Creating a Simulated Pharmacy and Blood Bank

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Meet Our Team

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Disclosure(s)

• We have nothing to disclose.

• Commercial vendors mentioned in this presentation are merely used as examples. We do not receive any compensation from them.
Learning Objectives

• Create a needs assessment to tailor the simulated drug production to your needs.

• Demonstrate how to produce vials for use as simulated drugs with hands-on instruction.

• Find ways to implement this new tool into your simulation center.
Does your Simulation Center...

• Use expired drugs?

• Buy commercially available simulated drugs?

• Make your own?
The Problems
A Solution: DIY!
Get The Right Tools for the Job

**Outside Diameter, or O.D.**

- Borosilicate Vial
- 0.9% NaCl (Normal Saline)

**Syringe**

**Table Salt**
Get The Right Tools for the Job

Stopper

Flip-Off Cap Crimper

Flip-Off Cap
Step One: Filling and Sealing
Step Two: Capping
Wow, That Was Easy!
Step Three: Crimping
The Assembled Vial
Now You Get To Do It!
Step Four: Labeling

SIMULATED ADENOSINE INJECTION
6 mg/2 mL (3 mg/mL) 2 mL

WARNING Not for human consumption or medical use.

Lot:
Meet SOPHIE

Looking for our IMSH 2014 presentation materials?

You can find all of the information that was presented during our workshop How to Supply Your Drug Habit at the International Meeting on Simulation in Healthcare (IMSH) 2014 on January, 25, 2014 by using the link below

View materials

No Photoshop skills required

With Sophie, designing drug labels for your simulated pharmacy is easy. Once you input your customizable dimensions, all you have to do is click on an area to edit. Yep, font sizes, colors, background colors, alignment; it’s all there.
Create Your Own Label

- Use preset templates or create your own custom label
Design Your Label

Create Label Design

Design and Customize
All text and colors are customizable. Just click a section to edit.

SIMULATED
Adenosine

WARNING
Not for human consumption or medical use.

6 mg/2 mL

Lot:

Start Over  Back  Save and Continue
Share Your Label

**Community Labels**

These labels have been shared by your colleagues with the community and are available for your use.

You can bookmark one and save it to your collection or duplicate it and make your own edits. Feel free to share your own designs and give back!

**Adenosine Injection**

5 cm x 2 cm  
Created 06/12/2014  
Updated 59 minutes ago
Making Blood Bags
What do you fill it with?

- Red food coloring and water
- Red water-soluble hand paint
- Commercial simulated blood
- Your own mixture
Step One: Making the Filling Apparatus

- Hang an empty 1L bag by an endotracheal tube stylet
- Snip the top-most front layer of the bag to allow it to be filled
Step Two: Attaching the Blood Bag

- Spike the 1L bag with the blood bag
Step Three: Filling the Bag

• Use a measuring cup to fill the 1L bag to 250 mL and gravity will do the work
Step Four: Clamping the Bag

- Clamp the tubing with a hemostat and separate the blood bag from the filling apparatus.
The Sealer

- We use an impulse bag sealer to seal the tubing
Step Five: Sealing

- Placing the tubing in a serpentine configuration saves time
Step Six: Finishing
What else can you make this way?

- Fresh Frozen Plasma
- Cryoprecipitate
- Platelets
What Does Your Center Need?

• Common/Crash Cart Meds

• Medications for Rare Conditions (Dantrolene for Malignant Hyperthermia, Blood Factors, etc.)
Needs Assessment

• Do you see a need for simulated medications to enhance realism and learning during the scenarios?
• Are there any injectable drugs you would like specifically created for your simulations? Concentration and volume?
• Do you have any suggestions for injectable drugs that may be useful for simulation, in general? Concentration and volume?
Simulated Drugs Currently Available at UCLA

<table>
<thead>
<tr>
<th>Adenosine</th>
<th>Etomidate</th>
<th>Metoclopramide</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alprostadil</td>
<td>Famotidine</td>
<td>Metoprolol</td>
</tr>
<tr>
<td>Amiodarone</td>
<td>Fentanyl</td>
<td>Midazolam</td>
</tr>
<tr>
<td>Atropine</td>
<td>Flumazenil</td>
<td>Naloxone</td>
</tr>
<tr>
<td>Calcium Chloride</td>
<td>Furosemide</td>
<td>Neostigmine</td>
</tr>
<tr>
<td>Carboprost</td>
<td>Glucagon</td>
<td>Nitroglycerin</td>
</tr>
<tr>
<td>Dantrolene</td>
<td>Glycopyrrolate</td>
<td>Norepinephrine</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>Heparin</td>
<td>Ondansetron</td>
</tr>
<tr>
<td>Dextrose 50%</td>
<td>Hydralazine</td>
<td>Oxytocin</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Hydromorphone</td>
<td>Phenylephrine</td>
</tr>
<tr>
<td>Digoxin Immune Fab</td>
<td>Insulin</td>
<td>Procainamide</td>
</tr>
<tr>
<td>Diltiazem</td>
<td>Intravenous Lipid</td>
<td>Propofol</td>
</tr>
<tr>
<td>Diphenhydramine</td>
<td>Labetalol</td>
<td>Rocuronium</td>
</tr>
<tr>
<td>Dopamine</td>
<td>Lidocaine</td>
<td>Sodium Bicarbonate</td>
</tr>
<tr>
<td>Ephedrine</td>
<td>Magnesium Sulfate</td>
<td>Succinylcholine</td>
</tr>
<tr>
<td>Epinephrine</td>
<td>Methylergonovine</td>
<td>Vasopressin</td>
</tr>
<tr>
<td>Esmolol</td>
<td>Methylprednisolone</td>
<td>Verapamil</td>
</tr>
</tbody>
</table>
Cost Analysis

The true cost of a simulated drug vial was derived from:

- **Material costs** were calculated by adding the price per unit for the vial, stopper, flip-off cap, contents and labels.
- **Labor costs** were calculated for a worker making $25/hr and one making $14/hr. A total of 26 hours were allotted for the production of 500 vials.
# Total Cost Per Vial Made

<table>
<thead>
<tr>
<th>Vial</th>
<th>Total Material Cost</th>
<th>Total Tech Labor</th>
<th>Total Non-Tech Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 mL</td>
<td>$0.52</td>
<td>$1.04</td>
<td>$0.73</td>
</tr>
<tr>
<td>5 mL</td>
<td>$0.76</td>
<td>$1.04</td>
<td>$0.73</td>
</tr>
<tr>
<td>10 mL</td>
<td>$0.81</td>
<td>$1.04</td>
<td>$0.73</td>
</tr>
<tr>
<td>20 mL</td>
<td>$0.97</td>
<td>$1.04</td>
<td>$0.73</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vial</th>
<th>Commercial Cost</th>
<th>Tech Vial Cost</th>
<th>Non-Tech Vial Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 mL</td>
<td>$1.38</td>
<td>$1.56</td>
<td>$1.25</td>
</tr>
<tr>
<td>5 mL</td>
<td>$1.50</td>
<td>$1.80</td>
<td>$1.49</td>
</tr>
<tr>
<td>10 mL</td>
<td>$1.77</td>
<td>$1.85</td>
<td>$1.54</td>
</tr>
<tr>
<td>20 mL</td>
<td>$2.09</td>
<td>$2.01</td>
<td>$1.70</td>
</tr>
</tbody>
</table>
Total Yearly Cost Using In-House Simulated Drugs Versus Commercial Drugs for Anesthesia Residents

<table>
<thead>
<tr>
<th>Vial Type</th>
<th>Vials Assembled</th>
<th>Commercial Cost</th>
<th>Tech Made</th>
<th>Non-Tech Made</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 mL</td>
<td>200</td>
<td>$276.00</td>
<td>$312.00</td>
<td>$250.00</td>
</tr>
<tr>
<td>5 mL</td>
<td>100</td>
<td>$150.00</td>
<td>$180.00</td>
<td>$149.00</td>
</tr>
<tr>
<td>10 mL</td>
<td>150</td>
<td>$265.50</td>
<td>$277.50</td>
<td>$231.00</td>
</tr>
<tr>
<td>20 mL</td>
<td>50</td>
<td>$104.50</td>
<td>$100.50</td>
<td>$85.00</td>
</tr>
<tr>
<td>Total</td>
<td>500</td>
<td>$796.00</td>
<td>$870.00</td>
<td>$715.00</td>
</tr>
</tbody>
</table>

Assumption: A year’s worth of simulated drug for Anesthesia residents is based upon 3 vials of simulated drug used during each simulation, 3 simulations per week for 48 weeks. This equals 432 vials with 68 vials as a buffer in case more are needed throughout the year.
## Total Cost Per Blood Bag

<table>
<thead>
<tr>
<th>Total Material Cost</th>
<th>Total Tech Labor</th>
<th>Total Non-Tech Labor</th>
</tr>
</thead>
<tbody>
<tr>
<td>$9.55</td>
<td>$3.20</td>
<td>2.24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Commercial Cost</th>
<th>Tech Vial Cost</th>
<th>Non-Tech Vial Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>$16.95</td>
<td>$12.75</td>
<td>11.79</td>
</tr>
</tbody>
</table>
Item Lists

Please visit:
https://www.sim.ucla.edu/sophie/imsh
References


6. Owen H: Unexpected Consequences of Simulator Use in Medical Education. *Simul Healthc* 2014;9(3):149-52


How to Reach Us

ANY QUESTIONS OR COMMENTS REGARDING THE MATERIAL PRESENTED CAN BE DIRECTED TO THE TEAM AT:
E-MAIL: SIM@MEDNET.UCLA.EDU
VISIT OUR WEBSITE AT: WWW.SIM.UCLA.EDU

THANK YOU FOR ATTENDING

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