

IPE Simulation Enhances the Quality of Care in Neonatal Hyperammonemia

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Abstracts

BACKGROUND: Rapid blood clearance through continuous renal replacement therapy (CRRT) should be considered for neonatal hyperammonemia when medical therapy will not rapidly clear the ammonia and irreversible brain damage might occur. The complexity of extracorporeal blood clearance might affect the quality of care in that critical time. Inter-professional education (IPE) simulation-based training can fill the gaps of the multidisciplinary collaborative team management and improve the outcome in neonatal hyperammonemia. The purpose of this study is to evaluate the effectiveness of IPE collaborative practice in the management of neonatal hyperammonemia through the simulation training.

METHODS One full day IPE simulation workshop was conducted in our institute for pediatric CRRT multidisciplinary team quality training. The Prismaflex® System from Gambro for CRRT and neonatal manikin were used. After theoretical background, the inter-professional team practiced hands-on the CRRT for 90 minutes. Simulation specialist facilitated the scenario over three phases with advocacy-inquiry and plus-delta debriefing formats in between the phases for 180 minutes. Two tools were used to assess the workshop learning outcome. The first was a self-assessment pre & post surveys. The second was the expert facilitator's assessment through a standardized checklist.

RESULTS The results showed a significant improvement in CRRT cognitive learning and psychomotor skills among the team as documented by the pre and post surveys. Inter-professional education and collaborative practice was also improved by the third phase compared to the prior two phases and their debriefing. This was observed by the means score improvement of the standardized checklist that documented by the experts in the field.

CONCLUSIONS This neonatal CRRT simulation training demonstrated a very effective learning achievement that can improve the patient outcome in real situation of neonatal hyperammonemia. We recommend simulation workshop or in-site (point of care) simulation training to enhance the quality of care of complex neonatal management.

Objectives

The aim of this work is to assess the effectiveness of the inter-professional pediatric CRRT simulation of one full day workshop in management of neonatal hyperammonemia emergency. Two main research questions the authors are trying to answer in this study:

- (1) Is there any significant improvement in the knowledge and psychomotor skills of neonatal CRRT by simulation training?
- (2) Have the learners as a team become more skilled and confident in neonatal hyperammonemia CRRT with IPE simulation-based learning?

Below are the pictures taken during the run of CRRT neonatal hyperammonemia scenario in phase 1 & 3 in order. Full scenario filming including the debriefing was recorded after verbal consent.



Methods

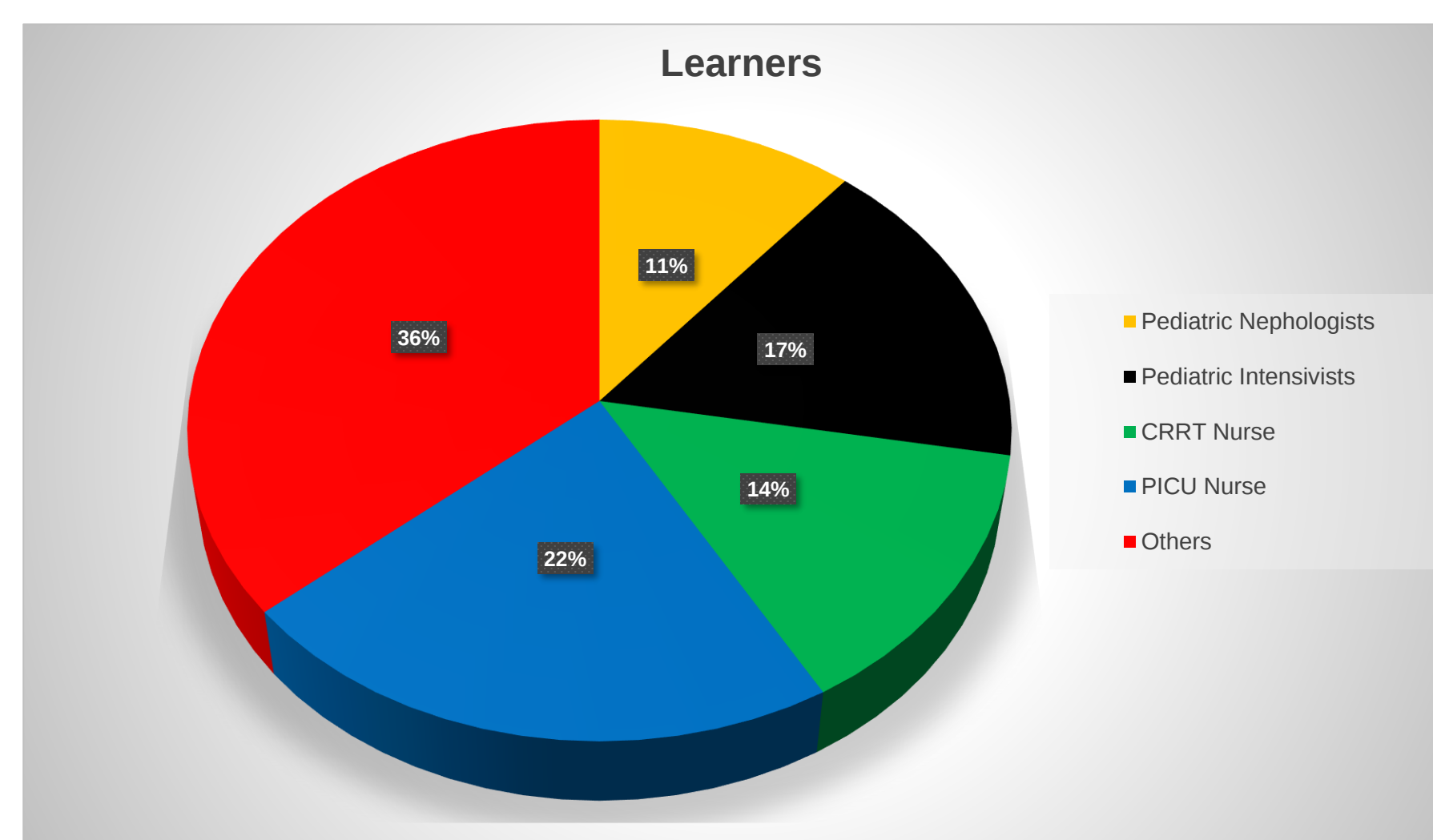
The study was conducted after the one full day inter-professional simulation workshop in our institute; the pediatric department of Hamad General Hospital in Qatar. The goal was to improve the training and quality of pediatric CRRT. The inter-professional education and multidisciplinary collaborative practice improvement were planned to be incorporated within the simulation sessions.

The Prismaflex® System from Gambro is the one used in our institute for pediatric CRRT and we used 3 machines for three different scenarios run in three rooms by 3 different facilitators.

The neonatal hyperammonemia is the researcher's scenario. In this scenario a 3 days old newborn was presented with lethargy, suspected sepsis and found to have severe hyperammonemia. The other two scenarios were 3 years old boy with neonatal sepsis and acute kidney injury and the third was 14 years old with Wilms tumor associated with acute kidney injury. Three manikins were used, the neonatal medium fidelity manikin was used in this scenario of neonatal hyperammonemia.

After theoretical background, the inter-professional team practiced hands-on the CRRT for 90 minutes. Simulation specialist (Facilitator) was facilitated the scenario over the three phases with advocacy-inquiry and plus-delta debriefing format over 180 minutes.

The total was 36 attendees; learners was distributed to the three rooms equally with the three facilitators. The neonatal scenario learners were one nephrologist, 2 pediatric intensivists, 3 CRRT nurses and 4 PICU nurses, one CRRT technician, one Simulation technician. The facilitator is a pediatric nephrologist as well as a simulation specialist in that neonatal hyperammonemia scenario.



The flow of the scenario was started from the baseline to phase three Baseline pre-briefing: "You are in PICU during night shift. There is a newborn inside the room just transferred from NICU. The PICU nurse is inside the room with the baby. She knows all the details about the baby. Now the pediatric intensivist arrived and need to assess the baby. Other team members have no rules until they have called".
Phase 1 :Team decision to start CRRT
Phase 2 : Day to day management and machine troubleshooting
Phase 3 Recirculation of the blood to send the baby for CT scan

Two tools were used to assess the workshop learning outcome. The first was a self-assessment through a pre & post surveys distributed after the registration and at the end of the workshop respectively (Likert scale from 1 to 5 questionnaire were used). There was no identity required to fill the paper form, only the position was required. The second assessment tool was the expert assessment through a standardized checklist which filled by the facilitator just after each simulation phases. The IPE simulation assessment tool used by the facilitator was based on the Society of simulation in healthcare (SSH) criteria and it tested the major four pillars of IPE which are; Values & Ethics, Roles & Responsibilities, Communication competency. Teams & teamwork. Moreover, four other areas were assessed by the facilitator through the checklist which are; two for simulation; Immersion in the fidelity and Self-reflection in debriefing and 2 domains for CRRT; Knowledge about CRRT, Confidence in CRRT management.

T-student test was used for statistical analysis of our data through SPSS software.

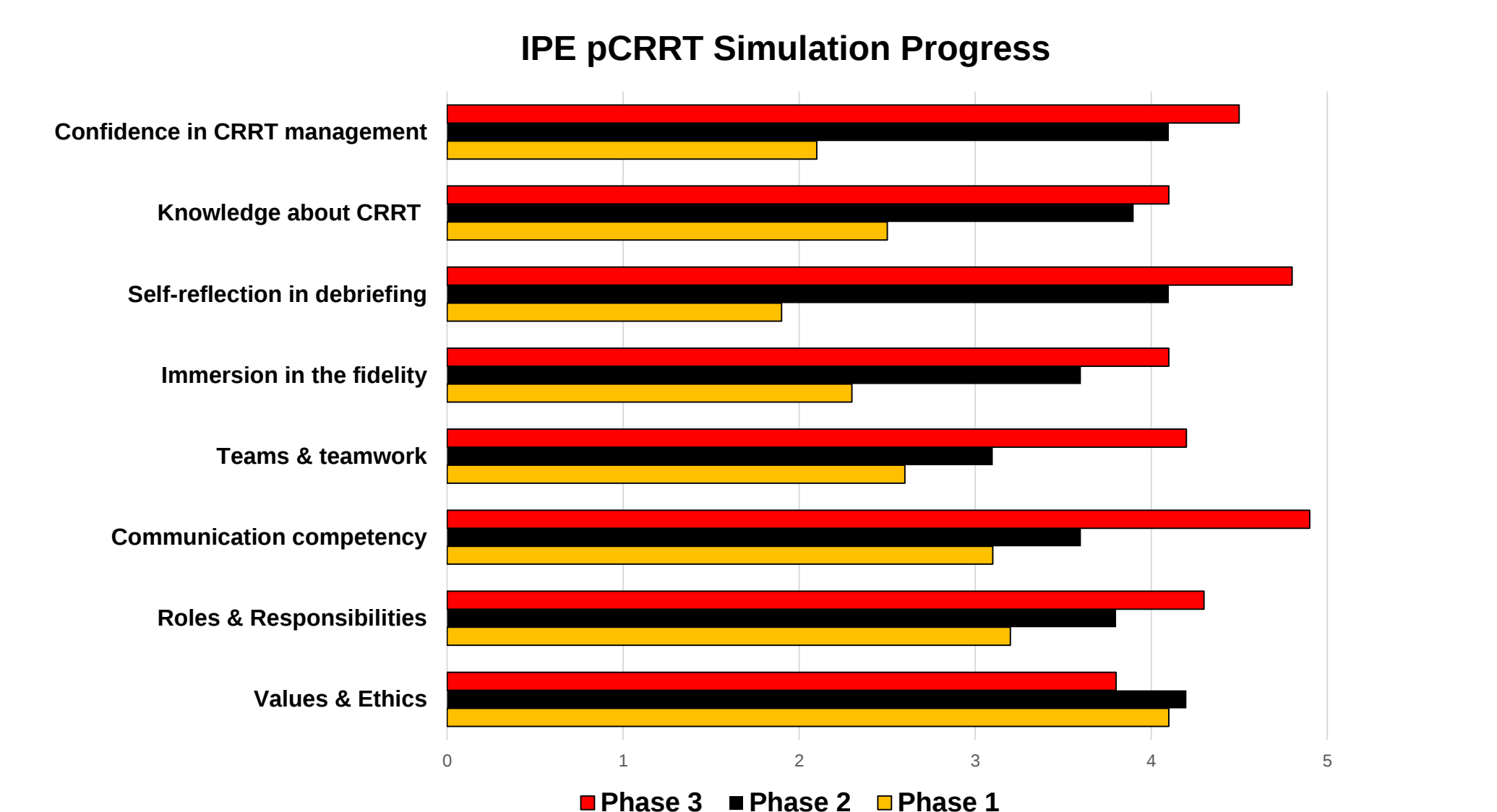
Results

Out of the total 36 attendees of the workshop, we received 14 pre and 17 post survey completed. The surveys was not for the neonatal session only because the identities of the learners were not known. Data extracted from those surveys showed significant improvement after the simulation experience in CRRT skills and knowledge (P-value 0.0005) and in IPE Simulation (P- value 0.03). The collective P-value of pre and post surveys was (0.0001)

Pre-workshop Survey	Mean
My knowledge about Pediatric CRRT Basics is very good	1.6
My knowledge about Pediatric CRRT prescription is very good	1.2
My knowledge about Pediatric CRRT daytoday management is very good	1.3
My skills in Pediatric CRRT Priming is very good	1.1
My skills in Pediatric CRRT Macine troubleshooting is very good	1.1
What is your background about simulation-based Education	3.1
What is your background Inter-Professional Education (IPE)	2.6
Post-workshop Survey	Mean
My knowledge about Pediatric CRRT Basics is improved after the simulation	4.6
My knowledge about Pediatric CRRT prescription is very good	4.1
My knowledge about Pediatric CRRT daytoday management is improved after the simulation	3.5
My skills in Pediatric CRRT Priming is improved after the simulation	3.2
My skills in Pediatric CRRT Macine troubleshooting is improved after the simulation	3.1
What is your feedback about simulationbased Education Experience?	4.3
How do you rate the InterProfessional Education (IPE) simulation	4.7

The inter-professional assessment by the facilitator's checklist also showed significant improvement in the four pillars of IPE, the other two area of simulation assessment and the 2 domains of CRRT assessment through the progression from the baseline to phase 3 with P-value 0.003 from phase 1 to phase 2 and 0.0001 between phase 1 and phase 3.

This data was demonstrated in the graph below.



Conclusions

The author concluded that pediatric CRRT IPE simulation training demonstrated a very effective learning tool to improve the collaborative quality of care and multidisciplinary team training and hence the patients outcome in the real situation of neonatal hyperammonemia. The author recommend IPE simulation workshop or in-site (point of care) simulation training to enhance the quality of care of complex treatment like neonatal management.

References

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