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Failure Modes Events Analysis

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Failure Mode

Manner in which a System Fails

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FLYER DRAMA

173 rescued after being stranded in capsules for several hours.

It's hard to imaging something so small could have stopped the Singapore Flyer, which dominates the Marina Bay Skyline

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The New Paper

"What could have been done better"

- Response time for Dive Marine to arrive on the scene was not fixed in the SOP for evacuation
- Who should be called in if such an incident happened again
- Chain of command and responsibilities to be worked out between Dive Marine, Police and SCDF
- Use of Auto Descenders
- Length of Rope increased from 200 to 300m
- Food supplies, Portable commodes and blankets in each capsule

What we will cover today ….

1. What is FMEA
2. How can FMEA help us
3. How is an FMEA done
4. Examples as we go along
5. Limitations and pitfalls of FMEA

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Failure Modes Events Analysis

Tool to improve system performance by identifying

- effects of potential product or process failure
- methods to eliminate or reduce chances of failure

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- Design FMEA
  - Examines function of component or part of system or system
  - e.g. incorrect material selection
- Process FMEA
  - Examines process used to make component, part or the whole system
  - e.g. incorrect method of assembling materials

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Why FMEA

- Product Development
- Quality Improvement
- Patient Safety
- Requirement (JCI /JCAHO)
- Preventative

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What can FMEA do for you?

- Reduce actual or potential failures
- Reduce complaints / claims
- Reduce operating costs
- Promote accountability
- Improve teamwork
- Provide follow through

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Steps in Performing FMEA

- Define Focus and Scope
- Define Failure Mode
- Identify Cause of Failure
- Identify Effects of Failure
- Determine Risks of Failure
- Corrective Actions

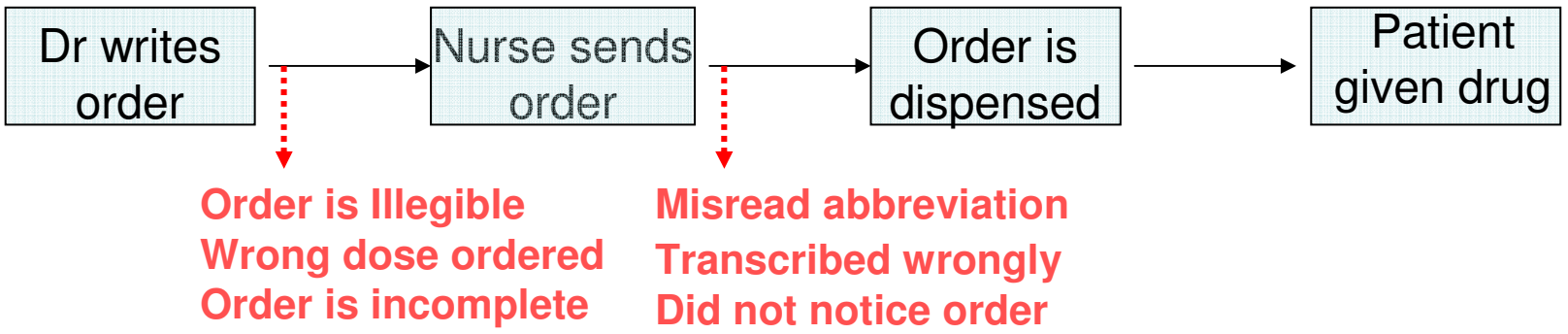
What areas to focus on?

High risk areas recommended by JCAHO

- Medication Usage
- Operative and other procedures
- Resuscitation
- Use of Blood and Blood products
- Restraints
- High risk populations
- Seclusion

Define Failure Mode

- Construct a detailed flow chart of the process
- Multi-disciplinary inputs from staff involved in process
- Determine which step and the number of ways in which it can fail



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Define Failure Mode

Man

Method

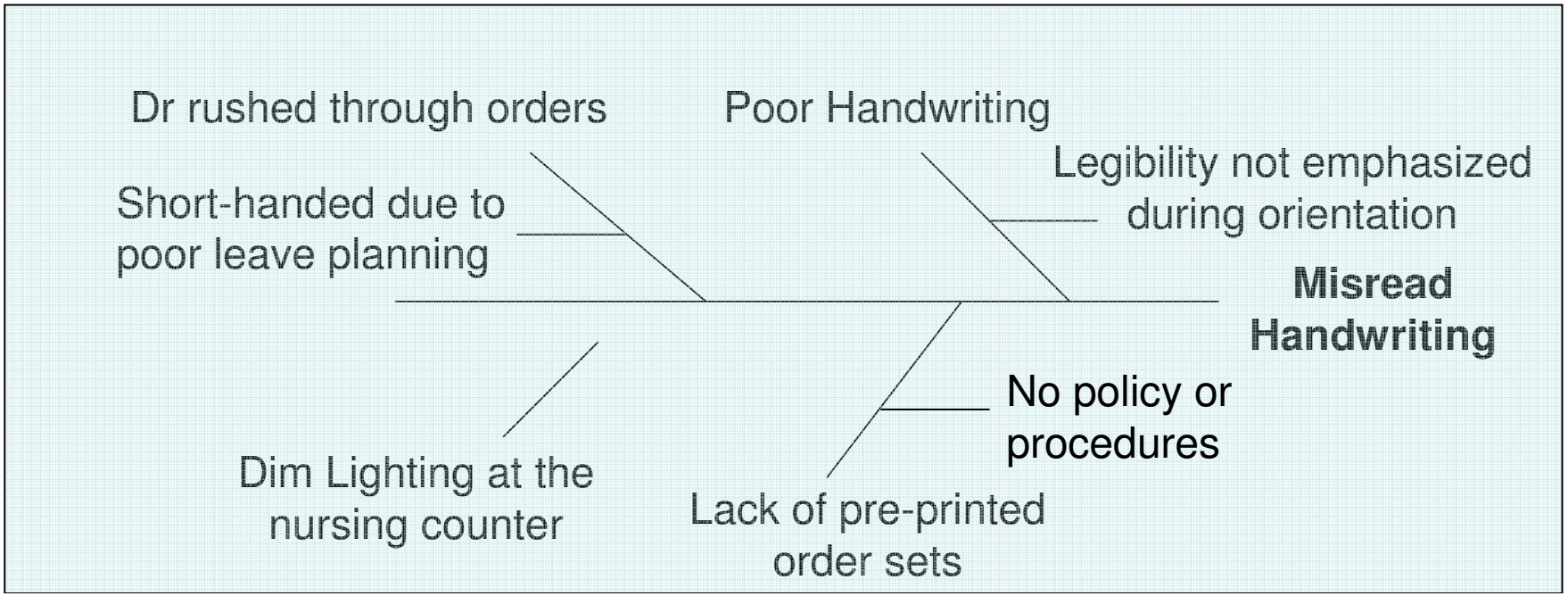
Machine

Material

Environment

Causes of Failure Mode

- Use Root Cause Analysis
- Ask Why, Why, Why, Why, Why ….. 5 times



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Effects of Failure

- Immediate consequence → cumulative consequences
- Local Effect → End effect

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Risks of Failure

- Occurence
  - Likelihood of failure by a specified cause
  - Scale of 1-10; 1=failure unlikely to 10=failure certain
- Severity
  - The impact of failure
  - Scale of 1-10; 1=no/slight effect to 10=mostsevere/death
- Detection
  - How early can we detect and correct failure
  - Scale 1-10; 1=very highly likely detected to 10=almost certain not to detect

Risk Priority Number (RPN)

- Compounds occurance, severity and likelihood of detection
- Helps us to prioritise area of greatest concern

RPN = *occurance rating* **x** *severity rating* **x** *detection rating*

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Corrective Actions

- Should be taken when
  - Severity rating is 9 or 10
  - Severity rating x Occurance rating is high
  - RPN is high
  - No absolute number for “high RPN”

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Solutions

1. Avoid or eliminate failure mode
2. Make failure more easily detectable
3. Reduce/ mitigate severity of impact
4. Who is responsible for the solution?
5. By when is the solution to be implemented

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Limitations

- Resource intensive
- Missing key failures
  - Limited understanding of human error
  - Focus on single event initiating failure mode
  - Focus on external influence limited

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Common Pitfalls in doing an FMEA

- Don’t understand scope and method
- Fail to separate Failure mode, cause and effect
- Wrong participants
- Requires honesty and openness from team
- Not identifying solutions to problems
- No follow-up action

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Thank you

Questions?