Interruptions Compromise Patient Safety

Pharmacy

Operating Room

Blood Transfusion

Drug Administration

Healthcare Human Factors
Interruptions in the Ambulatory Care Setting
Multi-Phased Study

- Characterization of Interruptions
- Safety Impact of Interruptions
- Development of Solutions
- Implementation & Assessment of Solutions

- Shadowing of Nurses
- Simulated Experiment 1
- Focus Groups
- Simulated Experiment 2
- Implementation
- Follow-up Shadowing

Healthcare Human Factors
Characterization of Interruptions

Shadowing of Nurses
Shadowing of Nurses

- Frequency
- Source
- Nature
- Effect on Task Times
Shadowing of Nurses

- Frequency
- Source
- Nature
- Effect on Task Times

Frequency of Interruptions per Task:
- Charting: 14%
- Verification: 11%
- Communication: 10%
- Medication Delivery: 5%
- Preparing: 26%
- Traveling: 34%
Shadowing of Nurses

- Frequency
- Source
- Nature
- Effect on Task Times

Frequency of Interruptions per Task

- Medication Delivery: 5%
- Verification: 11%
Shadowing of Nurses

- Frequency
- Source
- Nature
- Effect on Task Times

Interruptions per Occurrence of Safety-Critical Tasks

<table>
<thead>
<tr>
<th>Task Type</th>
<th>% of time interrupted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vital Signs Checks</td>
<td>60%</td>
</tr>
<tr>
<td>Drug Verifications</td>
<td>34%</td>
</tr>
<tr>
<td>IV Pushes</td>
<td>117%</td>
</tr>
<tr>
<td>Patient ID Checks</td>
<td>7%</td>
</tr>
<tr>
<td>Pump Programming</td>
<td>15%</td>
</tr>
</tbody>
</table>

Healthcare Human Factors
Shadowing of Nurses

- Frequency
- Source
- Nature
- Effect on Task Times

**Source of Interruptions**
- Nurse colleague
- Patient
- Pump
- Family
- Management
- Pharmacist

**Nature of Interruptions**
- Question
- Alarm
- Statement
- Personal
- Unknown
- Complaint
Characterization of Interruptions

Safety Impact of Interruptions

Simulated Experiment 1

Implementation & Assessment of Solutions

Focus Groups

Shadowing of Nurses

Healthcare Human Factors
Simulated Experiment 1

- Planted errors: 5 rights
- Interrupted vs. uninterrupted conditions
- Measures: Error Rates, Coping Mechanisms

![Bar chart showing overall number of errors made between interrupted and uninterrupted conditions.](chart)

* $p < .001$
Simulated Experiment 1

- Planted errors: 5 rights
- Interrupted vs. uninterrupted conditions
- Measures: Error Rates, Coping Mechanisms

![Frequency of Medication Administration Errors](image)

- % of Nurses Committing Errors
- Pump Programming vs. IV Push Rate
- *p < .03

Healthcare Human Factors
Characterization of Interruptions

Safety Impact of Interruptions

Development of Solutions

Implementation & Assessment of Solutions

Shadowing of Nurses

Simulated Experiment 1

Focus Groups

Simulated Experiment 2

Follow-up Shadowing

Healthcare Human Factors
The vest/sash kind of demeans us. I'm a professional, why would I wear it?

In a fast-paced CDC, sometimes you miss putting on gloves for your own safety. [This] just slows things down.

This would be good for an inpatient ward, not CDC - there are too many task changes.
Verification Booth

Having a glass wall around computers would give us privacy but let us see our patients at the same time.

We need an OPIS station and quiet space to check our drugs before reaching bedside.
Signage for Patients and Coworkers

Good for patients, as long as the intention is explained to them: patients tend to look around a lot.

We might be more conscientious of interruptions if we see these signs around.

Please do not distract the nurse when your pump is being programmed.
Signage for Patients and Coworkers

Verification Booth

PLEASE
Do Not Disturb
CRITICAL CHECKS
IN PROGRESS
IV Push Timers

Visual timers to keep track of time

No alarms or distractions

Can be used for other purposes: e.g., monitoring premed times
Standardized Verification Workflow

Good idea. All patients should see the same process: creates less stress, less chaos.

This is a good idea, combined with a quiet space: all discrepancies with drugs should be resolved before reaching bedside.
1. Pick up medication bin
   Check: Right patient’s bin

2. Check drugs, pharmacy order against OPIS
   Check: Right patient
   Right drug
   Right dose
   Right route
   Right time

3. Check drug against pharmacy order
   Check: Right drug
   Right dose
   Right route
   Right time

   - If administration is delayed
   - OR
   - If patient is reassigned bed

4. Check drug against patient's armband
   Check: Right patient

5. Administer Medication

6. Document administration of medication

If more than one medication

Healthcare Human Factors
Motion-activated ‘Busy’ Indicator
Speaking Aloud

I am programming a total of 250ml to be infused at a rate of 500ml/hour.
IT Cues

Highlight critical information

Documented & Accountable Verifications

Matched to drug labels

Easy to resume pre-interruption task
Critical errors pre- and post-intervention

<table>
<thead>
<tr>
<th>Task</th>
<th>Pre-Intervention</th>
<th>Post-Intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV Push Programming</td>
<td>20%</td>
<td>0%</td>
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<tr>
<td>IV Push Rate</td>
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<td>*</td>
</tr>
<tr>
<td>IV Push Volume</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Ambulatory Pump Programming</td>
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<td>*</td>
</tr>
<tr>
<td>Ambulatory Pump Volume</td>
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<td></td>
</tr>
<tr>
<td>Wrong Drug</td>
<td>*</td>
<td>*</td>
</tr>
<tr>
<td>Wrong Dose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wrong Patient</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < 0.05

Healthcare Human Factors
Open Verification ‘Area’
Juravinski Cancer Centre

Built-in Verification Area
PMH

Non-Smart Pumps
Juravinski Cancer Centre

Highly standardized verification process
The Hierarchy of Intervention Effectiveness

Healthcare Human Factors

(ISMP, 2003)
Conclusion

- Interruptions are a very complex phenomenon
- Holistic approach to interventions
- End-user buy-in and input is essential
Thank you!

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