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Evaluation of an innovative ECMO course at a smaller volume ECMO center

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Introduction
Simulation has been shown to improve outcomes and performance of individuals in healthcare. In order to become an ELSO center of excellence, processes need to be in place to provide staff training and certification. We typically held a two day lecture program to provide didactics to the ECMO team. Members of the team asked for a combined lecture and simulation experience. We designed a two day course in which ECMO simulation is incorporated.

Methods
ECMO simulation was held in November 2014.
- Participants included registered nurses, pharmacists and respiratory therapists.
- Participants completed a 15 question electronic survey before and after simulation.
- Study data were collected and managed using REDCap (Research Electronic Data Capture).
- We used electronic visual analog scales to assess:
  - participant's comfort level with ECMO
  - ECMO physiology
  - cannulation
  - anticoagulation
  - nursing role
  - circuit membrane pressures
  - ECMO emergencies such as air in the circuit, arterial line thrombus and an ECMO code.

Results
- 15 participants completed both the pre and post simulation surveys.
- Approximately half of the participants were inexperienced (< 3 ECMO patients managed) and had never participated in ECMO simulation before.
- The majority of participants had < 5 years experience in critical care medicine.
- Results of confidence in ECMO skills are shown in Table 1.

| TABLE 1. |
|-------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Overall | ECMO Circuit | ECMO Physiology | ECMO Anticoagulation | ECMO Nursing Role | ECMO Circuit Thrombi |
| Pre-test mean | 33.60 | 22.93 | 33.87 | 32.73 | 23.00 | 25.00 |
| Post-test mean | 55.80 | 54.07 | 64.00 | 63.40 | 59.13 | 53.67 |
| Difference | 22.20 | 31.13 | 30.13 | 30.67 | 36.33 | 28.67 |
| SD | 21.43 | 20.66 | 24.78 | 24.22 | 24.32 | 18.94 |
| SE | 5.53 | 5.33 | 6.40 | 6.25 | 6.28 | 4.89 |
| 95% CI | 10.33, 34.07 | 19.7, 42.57 | 16.41, 43.86 | 17.26, 44.08 | 22.67, 49.60 | 18.18, 39.16 |
| p | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 | <0.001 |

Conclusion
Overall we had a significant change in comfort level of all participants in managing patients on ECMO.
- Responses from all participants were encouraging.
- Incorporating simulation with lectures made the course more interesting and provided participants with more stimulation.
- We feel this is an important for smaller volume pediatric/neonatal centers to maintain retention.

We manage 7-12 ECMO patients a year and have similar outcomes compared to ELSO data. We therefore believe that an integrated ECMO lecture and simulation program is improving our providers comfort with managing ECMO patients.