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## Evaluations in safety-critical medical situations



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## Patient Safety





268 preventable deaths **per day**  
caused by medical error in the US

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## CHR Medication Error


- KCl given instead NaCl
- 2 patients died in 2004


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## Robson Report Recommendations

1. Assess medication preparation areas and renovate where necessary.
2. Assess the adequacy of the carts used for administration of medications.



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## Display Design Principles

1. Make displays legible
2. Minimize information access cost
3. Consistency

Wickens, Lee, Liu, & Gordon-Becker, 2004

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## Display Design Principles

1. **Make displays legible**
2. Minimize information access cost
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Wickens, Lee, Liu, & Gordon-Becker, 2004

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## Is one definition easier to read?

HUMAN FACTORS IS THE FIELD OF ACADEMIA THAT STUDIES THE ROLE OF HUMANS IN MAN-MACHINE SYSTEMS AND HOW SYSTEMS CAN BE DESIGNED TO WORK WELL WITH PEOPLE, PARTICULARLY IN REGARD TO SAFETY AND EFFICIENCY.

Human factors is the field of academia that studies the role of humans in man-machine systems and how systems can be designed to work well with people, particularly in regard to **safety** and efficiency.

NASA-STD-3000, 1995

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## Is one definition easier to read?

**SAFETY**

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## Font Type

# Aa

**Serif fonts** (i.e., Times New Roman) have added detail at the end of letter strokes, often including a horizontal line at the bottom of each character. This guides eye movements and is best for larger bodies of text.

# Aa

**San-serif fonts** (i.e., Arial) have consistent stroke widths and no added detail making the characters more legible. Generally, these fonts should be used for signage and labeling.

MIL-STD-1472F, 1999

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## Before Photos

DEXTROSE TAB 5.0  
DOCUSATE SOD LIQ 4mg/mL  
KAOPECTATE SUSP. 250mL

DIPHENHYDRAMINE CAP 25 mg  
DOCUSATE SODIUM CAP 100 mg

Atropine INJ 0.6mg/mL 1mL	2
Dexamethasone INJ 4mg/mL	2
Dimenhydrinate INJ 50mg/mL	10
Diphenhydramine 50mg/mL	2
Ephedrine INJ 50mg/mL	2

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## Display Design Principles

Grouped by route of administration

Stocking amount

Alphabetical arrangement

Diazepam  
Dimenhydrinate  
Diphenhydramine  
Epinephrine

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## Display Design Principles

Before

After

Injectables Red

Orals Yellow

Bulk/Misc/Topical Green

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## Display Design Principles

1. Make displays legible
2. Minimize information access cost
3. **Consistency**
  - Transferable user expectations
  - Region wide roll-out across more than 500 areas

Wickens, Lee, Liu, & Gordon-Becker, 2004

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## Standardizing the Storage and Labelling of Medications: Part 1

Contributors to this volume are prepared by the Institute for Safe Medication Practices Canada, a key partner in the Canadian Medication Incident Reporting and Prevention System (CMIRPS). From left to right, CMIRPS includes: Ontario, Alberta, British Columbia, Saskatchewan, Manitoba, and Quebec.

**CJHP**

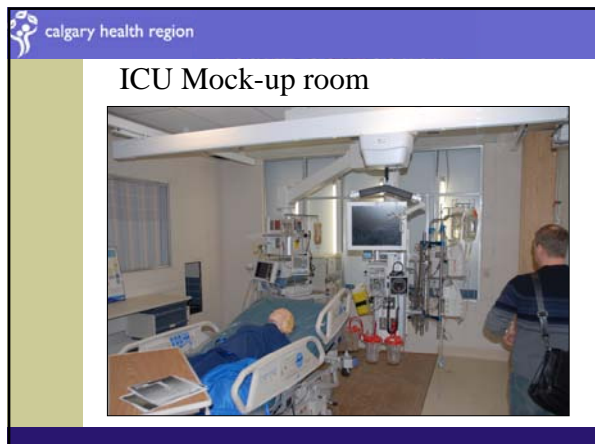
**ISMP Canada**

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## ICU Design Evaluation

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## Objectives

Evaluate the proposed ICU room design

- Adequacy of physical space
- Visibility of patient and monitors
- Access to equipment, supplies & patient
- Ease of communication

**What methods from class can we use to evaluate this?**

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## Scenario development

**Cardiac arrest**  
55 year old male admitted yesterday with Streptococcal pneumonia and Adult Respiratory Distress Syndrome (ARDS). He has a past cardiac history and Type II Diabetes mellitus (DM2). He unexpectedly removes his own endotracheal tube, promptly becomes hypoxemic, and suffers a cardiac arrest.

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## Methodology

- Develop scripts
- Meti Human-Patient Simulator
- Video tape the simulations
  - Constructive interaction (think aloud)
- User feedback
  - Focus groups after each scenario
- Video analysis



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## Articulating Arms – Improved access ★

- Improved staff and family access to head of bed
- Enables equipment to be easily positioned

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## Articulating Arms - Patient Monitor ★



Non-optimal monitor placement

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## Arm Equipment - Consistency

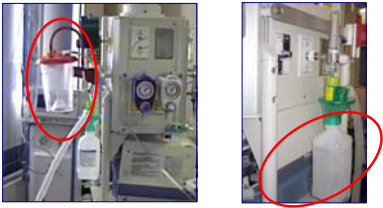


Inconsistent labeling of:

- medical air (black and white)
- oxygen (white)

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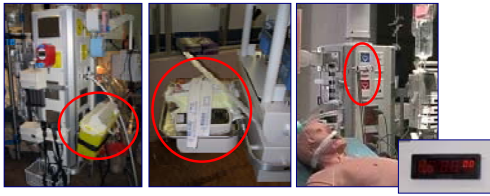
## Arm Equipment – Bumps and Spills



Suction canister & RT humidifier are inappropriately positioned

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## Arm Equipment – Prioritization ★



Sharps, shelves and code blue buttons should be relocated.

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## Questions?

