# Supplemental Digital Content

**Supplemental Digital Content Fig 1 – Calculation of the Delta Stroke Volume from a Fluid Bolus Challenge**

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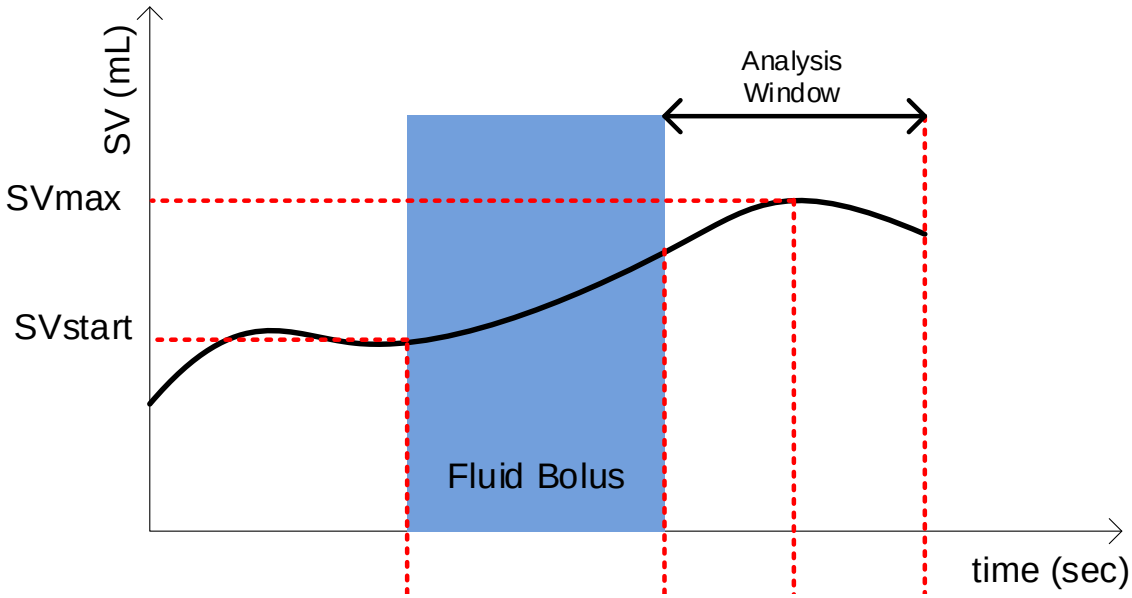
**Supplemental Digital Content Table 1 – Clinician participation by expertise and their knowledge of goal directed therapy based on use in current clinical practice.**

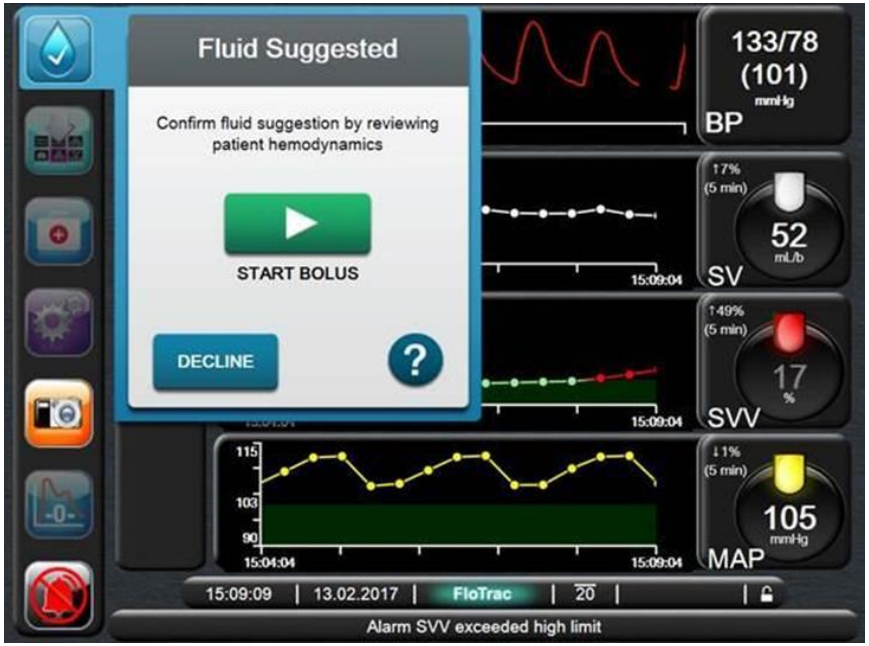
**Supplemental Digital Content Table 2 – Impact of study sites on primary effectiveness endpoint**




**Supplemental Digital Content 1 – Calculation of the Delta Stroke Volume from a Fluid Bolus Challenge.** The baseline stroke volume measurement (SVstart) at the start of the fluid bolus and the maximum stroke volume measurement (SVmax) found within the Analysis Window after the end of the fluid bolus are used to compute the delta stroke volume as (SVmax - SVstart)/ SVstart. The length of the Analysis Window is no longer than 6 minutes and dependent on the delivery rate of the fluid.

## Supplemental Digital Content 2 – AFM graphic user interface

**Figure 2 AFM Graphic User Interface**

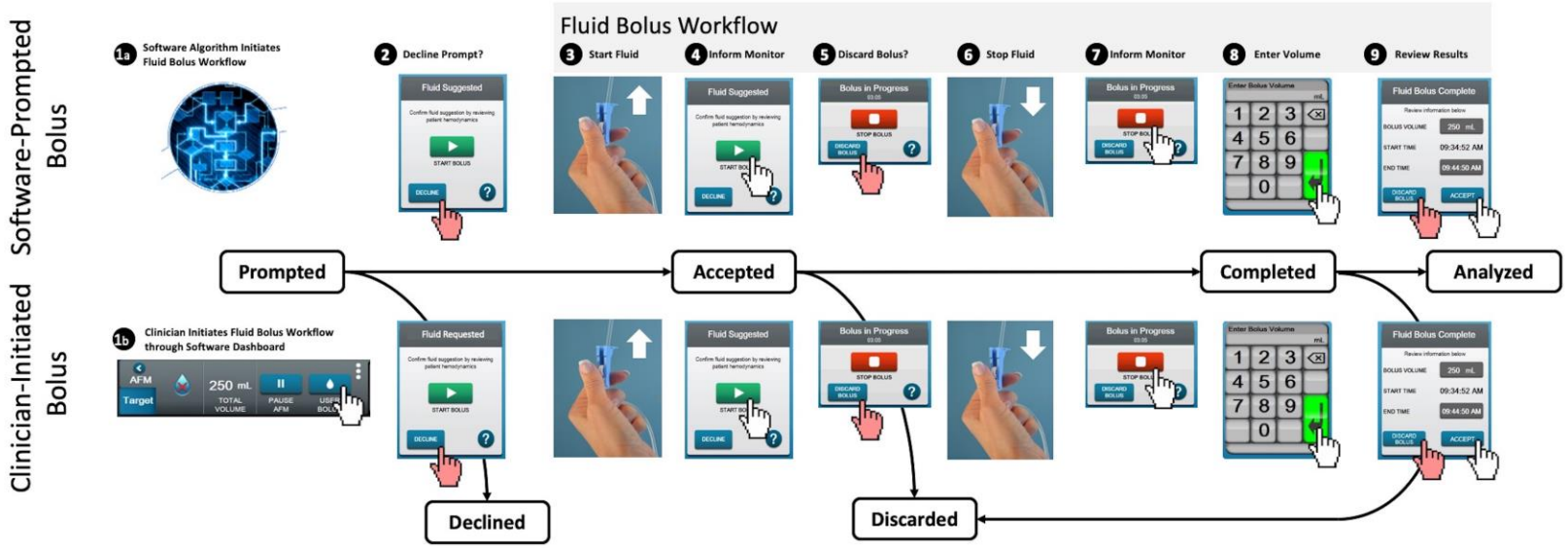



Fluid Recommendation

Test bolus

Fluid not suggested

## Supplemental Digital Content Fig 3 – Fluid Bolus Workflow




**Supplemental Digital Content 2: Fluid bolus workflow.** Whether a fluid bolus prompt originates from the software algorithm or the Clinician, it can take on the following states described in the inset table: Prompted, Declined, Accepted, Discarded, Completed and Analyzed. The workflow steps are as follows: In Step 1, the Fluid Bolus Workflow is initiated. The only differences between the software and Clinician workflows is that the resulting prompt (*i.e.*, pop-up) is automatically generated by the software when the algorithm suggests fluid whereas the Clinician needs to press the USER BOLUS button on the software dashboard to start a Clinician-Initiated Bolus. Here, the prompt title is "Fluid Suggested" in the case of a Software-prompted Bolus and "Fluid Requested" in the case of a Clinician-Initiated Bolus. In Step 2, the Clinician has the option to decline the prompt (by pressing the DECLINE button). The option to decline is available whether the prompt is created by the software or at the Clinician's request. **If the prompt is declined, the workflow ends.** In Step 3, the Clinician starts the fluid bolus by opening the IV line to the patient to deliver fluid. In Step 4, the Clinician notifies the software the prompt was accepted (by pressing the green PLAY button) and fluid was started. In Step 5, the Clinician has the option to discard the bolus (by pressing the DISCARD BOLUS button). **If the bolus is discarded, the workflow ends.** In Step 6, the Clinician stops the fluid bolus by closing the IV line to the patient to deliver fluid. In Step 7, the Clinician notifies the software the fluid bolus has stopped (by pressing the red STOP button). In Step 8, the Clinician enters the volume of fluid delivered to the patient. At this point the fluid bolus is complete. In Step 9, the Clinician reviews the fluid bolus information and decides to either discard the bolus (by pressing the DISCARD BOLUS button) or accept the bolus (by pressing the ACCEPT button). If accepted, the fluid bolus information is passed to the AFM algorithm for analysis.

| State | Definition |
|---|---|
| Prompted | A notification that allows the Clinician to either (1) accept and inform the monitor that fluid administration has started or (2) decline the suggestion |
| Declined | A notification that the Clinician has decided to ignore. A declined software prompt places the System in a 5-minute quiet period where no new notifications are presented to the Clinician. |
| Accepted | A fluid bolus that the Clinician has elected to start. |
| Discarded | A fluid bolus that the Clinician has decided not to present to the software for analysis. |
| Completed | A fluid bolus that the Clinician has sent to the software for analysis. |
| Analyzed | A fluid bolus that can be analyzed by the software. It was delivered within the prescribed rate and volume limits and has the required information to assess the hemodynamic response to the fluid. |

**Supplemental Digital Content Table 1 – Clinician participation by expertise and their knowledge of goal directed therapy based on use in current clinical practice.**

| ***Clinician Demographics*** | |
|---|---|
| **Attending or CRNAs/Fellows/Residents** | % (n/N)[a] |
| CRNAs/Fellows/Residents | 70.0 (851/1216) |
| Attending | 30.0 (365/1216) |
| Total | 100.0 (1216/1216) |
| **Current Use of Perioperative Goal-Directed Therapy** | |
| Sometimes | 59.0 (693/1174) |
| Never | 26.8 (315/1174) |
| Almost Always | 8.4 (99/1174) |
| Always | 5.7 (67/1174) |
| Total | 100.0 (1174/1174) |

Abbreviations: CRNAs, Certified Registered Nurse Anesthetists

[a] Denominators are based on the total number of available data captured for each parameter

## Supplemental Digital Content Table 2 – Impact of study sites on primary effectiveness endpoint

| SiteID | Mean Response % | 95% Lower CI | 95% Upper CI | Boluses | Subjects | Sample Mean | Bias |
|---|---|---|---|---|---|---|---|
| 004 | 58.09% | 50.00 | 66.216 | 76 | 30 | 58.11% | 0.0231% |
| 009 | 65.89% | 59.28 | 72.455 | 167 | 43 | 65.87% | -0.0187% |
| 016 | 68.18% | 59.38 | 76.119 | 67 | 20 | 68.18% | 0.0008% |
| 058 | 72.18% | 55.56 | 88.889 | 18 | 7 | 72.22% | 0.0472% |
| 064 | 100.00% | 100.00 | 100.00 | 4 | 4 | 100.00% | 0.0000% |
| 107 | 76.47% | 68.63 | 84.31 | 51 | 22 | 76.47% | 0.0026% |
| 127 | 43.73% | 18.75 | 68.75 | 16 | 4 | 43.75% | 0.0160% |
| 230 | 20.04% | 0.00 | 40.00 | 5 | 3 | 20.00% | -0.0360% |
| 231 | 78.25% | 65.22 | 91.30 | 23 | 10 | 78.26% | 0.0109% |

The table displays the primary effectiveness outcome, mean response rate, 95% bootstrapped confidence intervals, number of boluses and subjects.

We performed an additional analysis using a random effects approach with subjects nested within clinicians, and clinicians nested within sites in a logistic regression model to evaluate the impact of site on our effectiveness outcome. Assuming an unstructured covariance structure (UN(1,1)) for this hierarchical relationship, we found that site with clinician and subject sub-levels accounts for only a minimal amount of variance. The variance on the logit scale of the random site x clinician x Subject intercepts is estimated as $\sigma_c^2$=0.004369, se=0.01026. Therefore, the impact from the different sites on the primary effectiveness outcome was deemed negligible.