

POSTER 324

Low Cardiac Output and a Moving Ambulance—How Will They Affect Pulse Oximetry and Capnometry?

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Purpose: To test the accuracy of pulse oximetry and capnometry aboard a moving ambulance in a cardiogenic shock model.

Methods: Five dogs were anesthetized with pentobarbital, intubated, and instrumented. Stepwise worsening cardiogenic shock was induced with esmolol until cardiac output dropped 75%, then reversed in steps. An arterial blood gas specimen and hemodynamic measurements were taken at each step. Weeks later, the experiment was repeated aboard a moving ambulance on four dogs; shock was induced quickly and reversed slowly. O₂ saturation was estimated by pulse oximetry and pCO₂ by end-tidal CO₂. Differences between the noninvasive estimate and the blood gas measurements (measurement error) were compared statistically.

Results: Pulse oximetry and capnometry usually were accurate, but some highly erroneous readings occurred. Pulse oximetry readings sometimes were unavailable, especially during profound shock.

	O ₂ Sat	pCO ₂
Mean error	7	10
SD	9	11
50th %	2	6
75%	8	12
100%	47	51
% Obtained	87	100

Errors in O₂ saturation estimation increased by about 5 torr when made aboard the ambulance ($p = .04$); increased errors in pCO₂ estimation (<1 torr) were insignificant clinically. Pulse oximetry also was compromised by decreasing cardiac output ($p = .01$) and a hysteresis effect ($p = .05$). The pCO₂ estimation became less accurate with decreasing blood pressure ($p = .02$). Partial data were collected on two dogs: one had an intercurrent lymphoma, the other died following an infusion pump malfunction.

Conclusion: Pulse oximetry and capnometry usually were accurate estimators of O₂ saturation and pCO₂, but serious measurement errors occurred. Pulse oximetry is compromised when used aboard a moving ambulance. Both devices were less accurate as the severity of shock progressed.

POSTER 426

Safe Prehospital Treatment of Chest Pain Without On-Line Medical Control

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Hypothesis: Patients with uncomplicated chest pain can be treated safely and transported by paramedics without on-line [direct] medical control (OLMC).

Methods: A retrospective chart review of all non-traumatic patients with chest pain treated in a combined rural and suburban emergency medical system over a two-year period (December 1990–November 1992) was conducted. Prior to 1 November 1991, OLMC was mandatory for all patients with chest pain. Beginning 1 November 1991, if a patient had pain resolution spontaneously, with the administration of oxygen, or following a single dose of nitroglycerin, OLMC was at the discretion of the paramedic. Using the above criteria for inclusion, two study groups were defined, before and after protocol change (groups I and II respectively). The groups were compared using the following study parameters: scene time, transport time, time to administration of first nitroglycerin, number of vital signs completed, oxygen use, IV access, and ECG monitoring. Continuous and categorical variables were analyzed by *t*-test and χ^2 respectively.

Results: Of 303 non-traumatic, adult chest pain patients, 55 met inclusion criteria for group I and 39 for group II. The majority of patients were excluded due to persistent pain requiring OLMC. The sample size yielded a power of 80% to detect a difference of 20% at $\alpha = 0.05$. No statistical difference was found in any of the study parameters.

Conclusions: Uncomplicated, adult, chest pain patients can be treated appropriately by paramedics without OLMC.