Overview

- Purpose
  - Describes one approach to managing sterile injectable drug shortages and address the tension between meeting patient care needs and ensuring product integrity
  - Case study of injectable papaverine drug shortage
- Goal
  - To be transparent with our experience
  - Patient safety and quality come first
- Disclosure
  - I am not a 797 expert

Learning Objectives

- Understand implications of the changing compounding landscape in light of safety concerns, drug shortages and regulatory changes
- Explain one system’s approach towards addressing a sterile compounding situation using the medication use process and plan-do-study-act cycle
- Identify two considerations when selecting alternative to injectable papaverine for intraoperative use

Methods

- Environmental Scan
- Gap Analysis
- Risk Assessment
- Tools
  - Invoice/purchase reports
  - Multi-modal communication
  - State board and national organization resources
  - First-hand observation of process and indications
  - Primary literature, evidence
  - Ongoing plan-do-study-act (PDSA) cycles
Environmental Scan

- Increased focus on compounding by all stakeholders
- Lack of clarity surrounding definitions
- Concurrent drug shortages
- Increasing regulatory activity and significant degree of practice variation
- Tension between meeting patient care needs and ensuring product integrity

Timeline

Early Oct 2012
- Public Health NECC memo
- WA facilities identified having NECC products

Mid Oct 2012
- FDA publishes erroneous NECC list
- Ameridose closes
- Gap analysis
- Compound work ↑

Late Oct 2012
- Ameridose recall
- Ongoing gap analysis
- Alternatives
- Internal policy change

Nov - Dec 2012
- Site visits
- Validating internal sterility/batch testing
- Cont. environmental scan

Other:
- Vendor CQI evaluation
- Ongoing drug shortages
- CDC One & Done campaign (multi-patient/dose vials)
- 60 Minutes

Compounding Gap Analysis

- Capture internally, externally prepared products
- Identify gaps in therapy and potential alternatives
  - Started October 2012, living document
  - Tool for communicating with executives
  - Sterile, non-sterile
  - Incorporated “office-use” list

Risk Assessment

Risk Assessment: Papaverine injection

- Identify potential risks and develop mitigation strategies
Risk Assessment: Papaverine injection

Select/ Procure
- Supply status
- Supply options
  - Alternatives
  - Compounded
  - Supply chain options
  - Emergency/reserves
- Clear policy on medication distribution practices

Prescribe/ Order
- Used by
  - Cardiothoracic, Vascular, Plastics, Urology, Transplant
- Alternatives
- Understand intended pharmacological and operational application
  - Intraoperative – Vasodilation
  - Office/Home – Erectile Dysfunction
- Recognize implications
- Understand stakeholders’ concerns
  - Surgeon, Physician, Nurse
  - Manager
  - Patient
- pH – Compatibility - Availability – Expense
- Investigate alternatives
  - Literature search
  - Engage providers

Order Processing
- Paper
- Preference card
- Lack expertise
- “Office use” regulations
- Understand implications of origin and vehicle for ordering
  - Align with new processes
  - Regulatory and policy boundaries

Preparation/ Dispensing
- No internal equipment, procedures for sterilizing
- Internal decision: no high risk compounds from outside pharmacies
- Consider the ...
  - Who?
  - What?
  - Where?
  - When?
  - How?

Administer
- Vein bath, irrigation
- In office and patient home administration
- Diagnostic injection in ultra-sound

Risk Assessment: Papaverine injection

Monitor
- Evaluate effectiveness of alternatives
- Patient awareness of compounding pharmacies
- Gather/invite input into how the alternative or process changes are going
  - Various sources
  - Communication
  - Outcomes
  - Plan – Do – Study – Act

Intraoperative Papaverine Alternatives

Initial Trial
- Nitroglycerin 4 mcg/mL in 50 mL NS syringes
- Surgeons reported experiencing more vasospasm

Practice-based considerations
- Mechanism of action, onset
- pH – Compatibility - Availability – Expense
- Understanding type of procedure

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Alternatives to Nitroglycerin

<table>
<thead>
<tr>
<th>Options</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Verapamil</td>
<td>pH 4.6-5.1, heparin</td>
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<td>Diltiazem</td>
<td>pH 3.7-4.1, heparin-variable</td>
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<td>Nicardipine</td>
<td>steady, not heparin</td>
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<td>Nitroglycerin</td>
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<td>Lidocaine</td>
<td>Literature or specific</td>
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<td></td>
<td>application</td>
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<td>Adenosine</td>
<td>Limited supply</td>
</tr>
<tr>
<td>Papaverine</td>
<td>pH 3.9-5.1, unavailable</td>
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</tbody>
</table>

Key Learnings

- Be proactive, thorough, humble
- Seek to understand
- Ask questions, over communicate, involve key stakeholders, simulate
- Prepare for the worst but fail forward
- Know what you don’t know and look for the unknown

Nitroglycerin and Nicardipine Cocktail

Wei He et al.

Nitroglycerin 5mg + Nicardipine 5mg in 0.9% NaCl 250ml

- Non-PVC bags
- Normal saline v. Normosol-R
- Not buffered
- Tailored and tested pH with one buffered bag buffered
- pH of drugs and diluents vary batch to batch
- Surgery observation of vasodilation
- Report, instant feedback, clear picture of indication

Summary

- In the absence of commercial products designed to meet patient care needs
  - Assess current state of internal and external compounding
  - Identify and incorporate potential risk and mitigation strategies
  - Develop processes and policies to keep patients safe
  - Engage stakeholders early and understand their needs
  - “Go See”
  - Be ready to make the “right decision”

References


Health care systems need to only consider official FDA statements when determining the safest and best way to deliver patient care.
Using the medication use process framework is an effective and systematic way to describe a situation and engage stakeholders.

A  True
B  False

Intraoperative vasodilators must be at physiologic pH in order to be effective.

A  True
B  False