

1 Context and Purpose:

The purpose of this IHE Devices Pump Work Group activity is to identify a means for communicating a flush event that is performed as a part of infusions. Health care providers use IV flushes to clear out IV lines that deliver medicine directly into the veins of a patient. Flushes are administered before and after starting IV medication administrations. This has multiple effects such as:

- Ensures complete delivery of the medication
- Prevent adverse reactions between different medication administrations
- Prevent blockages in the IV lines
- Keeping the IV lines clean

The primary goal is to define a solution that allows for the electronic transfer of infusion parameters and communicate infusion pump events specifically for flush uses cases.

2 Summary:

Flush events may occur for either an intermittent syringe or a large volume pump (LVP). For intermittent syringes, there are three clinical cases a flush would be used after: an infusion completes, syringe is empty, or micro dose volume is primed. In each syringe case, a clinician can manually or auto program the flush parameters (six use cases). For the LVP case, a clinician would manually program the flush based on the primary infusate after the medication delivery from the secondary source is completed. The clinical cases determine when an infusion of a medication is complete which is marked by a different stop event depending on the case.

An infusion completes use case is marked by the medication dose volume being less than or equal to the volume in the disposable. However, there is medication dose volume remaining in the tubing that needs to be delivered via a flush. Following the report of an infusion stop event; this use case contains a flush start and flush stop event that is reported from the infusion pump to a Hospital Information System (HIS). Depending on the HIS implementation, the generic flush maybe be associated with the medication being delivered.

The syringe empty use case where the medication volume to be delivered (VBTI) is larger than the disposable volume, such that the disposable tubing is primed with the medication and the remaining volume in the medication syringe is less than what is needed to be infused. This concept allows for the syringe VBTI to be programmed beyond the syringe volume (manually or auto-programmed). In doing so, when the syringe is empty, the infusion pump stores the remaining volume and rate of the medication to be delivered. A flush syringe can then be mounted and quickly programmed using the outlined flush feature to recover the remaining medication volume and rate. Using the mounted flush syringe, the infusion of the remaining medication in the disposable is completed and then the flush begins. This is reported to the HIS in two steps, which allows for the remaining medication to be delivered and seamlessly transition to the start and delivery of the flush. In this case, the generic flush is associated with the medication delivered in the HIS.

The final syringe case for micro dose volume is based on the conditions where the medication dose volume is less than the tubing volume and requires an immediate start of the flush to deliver medication. In this case, the pump would report the medication infusing start and stop events, followed by the flush start and stop events to the HIS. In this case, the generic flush is associated with the medication delivered in the HIS.

The LVP use case is marked by an infusate running on the primary line. The primary infusate is stopped and reported to the HIS before while the pump retains the rate, VTBI, and volume infused. The medication start event then begins delivery from the secondary source. The medication delivery is stopped when the VTBI is reached. However, there is medication dose volume remaining in the tubing that needs to be delivered via a flush. The pump then immediately transitions back to the primary line and the flush begins at the same rate as the medication. This is reported to the HIS in two steps, which allows for the medication to be delivered from the secondary source and seamlessly transition to the start and delivery of the flush. This concept allows for the completion of the flush and the pump to automatically resume the primary infusion at the original primary rate and accumulate the primary volume infused.

All start and stop events reported to the HIS follow IHE PCD-01 and IHE PCD-10. In the cases where the flush is automated for each clinical use, a flush auto-programming request is sent to the infusion pump following IHE PCD-03 and the same start and stop events are reported to an HIS as in the manual process.

3 Scope:

The scope of this white paper will focus on intermittent syringe and LVP infusions only.

4 Key Insights/Conclusion:

To support current clinical workflows, this flush concept meets several key needs. It allows the clinician to program the pump as the order is written at all times, even when the line has been primed with medication. It also allows a flush syringe and LVP to be easily programmed for the remaining line volume and with the same medication delivery rate. It documents the medication delivered and the flush phase as a single medication delivery (separate dose vs flush for HIS). Finally, this concept supports the interoperability workflow without a manual entry via automated programming requests from the HIS and allows the infusion pump to display what is infusing (drug or flush). This highlights the importance of defining flush use case concepts for communicating flush events, associating flush events with the related medication infusion, and allow for the auto-programming of those event in order to maintain seamless interoperability for all workflows between infusion pumps and hospital networks.