Safe Administration of High-Risk IV Medications

Intra- and Inter-Hospital Standardization: Drug Concentrations and Dosage Units

Tool Kit

Revised 2009

San Diego Patient Safety Council
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Introduction

As part of continuing efforts to improve patient and medication safety, in January 2005 members of the San Diego Patient Safety Council evaluated areas for local patient safety improvements. Standardization of intravenous (IV) infusion medication concentrations and dosage units with and across hospitals in San Diego County was identified as a significant opportunity to reduce morbidity and mortality due to preventable, high-risk IV-related adverse drug events. This toolkit provides the results of the work by the San Diego Patient Safety Council IV Safety Task Force, along with tools and information to assist other acute care organizations in implementing this standard approach.

Goal

Standardize high-risk IV drug concentrations and dosage units within and across hospitals area wide to reduce the likelihood of adverse drug events.

Standardization of Intravenous (IV) Medication Administration

Clinical practice will always involve some degree of variability, given the inherent variability in patients’ underlying pathophysiology and unique needs. Nevertheless, it is important to identify and reduce both unnecessary variability that increases opportunities for error and costs, and undesirable variability that reflects deviations from clinical guidelines and best practices. The challenge is to identify such variability, implement changes to reduce it, monitor the impact of those changes, and work to continuously improve patient safety and evidence-based care.

The 2006 Institute of Medicine (IOM) report, “Preventing Medication Errors,” urges hospitals to take action to reduce the potential for errors.

The experience of the San Diego Patient Safety Council shows that area wide standardization of high-risk IV drug concentrations and dosage units significantly reduces variability in IV therapy, helping to promote safer and more consistent practices in administering high-risk IV medications to patients.

Potential Benefits

- Improved patient safety due to reduced complexity, variability, and opportunities for high-risk IV medication errors.
- Improved compliance with best practices.
- Extended institutional compliance with the Joint Commission and local IV medication safety goals area wide, across all hospitals and related medical services (e.g., home health, long-term care, and paramedic services).
- Increased clinician satisfaction due to a less complex, safer environment that is also attractive to prospective employees.
- Increased opportunities to drive vendor standardization and other improvements to reduce IV medication-related costs.
- Improved dose error reduction software data set for current or future “smart pump” and/or bar code administration systems.
Creating a Shared Need: The Case for Standardization

IV Medications Are Associated With the Highest Risk Of Harm

In seeking to improve patient safety, the primary focus should be on preventing errors with the greatest potential for harm. Many of the highest risk medications (e.g., heparin, insulin, and narcotics) are delivered by IV infusion. In fact, 61 percent of the most serious and life-threatening potential adverse drug events are IV drug related. IV administration often results in the most serious outcomes of medication errors.

The Administration Process Is Vulnerable to Error

Relative to the other points along the medication-use continuum, the administration process has the fewest safeguards and least support mechanisms, and it often relies on a single healthcare professional for accuracy. This is because there is less opportunity to intercept these errors; administration is at the end of the process with no naturally occurring redundancies. Studies in the Intensive Care Unit found high-alert IV medication administration error rates of 34 percent and 49 percent. 41 percent of drug-administration mortalities were associated with dosing errors.

Dosing errors were by far the most common type of medication error at 28 percent. While 70 percent of ordering errors were intercepted; only 6 percent of the wrong dose errors occurring in the nurse administration stage were intercepted.

The second most common cause of nurse administration errors, at 13 percent, was infusion pump and delivery problems.

Extensive Variability Increases Opportunities for Errors

High variability across the administration process is a significant contributor to errors, for instance:

- A key medication process problem related to administration and monitoring is incorrect dosing due to confusion among medications.
- Nursing staff turnover rates are as high as 21.3 percent per year for some hospitals.
- Many nurses now work in multiple settings, and both patients and nurses transfer among area hospitals.

Standardization Is Supported by Patient Safety Initiatives and Research

Lack of standardization has been at least a partial cause of many cases of overly high doses, including a number of fatal overdoses. The need to reduce variability is a focus of Institute of Medicine (IOM, 1999) and Institute for Safe Medication Practices reports, and Institute for Hospital Improvement initiatives. Substantial unnecessary variation in IV medication practices is associated with increased risk of harm and therefore standardization has the potential to substantially improve IV medication safety. The Joint Commission National Patient Safety Goals require a hospital to:

- Goal 3. Improve the safety of using medications.
- Goal 3b. “Standardize and limit the number of drug concentrations available in the organization.”

Management Support Is Essential

Hospital-wide standardization of doses requires top-level decisions. Frontline operators, who make the errors in drug use, have limited ability to correct these systems problems on their own.
Need to Go Beyond Drug Concentrations

In many institutions, concentration standardization is well on the way to full implementation. Moreover, in a 100-hospital sample, Bates et al found drug concentrations to be the least variable of the infusion parameters.\(^{19}\)

Extensive variability exists in drug dosing units, and selection of the wrong dosage unit can result in very large errors. For example, some hospitals use more than one dosage unit for heparin (e.g., units/hr and units/kg/hr) in the same patient care area. This creates opportunities for significant errors, (e.g., a 68-kg patient could receive a 68-fold overdose).

Often the standard is not the same across all areas in a hospital, across hospitals in a system, or across all or even most hospitals in a given region where patients and staff may transfer.

Policies, procedures, and standard work processes can provide a substantial margin of safety in minimizing variability in high-risk situations. Importantly, technology is not required to implement standardization of IV drug concentrations and dosage units.

For institutions that do have or plan to implement smart pumps with dose error reduction software, standardization of drug concentrations and dosage units is an important first step in creating the necessary drug libraries. Standardization of drug dosing ranges is a logical next step in improving medication safety.

The San Diego Patient Safety Council recommends the following methodology for successful IV standardization safety:

- Mobilizing Commitment
- Developing a Standardized List
- Planning for Implementation
- Monitoring Change, Celebrating Success

Mobilizing Commitment

Forming the Task Force

The first step in developing an area wide IV safety campaign is to bring together the individual institutions in a geographic region to form a task force. The task force should be comprised of key individuals representing various roles and departments from each institution, such as:

- Critical Care Nurses\(^*\) (from all institutions)
- Clinical Pharmacists\(^*\) (from all institutions)
- Perinatal Nurses (from all institutions)
- Process Improvement Department
- Clinical Nurse Specialists/Educators
- Information Technology Department
- Pharmacy Buyers/Wholesaler Supplier Information
- Chief Nursing Officer/Nursing Leadership
- Pharmacy Leadership
- Intensivists Neonatologists
- OB-GYN Physicians
- Anesthesia
- Pharmacy and Therapeutics Committee
- Policy and Procedure Committee
- Those responsible for standard order sets
- Others, as needed

\(^*\) = Task Force members

Developing an Elevator Speech

An “Elevator Speech” can be used to quickly convey key elements of the IV safety campaign, for example:

What: We are creating area wide standards for high-risk IV infusion concentrations and dosage units in ___ (name of designated area) ___.

Why: This is important because there’s great risk of harm associated with variation in practice.
Creating a Shared Need: The Case for Standardization

**Success:** Success in our region will be achieved when a patient/nurse can transfer to any area or facility and the IV concentrations and dosing units will be the same. This will help reduce errors and confusion among clinicians.

**Need:** We need your institution’s support and participation in developing these community standards and rolling out the changes within your organization.

Creating a Project Charter and Plan

Once the task force is formed, a project charter for the IV safety campaign should be developed. This is key to establishing the scope of the campaign, keeping the team moving in the same direction, and preventing the goals and objectives from migrating during the course of the campaign. The goals and objectives should be time-specific and measurable.21

- **Sample Primary Goal:** Within one year, for selected common IV infusions, implement one community standard for each drug for 1) concentration and 2) dosing unit.
- **Sample Objective:** By __ (date) __ identify and engage the process-change participants representing each site and its clinicians.

As part of any campaign, the following is recommended:

- Develop and endorse roles and schedules.
- Consider individual calendars to determine if adequate time is available for campaign-related activities.
- Schedule all bi-weekly or monthly meetings early.

Additionally, roles need to be identified specifically for executive sponsor, process owner, and change agents for each participating organization.

Managing Resistance

Some resistance should be expected considering the impact to daily work processes. Therefore, proactive change management efforts should be implemented, for example:

- Identify key stakeholders and anticipate the amount of resistance they will have, what the fundamental concerns are, and how to minimize the barriers and maximize the benefits. Be sure to validate assumptions with each stakeholder.
- Obtain a coalition of committed supporters.
- Develop a strategy to secure the support of front lines and management personnel, for example: “We want our name to be on the list of the safest hospitals in the area.”

Communicating Effectively

Early and continuous communication is essential during the IV safety campaign, such as:

- Select the audience(s) within the hospitals, including the various disciplines’ leaders – especially nursing – as well as those involved with pre-hospital medication administration, such as home health, long-term care, and emergency medical services.
- Convince them of the problem and staff benefits to result from implementing change.
- Use information to garner support, for example:
  - Own knowledge of the most important medication errors
  - MEDMARX and other medication error databases
  - The medical literature
  - Guidelines from Society of Critical Care Medicine, others
**Creating a Shared Need: The Case for Standardization**

### Desired Outcomes

Expected outcomes for mobilizing commitment:

- **Specific** identified sponsors (e.g., Chief Nursing Officers, Pharmacy Directors, and Pharmacy and Therapeutics Committees) are willing to give visible, active, and public commitment and support to the project.

- Stakeholders and task force members have the ability to direct resources to the project and are willing to provide leadership by example and to devote their personal focus, time, and passion to this effort.\(^2^2\)

- Stakeholders and task force members agree on the story they wish to tell and have a quick, effective way to communicate that story.

- The task force has a clear goal, objectives, scope, and set of operating norms, and all meetings have been scheduled.

- The desired result (i.e., area-wide/regional standardization of IV medication concentrations and dosage units) is clear, widely understood, and shared.

### Tools

Tools needed for mobilizing the task force and stakeholders are:

- Invitation
- Project Charter
- Roles and Responsibilities
- Stakeholder Support/Resistance Analysis Tool

Examples of these tools are available in the Appendix: Tools to Drive Success on page 12.

### Developing a Standardized List

The recommended approach to developing the standardized IV list is:

- Perform an area-wide inventory of medication concentrations and dosage units.

- Prioritize the high-risk medications: insulin, heparin, IIb/IIIa inhibitors, neuromuscular blockers, opioids, electrolytes (e.g., magnesium).

- Determine where variations exist in current practice.

- Identify by care area the drugs that need to be changed and consolidate the data to eliminate unnecessary variability.

- Through multiple iterations, develop an agreed-upon list of standardized concentrations and dosage units for common IV medications.

- In parallel with reviewing infusion standards, begin planning for education, training, and implementation.

- Work with stakeholders at each institution to obtain agreement on a consolidated list.

- Physicians may want to review and participate in standard-concentration changes, especially the anesthesia standards.

- Physicians should review any changes to dosage units, while specialty subcommittees can advise pharmacy and therapeutics committees.

### Desired Outcome

The stated desired outcome is an agreed-upon list of standardized IV medication concentrations and dosage units.

### Tools

A survey tool can help identify participating hospitals’ current practices regarding the administration of IV medications. The following tables provide a standardized list of adult IV infusions developed by the council.
## Standardized List of Adult IV Infusions – High-Risk Medications

<table>
<thead>
<tr>
<th>DRUG</th>
<th>MIXTURE(S)</th>
<th>STANDARD FINAL CONCENTRATION (Single Strength)</th>
<th>STANDARD INFUSION RATE UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Antithrombotics, Electrolytes, Insulin, Opioids, Neuromuscular Blockers</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Abciximab (Reopro)</td>
<td>Standardized rate and duration, with variable concentration being weight-based and patient specific</td>
<td>12 hr bag, with variable concentration per patient specific, weight-based standard infusion of 0.125 mcg/kg/min (max 10 mcg/min)</td>
<td>Flat rate 21 ml/hr; dosing units are mcg/kg/min</td>
</tr>
<tr>
<td>Eptifibatide (Integrilin)</td>
<td>Standard pre-mixed products (i.e., 75 mg/100ml)</td>
<td>75 mcg/ml</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>fentaNYL (Sublimaze)</td>
<td>Varies</td>
<td>IV: 10 mcg/ml (0.01 mg/ml)</td>
<td>IV: Mcg/hr OB: Mcg/hr</td>
</tr>
<tr>
<td>Heparin (Warning: look-alikes: 2 units/ml vs. 50 units/ml 500 ml bags vs. Hespan)</td>
<td>25,000 Units/500 mL</td>
<td>50 units/ml</td>
<td>Units/hr</td>
</tr>
<tr>
<td>HYDROmorphone (Dilaudid) PCA or IV</td>
<td>10 mg/50ml, 20 mg/100ml</td>
<td>0.2 mg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Insulin</td>
<td>100 units/100ml</td>
<td>1 Unit/mL</td>
<td>Unit/hr</td>
</tr>
<tr>
<td>Magnesium Sulfate</td>
<td>20 gm/500 ml (4%) LVP OB only Otherwise, IVPB as 1 or 2 gm/50 ml, or 4gm/100ml</td>
<td>4% LVP solution for OB use only Otherwise, IVPB as 0.02 gm/ml (2%) or 0.04 gm/ml (4%)</td>
<td>Gm/hr</td>
</tr>
<tr>
<td>Morphine PCA or IV</td>
<td>Volume variations on a theme, depending upon device and patient needs: 50 mg/50ml, 100 mg/100 ml, 250 mg/250 ml, 300 mg/300 ml</td>
<td>1 mg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Vecuronium</td>
<td>100 mg/100ml</td>
<td>1 mg/ml</td>
<td>Mcg/kg/min</td>
</tr>
</tbody>
</table>
### Standardized List of Adult IV Infusions – Other Medications

<table>
<thead>
<tr>
<th>DRUG</th>
<th>MIXTURE(S)</th>
<th>STANDARD FINAL CONCENTRATION (Single Strength)</th>
<th>STANDARD INFUSION RATE UNITS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amiodarone</td>
<td>Load: 150 mg/100 ml Drip: 900 mg/500 ml</td>
<td>IVPB Load: 1.5 mg/ml LVP Drip: 1.8 mg/ml</td>
<td>Mg/min</td>
</tr>
<tr>
<td>Bumetanide</td>
<td>Undiluted 25 mg/100 ml</td>
<td>Undiluted 0.25 mg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>DOBUTamine</td>
<td>500 mg/250 ml</td>
<td>2 mg/ml</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>DOPamine</td>
<td>400 mg/250 ml</td>
<td>1.6 mg/ml</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>EPI/CAL</td>
<td>2 mg epi + 1 Gm CaCl2/250 ml</td>
<td>8 mcg/ml</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>EPINEPHrine</td>
<td>2 mg/250 ml</td>
<td>8 mcg/mL</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>Esmolol (Brevibloc)</td>
<td>2500 mg/250ml</td>
<td>10 mg/ml</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>Furosemide</td>
<td>250 mg/250ml</td>
<td>1 mg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Isopreterenol</td>
<td>1 mg/250 ml</td>
<td>4 mcg/ml</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>Labetalol</td>
<td>100 mg/100 mL</td>
<td>1 mcg/mL</td>
<td>Mg/min</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>2 gm/250 ml pre-made</td>
<td>8 mg/ml</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>LORazepam</td>
<td>1 mg/ml D5W; std volume not determined</td>
<td>1 mcg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Midazolam</td>
<td>1 mg/ml D5W; std volume not determined</td>
<td>1 mcg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Milrinone</td>
<td>20 mg/100ml pre-made</td>
<td>200 mcg/ml</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>Neosynephrine</td>
<td>50 mg/250 mL</td>
<td>200 mcg/ml</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>Nesiritide</td>
<td>1.5mg/250ml</td>
<td>6 mcg/mL</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>niCARDipine</td>
<td>25 mg/250 mL</td>
<td>0.1 mg/mL</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Nitroglycerin Glass Only</td>
<td>50 mg/250 mL pre-made</td>
<td>200 mcg/mL (0.2 mg/ml)</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>Nitroprusside</td>
<td>50 mg/ 250 ml</td>
<td>200 mcg/ ml (0.2 mg/ml)</td>
<td>Mcg/kg/min</td>
</tr>
<tr>
<td>Norepinephrine (levophed)</td>
<td>4 mg/250 ml D5W</td>
<td>16 mcg/ml</td>
<td>Mcg/min</td>
</tr>
<tr>
<td>PENTobarbital</td>
<td>2.5 gm/500 ml</td>
<td>5 mg/ml</td>
<td>Mg/hr</td>
</tr>
<tr>
<td>Pitressin (vasopressin)</td>
<td>100 units/100ml</td>
<td>1 unit/ml</td>
<td>Unit/min</td>
</tr>
<tr>
<td>Procainamide</td>
<td>2 gm/ 250 ml</td>
<td>8 mg/ ml</td>
<td>Mg/ min</td>
</tr>
<tr>
<td>Propofol</td>
<td>Undiluted</td>
<td>Undiluted 10 mg/ ml</td>
<td>Mcg/kg/ min</td>
</tr>
<tr>
<td>Theophyllin</td>
<td>800 mg/500mL (pre-mixed) (1,000 mg/500 ml aminophylline)</td>
<td>1.6 mg/ml theo (2mg/ml aminophylline)</td>
<td>Mg/kg/hr</td>
</tr>
</tbody>
</table>
Planning for Implementation: Tips From the Field

Objective

Error-free, synchronized system change implemented on a mutually determined change date/time.

Standardization of high-risk IV medication concentrations and dosage units is a high-risk process change. If less than completely successful, it could result in dosage errors and serious, preventable harm to patients.

Sufficient time and effort must be allocated to successfully implement the change, and activities must be well coordinated, so that staff will agree to make the changes and make the project succeed.22

Identifying Process Owners

For each site, an interdisciplinary, implementation management team is identified and ideally includes:

- Nurse Executive—executive sponsor
- Pharmacist
- Critical Care Nurse Leader
- Perinatal Nurse Leader
- Pharmacy technician(s) to support system monitoring and IV product change-out
- Nurses from each affected unit
- Information Technology (IT) analyst(s) expert in the relevant IT systems that contain IV drug infusion dosing and concentration information such as standard orders

The existing organizational departments and interdisciplinary bodies owning all the various pieces of this complex implementation must be identified. Additionally, it is necessary to include as yet non-existent, interdisciplinary bodies needed to coordinate this complex process.

Synchronizing System Change Within and Across Sites

Effective change implementation within and across sites require coordination of these stakeholders and activities:

- Medication Usage: Identify the stages of the medication-use process, tools, and users potentially most impacted by these changes.
- Change Approval Processes: Identify the relevant change approval processes, including anticipated turnaround times for each process change (e.g., nursing and pharmacy leadership, critical care, IT, etc.).
- Baseline: Obtain an IV medication errors measurement baseline three to six months prior to the system change. This should be compared with a measurement with the same timeframe after go-live of the new standards. A 30-day transition between baseline and re-measure is reasonable.
- Timeline: Ensure all owners/approvers are on the same page at the date/time of implementation of the new standards.
- Policy and Procedures Committees: Identify policies that need to be changed.
- Update IV Medication Guidelines and any other descriptors of new standards for IV medications.
- Formulary/compendium: Necessary updates may require involvement of IT leadership or dedicated committees to synchronize pharmacy, nursing, computerized prescriber order entry (CPOE), and other IT systems.
- Medication Order Processing System: IT leadership or dedicated IT committees may need to approve updates.
- Order Sets: Identify preprinted and CPOE order sets that need to be changed to prevent conflicts in description of drug product and dosage units.
- Pharmacy and Therapeutics Committee: Established pre-approved change criteria (i.e., using “standard concentration” as

Creating a Shared Need: The Case for Standardization
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defined in Standard Infusion Definitions, instead of in the order sets). Thereafter, this will prevent conflicts and asynchrony between medication standards and order sets, and avoid the time-consuming, tedious, and highly error-prone task of updating and maintaining order sets.

• Paper: Find and replace all old order sets – often a low-yield process requiring multiple cycles. Furthermore, in lieu of fully electronic documentation, print-on-demand electronic standard order forms facilitate achieving this standardization goal. However, there is added risk of each care area becoming its own print shop, creating stores of order forms.

• Nursing Documentation: Identify documentation forms (paper/computerized) that need to be changed (e.g., Nursing Medication Administration Record and Input and Output documentation to be updated with new dosage units).

• Drug Product Availability: Obtain assurance from pharmacy and vendors that any necessary new products will be available on the day of implementation of the new concentrations and reliably available thereafter through appropriate par levels.

• Drug Packaging: Ensure that the new concentration product is OBVIOUSLY NEW and DIFFERENT. A Pharmacy temporary “wrapper” should be used to alert nurses hanging the new drips.

• Smart pumps (if applicable):
  • Update datasets with a unique filename communicated in the change implementation campaign and on product alert wrappers.
  • Apply the pharmacy temporary “wrapper” or other product alert identifier for a long enough period after the change (i.e., two to three months, as negotiated with the nursing staff) to catch smart pumps still without the new dataset (e.g., “closet” pumps, rentals, etc).
  • Ensure that software and experts are available to monitor updating of smart pump datasets with new standardized concentration and dosage units, as well as subsequent pump activation of new dataset.
  • If manual upload of the new dataset is required, identify locations of all smart pumps.
  • If the upload is to be done wirelessly, test the integrity of the dataset updating functionality, wireless system integrity, and scope of coverage.

Communicating Start Date Clearly

It is important to reinforce the momentum of the project and announce clearly, and with total management support, its imminent implementation,\(^\text{21}\) such as:

“Effective ___(date)____(or “next Monday”), all employees will use the new system.”

Desired Outcomes

Desired outcomes for implementation of the standardized list are:

• A clear understanding in the organization of the new system and sufficient commitment to implement it successfully,\(^\text{21}\)

• Integration of the new initiative with ongoing work activities.\(^\text{21}\)

• A clear sense of the official start date for the new system.\(^\text{21}\)

Tools

Tools needed to implement are:

• Implementation Timeline

• Implementation Checklist

• Temporary Pharmacy IV Wrapper

Some examples of these tools are available in the Appendix: Tools to Drive Success on page 12.
Monitoring Change, Celebrating Success

It is important to ensure that once the change is started, it endures and flourishes, and that necessary learning and skills are transferred throughout the organization.\(^2\)

Reporting Results

A baseline of IV medication errors measurements should be performed three to six months prior to the system change. Later, these should be compared with a same period of time after go-live of the new standards. A 30-day transition between baseline and re-measure is reasonable. Figures 1 and 2 show results obtained across all participating council hospitals in San Diego, California.

Celebrating Success

Celebrate success of area wide standardization in terms of satisfaction, service, and safety.

- Formal report to stakeholders, such as site quality councils, nursing leadership, etc.
- Public relations campaign, such as press release, newsletter article, posters, slides, web site.

Desired Outcomes

Expected outcomes for monitoring change and celebrating success are:

- Reduction in IV infusion medication errors.
- Consistent, visible, and tangible reinforcement of the change initiative in the organization.\(^2\)
- Sense of accomplishment shared within and across institutions.

Figure 1: Elimination of Non-Standard Concentrations

Figure 2: Elimination of Non-Standard Dosage Units
Creating a Shared Need: The Case for Standardization

References


18. IHI.org. 100,000 Live Campaign. http://www.ihi.org/IHI/Programs/Campaign/ (last accessed November 16, 2005)


Appendix: Tools To Drive Success

The following tools are available in this appendix:

- **Invitation: Example** - This letter can be customized to invite people to join your collaborative effort. The invitation presents the goal and the process that will be followed to achieve the goal. An “Agreement to participate” allows people to fax back their recommendations for task force members, so that:

  “Together we can make _____(area name)_____ among the safest places in the US to receive critical healthcare.”

- **Project Charter: Example** - This tool helps a task force to specify critical project elements, such as project start and length, project owner, sponsor, team members, problem statement, what success will look like, and key measurements.

- **Roles and Responsibilities: Example** - This tool specifies the common and distinct responsibilities of various task force members, such as Executive Sponsor, Process Owners, Change Agents, and Team Members.

- **Stakeholder Support/Resistance Analysis Tool: Example** - This brief process description and analysis template can be used to help identify resistance and gain support of key individuals for the project.

- **Implementation Checklist: Example** - This tool is another way to check that all necessary steps have been taken for implementation of the standardized list.

- **Pharmacy Temporary IV Wrapper** - This should be used to ensure that a new concentration product is OBVIOUSLY NEW and DIFFERENT to alert nurses hanging the new standardized drips.

- **Press Release: Example** - This can be customized to communicate the work of the task force to your wider community.
Invitation: Example

[Letterhead]

__ (date)__

Re: Safe Intravenous Administration of High-Risk Medications – A Collaborative Effort of the San Diego Center for Patient Safety

Dear ________:

We welcome you to join the [first] collaborative effort of the ___(organizing organization’s name)__, Safe Administration of High-Risk IV Medications. This collaboration [is supported by a grant from ___(name)____] and is being offered to you at no charge other than your active participation.

The goal of this collaboration is to help avoid medication errors and associated harm by implementing an “IV infusion bundle” of best practices. We hope that all hospitals and health systems in ___(area)____ will join to ensure that these best practices are routinely followed.

The collaborative process will be as follows:

1. Select one or two members from your hospital to participate on the collaborative task force. These can be nurse managers, physicians, pharmacists, or administrators who have responsibility for clinical policies involving intravenous infusion of medications.

2. These representatives will attend a ___(name)____ Regional Conference on Preventing Harm Associated with High-Risk IV Medications on ___(date)____ at ____ (location)____ to explore the current best practices in the safe intravenous administration of high-risk medications.

3. The task force will then meet bi-monthly for one year to develop, along with experts, the “IV infusion bundle” of best practices, implementation strategies for their routine use, and measurement of results.

____(person’s name, credentials, institution)____ will chair the task force. ____ (name, credentials)____ will serve as the task force facilitator. The ____ (organization or person)____ will provide data analysis for the collaboration.

Please indicate the participation of your hospital or health system in this lifesaving collaboration by signing the enclosure and listing the individuals who will represent your hospital/health system on the task force. Your participation is entirely voluntary with the intent to improve clinical practice.

Thank you for your willingness to join this most important collaboration. Together we can make ____ (area name) ____ among the safest places in the US to receive critical healthcare.

Sincerely,

____ (name and title of organizer(s))____
Appendix: Tools To Drive Success

Project Charter: Example

Project Start: <Date>
Project Length: <Duration>

Project Owner: <Name of Project Owner>
Project Sponsor: <Name of Project Sponsor>
Team Members: <List each team member>

Problem: Increased variability in IV infusions leads to increased risk and harm

What will success look like?
1. All participating organizations will have implemented the standard names, concentrations, dosage units, and safety limits
2. There will be a reduction in harm

Project Scope: Develop an administration tool kit to describe the process to standardize infusion of high-risk IV medications.

Must Do’s:
1. Create Toolkit
2. Identify and eliminate high-risk practices

Must Have: Consensus on standard names, concentrations, and dosage units

Key Measurements Met:
1. Reduced harm from IV infusions
2. Implementation of standard names, concentrations, and dosage units by all participating hospitals
3. Culture survey completed
4. Reduced variability in names, concentrations, and dosage units
Appendix: Tools To Drive Success

Roles and Responsibilities: Example

Executive Sponsor Responsibilities

- Demonstrate commitment and support for project.
- Take responsibility and action if the project falls behind schedule or fails to bring desired results.
- Require the use of solid facts and data to support actions at all levels of decision-making.
- Make final decisions and make required judgment calls when conflicts arise.
- Assure linkage of project efforts to organizational strategies and priorities.
- Be prepared for and actively participate at all meetings where project sponsor is necessary (Initial Kick-off, Tollgate Reviews, and Final Report Out).
- Communicate project updates and expected outcomes, as appropriate, throughout the organization.
- Ensure speedy reviews at key decision points to accelerate decision-making, keep team members motivated, and maintain project velocity.
- Clearly communicate project expectations to directors, managers, and physicians.
- Hold the process owner and change agent accountable for:
  - Maintaining project scope
  - Providing periodic and final reports
  - Using effective change management strategies within the organization
- Provide the necessary resources (time, people, and materials) to the team.

Process Owner Responsibilities

- Demonstrate commitment and support for project.
- Take responsibility and action if the project falls behind schedule or fails to bring desired results.
- Require the use of solid facts and data to support actions at all levels of decision-making.
- Be prepared for and facilitate (or co-facilitate with Change Agent) all meetings.
- Make action plan assignments to team members that are clear, specific and realistic as to the who, what, and when, and a plan for obstacles that prevent the achievement of the assignment.
- Communicate project updates and expected outcomes, as appropriate, throughout the organization.
- Ensure speedy reviews at key decision points to accelerate decision-making, keep team members motivated, and maintain project velocity.
- Clearly communicate project expectations to managers and team members.
- Maintain project scope.
- Provide periodic and final report.
- Use effective change management strategies within the organization.
- Use resources (time, people, and materials) efficiently.

Change Agent Responsibilities

- Demonstrate commitment and support for project.
- Take responsibility and action if the project falls behind schedule or fails to bring desired results.
- Provide solid facts and data to support actions at all levels of decision-making.
- Make recommendations to team for decision-making.
- Facilitate (or co-facilitate with process owner or champion) all meetings.
- Make action plan assignments to team members that are clear, specific, and realistic as to the who, what, and when, and a plan for obstacles that prevent the achievement of the assignment.
Appendix: Tools To Drive Success

- Recommend communication strategies to the process owner/champion.
- Ensure speedy reviews at key decision points to accelerate decision-making, keep team members motivated, and maintain project velocity.
- Maintain project scope.
- Provide periodic and final reports.
- Use effective change management strategies within the organization.
- Use resources (time, people, and materials) efficiently.

Team Member Responsibilities
- Demonstrate commitment and support for project.
- Gain clear understanding of project assignments.
- Take responsibility for completing project assignments on time and communicating to process owner obstacles that prevent completion of assignments.
- Use solid facts and data to make decisions.
- Listen to, consolidate, and funnel feedback from stakeholders.
- Be prepared for and actively participate in decision making at all meetings.
- Communicate project updates and expected outcomes, as appropriate, to represented constituents.
- Use effective change management strategies within the organization.
Appendix: Tools To Drive Success

Stakeholder Support/Resistance Analysis Tool: Example

<table>
<thead>
<tr>
<th>Name</th>
<th>Strongly Agree</th>
<th>Moderately Agree</th>
<th>Neutral</th>
<th>Moderately Disagree</th>
<th>Strongly Disagree</th>
<th>Issue Concern</th>
<th>“Win”</th>
<th>Influence Strategy</th>
</tr>
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<tbody>
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Key Considerations

- Who are the stakeholders?
- Who controls the resources?
- Who can block the change directly or indirectly?
- Who must approve aspects of the change?
- Who owns the process?
- How does the stakeholder view the merits of the change initiative?
- How critical is each person’s support to the success of the project?
- What is the level of attention needed for each person? (based on acceptance and criticality)
- What are potential issues and concerns?
  - Technical: Costs required, lack of skills available, lack of critical resources, doubt as to outcome, etc.
  - Political: Issues of power, authority, and relationships
  - Cultural: Norms, mind-sets, habits, etc.
- What are the real, underlying issues? Can we address them?
- What history needs to be considered?
- If the stakeholder is entrenched, can we create a resolution that will let them save face?
- What is the stakeholder’s style?
- How is the stakeholder best approached (1:1, informally, demo, other)?
- Who can best influence the stakeholder?
Appendix: Tools To Drive Success

Implementation Checklist: Example

When implementing the standard adult IV Infusions, be sure to perform all the following changes:

- Formulary/Compendium
- Policies and Procedures
- Standard work processes in IV pharmacy
- CPOE and standard order sets
- Dosing ranges and other dose-error-reduction-software (DERS) system changes
- IT systems, including point-of-care clinical charting, pharmacy dispensing systems, label printing system, medication ordering system, emergency department system, anesthesia system
- Notebooks or other hard-copy references on each nursing unit that contain standard IV infusion guidelines
- Orientation and preceptor documents
- Competency documents for annual certifications
- Case studies used in simulations, Advanced Cardiac Life Support, Pediatric Advanced Life Support training, and in-service education
- Other: __________________________________________________________________________
Temporary Pharmacy IV Wrapper: Example

**READ THIS FIRST!!!!!!**

EFFECTIVE ___/___/___

This is the **NEW** STANDARD CONCENTRATION AND DILUENT FOR

**HEPARIN**

INFUSIONS.

<table>
<thead>
<tr>
<th>OLD</th>
<th>NEW! (changes are underlined)</th>
</tr>
</thead>
<tbody>
<tr>
<td>25,000 units in 250 ml D5W</td>
<td>25,000 units in <strong>500</strong> ml ½ NS (50 units/ml)</td>
</tr>
<tr>
<td>(100 units/ml)</td>
<td></td>
</tr>
</tbody>
</table>

**Benefits:**

All sites are now utilizing the same standard concentrations and diluents for their most common intravenous infusions.

This will reduce the potential for user error with _(???)_ order entry of these infusions.

To correctly use this new product, FIRST...

1. Ensure the smart pump system is updated with the new library containing this item:
   A. The PCU module screen should indicate “(insert name of the new dataset here)”
   B. If not, then power the unit OFF, then back ON, and wait for the green communication light (bottom left) to stop blinking, select NEW PATIENT, then perform step 1 above again.

2. Enter the Library and select this standard item.

3. Program the infusion in the defined dosage units, i.e., units/hr, NOT volume, i.e., ml/hr.
FOR IMMEDIATE RELEASE

SAN DIEGO MEDICATION SAFETY TASK FORCE CREATES UNIQUE COLLABORATION FOR SAFER USE OF INTRAVENOUS MEDICATIONS

Establishing Common Practices Across Multiple Hospitals is Key to Reducing Harm; Initiative Serves as Model for Hospitals Across United States

SAN DIEGO, Nov. XX, 2006 – Local hospitals throughout San Diego County, along with San Diego Patient Safety Consortium and the CareFusion Center for Safety and Clinical Excellence, today announced the results of a first-of-its-kind regional task force to improve patient safety by eliminating variation in intravenous (IV) medication practices among county hospitals.

The task force has created county-wide standards for safe administration of IV medicines by using a common drug identifier and standardizing the concentration and dosage units for each drug. The task force aims to make San Diego the first metropolitan area in the United States to develop and implement this new approach to significantly reduce the variation in IV therapy, resulting in safer and more consistent practices in administering high-risk IV medications to patients.

“The San Diego campaign for Safe Administration of High-Risk IV Medications has brought together virtually every hospital in our region to agree on IV standards that will reduce unnecessary variation among hospitals that can lead to harmful medication errors,” said Nancy Pratt, Senior Vice President of Clinical Effectiveness for Sharp HealthCare and key participant in the Task Force. “We hope our efforts in San Diego can serve as a model for other regions and begin to create a common standard for IV practices in hospitals across the country.”

The 2006 Institute of Medicine (IOM) report, “Preventing Medication Errors,” found that medication errors cause harm to more than 1.5 million people annually and cost hospitals more than $3.5 billion each year. The task force chose to concentrate on IV practices because 61 percent of the most serious and life-threatening potential adverse drug events are related to IV medications, and the IV route of administration often results in the most serious outcomes of medication errors. The report urged hospitals to take action to reduce the potential for errors, which reinforced the efforts being made by the medication safety task force in San Diego that began more than a year ago.

The IOM report further points out that the most common cause of IV medication errors is the incorrect programming of infusion devices. A key problem related to drug administration is incorrect dosing due to confusion among medications and the complexity of the medication use process. The San Diego initiative focused on standardizing high-risk IV drug concentrations and dosage units within and across San Diego hospitals to reduce complexity and improve compliance with best practices. These standards improve medication safety for patients and clinicians by ensuring the safest medication process is in place regardless of the caregiver or healthcare facility.

When infusion practices differ from one patient care area or hospital to another, the use of agency nurses, new graduates, traveling nurses, and nurses who change hospitals or care areas can further increase the likelihood of errors. For example, if one hospital or patient care area uses an infusion rate

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Appendix: Tools To Drive Success

of milligrams per minute and another uses milligrams per hour, choosing the wrong dosage unit could result in a 60-fold overdose.

San Diego County is the first region in the nation to standardize practices for safe administration of IV medications. When the task force began their work, the 15 hospitals in the San Diego task force used a combined total of more than 85 different concentrations and 57 different dosage units for 34 IV medications. Today those totals have been reduced to 34 standard, single-strength concentrations and 34 standard dosage units, effectively eliminating 100 percent of unnecessary variability in administering continuous IV infusions. Having met their goal of standardizing IV concentrations and dosage units, the task force is now working to standardize dosage ranges and drug libraries involved in the use of computerized "smart" pumps.

“While clinical practice will always involve some degree of variability, it is important to identify and reduce both unnecessary variability that increases opportunities for errors and costs, and undesirable variability that reflects deviations from clinical guidelines and best practices,” said Tim Vanderveen, Vice President of CareFusion’s Center for Safety and Clinical Excellence. “The challenge is to identify the variability, implement changes to reduce it, monitor the impact of those changes, and use clinical data to continually improve patient safety and care.”

The IV Safety Task Force also created a “tool kit” that contains the final list of standard concentrations and dosage units, and is intended to help other regions implement similar measures to standardize IV medication practices. The tool kit also includes practical advice on forming a regional task force, identifying variations in practice across different hospitals, developing standards, and overcoming barriers that may arise during the process. In addition to patient safety benefits, the implementation of consistent IV practices is expected to help hospitals comply with measures set by the Joint Commission of Accreditation of Healthcare Organizations (JCAHO), which has identified standardization of IV concentrations as one of its National Patient Safety Goals. The tool kit will be available in mid-November at http://www.hasdic.org.

Local hospitals involved in this initiative include Alvarado Hospital Medical Center, Palomar Pomerado Health, Scripps Health, Sharp HealthCare, Tri-City Medical Center, University of California San Diego Medical Center, and VA San Diego Medical Center.
Appendix: Tools To Drive Success