Pharmacy Informatics and Technology

IV Push Medication Build within the Electronic Medical Record: Frequently Asked Questions and IV Fluid Shortage Considerations

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Purpose

This document addresses certain actions for the pharmacy informatics team to consider when engaged in implementation of intravenous (IV) push of specific medications. Informaticians should use their professional judgement in deciding how to use the information in this document, considering the needs and resources of their individual organizations.

For additional information, please review other documents in the ASHP Resource Center.

Why is IV push of medications being implemented?

Several advantages of IV push medication delivery have been identified and highlighted in literature[3]. IV push of medications has proven to be advantageous in the following aspects:

- Decreased the time from ordering to the start of administration[1],
- Allowed for optimal timing of administration in a perioperative setting[2],
- Minimized preparation and administration times, and
- Has resulted in cost savings[1]

The shortage of IV fluids has been an ongoing issue for the past several years due to a variety of factors, but the situation has intensified recently. As of late 2024, hospitals and other health care facilities are experiencing shortages of sodium chloride injection, lactated ringers, dextrose injections and sterile water for injection due to the effects of Hurricane Helene in North Carolina. In the face of a national fluid shortage, IV push of appropriate medications allows organizations to conserve parenteral IV solutions.

What to Convert?

Steps to take when considering medications to convert to IV push include:

- Evaluate current health system stock of all fluids and volumes
- Review available literature to identify medications which can be safely administered via IV push medication delivery.

- Stay up to date with manufacturer and distributor communications to monitor availability and allocation updates.
- Review historic utilization data to maximize the conservation of IV fluids while making as few changes as necessary to standardize local practices and workflow.

Beta-lactam antibiotics such as cefazolin, ceftriaxone, and medications such as ondansetron, dexamethasone, thiamine, diphenhydramine and many others are reliable choices.[5,6] An interdisciplinary team should consult with the drug information division, infectious disease services, cardiology, oncology, and other affected disciplines, as well as pharmacy service representatives to identify the top drugs (including specific doses) based on the current usage to convert to IV push medication delivery.

How?

Engage with the nursing and medicine teams as well as the pharmacy operations leaders to determine the dispensing process for the IV push medications.

Some questions to ask would be –

- *Would medications be diluted on the nursing unit?*

  Considerations:

  - If diluted on the nursing unit, would the build in the electronic medical record dictate how and what needs to be dispensed from carousels and automated dispensing cabinets?
  - Coordination may be necessary with multidisciplinary teams to align to the new workflow, such as central supply, depending on which group manages IV fluid stock at your institution.
  - Maximize integration with hospital automation so that the administration process includes scanning both the medication and diluent with Bar Code Medication Administration (BCMA).
  - Alternatively, automated dispensing technology allows for the creation of ad-hoc kits which can be utilized for dispensing the individual vial and diluent components.

  As clinical decisions are made, engage with the purchasing group to ensure an appropriate supply of exact medication vial sizes and diluent is available for purchase before proceeding with a conversion (e.g., matching 10 mL vials of sterile water for injection to an appropriate medication newly designated for IV push). Unit

stock of diluent vials may need to be increased in automated dispensing cabinets based on usage in different areas of the facility. Plan in full before commencing with roll-out of the new process.

Additional Medication Safety Considerations:

- One key consideration when transitioning the administration of medications from small volume solutions to IV push is to ensure the medication administration instructions listed in the medication administration record match the pharmacy label on the dispensed product. This will decrease staff confusion and increase patient safety.
- Consider adding automated dispensing cabinet level alerts to provide an extra layer of safety for medication/fluid compatibility and also to communicate that the change in administration is due to fluid shortage.
- During nursing education, highlight that medications should NOT be diluted with prefilled normal saline flush syringes. Prefilled syringes of saline are designated as devices (not medications) by the US Food and Drug Administration and have not been approved for the reconstitution, dilution and/or subsequent administration of IV push medications.[7,8] Use of prefilled saline syringes to dilute and administer medications would be considered off-label use.[9] There is also a risk that a prefilled syringe used to dilute a medication could result in a medication error if not labeled appropriately and includes a barcode to confirm the medication when administered.[9]

- *Would pharmacy reconstitute/dilute and dispense the medication?*

  Considerations:

  - Would this product be batched and require a specific identifier to scan at the bedside?
  - Would the medication be prepared and dispensed with a patient specific syringe label?
  - Consider building the EMR records based on the above options.
  - Update the IV workflow management systems (as applicable) to allow for this dispensing. Always review USP 797 guidelines to ensure sterility requirements are met.

Other build considerations:

- Ensure changes in the ordering and administration process do not endanger specialty populations, such as pediatric/neonatal and geriatric patients. Consider specific dose limits and patient age, weight and renal function when making build changes.
- In a multi-hospital system, build records such that different hospitals can switch out build based on individual timelines to allow for appropriate inventory usage and minimization of waste.
- Default the 'infuse over' time frame in the medical record so the necessary information is available to nursing staff when administering the drug.
- If using syringe IV pumps for administration, ensure that the concentration and dose limits are applicable with the IV push workflow. Make sure the drug is in the pump library with IV push administration times.
- Health systems may create a note type within their EHR that front-line staff can use to document when a procedure is canceled or deferred due to IV fluid shortages. This allows the health system to quantify the effect of shortages on patients and workload to assist in planning for future shortages.

- *What will the pharmacy informatics team's build strategy be to support the conversion to IV push?*

  Considerations

  - Collaborate with medicine teams, nursing, and pharmacy when deciding to alter any ordering processes or implementing CDS tools.

  Clinical Decision Support (CDS)

  - Consider implementing CDS tools such as non-interruptive or interruptive alerts when selecting IV maintenance fluids to assist with communication of the IV fluid shortage and to promote IV fluid conservation.
  - Also consider implementing non-interruptive or interruptive CDS alerts to populate in the EHR when providers are ordering medications that have been transitioned to IV push. These alerts could be utilized with the purpose of spreading awareness of the IV fluid shortage conservation efforts at the institution and/or recommending alternative therapies when appropriate.
  - Determine how severe the state of the IV fluid shortage is at the time of considering CDS alert implementation to guide whether to implement soft stop alerts that let the providers continue with their fluid order or hard stop alerts that require an alternative selection.

    - Hard stop interruptive alerts can be utilized to recommend alternative therapies such as IV push or oral alternative therapy options, depending on the case and which clinically appropriate alternative therapies are decided upon at your institution.
- One area of opportunity for promoting fluid stewardship during IV fluid shortage that could be supported by pharmacy informatics build is reviewing electrolyte repletion policies and opportunities for transitioning to oral options if clinically appropriate.
    - For example, for potassium repletion it could be considered to use a soft stop CDS alert that recommends using PO repletion if able based on the institution's policy. This CDS strategy could be used to steward potassium chloride IV usage to be prioritized for use in patients that are NPO.
    - Consider adding details in the CDS alerts from the electrolyte repletion policy on when it is appropriate to switch to an oral alternative to increase staff awareness of fluid conservation in the setting of electrolyte repletion.

Medication Ordering Process Design

- Assess the current medication ordering process in the EHR for the medications where the route of administration will be transitioned to IV push.
    - Review EHR system medication ordering build to assess if medications are embedded within order sets or ordered individually outside of order sets, or both.
    - Based on the current system set up for ordering the medications, determine the pharmacy informatics build strategy to support the new IV push medication records.
    - This could include implementing interruptive or non-interruptive CDS alerts, and replacing current medication builds within order sets with the new IV push medication records.
    - When deciding if medications should be swapped to IV push within order sets, consider the anticipated length and impact of the shortage, as well as available pharmacy informatics resources to complete the build and consider resources needed to reverse the build after the shortage.

- Review order sets to assess if any supportive medications used frequently within the order sets can be converted to IV push. For example, if your institution has a high volume of chemotherapy order sets that include supportive therapy medications, review the current literature to consider IV push alternatives.
    - An example of this is fosaprepitant being utilized within oncology order sets via a reconstitution drug delivery system by nurses before the shortage, being converted to IV push aprepitant without dilution.

- Another area of opportunity for IV fluid conservation that could be supported by pharmacy informatics build is increased stewardship of transitioning from IV to PO antibiotics. Work with an interdisciplinary team to determine if implementing CDS for this area would benefit your institution during the fluid shortage.

Conclusion

The keys to making the transition to IV push medications due to fluid shortage as smooth as possible are collaboration and communication. Work with an interdisciplinary team at your institution to make sure there is a single, consistent, internal source for updated information for your healthcare system. This will decrease any confusion of news on updated practices to support the IV fluid shortage spreading solely by word of mouth. Collaborate with medicine teams, nursing, supply chain and pharmacy when deciding on EHR ordering process updates and new CDS build implementation. If the method of ordering the IV push medications is significantly different within the EHR, a short visual guide walking through the new ordering process may be provided for front-line staff.

After the IV fluid shortage resolves, it will be necessary to revert any pharmacy informatics build changes in the EHR implemented to support the shortage. It would also be beneficial to review data from the time of the shortage and reflect with the interdisciplinary team on strengths and weaknesses of the IV fluid conversion process. Including the process of budgeting to support the shortage. Finally, work with the team to refine the conversion processes for future shortage events.

References:

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6. Adult and pediatric IV push medication reference (vizientinc.com)
7. Product Classification (fda.gov)
8. Saline and Heparin Flush Classification | Hospital and Hospital Clinics | Medication Management MM | The Joint Commission
9. ISMP Safe Practice Guidelines for Adult IV Push Medications: ISMP97-Guidelines-071415-3. FINAL.pdf. Page 13.

Other Helpful Links:

- Small- and Large-Volume Fluid Shortages – Suggestions for Management and Conservation - ASHP
- Intravenous Push Administration of Antibiotics: Literature and Considerations - PMC (nih.gov)
- Safe Practice Guidelines for Adult IV Push Medications (ecri.org)
- https://www.ashp.org/drug-shortages/shortage-resources/publications/fluid-shortages-suggestions-for-management-and-conservation
- INS – Infusion Nurses Society: 1a92497b-3705-4cef-a4ac-89c5788873f7.pdf (constantcontact.com)
- https://www.ashp.org/-/media/assets/drug-shortages/docs/drug-resources-conservation-strategies-iv-fluids.pdf

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