

CLOSED-LOOP FLUID MANAGEMENT DURING HEMORRHAGE IN ADULT PIGS: LIR™ VERSUS ANESTHESIOLOGISTS

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Many have observed that medical device clocks are not set to the correct time. This is due to a number of causes. Most medical devices lack automatic clock-setting capabilities and cannot set their clocks using a network time reference. Also, there is no adopted standard for medical device time management. Consequently, clocks are typically set manually twice yearly for DST.

Most electronic medical devices contain an internal clock that is used to timestamp data. Depending on the configuration of the EMR and the data source, the EMR may insert the incorrectly time-stamped data into the wrong time slot, or reject the data altogether. Therefore, asynchronous time stamps may undermine the integrity of EMR data and the accurate reconstruction of clinical events or device failures.

To explore the problem, a sample of medical device clocks from the operating rooms, ICUs, and equipment storage facilities at Massachusetts General Hospital (Boston, MA) were recorded. Device clocks were compared to the NIST Internet Time Service to compare clock consistency and evaluate the deviance of the device clocks. Of 337 device clock-times that were recorded, 53% had an offset of > 1 min, 17% had an offset of > 30 minutes, and 11% had an offset of > 1 hour.

This pilot study supports anecdotal data and first principles that erroneous clock times are pervasive. Given the absence of automatic clock setting capabilities in most medical devices, and typical clock drift, these findings are not surprising. We are working on extending the study to other institutions and care areas.

Fluid Management During Hemorrhage in Adult Pigs: Closed-Loop (LIR™) vs. Anesthesiologists

	Blood Loss (ml)	Volume Given, ml/Kg	HR	MAP	Average CO	Min CO	Average SV	Min SV	Urine Output (ml/min)
Anes 1	1340	80.0	77 ± 4	63 ± 21	4.5 ± 0.5	3.5	60 ± 7	41	4.6 ± 3.5
Anes 2	1200	72.7	103 ± 6	69 ± 9	5.1 ± 0.4	4.5	50 ± 5	39	1.1 ± 2.7
Lir 1	1125	72.0	111 ± 3	76 ± 5	6.8 ± 0.9	5.2	61 ± 7	48	11.8 ± 4.2
Lir 2	1650	72.5	87 ± 10	77 ± 9	4.7 ± 0.7	3.8	54 ± 8	35	8.4 ± 5.9
Lir 3	1200	75.8	82 ± 2	63 ± 9	5.5 ± 0.6	4.7	67 ± 7	56	8.3 ± 6.0

HR - Heart Rate; MAP - Mean Arterial Pressure; CO - Cardiac Output; SV - Stroke Volume; Min - Minimum