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Topic: EQUIPMENT, MONITORING, AND ENGINEERING TECHNOLOGY

Simulator-based study of the Dräger apollo low flow wizard: preliminary results

Samsun Lampotang, Isaac Luria, David Lizdas, Schwab Wilhelm
LouAnn Cooper Office for Educational Affairs, College of Medicine,

Introduction: The Low Flow Wizard (LFW; Dräger, Lübeck, Germany) provides real time guidance for cost effective user optimization of fresh gas flow (FGF) range during general inhalational anesthesia. The LFW continuously informs users whether FGF is too high, appropriate or too low and its color-coded display (red: too low; green: appropriate; yellow: too high) responds in real-time to changes in FGF performed by users.

Objectives: The study objective is to determine if the Low Flow Wizard feature, as implemented in the Dräger Apollo workstation, reduces volatile anesthetic consumption.

Methods: Because a study during actual clinical use with patients involves many potentially confounding variables, we used a mannequin patient simulator (Human Patient Simulator, HPS, version B, CAE Healthcare/Medical Education Technologies, Inc., Sarasota, Florida, USA) that consumes and exhales volatile liquid anesthetic. The patient was a 64-years old, 70 kg male with a pancreatic head mass scheduled for a laparoscopic procedure. A multi-parameter physiological monitor (Merlin 6M1046, Philips Healthcare, Andover, MA, USA) placed on top of the Apollo displayed the ECG, heart rate, SpO₂ and first, noninvasive blood pressure and then invasive. In this within group study, each participant acted as his or her own control. Each participant was asked to anesthetize the same "patient", as simulated by the HPS as they normally would, twice: first with the LFW disabled and subsequently with the LFW enabled. The volatile anesthetic was isoflurane. Both simulation runs were set up to have similar time durations for the different phases of anesthesia: induction and maintenance. We started a 10 minute timer whenever the clinician said that they were ready for surgical prep and ended the scenario after 10 minutes has elapsed. We announced first incision 4 minutes after prep accompanied by elevation of BP and HR which declined over the next 5 minutes. Emergence was not simulated. The isoflurane vaporizer was weighed before and after each simulation run on a digital scale (Model EK-12Ki, 12000gx1g, A&D Engineering, San Jose, CA, USA) to determine volatile liquid anesthetic consumption.

Results: The ratio of liquid isoflurane consumption in grams with, and without, the LFW for the first three participants were 7:11 (63%), 5:7 (71%) and 5:14 (36%).

Conclusions: While we still have more participants to run through this ongoing study, our preliminary data suggest that use of the LFW results in large reductions (average of 47% reduction) in volatile liquid anesthetic consumption.

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