Healthcare Technology Safety Institute Infusion System Meeting

A National Study of Intravenous Medication Errors: Understanding How to Improve Intravenous Safety with Smart Pumps

David W. Bates, MD, MSc
Chief Quality Officer & Chief of the Division of General Medicine, Brigham and Women’s Hospital
Medical Director of Clinical and Quality Analysis for Partners Healthcare
Professor, Harvard Medical School

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Agenda

- Background
- Project goals
- Methods/timeline
- Roles & responsibilities
- Research team
Project Goals

- To identify the key issues around use of smart pumps and to develop strategies that will improve the prevention of intravenous errors that will be broadly applicable.

- A national study using the general methodology by Husch et al, which allows a rapid assessment of the frequency and types of medication errors at an institution.
  - Across multiple sites to enable generalization of findings for improving Smart Pump use.
Research Questions

1. What are the frequency and types of IV medication errors?
2. How much variability is there by frequency and type among settings?
3. After review of the initial data, what strategies appear to have the greatest potential for reducing IV medication error frequency?
4. How effective is an intervention including a bundle of these strategies at multiple sites?
### Methods/Timeline

- **Observation study at multiple hospitals (multiple smart pump vendors)**

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<tr>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
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<tr>
<td>Phase 1</td>
<td>Phase 2</td>
<td>Phase 3</td>
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| 1. Obtain IRB approval  
2. Development of data collection form  
3. Observer training  
4. Initial measurement of IV medication errors | 1. Observation data analysis  
2. Face-to-face-meeting for developing recommendations  
3. Interventions to reduce IV medication errors | 1. Second measurement of IV medication errors  
2. Data analysis  
3. Face-to-face-meeting for developing final recommendations  
4. Publication of a final report |
1. Development of Data Form

- Develop electronic standardized data collection form (Microsoft Access)
- Will classify the severity of each incident/error
Definitions

- **Medication errors**: an error occurring in the medication–use process and can occur at any stage in the medication use process, including prescribing, transcribing, dispensing, administering, or monitoring. Not all medication errors have the potential to harm a patient.

- **Adverse drug events (ADEs)**: injuries due to a medication and are classified as preventable (associated with a medication error) or non-preventable.

- **A potential adverse drug event (PADE) / near miss**: a medication error that has the potential to cause harm but did not because it either was intercepted before reaching the patient (intercepted PADE) or reached the patient and because of luck did not cause harm (non-intercepted PADE)

- **Serious medication errors**: include both preventable ADEs and non-intercepted PADEs, which either harmed the patient or were judged to have the capacity to do so.
## Definitions of Error Types

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<tr>
<th>Error Type</th>
<th>Definition</th>
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<tr>
<td>1. Wrong Dose</td>
<td>The same medication but the dose is different from the prescribed order.</td>
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<tr>
<td>2. Wrong Rate</td>
<td>A different rate is displayed on the pump from that prescribed in the medical record. Also refers to weight based doses calculated incorrectly including using a wrong weight.</td>
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<tr>
<td>3. Wrong Concentration</td>
<td>An amount of a medication in a unit of solution that is different from the prescribed order.</td>
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<td>4. Wrong Medication</td>
<td>A different fluid/medication as documented on the IV bag label is being infused compared with the order in the medical record.</td>
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<td>5. Known Allergy</td>
<td>Medication is prescribed/administered despite the patient had a known allergy to the drug.</td>
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<td>6. Omitted Medication</td>
<td>The medication ordered was not administered to a patient.</td>
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<td>7. Delay of Rate or Medication/Fluid Change</td>
<td>An order to change medication or rate not carried out within 4 hours of the written order per institution policy.</td>
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<td>8. No Rate Documented on Label</td>
<td>Applies both to items sent from the pharmacy and floor stocked items per institution policy.</td>
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<tr>
<td>9. Incorrect Rate on Label</td>
<td>Rate documented on the medication label is different from that programmed into the pump. Applies both to items sent from the pharmacy and floor stocked items.</td>
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<td>10. Patient Identification Error</td>
<td>Patient either has no ID band on wrist or information on the ID band is incorrect.</td>
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<tr>
<td>11. No Documented Order</td>
<td>Fluids/medications are being administered but no order is present in medical record. This includes failure to document a verbal order.</td>
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2. Initial Measurement of IV Medication Errors

- 4 days, with 8 hours per day on four different units
- Each team will compare the infusing medication, dose, and infusion rate on the pump with the prescribed medication, dose, and rate in the medical record (both electronic/paper based)
3. Expert Meeting for Establishing Consensus

- Sharing results from data analysis
- Developing interventions

Potential interventions:
- Standardize drug nomenclature
- Implement auto documentation
- Commit to standardized critical drug hard stops across all care environs
- Standardize competencies: clinician training, checklists, and competency assessments and audits
- Placement of all pumps on secure wireless networks

Implementation of Recommendation Plans
4. Re-measurements of Medical Errors after Strategic Intervention

- Post intervention observation
- Evaluate by comparing the pre and post intervention error data
- An additional face-to-face meeting with all investigators

**Products**
- A publication about the baseline error rates at individual sites
- A publication about the results of the intervention
- A set of recommendations about best practices in the use of smart pumps
# Research Team

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<tr>
<th>Name</th>
<th>Role</th>
<th>Institution</th>
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<tr>
<td>David W. Bates, MD, MSc</td>
<td>Principal Investigator (PI)</td>
<td>Chief of the Division of General Medicine at Brigham and Women’s Hospital (BWH), and Medical Director of Clinical and Quality Analysis for Partners Healthcare</td>
</tr>
<tr>
<td>Kumiko Ohashi, RN, Ph.D</td>
<td>Co-PI: Medical/Nursing Informatics specialist</td>
<td>Research fellow at the division of General Medicine, BWH and Harvard Medical School (HMS)</td>
</tr>
<tr>
<td>Patricia C. Dykes, RN, BSN</td>
<td>Co-Investigator, Nursing informatics</td>
<td>Center for Nursing Excellence at BWH</td>
</tr>
<tr>
<td>Matt Wein</td>
<td>Database analyst</td>
<td>Partners HealthCare</td>
</tr>
<tr>
<td>Marla Husch</td>
<td>Co-Investigator</td>
<td>Director, Patient Safety and Quality, Central Dupage Health, Inc. Northwestern Memorial Healthcare</td>
</tr>
<tr>
<td>Leah Lough</td>
<td>Co-Investigator, Education/dissemination</td>
<td>AAMI Foundation Executive Director</td>
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<tr>
<td>TBD</td>
<td>Site manager</td>
<td>Each participating hospital</td>
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Discussion/Questions?