

THE FLUIDOMETER™: A NEW INTRA-OPERATIVE FLUID MANAGEMENT AID

Thomas Hemmerling, MSc, MD; E Arbeit; L Tang; S Cyr; M Wehbe; C Zaouter

Dept. of Anesthesiology, McGill University, ITAG Laboratory, Montreal, Canada

Introduction: Intra-operative fluid management requires the anesthesiologist to spend time in calculations in order to give the patient the exact volume of fluids according to a vast number of variables, such as patients’ anthropometric data, type of surgery, duration of procedure, blood loss, etc, in a fine balance between inputs and outputs. We designed a novel system (Fluidometer™), as an aid for intraoperative fluid management.

Methods: One hundred patients undergoing either urologic or orthopedic surgery are enrolled and pair-randomized (type of surgery) in two groups of equal size each in order to receive either “standard” fluid management (Control group) or “Fluidometer™-guided” fluid management. All patients received TIVA automatically delivered by an automated anesthesia delivery system (McSleepy™, 1). Arterial blood gases were obtained every 30 minutes. The Fluidometer™, (Figure), is an algorithm which takes into account patient’s anthropometric data, the type of surgery, blood loss and gives a real-time visual indication of the patient’s hydration status throughout surgery comparing the “target volume” (fluid volume that the patient should have received up to that moment) with the “given volume”. The given volume is manually updated by the anesthesiologist every time 500ml of crystalloid or colloid are given, by clicking a special button on a touch screen interface. The Hydration status is shown by the Fluidometer™ as “very dry”, “dry”, “fair”, “wet” or “very wet” if the given volume is respectively -75%, -50%, within ±25%, +50% or +75% than the “target volume” calculated by the Fluidometer™. Patient Data as well as the amount of fluid administered, changes in hemoglobin and hematocrit were analyzed with Student’s t-test or chi-square test (p<0.05) and are presented as mean (SD).

Results: (Preliminary results of 22 patients) Patients’ demographic data and length of procedure were similar in the two groups of 11 patients each. Mean age and weight was 58 (18) yrs and 79 (15) kg in the Fluidometer™-group (7 men, 4 women) vs 60 (16) yrs and 80 (16) kg in the Control group (8 men, 3 women). Mean anesthesia duration was 175 (66) min (Fluidometer™ group) vs 199 (54) min (Control group). The administered fluid volume was significantly less at 1900ml (710) in the Fluidometer™-guided group, vs 2900ml (1300) in the standard fluid management group. The relative hemoglobin and hematocrit decrease were significantly lower in the Fluidometer™-group than in the standard fluid group (Table 2).

Conclusion: The Fluidometer™ is a novel instrument used to automatically calculate the intra-operative fluid target; it can be used as an aid for intraoperative fluid management. Preliminary results show that in comparison to our present standard fluid administration, it reduces the crystalloid volume given, thus reducing hemoglobin or hematocrit decrease. More patients are needed to confirm the potential of this new monitor.

Reference:

1. CAS meeting 2010, Montreal, Abstract ID: 803213

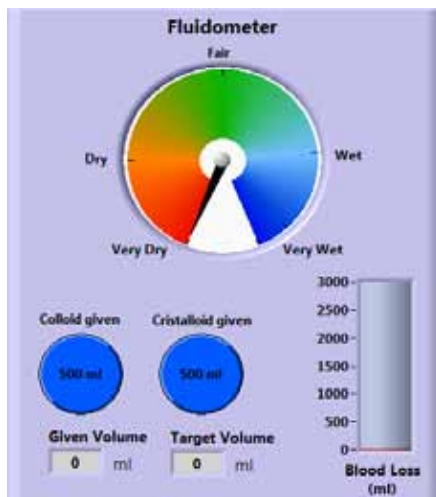


Figure: User interface

Groups	Fluidometer™	Control	P
Fluid during surgery (ml)	1864 ± 710	2909 ± 1281	0.028*
Absolute Hb decrease (g/dL)	1.2 ± 0.6	1.8 ± 1.0	0.067
Absolute Hct decrease (%)	3.8 ± 2.0	5.9 ± 3.1	0.073
Relative Hb decrease (%)	9.6 ± 4.3	16.8 ± 8.7	0.023*
Relative Hct decrease (%)	9.7 ± 4.4	16.8 ± 8.8	0.025*
Initial Hb (g/dL)	11.8 ± 1.6	10.7 ± 2.1	0.153
Minimum Hb (g/dL)	10.7 ± 1.3	9.1 ± 1.8	0.028*
Initial Hct (%)	38.2 ± 5.3	34.5 ± 6.6	0.160
Minimum Hct (%)	34.5 ± 4.2	29.5 ± 5.6	0.029*

Table: Fluid and hemoglobin/-crit changes