Hands-On Cannula Care: A Structured Simulation-Based ECMO Nursing Education Program.

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Background: Variability in bedside ECMO cannula care practices is a recognized driver of mechanical complications, infection, and accidental decannulation. Despite the high-stakes nature of ECMO nursing, standardized training frameworks remain scarce. Simulation-based education offers a reproducible strategy to bridge the gap between theoretical knowledge and clinical competency.
Methods: Following institutional ethics approval and informed consent, ECMO nursing staff underwent a structured multimodal education program. Baseline competency was assessed via a standardized pre-test evaluating cannula care knowledge and clinical decision-making. Prior to any formal instruction, participants performed hands-on cannula care on realistic ECMO cannulation simulation mannequin, with cannulas inserted into material resembling skin ; performance was assessed using a structured bundle checklist, followed by guided debriefing to identify knowledge gaps. Theoretical reinforcement was then delivered through step-by-step video-based instruction covering dressing exchange, securement assessment, limb positioning, bleeding surveillance, and early complication recognition. A post-test was applied to evaluate immediate knowledge acquisition. To assess long-term retention and procedural consolidation, perfusionist-led bundle evaluations will be conducted at three months following program completion. Pre- and post-test comparisons will quantify knowledge acquisition, while longitudinal bundle assessments will capture skill consolidation and protocol adherence over time. Collectively, these metrics will provide a comprehensive evaluation of the program's impact on ECMO nursing competency.
Conclusion: This structured simulation-based program integrates hands-on practice, debriefing, and video instruction within a rigorous assessment framework. It represents a reproducible and scalable model for standardizing ECMO cannula care and strengthening nursing competency at the bedside.

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