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## OBJECTIVE

The use of medications on the sterile field is unique from other settings and its complexity makes it more susceptible to error. Infection control procedures require that medications and solutions be labeled and delivered aseptically. The use of multiple medications and non-standard concentrations, the lack of a defined labeling system, the common practice of verbal orders, the absence of patient unit-dosing, and the infrequent review by pharmacy of individual orders increases error risk. Published reports of serious patient injuries and deaths from medication errors on the sterile field from other hospitals lead us to conduct a proactive, comprehensive safety analysis of this medication use process in our institution. An area of concern identified was the dispensing practices in the operating rooms (OR). A sub-analysis of a comprehensive failure mode and effects analysis (FMEA) of the medication use process in the operating room was conducted that focused on dispensing practices for getting medications on the sterile field. The goal of this initiative was to identify potential failure modes in the dispensing system that could lead to an error.

## METHODS

An interdisciplinary team of surgical nurses, operating room technicians, and pharmacists was assembled to conduct an FMEA. Flow-charts for the dispensing process for medications brought into the OR for use on the sterile field were created. The panel was asked to provide expertise on the medication use process, help identify system issues that may increase medication error risk, and assign criticality scores to identified failure modes. A research pharmacist coordinating the project served as the FMEA facilitator.

## FMEA Steps

- Form an interdisciplinary team
- Flow chart the process
- Determine failure modes (what can go wrong)
- List cause (s) of failure
- List effect (s) of failure
- Investigate actions to reduce the criticality index
- Implement actions
- Follow up and assess

## Average Criticalities

- 3 scores
  - Failure mode
  - Target step
  - Macro process
- Used to rank priorities

## Criticality Scores

Criticality = Severity x Frequency x Discoverability

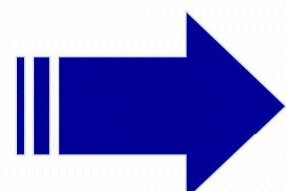
Score	10	1
Severity	10 - death	1 minor injury
Frequency	10 - often	1 not often
Discoverability	10 – not caught	1 almost always discovered

## Scoring Sheet

[illegible]

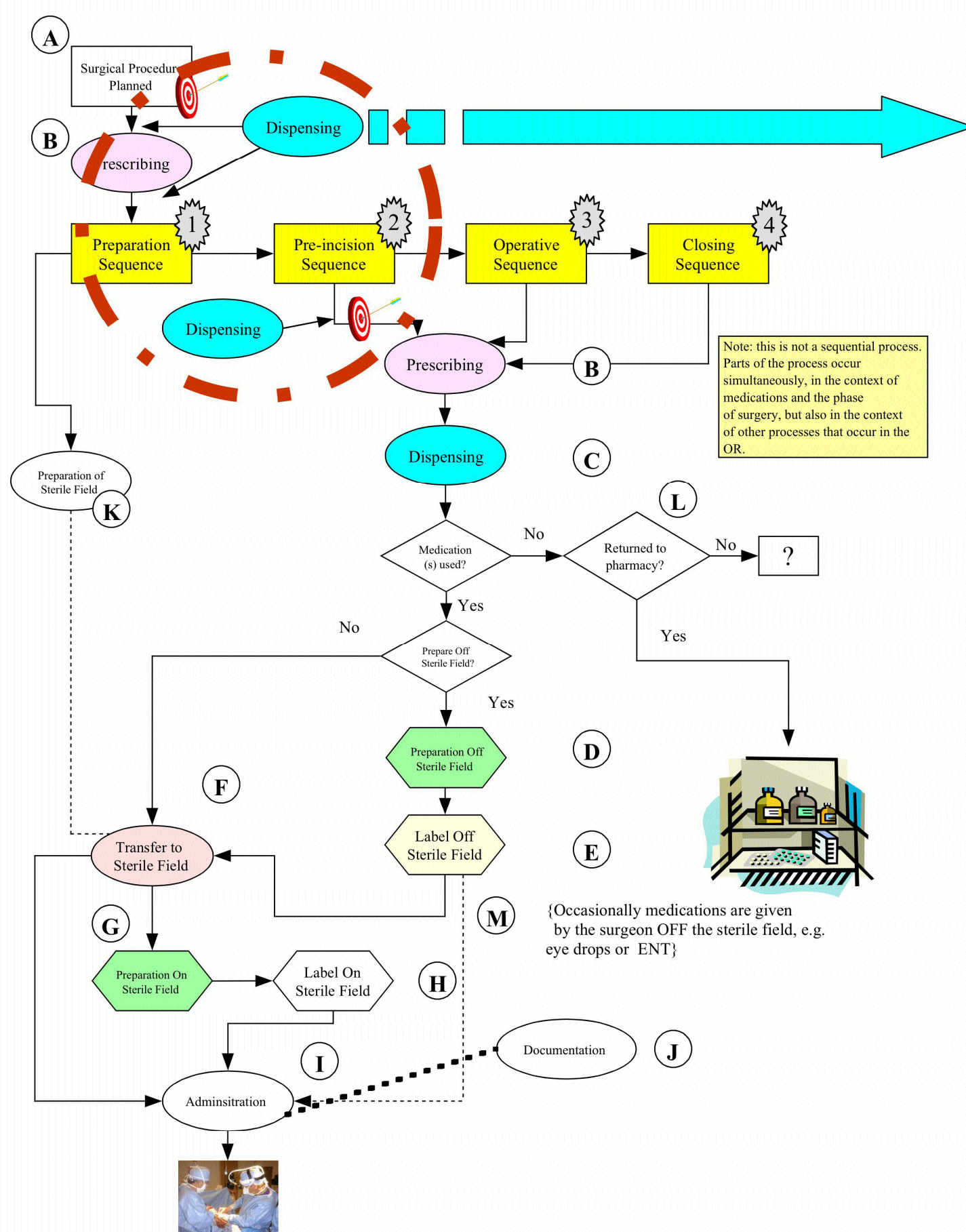
## Where Do Sterile Field Medications Come From?

- Anesthesia
- Blood Bank
- Drawers in OR
- Eye Box (Ophth.)
- From the Floor
- Front Desk
- Intervent. Radiology
- Materials Mgt.
- Med cart (OR12A)
- PACU
- Pharmacy
- Pre-op areas
- “Private stash”
- Pyxis
- Refrigerator
- Residents
- Surgeons



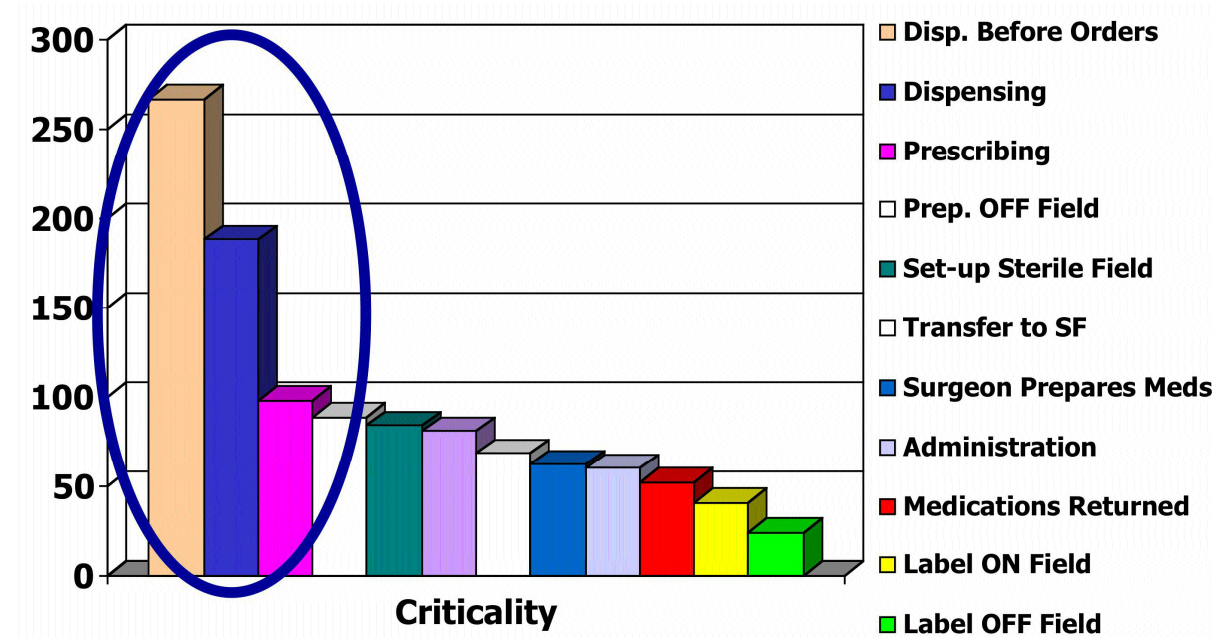
## RESULTS

## Sterile Field Medication Process



Targets represent steps in the process where the FMEA team felt the risk for a medication error is greatest.

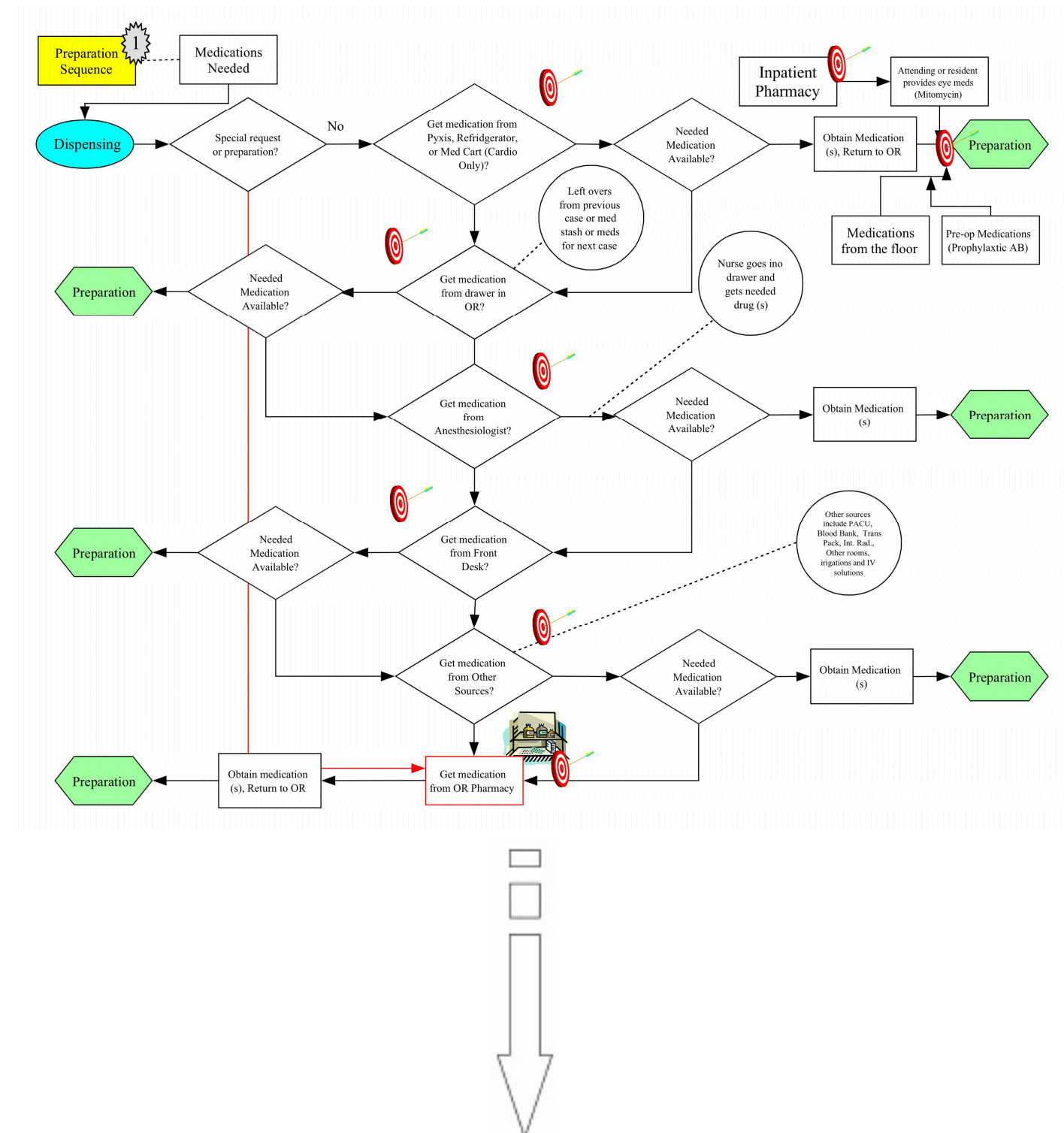
### Criticality Averages Total Process



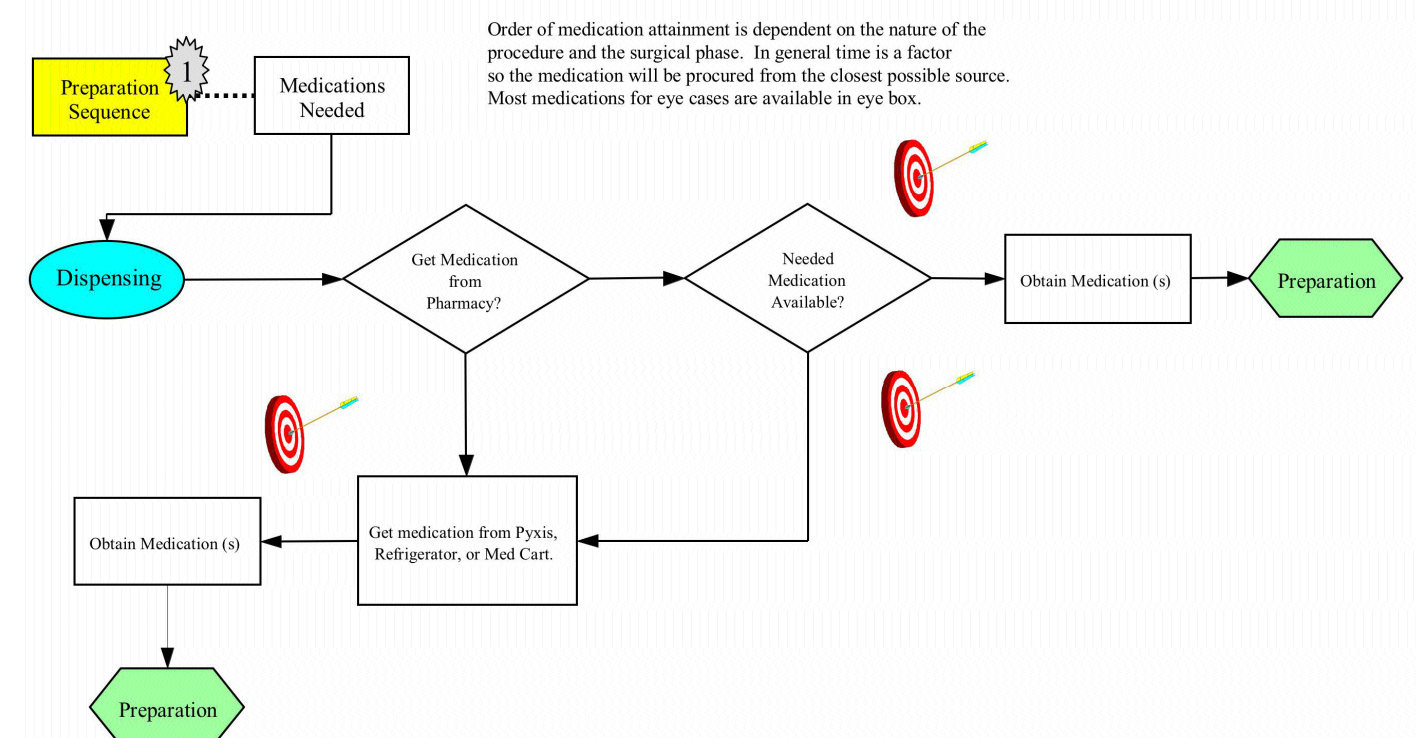
## CONCLUSIONS

How a medication makes it into the OR is independent of other steps in the medication use process (for example the prescribing method (written or verbal order)) and was more controlled by non-medication related factors, such as an OR's location in relation to a Pyxis® machine or time constraints, i.e. the need to get medications into the OR quickly. These and other factors contribute to a perceived need to circumvent the usual distribution channels. Results from this analysis revealed system issues that could lead to a medication error. While an OR Pharmacy exists it was not always the first source for medication distribution. System improvements, whether inside or outside the medication process, that make it less attractive to go outside the customary supply route, will simplify a rather complex system of steps by removing the need for multiple medications sources.

### Dispensing Process in Preparation Sequence of Surgery



## Dispensing Process: REDESIGN



## Statistics

## 72 Steps

- 16 recognized for significant error potential
- Top 5 based on criticality

- Medications obtained from Pyxis® 244
- Medications obtained from other sources 207
- All steps in dispensing process together 177
- Medications obtained from OR Pharmacy 161
- Medications obtained from drawers (Stash) 145

## 45 Failure modes identified

- Top 5 based on criticality

(Result-Medications obtained from unauthorized areas)

- Needed drug not in stock 349
- Pyxis<sup>®</sup> too far from OR rooms 328
- Long line at Pyxis<sup>®</sup> 316
- No pharmacy on ambulatory surgery floor 297
- Not enough time to get medications (late orders) 293