A Matter of Perspective: Insights into I.V. Medication Safety from the Frontline Pharmacist and Nurse

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A Matter of Perspective: Insights into I.V. Medication Safety from the Frontline Pharmacist and Nurse

Agenda

11:30 a.m. - 11:35 a.m.
Welcome & Introductions
Rita Shane, Pharm.D., FASHP, FCSHP

11:35 a.m. - 12:50 p.m.
Problem Prone Processes in I.V. Medication: From Bench to Bedside
Kelley M. Reece, Pharm.D.
Rita Shane, Pharm.D., FASHP, FCSHP
Sharon K. Steingass, RN, MSN, AOCN®

12:50 p.m. - 1:00 p.m.
Faculty Discussion and Audience Questions
All Faculty

Faculty

Rita Shane, Pharm.D., FASHP, FCSHP, Activity Chair
Chief Pharmacy Officer
Cedars-Sinai Medical Center
Assistant Dean, Clinical Pharmacy
UCSF School of Pharmacy
Los Angeles, California

Kelley M. Reece, Pharm.D.
Assistant Manager
M.D. Anderson Cancer Center
Houston, Texas

Sharon K. Steingass, MSN, RN, AOCN®
Director, Innovation and Communication
The Ohio State University James Cancer Hospital
Columbus, Ohio
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Activity Overview

Faculty will provide a dynamic and interactive approach to discussing i.v. medication safety from the perspectives of pharmacy administration, frontline i.v. and clinical pharmacists, and nursing. Using a series of i.v. safety pearls, speakers will explore problem prone processes with i.v. medication from bench to bedside. Safety concerns paired with best practices solutions will be shared in the areas of compatibility, implantable pumps, pain management, heparin dilutions, and investigational drugs.

Learning Objectives

At the conclusion of this application-based educational activity, participants should be able to

- Analyze nursing decision points for i.v. medication administration.
- Identify at least one safety risk associated with each point in the i.v. medication use process.
- Discuss environmental factors that affect i.v. medication safety.
- Discuss human factors that affect i.v. medication safety.
- Analyze ways to better communicate both safety concerns and best practice solutions in the i.v. medication use process across the continuum.

Additional Educational Opportunities about IV Safety Coming in 2016

- **Web-based activity** - Based on today’s live symposium (1.5 hours of CPE, please note that individuals who claim CPE credit for the live symposium or webinar are ineligible to claim credit for the web-based activity)

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On-Demand Activity ACPE #: 0204-0000-15-478-H05-P

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Visit www.ashpadvantage.com/perspectives to find:

- Webinar registration link
- Group viewing information and technical requirements
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Rita Shane, Pharm.D., FASHP, FCSHP, Activity Chair
Chief Pharmacy Officer
Cedars-Sinai Medical Center
Assistant Dean, Clinical Pharmacy
UCSF School of Pharmacy
Los Angeles, California

Rita Shane, Pharm.D., FASHP, FCSHP, is Chief Pharmacy Officer at Cedars-Sinai Medical Center, an 886 bed acute, tertiary care, teaching institution in Los Angeles and Assistant Dean, Clinical Pharmacy Services, at the University of California, San Francisco, School of Pharmacy. She received her Pharm.D. degree from the University of Southern California.

Dr. Shane began her career at Cedars-Sinai Medical Center as an intern pharmacist and specialized in Pediatrics during her early career. She was promoted to Clinical Coordinator and served as Assistant Director prior to becoming the Director of Pharmacy in 1988. With increasing system level responsibility, she became the Chief Pharmacy Officer in 2015. She has been on the faculty of USC and UCSF Schools of Pharmacy for over 20 years.

Throughout her career, Dr. Shane has been actively involved in the profession. Dr. Shane was a co-investigator in two research studies in collaboration with the UCSF School of Pharmacy and approved by the California State Board of Pharmacy demonstrating the safety and impact, respectively, of allowing technicians to check technician-filled medication cassettes in hospitals. She also worked collaboratively with CSHP to author language in support of this regulatory change, which was approved in California in 2007. Dr. Shane has served on numerous CSHP and ASHP Committees. She served as Chair of the CSHP Task Force that established the CSHP Practitioner Recognition Program and Chair of the ASHP Pharmacy Practice Management which preceded the Section on Pharmacy Practice Management. She was also the ASHP representative to the American Hospital Association Health Professions Committee from 2003-2008, the National Quality Forum, Patient Safety Advisory Committee in 2009 and the Joint Commission Hospital Professional Technical Committee from 2007-2013.

Dr. Shane has been recognized for her contributions and was named as one of the “50 Experts Leading the Field of Patient Safety,” in the 2013 Becker Hospital Review. She is the 2012 recipient of the Harvey A.K. Whitney Award, the highest honor in health-system pharmacy. In 2012, she was also the recipient of the National Rho Chi Society Alumni Honor Roll awarded to an alumnus who has “advanced the profession through intellectual leadership and the pursuit of excellence”. She received the California Society of Health-Systems Pharmacists, Pharmacist of the Year Award in 2007 and the ASHP Distinguished Service Award the same year. She received the ASHP Distinguished Leadership Award in 2005 and the John Webb Professorship in Hospital Pharmacy on management excellence in 1996.

Dr. Shane has written over 85 papers and was author of one of the ASHP Pharmacy Practice Model Summit papers. She was the U.S. facilitator and author of an international paper on medication administration at the Global Conference on the Future of Hospital Pharmacy held in 2008. In the area of research, Dr. Shane was co-investigator of a 2000 National Patient Safety Foundation Research Award to study the impact of dedicated medication nurses on the rate of medication administration errors which was subsequently published in the Archives of Internal Medicine. She also served as an investigator in a multicenter study of medications errors recovered by emergency department pharmacists supported by
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the ASHP Foundation which was published in the *Annals of Emergency Medicine*. Her current area of research interest is in transitions of care.

Dr. Shane has provided over 175 presentations and recently served as the keynote speaker at pharmacy meetings in Singapore and Spain. She loves teaching and has mentored over 110 residents. Her Big Hairy Audacious Goal is that patients ask “Where is my pharmacist?” whenever they receive healthcare services.
Kelley M. Reece, Pharm.D.  
Assistant Manager 
M.D. Anderson Cancer Center 
Houston, Texas 

Kelley M. Reece, Pharm.D., is Assistant Manager at M.D. Anderson Cancer Center in Houston, Texas. She earned her Doctor of Pharmacy degree from the University of Texas at Austin College of Pharmacy. After graduation, she completed a pediatric pharmacotherapy residency at Texas Children’s Hospital in Houston, Texas.

Dr. Reece has served in a number of different roles, including Pediatric and Critical Care Pharmacist at The University of Texas Medical Branch in Galveston, Texas and Pediatric Critical Care Pharmacist at Texas Children’s Hospital in Houston. She has worked in the Ambulatory Treatment Center at M.D. Anderson Cancer Center for the past 9 years and is responsible for USP Chapter <797> compliance, hazardous drug safe handling, and implementation of the i.v. room workflow software system. She collaborates with other departments as a member of the institutional safety committee and the medication administration pact.

Dr. Reece has presented her work at local, state, and national conferences including ASHP Midyear Clinical Meeting and HIMSS Intelligent Health™ Pavilion.
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Sharon K. Steingass, MSN, RN, AOCN®
Director, Innovation and Communication
The Ohio State University James Cancer Hospital
Columbus, Ohio

Sharon K. Steingass, MSN, RN, AOCN®, is Director, Innovation and Communication, at The Ohio State University James Cancer Hospital in Columbus, Ohio. In this role, she is responsible for identifying and implementing new ways to deliver care with the goal of improving the management of patient care.

Ms. Steingass received her Bachelor of Science degree in Nursing at Capital University in Columbus, Ohio and her Master of Science in Nursing Administration degree at Case Western Reserve University Frances Payne Bolton School of Nursing in Cleveland Ohio. In addition, she has completed a post-masters course in LEAN and Six Sigma and currently holds a green belt. Sharon has worked in both Ohio and California in various NCI designated cancer programs. Sharon has been actively involved in medication safety throughout her nursing career leading the implementation of smart pump technology in 2004 at the City of Hope National Medical Center in Duarte, California. She currently serves on the Medication Safety Subcommittee at The Ohio State University Wexner Medical Center.
Disclosures

- All faculty and planners report no financial relationships relevant to this activity.

Learning Objectives

- Analyze nursing decision points for intravenous (i.v.) medication administration.
- Identify at least one safety risk associated with each point in the i.v. medication-use process.
- Discuss environmental factors that affect i.v. medication safety.
- Discuss human factors that affect i.v. medication safety.
- Analyze ways to better communicate both safety concerns and best practice solutions in the i.v. medication-use process across the continuum.
Background

- Intravenous (i.v.) medications are associated with 54% of potential adverse drug events (ADEs)
- 56% of preventable ADEs in a five-year retrospective review of medication errors in a United Kingdom pediatric teaching hospital;
- 59% of these errors occurred during drug administration by nurses, with dosing and concentration mistakes the most prevalent


Background

- Lack of established standardized safe practices associated with i.v. push injection safety
- Lack of knowledge and training related to vascular access devices
- Varying drug concentrations from manufacturers
- Lack of pharmacist knowledge on how nurses prepare and administer medications

Problem Prone Processes with Parenteral Medications

- Lines, Tubes and Devices
- Pain Management and Elastomeric Devices
- Heparin
- Investigational Agents
- Infusions from the Outside
What steps has your organization taken to prevent administration of medications via the wrong line, tube or device?

a. Conducted a Failure Mode and Effects Analysis (FMEA)
b. Discussed route and sequence of medications on daily rounds
c. Addressed at medication safety meeting
d. Required labeling of medication administration lines or tubes
e. Have not formally addressed at this time

Lines, Tubes, Devices, Oh My!

Scope of the Problem

• 1972-First reported tubing misconnection
• Tubing misconnections
  – A tube from the medical device for one delivery system is connected to a system that serves a different function
  – Have resulted in injury and death
• Pharmacy may not know or understand how medications are administered

Examples of Tubing Misconnections

• Liquid formula or medication intended for delivery into the stomach via feeding tube delivered intravenously
• Non-invasive blood pressure (BP) inflation tube connected to an i.v. line resulting in air embolism
• i.v. fluids connected to the inflation cuff of an endotracheal tube

S. Steinhaus, pictures used with permission
Lines, Tubes, Devices, Oh My!

- Patients may have multiple types of infusion devices
- Medications/fluids being administered via variety of routes
- Devices are commonly attached to the same i.v. pole

Lines, Tubes, Devices, Oh My!

Why do misconnections occur?

- Cognitive slips or functioning in “automatic” mode
- Poor design of products
- Nonparenteral medications and fluids prepared in containers resembling those used for i.v. route
- Complexity of patients
- Many distractions
- “Off label” use of supplies and equipment
  – aka “The MacGyver Effect”

Lines, Tubes, Devices, Oh My!

What is being done – Long-Term Strategies

- The Joint Commission (TJC) issued sentinel event alert 53 – August 2014
- International Organization for Standardization (ISO) developing manufacturing standards
- First implementations are with enteral feeding tubes – Global Enteral Device Supplier Association (GEDSA)

Lines, Tubes, Devices, Oh My!
What is being done – Short-Term Strategies

- Affix labels or other color-coded tabs to lines to indicate line type (e.g., i.v., epidural, nasogastric)
- Trace lines back to the source prior to medication administration
- Perform organizational risk assessments
  - Evaluate current and work-around practices
  - Create interdisciplinary teams
  - Conduct FMEA with nursing and pharmacy
  - Raise organizational awareness

Types of IV Catheters

<table>
<thead>
<tr>
<th>Catheter Type</th>
<th>Common Names</th>
<th>Entry Site</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral venous or arterial catheters</td>
<td>Usually veins of forearm or hand, or radial, femoral, axillary, brachial, posterior tibial arteries</td>
<td>&lt; 3 inches</td>
<td></td>
</tr>
<tr>
<td>Midline catheters (peripheral)</td>
<td>Inserted via antecubital fossa into proximal veins</td>
<td>3 – 8 inches</td>
<td></td>
</tr>
<tr>
<td>Nontunneled central venous catheters</td>
<td>Hohn, Deseret (3 lumens), Hickman, Broviac, Groshong (1 or 2 lumens)</td>
<td>Percutaneously inserted into central veins (subclavian, internal jugular (IJ), femoral)</td>
<td>&gt; 6 cm (depending on patient)</td>
</tr>
<tr>
<td>Peripherally implanted central venous catheter (PICC)</td>
<td>PICC line</td>
<td>Inserted into basilic, cephalic, or brachial veins and enter superior vena cava</td>
<td>&gt; 20 cm (depending on patient)</td>
</tr>
<tr>
<td>Tunneled central venous catheters</td>
<td>Implanted into subclavian, IJ, or femoral veins</td>
<td>&gt; 8 cm (depending on patient)</td>
<td></td>
</tr>
<tr>
<td>Completely implanted catheter</td>
<td>Chemo-port, Medi-port, Port-a-cath</td>
<td>Beneath the skin with SC port access; implanted in subclavian or IJ</td>
<td>&gt; 8 cm (depending on patient)</td>
</tr>
</tbody>
</table>

Other Issues With Lines and Tubes

- Routes of administration may need to change and are not always clearly communicated during hand-off or between nursing and pharmacy
- Line type is not easily identified in the electronic medical record (EMR) or may be difficult to locate
- Timing and sequencing of medications are a challenge when routes are limited or competition exists

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National Center for Infectious Diseases. 2004.
Lines, Tubes, Devices, Oh My!

What’s in your line?
- Residual volume stays in tubing if not flushed
- Primary vs. secondary infusion
- Implications
  - Pediatrics: Significant amount of dose stays in tubing
  - Adults: Antibiotics may not infuse entire dose
  - Chemotherapy
    - Priming in pharmacy to prevent hazardous drug exposure in patient care areas
    - Residual volume contains chemotherapy

Lines, Tubes, Devices, Oh My!

I.V. tubing characteristics
- Polyvinyl chloride (PVC)
  - Some drugs are incompatible with PVC and adhere to it
  - Amiodarone dosing studies used PVC tubing
- Diethylhexyl phthalate (DEHP)-plasticizer
  - Certain drugs contain solvents or surfactants known to cause leaching of DEHP
- Low-sorb: polyethylene lined with a PVC-free fluid path
  - Used to minimize adsorption of certain drugs

Lines, Tubes, Devices, Oh My!

Filter types
- 0.2 micron filter
  - Removes bacteria
- 1.2 micron filter
- 5 micron filter
  - Removes particulate matter
  - Filter needles and straws

To filter or not to filter?
- Size of molecules
- Binding to filter
Lines, Tubes, Devices, Oh My!

- Administration considerations
  - Distal vs. proximal placement
  - In-line vs. add-on filter
  - I.V. push medications in a side port

Lines, Tubes, Devices, Oh My!
Case Study

- You are verifying orders for a patient on your floor
- I.V medications include:
  - Etoposide infusion
  - Hydromorphone patient-controlled analgesia (PCA)
  - Cefepime
  - Continuous i.v. fluids
- Prescriber orders ondansetron and the nurse asks you about compatibility

Lines, Tubes, Devices, Oh My!
Case Study

- What questions should you ask the nurse?
  - What type of line and how many lumens?
  - What are the route and method of administration for ondansetron: i.v. push, piggy back, continuous infusion?
  - Which lumen(s) is being used?
  - Is anything currently being administered via Y-site?
  - What additives are in the i.v. fluid?
Lines, Tubes, Devices, Oh My!
Case Study

- Patient has a double lumen PICC
- Nurse is using both lumens
- 6 port manifold for each lumen
  - Chemotherapy in one lumen
  - The other lumen is for all other medications
- Ondansetron is ordered as 16-mg i.v. piggyback
- I.V. fluids contain sodium bicarbonate

Photo courtesy of MD Anderson Cancer Center
Lines, Tubes, Devices, Oh My!
Case Study

- Ondansetron is incompatible with both cefepime and sodium bicarbonate
- How would you recommend the dose be administered?
  - Since ondansetron is compatible with etoposide, Y-site infusion with etoposide in the other lumen
  - Hold i.v. fluids, hydromorphone, and cefepime, flush line with normal saline, and administer ondansetron
  - Flush line again and resume medications.

What is your institution’s “pain point” when managing opioid orders?

a. Complexity of hospice care processes
b. Staff’s lack of knowledge about elastomeric pain pumps
c. Multiple concentrations of PCA medications
d. Documentation of dose changes on the MAR
e. Other issues

Pain Management

- Sound-alike names can lead to prescribing, dispensing, and administration errors
  - Morphine and hydromorphone errors are especially problematic
  - Morphine 10 mg=hydromorphone 1-1.5 mg
- Multiple concentrations
  - Standard vs. custom
  - Adult vs. pediatric
- Multiple routes of administration
- Unique populations, such as hospice patients
- Monitoring patients for oversedation
Pain-Case Study

- The admitting physician writes a morphine PCA order using the hospital standardized PCA order set for an adult patient on your floor
- There are two standard concentrations available:
  - 1 mg/mL for pediatric patients
  - 5 mg/mL for adult patients

Pain-Case Study

- The pharmacist determines the prescribed continuous infusion rate of 0.3mg/hour is too slow for the 5mg/mL concentration and the pump rate would not be accurate
- Morphine 1mg/mL is dispensed to the floor to be infused at a rate of 0.3ml/hour

Pain-Case Study

- Upon programming the pump, the nurse determines the 1mg/mL concentration is not in the pump for programming
- What should be done?
  - Use the pediatric (1mg/mL) pump programming protocol
  - Program the pump manually without using safety limits
  - Request new concentration
Pain-Hospice Care

- Home hospice
  - Dosing
    - Continuous pain infusions are typically discontinued
    - Syringes with i.v. or subcutaneous pain medications may be dispensed for patient transport
  - Pharmacy considerations
    - Stability information for syringes
    - Narcotic disposal at patient’s home
    - Drug diversion by family members

Pain-Hospice Care

- Inpatient hospice
  - Dosing
    - Continuous infusion hydromorphone or morphine with nurse controlled bolus dosing
    - Starting doses are dependent on disease state
    - Has the patient been receiving chronic pain medications already?
    - Doses may be increased by 30-50% after patient evaluation; up to 100% if acute pain

Pain-Hospice Care

- Inpatient hospice
  - Pharmacy considerations
    - Be familiar with starting doses
    - Verify dose appropriateness
      - Errors in prescribing can still be made
    - Pain vs. opioid toxicity - Is dose escalation warranted?
Pain Management for Patients Undergoing Procedures

Elastomeric Pain Devices or Pumps

• An elastomeric pump is a device that infuses medication once the tubing is unclamped
• Built with an elastic balloon inside a very tough outer cover, the device pushes intravenous medication through tubing and a filter that is attached to the reservoir
• Has been used to infuse medications via a variety of routes

Potential Pitfalls of Elastomeric Pain Devices

• Lack of pharmacy involvement in preparation or dispensing of the device
• Missing or inadequate documentation:
  – Medication orders may not be present
  – Device fails to contain a label
  – Medication may not appear on MAR
• Lack of staff education

Strategies for Using Elastomeric Pain Devices

- “Getting ready” or implementation planning
  - Patient population and indications for use
  - Management of supply
- Medication management
  - Formulary
  - Ordering, Preparation, Dispensing
- Staff education
- Patient education


What types of heparin events are most commonly reported in your organization?

a. Wrong concentration dispensed
b. Wrong dose administered
c. Rate or dose errors during pump programming
d. Concentrated heparin used to flush line
e. Other types of errors

Heparin

- So many concentrations, so many indications, so much confusion
- Therapeutic anticoagulation vs maintaining patency of lines and devices
  - Myriad of central lines
- Devices:
  - Continuous renal replacement therapy (CRRT)
  - Extracorporeal membrane oxygenation (ECMO)
  - Cardiac bypass perfusion
  - Plasmapheresis

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### Catheters

<table>
<thead>
<tr>
<th>Catheter Type</th>
<th>Heparin Dose</th>
<th>Concentration/Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passport</td>
<td>500 units</td>
<td>100 units/mL, 5 mL</td>
</tr>
<tr>
<td>Port-a-Cath</td>
<td>500 units</td>
<td>100 units/mL, 5 mL</td>
</tr>
<tr>
<td>Mahurkur</td>
<td>250 units</td>
<td>100 units/mL, 2.5 mL</td>
</tr>
<tr>
<td>PICC</td>
<td>250 units</td>
<td>100 units/mL, 2.5 mL</td>
</tr>
<tr>
<td>Broviac/Hickman</td>
<td>2,000 units</td>
<td>1000 units/mL, 2 mL</td>
</tr>
</tbody>
</table>

#### Pediatric Catheters

<table>
<thead>
<tr>
<th>Category</th>
<th>Heparin Dose</th>
<th>Concentration/Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central Venous</td>
<td>10 units (0.5-2 kg) 10 units/mL, varies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>20 units (5-10 kg) 10 units/mL, varies</td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 units (10-50 kg) 10 units/mL, varies</td>
<td></td>
</tr>
<tr>
<td>Umbilical</td>
<td>0.5-3 units</td>
<td>1 units/mL, 10 mL</td>
</tr>
</tbody>
</table>

### Heparin Flushes

<table>
<thead>
<tr>
<th>Device</th>
<th>Priming Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plasmapheresis</td>
<td>14000 units in 0.9% NaCl 1000 mL</td>
</tr>
<tr>
<td>Therapeutic Plasma Exchange Device Priming Procedure</td>
<td>10000 units in 0.9 % NaCl 500 mL</td>
</tr>
<tr>
<td>Photopheresis Device Priming Procedure</td>
<td>3000 units in Lactated Ringer’s solution 1000 mL</td>
</tr>
</tbody>
</table>

Device Patency:
- CRRT
- ECMO
- Cardiac bypass perfusion


### What about human factors and programming pumps?

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Rate/Dose Errors and I.V. Heparin Human Factors

- Confusing protocols
- Ambiguous heparin dosing terms
- Lack of or confusing organizational standards for weight-based medications
- Systems “not speaking the same language”
- Issues related to “independent double check”

Heparin Rate/Dose Errors I.V. Pump Programming – Human Factors

- Programming screen layout
- Programming process – identifying the priority
  - dose
  - rate

Heparin Rate Dose Error Other Human Factors – I.V. Pumping Module

- Pumping module provides the dose and the rate
- Rate and dose are easily confused
How many investigational drug research protocols is your organization participating in currently?

a. None  
b. 1-50  
c. 51-100  
d. Greater than 100  
e. I don’t know

Investigational Drugs

Evolving cellular and gene therapy considerations

- USP Chapter <1046>: handling, administration precautions
- NIH guidance on gene/viral therapy and employee risk levels
  - Risk level determines compounding process
    - Pathogenicity, mode of transmission, availability of treatment, e.g., antibiotics
- Storage
  - Freezers and storage: -30° C, -70° C, -80° C
  - Emergency power


Investigational Drugs

- Compounding
  - Isolate preparation to minimize employee exposure
  - Requires separate room
  - Decontamination of biological safety cabinets; cannot use horizontal laminar airflow hoods
    - Protocol-specific requirements
    - Nosocomial Mycobacterium bovis-Bacillus Calmette-Guérin (BCG) infections in immunocompromised patients due to hood contamination of chemotherapy

Investigational Drugs

• Transportation
  – Biological safety kit for spills
  – Time to patient can be as short as 30 minutes from thawing to administration for cells

Investigational Drugs

• Protocols specify infusion time and volume to be infused
  – Implications
    • Removal of overfill
    • Infusion as a secondary i.v. may create a protocol deviation if end time unknown (since primary i.v. automatically begins after secondary infused)

What are some nursing considerations related to investigational drugs?
Investigational Medications
Logistics Challenges for Nursing

• Roles, responsibilities and competency
  – Research support staff
  – Investigational pharmacist
  – Infusion nurse
• Availability of protocol resources
• Throughput and staffing resources
• Hand-off communication
  – Perils of “off hours” coverage
• Documentation requirements

Investigational Drugs - Case Study

• Pharmacist receives investigational vaccine order for a Phase 1 melanoma trial
  – Several different arms of the protocol to which patient can be randomized
  – Different drugs and doses for each arm
• Drug storage
  – -70°C freezer in the investigational pharmacy
  – Product shipped from the sponsor

Investigational Drugs - Case Study

• Drug preparation
  – Short stability: 4 hours
  – Thaw time from freezer: Must be used within 24 hours from thawing
  – Reconstitution using several different vials
  – Glass syringes are used for mixing
  – Drop test performed to ensure emulsification
  – Transferred to a plastic syringe
Investigational Drugs - Case Study

• Drug delivery
  – The entire process is very time consuming and must be coordinated with the research nurse
  – Because the dose is “on call”, the patient may be waiting if he/she is in the clinic

Drug procurement + Dose preparation + Administration
must be ≤ 4 HOURS

Do you allow patients admitted in your institution to use their own devices/pumps for medication delivery?

a. Yes
b. No
c. Depends on the medication infusing
d. Unsure

Patient’s Own Infusions and Devices

• The “new” patient’s own medication
  – Different cassettes, different tubing
  – Restricted access and delays when medication runs out and tubing unavailable

• Product integrity and liability
  – Stability
  – Sterility
  – Counterfeit
Patient’s Own Infusions and Devices

- Preparation considerations
  - Pharmacy staff competency in infusion devices and other drug delivery systems
  - Non-sterile powder compounding
  - Is the medication approved for administration via device
    - Clonidine and intrathecal pump
  - Outsourcing considerations

- Administration considerations
  - Nursing knowledge of infusion device operation
  - Is patient competent for self-administration during entire admission, i.e., deterioration of condition or procedures?

- Operational considerations
  - Preventive maintenance
  - Infection control considerations

- Coordination of patient-specific medications and supplies across transitions of care

- Patient consent form
  - States that drug has not been dispensed or prepared by pharmacy
  - “Because the preparation of the drug is not within the control of the Pharmacy Department, it’s potency, safety, and sterility cannot be guaranteed by the Medical Center”
  - Requires physician and patient signatures
What are some other considerations with infusions from outside the institution?

### Infusions From the Outside...

- **Routes and methods of administration**
  - Intrathecal
  - Ambulatory i.v. infusion pumps
  - Implanted pumps: multiple routes of administration
  - Elastomeric infusion devices
- **Examples of medications delivered:**
  - Opioids
  - Insulin
  - Chemotherapy
  - Parenteral Nutrition
  - Local Anesthetics
  - Epoprostenol
  - Fluids
  - Investigational agents

- **Standards of practice and management**
  - Inpatient vs. outpatient vs. emergency department
  - External vs. implanted
  - Verification of identity of the medication
  - Manipulation or adjustment of doses
  - Disposal of the medication
  - Management of the device
  - Documentation of medication delivery
- **Risk Management and Patient Experience**
Infusions from the Outside... Case Study

- Upon admission to the floor, a pediatric patient is found to have an insulin pump
- An endocrine consult has been requested but will not take place until the morning. What do you do?
- Check your institution’s policies on devices and medications from home and self-administration of medications

Infusions from the Outside... Case Study

- Does the patient have enough supply on hand to continue dosing from the insulin pump?
  - Yes, the patient’s mother has brought in extra supplies
- Is the insulin being used available in your pharmacy and on formulary?
  - No
  - Important to consider the plan if supplies are depleted

Infusions from the Outside... Case Study

- Who will adjust the pump settings?
  - The patient has been using the pump for several years and is familiar with the pump
- If the institution has an EMR, can the doses be documented?
  - Yes, the nurse can document as patient self-administration
Infusions from the Outside... Case Study

• An endocrine consult takes place the next morning, and switching to sliding scale insulin by protocol is recommended
• Most important...Take care of the patient

Key Takeaways for Team Approach to Parenteral Drug Safety

• Observe pharmacy and nursing practices for the preparation and administration of parenteral drugs
• Ensure that route and method of administration are specified on MAR
• To ensure patient safety, determine heparin concentrations, indications, documentation and storage locations
• Establish organizational standards of practice for managing investigational agents
• Develop an organizational policy on patient’s own infusions and devices

What is the first change you plan to make to your practice as a result of what you learned today?

a. Convene a meeting with nursing staff to discuss ways for pharmacy and nursing to work together to improve communication about safe i.v. medication administration.
b. Engage pharmacy staff in ongoing discussion about problem prone processes in the i.v. medication use process.
c. Enlist nursing to assist pharmacy staff in understanding i.v. medication delivery at the bedside—including length of tubing, insertion sites, catheter types, etc.
d. Read the most current literature specific to i.v. medication safety opportunities.
Self-assessment Questions

1. Nursing decision points associated with i.v. medication administration include
   a. Ensuring lines are labeled to prevent wrong route errors.
   b. Recognizing that lines may contain significant residual drug amounts.
   c. Determining how to manage patients who are admitted on infusions from the outside.
   d. A and B.
   e. All of the above.

2. I.V. medication errors are often intercepted before the drug is administered
   a. True.
   b. False.

3. What are important considerations when determining compatibility with i.v. medications?
   a. Type of line.
   b. Concurrent medications infusing.
   c. Infusion vehicle.
   d. Frequency of infusion.
   e. All of the above.

4. A 0.2 micron filter can
   a. Remove bacteria.
   b. Remove particulate matter.
   c. Be found in filter straws.
   d. A and B.
   e. All of the above.

5. What factor makes pain management errors more devastating?
   a. Opioids are high alert medications.
   b. Too many concentrations.
   c. Pharmacists are unfamiliar with dosing protocols.
   d. Infusions are not administered via smart pumps.

6. Which is NOT an environmental factor that pharmacy should consider when dispensing home hospice medications?
   a. Available stability information for i.v. syringes.
   b. Dose escalation.
   c. Disposal of remaining narcotics.
   d. Drug diversion.
7. The following are important considerations when determining whether to use a patient’s own infusion device EXCEPT
   a. Availability of drug at the institution.
   b. Patient’s competency in using the device.
   c. Length of patient stay.
   d. Institutional policies.

8. What types of challenges does nursing experience when patients are admitted on a clinical trial?
   a. Access to protocol resources and research staff who are aware of the protocol details.
   b. Nurses are completely prepared and understand how to administer investigational agents.
   c. Knowing that the patient is on a clinical trial and receiving an investigational medication.
   d. A and C.
   e. All of the above.

Answers

1. e
2. b
3. e
4. d
5. a
6. b
7. c
8. d
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