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**Improving Surgical Instrument Reprocessing  
at the University of Michigan Health System**

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# Outline

- Background
- UMHS Case Study
  - The Problem
  - Our Approach to Finding a Solution
- Methods
  - Literature Review
  - Process Flow Analyses
  - Cleanability Index
  - Instrument Set Reconfiguration
- Conclusions & Next Steps
  - Future Work, Research & Policy
- Questions



Key Terms

Surgical Instrument Reprocessing

Reusable Surgical Instrument Cycle

# BACKGROUND

# Key Terms & Abbreviations

- **Surgical “Case”** – Surgery
- **O.R.** – Operating Rooms
- **CSPD** – Central Sterile Processing Department  
(instrument cleaning room)
- **Bioburden** – “dirt” on instruments from previous use  
(e.g. blood, bone, tissue)

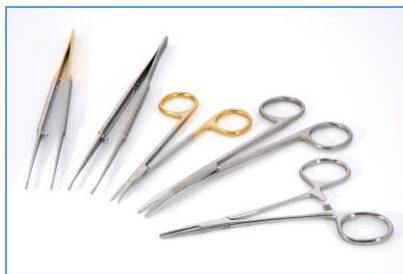
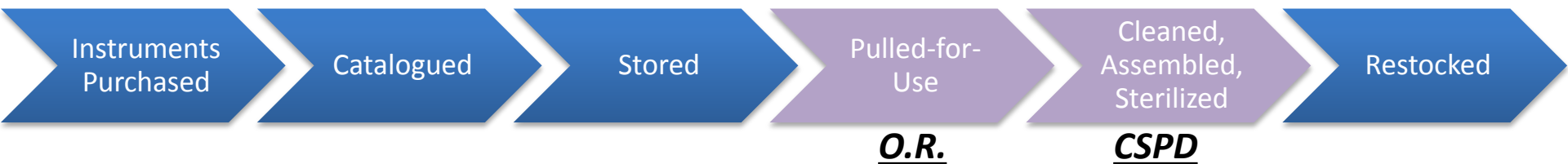
# Background on Instrument Reprocessing

- Efficiencies are a critical challenge for hospitals nationwide
- Involves multiple functions, resources, and stakeholders
- **UMHS:**
  - 51,583 cases in FY14
  - 65-70 cases/day
  - 4,000 instruments processed/day





- Surgical instrument cycle
  - From Purchase to Use



"Instrument"



"Instrument Set"

- Instruments are grouped together in predefined ***instrument sets***
- Instruments are classified by **category**
- Each category may have multiple **sub-categories**



Tympanoplasty Instrument Set





UMHS Reprocessing Goal  
Key Issues and Challenges  
Our Approach to Finding a Solution

# GOALS AND OBJECTIVES



# UMHS Reprocessing Goal

*“To have all items required for the proper care of the patient available at the time of surgery, properly cleaned, sterilized, and in working condition – while ensuring the efficient use of resources.”*

# Key Issues

- Frequent problems with reprocessing & delivery of instruments
  - Unavailable sets/items
  - Poorly functioning items
  - Insufficiently cleaned items (*containing “bioburden”*)
- **Adverse impact on:**
  - *Patient safety*
  - Surgical procedure durations
  - Overall surgical outcomes

- Some reasons why these issues exist?
  - **O.R. Volume** ↑
    - CSPD's struggle to keep up
  - **Room Turnaround Time Pressure** ↑
    - O.R. Staff forgo point-of-use cleaning protocols

# Our Approach

- ❖ **Objective 1:** Understand and improve UH's reprocessing systems

## Purpose

- Grasp and define current state processes

## Methods

- Observations, Interviews & Process flow mapping
- Historical Data Analyses

## Findings & Contributions

1. Observed variations in Decontam processing times, although UH Policy allocates 15 min of decontam processing time for all sets
2. Identified two major areas of opportunity for further investigation: **instrument cleanability** and **instrument set configurations**
3. Recognized that some instruments are more bioburden-prone than others based on design features
4. Concluded that all instruments should not be treated the same way, and more time should be allocated for harder-to-clean items

## ❖ Objective 2: Develop an “instrument cleanability index”

### ❖ Purpose

- Create a systematic way of determining
  - i. hard-to-clean an instrument is (for example, on a 1-6 scale)
  - ii. total distribution in any given set
  - iii. operational impacts & tradeoffs

### ❖ Methods +

- Literature Reviews
  - Content analyses of UMHS, FDA, & Manufacturer reprocessing policy guides
- Focus Group Surveys
  - Using Analytical Hierarchy Process (AHP) to capture the perceived relative ease or difficulty of cleaning from 8 O.R. & 8 CPSD personnel

## Findings & Contributions

1. Developed a comprehensive “instrument design features list”
2. Identified low-risk and high-risk instrument categories in UMHS-Neurosurgery (NSA) database and their associated design features



*Surgical bowl*  
EASY TO CLEAN



*Retractor*  
HARD TO CLEAN





## Findings & Contributions

1. Developed a comprehensive “instrument design\_features list”
2. Identified low- and high-risk instrument categories in UMHS-Neurosurgery (NSA) database and their associated design features
3. Measured staff’s perceived ease and difficulty of cleaning instruments
4. Preliminary analysis showed correlations between staff perceptions and trending bioburden incident data

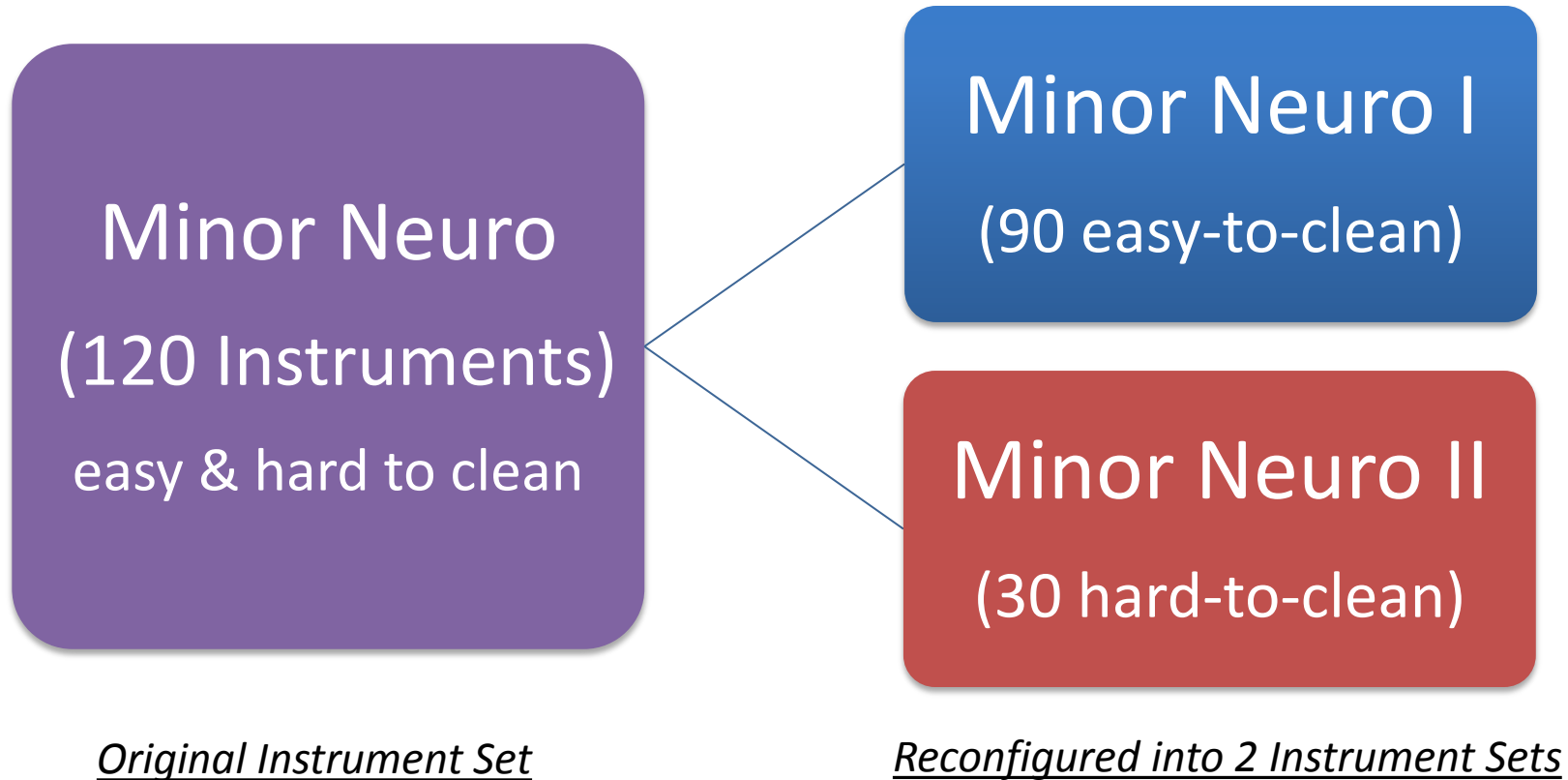
❖ **Objective 3:** Develop an instrument-set configuration tool, to decrease number of items sent back for reprocessing

❖ **Purpose**

- Develop tool to:
  - i. Evaluate configuration impacts on the reprocessing outcomes
  - ii. Recommend potential optimal set configurations

❖ **Methods ++**

- Excel-based modeling





## Findings & Contributions

1. Developed and beta-tested tool to evaluate set configurations
2. Validated findings of Objective 1 using the tool  
 “By demonstrating that **separating high from low-risk items** in a set **improves reprocessing outcomes** and decreases overall disruption of surgeries”

Set Type Name:				
Set Type ID: <span style="background-color: yellow; display: inline-block; width: 150px; height: 1.2em; vertical-align: middle;"></span>				
<b>Configuration Summary</b>	<i>Total # Items:</i>	<b>123</b>	<i>Total weight (lbs):</i>	0
	<i>Total # Item Categories:</i>	<b>20</b>	<i>Average weight per set:</i>	0
	<i>Total # Sets Configured:</i>	<b>5</b>	<i>Sets &gt; 25 Pounds?:</i>	0
	<i>Items distributed correctly?:</i>	<b>YES</b>		
<b>Probability Summary</b>	<i>Expected # sets sent back:</i>	<b>4.29855</b>	<i>Most problematic instrument:</i>	
	<i>% sets sent back:</i>	<b>86%</b>	<i>% most problematic sent back:</i>	



Future Work

# NEXT STEPS

# Future Work

- Refine and pilot cleanability index (*Objective 2*)
- Perform set-reconfiguration pilot with NSA Department
- Publish findings and recommendations
- Contribute to the body of knowledge on:
  - Surgical Instrument Reprocessing
    - Inform purchasing-to-use
  - Patient Safety



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# Questions?



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