

# Drug changes create potential failure modes in the drug dispensing process

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## CONCLUSION

- 56 potential failure modes (errors) were identified in the dispensing process of which 15 could be related to drug changes
  - Risk evaluation revealed “Stress” and “Calculation error” as the causes assessed with highest hazard scores
- The present results emphasize that drug changes do challenge the patient safety of the medication process. Further studies are therefore needed to elucidate how to overcome these challenges.

## INTRODUCTION

Drug changes is a common challenge at Danish hospitals. A drug change may result in e.g., change of names, colors, shapes, devices, strengths of the drug or drug formulation. Drug changes may potentially lead to errors (failure modes) that can have serious patient safety consequences such as delayed or omitted drug treatment, wrong dose or wrong drug administered/dispensed. A more detailed understanding of the challenges associated with drug changes is a crucial step in improving safety of the medication process.

## AN EXAMPLE – ISOPRENALINE 5 MG/ML (5 ML) IS CHANGED TO ISOPRENALINE 0,2 MG/ML (1 ML)

Potential failure modes: risk of calculation error, wrong drug concentration, wrong solvent.



## AIM

The aim of the current study was to describe the dispensing process in detail and identify potential failure modes related to drug changes using Health Care Failure Mode and Effect Analysis (HFMEA).

## METHOD

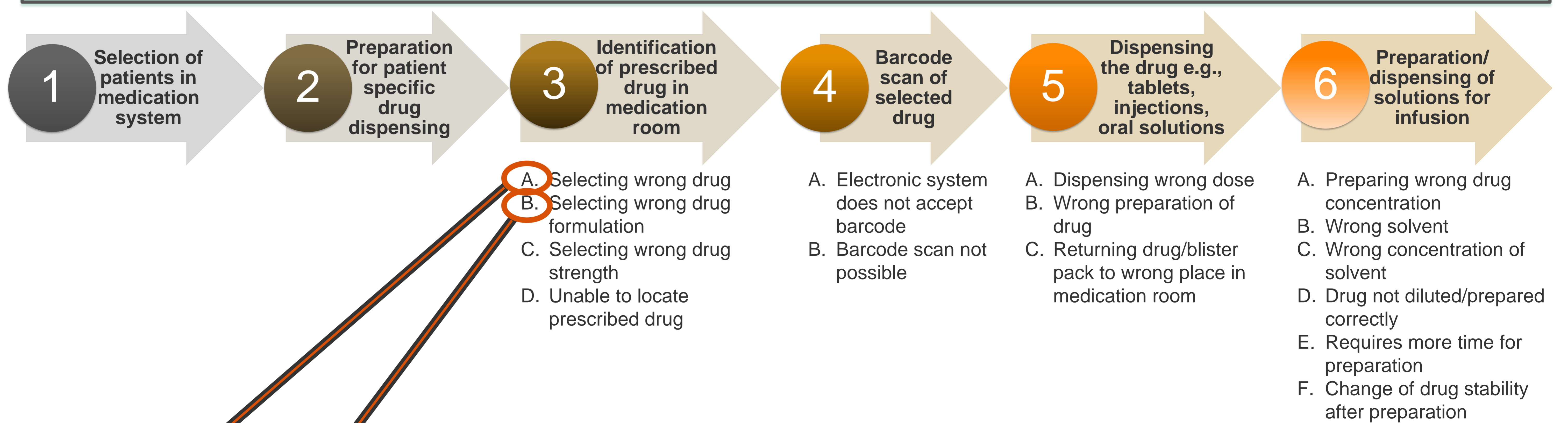
A detailed description of the medication process was obtained through structured observation of the dispensing process at two wards. Observations were followed by a semi-structured interview of the persons observed in order to validate the observations.

The methodology from HFMEA was used to identify potential failure modes and potential failure causes in the drug dispensing process. The failure modes were identified by nurses, medical doctors (MD) and pharmacy personnel through a focus group workshop or face-to-face interviews. Failure modes and causes that could be related to drug changes were identified. Subsequently, HFMEA participants performed a risk evaluation of the failure mode causes related to drug changes. Risks (hazard score) were scored on a 16 point scale.

## RESULTS

- 23 healthcare professionals were observed performing drug dispensing. In total, drugs dispensed for 197 patients were observed.
- One nurse, one MD and one pharmacy technician (PT) participated in a HFMEA workshop. Two nurses, one MD and one PT participated in interviews.
- 56 potential failure modes (errors) were identified in the dispensing process of which 15 could be related to drug changes.
- “Stress” and “calculation error” were identified as causes with the highest hazard score (Score 11,0-12,3 on a 16-point scale).

## DISPENSING PROCESS AND POTENTIAL FAILURE MODES RELATED TO DRUG CHANGES



## POTENTIAL FAILURE MODE CAUSES WITH A HAZARD SCORE HIGHER THAN 8

3A	3B	3C	3D	4A	4B	5A	5B	5C
<ul style="list-style-type: none"> <li>• <b>Stress</b></li> <li>• Look-a-like</li> <li>• Sound-a-like</li> <li>• Lack of attention</li> <li>• Habit</li> <li>• Lack of drug control</li> </ul>	<ul style="list-style-type: none"> <li>• Misunderstand prescription</li> <li>• Drug formulation not clear in prescription</li> <li>• Lack of drug control</li> </ul>	<ul style="list-style-type: none"> <li>• Drug has been changed to new strength</li> </ul>	<ul style="list-style-type: none"> <li>• Patient own drug is not in medication-room</li> </ul>	<ul style="list-style-type: none"> <li>• System does not accept generic substitution</li> <li>• System does not accept change in drug formulation</li> <li>• System does not accept change in drug strength</li> </ul>	<ul style="list-style-type: none"> <li>• No barcode on primary packaging</li> <li>• System does not recognize barcode</li> </ul>	<ul style="list-style-type: none"> <li>• Difficulties doing right calculation</li> <li>• MD prescribes not knowing that it needs further calculation</li> </ul>	<ul style="list-style-type: none"> <li>• Lack of knowledge about new drug</li> <li>• <b>Stress</b></li> <li>• Lack of focus</li> <li>• Not checking how to handle new drug</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Stress</b></li> <li>• Habit of not putting drug correctly back</li> </ul>
6A	6B	6C	6D	6E	6F			
<ul style="list-style-type: none"> <li>• <b>Calculation error</b></li> <li>• Unfamiliar with new drug</li> </ul>	<ul style="list-style-type: none"> <li>• Look-a-like</li> <li>• Lack of information about solvent for new drug</li> </ul>	NA	<ul style="list-style-type: none"> <li>• New drug needs to be dissolved before dilution</li> </ul>	<ul style="list-style-type: none"> <li>• Unfamiliar with new drug</li> </ul>	NA			