viral shedding in urine and faeces was present. Results of antibody tests in the neonate (IgM and IgG) were persistently negative. The first negative PCR result from nasopharyngeal sample at 21 days allowed discontinuation of isolation measures. There was no evidence of seroconversion at 4 weeks post birth (Table 1).

During delivery, the mother wore a FFP2 mask. Skin-to-skin contact and delayed cord clamping were avoided. The neonate was fed with donor human milk initially, followed by artificial formula. Mother and child remained separated until the mother's quarantine could be lifted (positive IgG test), and the first mother-child visit took place 5 days after birth. However, tests were not performed for detection of the virus in the placenta, umbilical cord blood or amniotic fluid, so no definitive results could verify vertical transmission of SARS-CoV-2.

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