TITLE: EVALUATION OF A PORTABLE COAGULATION MONITOR IN CARDIAC SURGICAL PATIENTS

AUTHORS: GJ Despotis, MD; SM Poler, MD; PM Heerdt, MD PhD; DG Lappas, MD

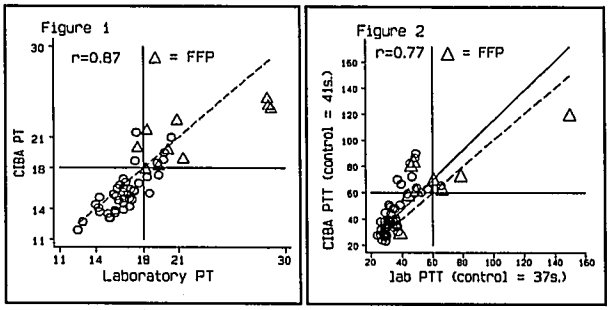
AFFILIATION: Department of Anesthesiology, Washington University School of Medicine, St. Louis, MO 63110

Coagulopathy following cardiopulmonary bypass (CPB) is not unusual. The etiology of these abnormalities include excess heparin or protamine, qualitative and quantitative platelet abnormalities, coagulation factor depletion and, rarely fibrinolysis and circulatory coagulation inhibitors. Frequently, non-specific treatment of post-CPB bleeding abnormalities with additional protamine, fresh frozen plasma (FFP) and platelet concentrates (PC) is initiated, before results from laboratory coagulation tests are available, potentially placing the patient at increased risk. Rapid determination of prothrombin time (PT) and activated partial thromboplastin time (PTT) in the operating room may thus be beneficial. This study was designed to compare post-CPB PT and PTT values measured with a CIBA/Corning 512 coagulation monitor to test results obtained via a standard laboratory assay (Ortho) and correlate these values with empiric intraoperative management.

Data from 50 cardiac surgical patients were used for the study after approval by the Human Studies Committee of this institution. The same blood specimen was used for determination of PT and APTT by both the laboratory and the CIBA-512. All blood samples were obtained in the post-CPB period after the administration of protamine. Other laboratory tests obtained included CBC with platelet count, thrombin time and activated clotting time. Physicians involved with intraoperative management were not aware of data obtained with the CIBA-512 monitor; therapy involving additional protamine, FFP or PC was guided by standard laboratory tests or subjective assessment of bleeding. All therapeutic interventions for bleeding were recorded and patients were grouped based on therapy. Data were analyzed by paired t-test, correlation, and weighted linear regression with $p<0.05$ considered significant.

For all patients, there was no difference in PT obtained by the CIBA-512 (16.8 $\pm$ 3.2) or the lab (17.6 $\pm$ 3.4). This was also true for the subgroup of patients (n=10) who received FFP (CIBA: 21.3 $\pm$ 2.6, lab: 22.2 $\pm$ 4.6). However, APTT obtained by the CIBA-512 (50.3 $\pm$ 21.3) was different from the lab value (41 $\pm$ 19.7), except in patients who had received FFP (CIBA: 68.1 $\pm$ 25.1, lab: 61.6 $\pm$ 33.8). The dashed line of identity (slope=1) is also shown. Figure 1 illustrates the correlation between CIBA PT and the lab PT (R=0.87). Figure 1 also demonstrates that in patients who received FFP ($\Delta$ data points), the diagnosis of factor deficiency based on a PT value of 1.5 x control (vertical and horizontal lines, based on mean value of normal range = 12) would have been supported by the CIBA-512 system. Figure 2 illustrates the correlation between CIBA APTT and the lab APTT (R=0.77); in addition, the regression line is to the left of the line of identity.

This study demonstrates that PT values obtained with the CIBA-512 correlate with the laboratory standard. In contrast, APTT values differ, probably due to increased sensitivity of the CIBA-512 to factor deficiencies. Prospective studies are needed to define the role of this monitor in formulating an algorithm for the treatment of intraoperative coagulopathy.




## A503

Title: AUTOMATED RECORDING OF PULSE OXIMETRY

Authors: P.H. Pan, MD, and N. Gravenstein, MD

Affiliation: Dept. of Anesth. and Neurosurg., Univ. of Fla. Gainesville, FL 32610-0254

One essential feature of the automated record keeper is automatic data collection from front-end monitors. We categorized the types and examined the incidence of incorrect data when pulse oximetry data were automatically recorded during general anesthesia.

We used a pulse oximeter (Ohmeda 3700) set for fast response. Oxygen saturation ($SpO_2$) and heart rate (HR) values were transmitted (independent of values recorded for clinical monitoring) via a communication port (serial RS232) to a portable computer every 2 s during 46 cases of general anesthesia and were recorded. $SpO_2$ values were classified as normal (measurement completed) or incorrect, and incorrect values were classified as absent (pulse oximeter did not detect $SpO_2$), uncertain (interference, motion artifact, or low-quality signals occurred), or false (HR varied by more than 10 beats/min between consecutive 2-s samples and the pulse oximeter gave no warning message). The incidences and percentages of incorrect $SpO_2$ values and the numbers of each type per hour during each phase of anesthesia--induction, maintenance, and emergence--were calculated and compared by Chi square analysis, ANOVA, and Tukey as appropriate.

A total of 1,288 min (induction), 3,623 min (maintenance), and 500 min (emergence) of pulse oximetry data were collected. Incorrect values occurred 3.3%, 6%, and 9.7%, of the time, respectively ($P < 0.001$) (fig.). During induction and emergence, absent values were most common ($P < 0.05$), and during maintenance, uncertain values were most common ($P < 0.05$).

Eliminating transmission of uncertain or false data by improving algorithms will make automated pulse oximetry recording reliable over 98% of the time during induction, over 99% of the time during maintenance, and over 93% of the time during emergence.

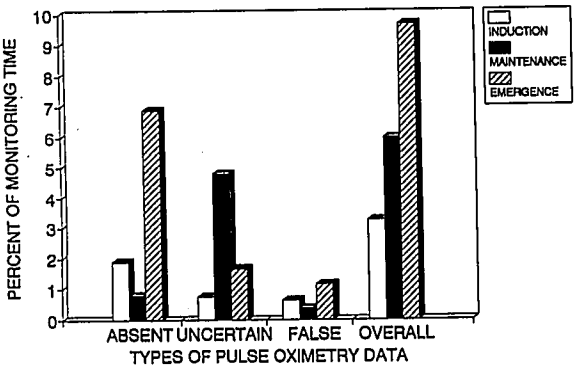



FIG. Percent of time pulse oximeter data recorded during general anesthesia were absent, uncertain, or false according to phase of anesthesia.