

A Systematic Approach to Improving the Reprocessing of Surgical Instruments

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- **Background**
- **Goals and Objectives**
- **Methods**
 - Process Flow Analyses
 - Cleanability Index
 - Instrument Set Reconfiguration
- **Future Work**
- **Questions**

BACKGROUND

Key Terms

Surgical Instrument Reprocessing

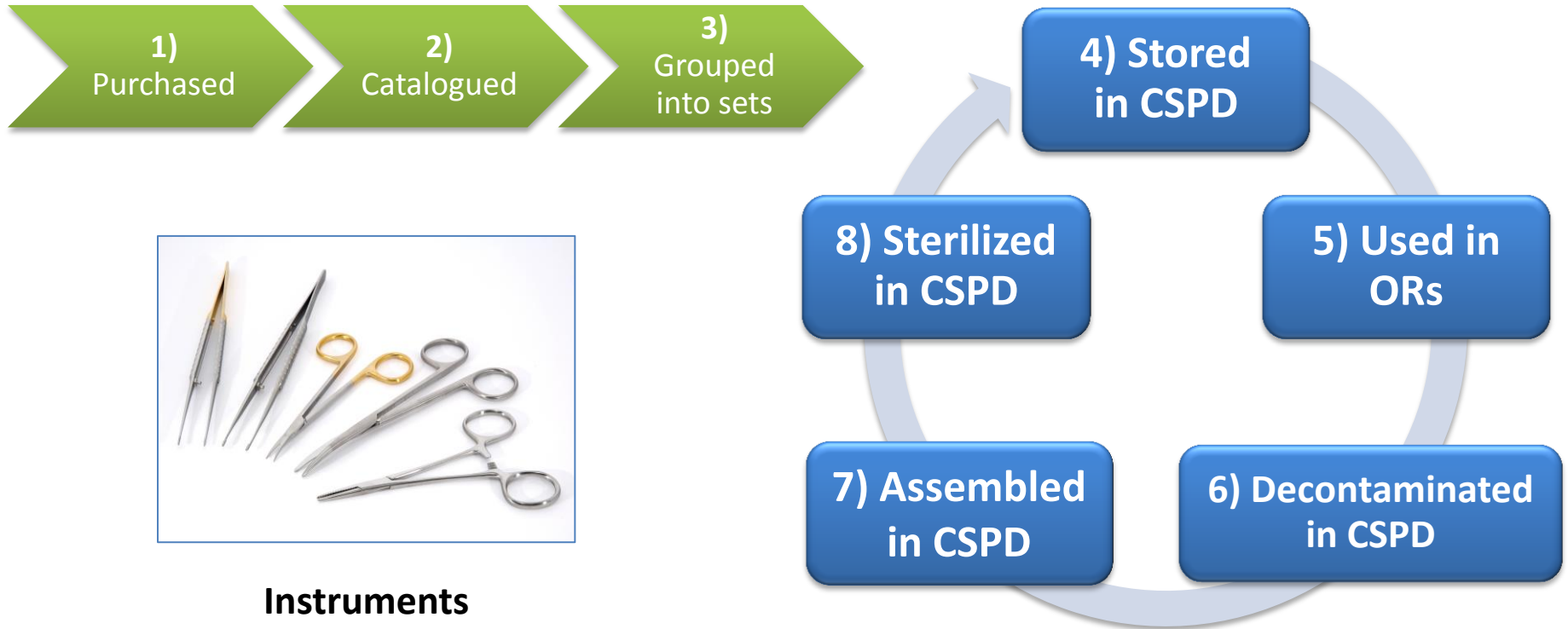
Surgical Instrument Cycle



- **Bioburden** Contamination by human tissue from a previous surgical case (e.g., blood, bone)
- **CSPD** Central Sterile Processing Department
- **OR** Operating Room
- **Surgical Case** Surgery

- Efficiency is a critical challenge for hospitals nationwide
- Reprocessing involves multiple steps, resources, and stakeholders
- UMHS:
 - 51,000+ cases per year
 - 65-70 cases per day
 - 4,000 instruments processed per day

Surgical Instrument Cycle



Surgical Instrument Reprocessing

- Instruments are grouped together in predefined instrument “sets” or “trays”
- Instruments are classified by **category**
- Some categories have multiple **sub-categories**



Tympanoplasty Instrument Set

GOALS AND OBJECTIVES

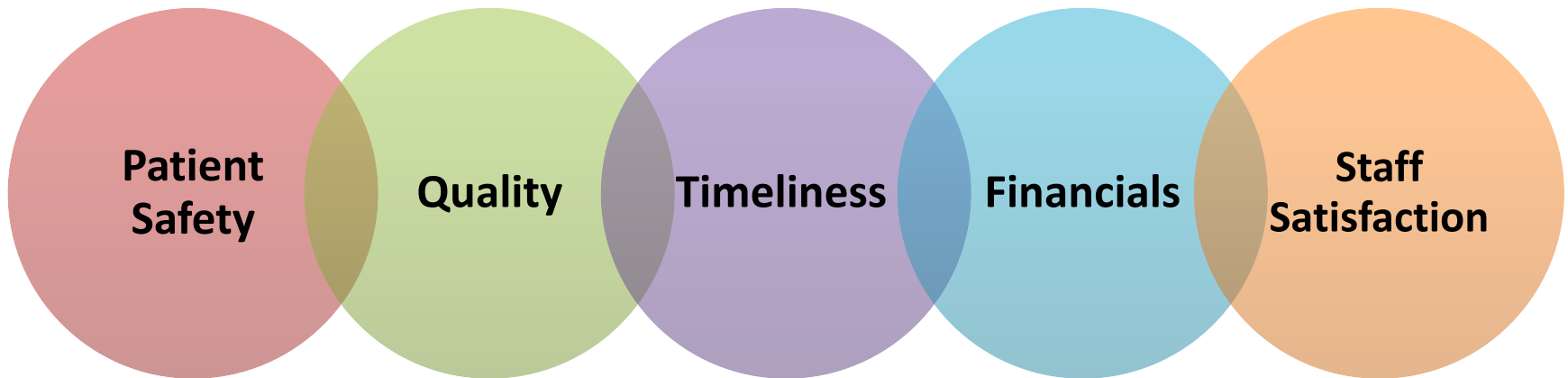
Goal

Key Issues and Challenges

*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.*

- Challenges are ensuring
 - Sets and instruments are available
 - All instruments are functioning
 - All instruments are free of bioburden/debris
- Four new ORs are scheduled to open in June 2016

- Institutional outcome measures not being met:



- Why do these issues exist?
 - **OR Volume** ↑
 - CSPD struggles to keep up
 - **Time pressure to turn over ORs** ↑
 - OR staff forgo point-of-use instrument-cleaning protocol
 - **Instrument design complexity** ↑
 - Each instrument has a unique cleaning protocol (IFU)

METHODS

Process Flow Analyses

Cleanability Index

Instrument Set Reconfiguration

Objective 1: Understand UMHS's reprocessing system

Purpose

- Grasp and define current state processes

Methods

- Observations, interviews, and process flow mapping
- Historical data analyses

Findings and Conclusions

- We observed variations in decontamination processing times despite 15 min/tray policy
 - It's not the staff
 - It's the system
 - The system is creating an environment for adverse events

Findings and Conclusions, continued

- We identified two areas of opportunity for investigation:
 - Instrument cleanability
 - Instrument set configurations
- We recognized that:
 - Some instruments are more “**bioburden-prone**” due to design features

Findings and Conclusions, continued

- We concluded that:
 - All instruments cannot be treated equally
 - Harder-to-clean instruments require **more cleaning time**

Objective 2: Develop an instrument “Cleanability Index” (CI)

Purpose

- Create a systematic way to determine:
 - i. An **instrument’s** level of cleanability (e.g., on a 1-10 scale)
 - ii. A **set’s** level of cleanability, based on its contents
 - iii. Recommended cleaning times based on a set’s level of cleanability

Methods

- **Focus group surveys** to capture staff’s perceived ease and difficulty of cleaning instruments
 - Analytical Hierarchy Process (AHP)

Methods

- We developed a list of instrument design features
- We identified Neurosurgery's **low-risk** and **high-risk** instruments and their associated design features



Surgical Bowl
EASIER to clean



Retractor
HARDER to clean

Findings and Conclusions

- Preliminary analysis showed **positive correlations** between
 - Staff perceptions and trending bioburden incident data
 - Staff perceptions and hard-to-clean instruments identified by the CI system

Objective 3: Develop an instrument-set configuration tool to decrease number of instruments sent back for reprocessing when a bioburden event occurs

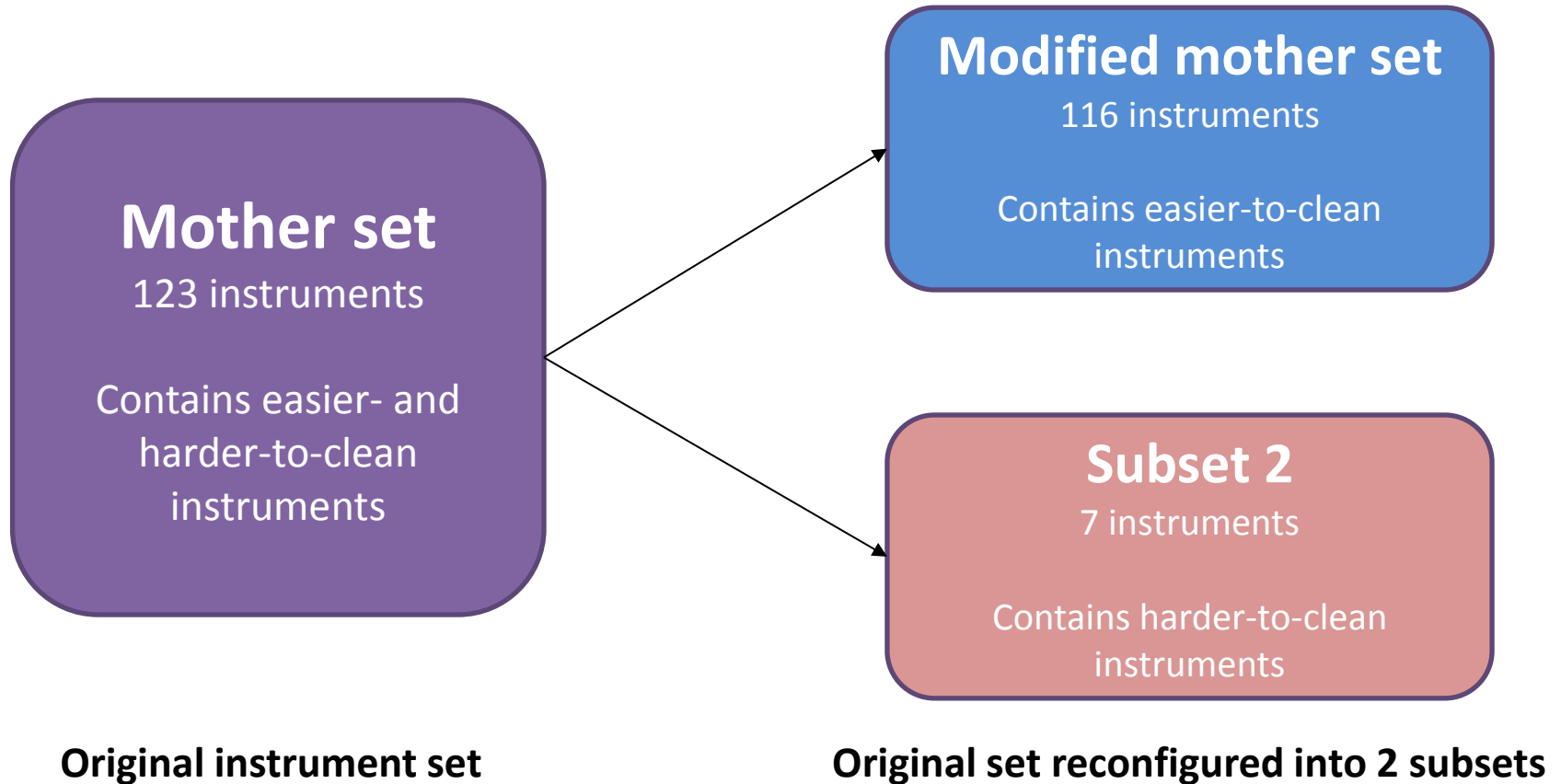
Purpose

- Create tool to:
 - i. Evaluate the impact that set configuration has on reprocessing outcomes
 - ii. Recommend potential optimal set configurations

Methods

- Excel-based modeling

Configuration tool example



Instrument Set Reconfiguration

Set Configuration Demo Tool

Set Type Name: SET, MINOR NEURO UH

Set Type ID: 500148

Update Filters

SET, MINOR NEURO UH - 500148

Initial Configuration	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories
		Minor Neuro	12.5%	123	22.33
Reconfiguration Summary	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories

Instrument Set Reconfiguration

ItemCategory	Aggregate Weight (lbs)	P(bioburden)	# of Items	Items distributed correctly?	Modified Mother Set
(Total)			123	123	123
APPLIER	0.14	0.00%	4	4	4
BIPOLAR (forcep)	0.17	0.60%	4	4	4
CUP	0.14	0.00%	6	6	6
CURETTE	0.12	0.00%	1	1	1
DISSECTOR	0.08	0.00%	6	6	6
ELEVATOR	0.21	0.00%	5	5	5
FORCEP	0.17	0.00%	40	40	40
GLASS	0.16	0.00%	1	1	1
GUN	0.50	0.00%	1	1	1
HEMOSTAT	0.04	0.00%	10	10	10
HOOK	0.07	0.00%	1	1	1
KNIFE HANDLE	0.06	0.00%	3	3	3
NEEDLE HOLDER	0.15	0.00%	6	6	6
RETRACTOR	0.21	0.00%	10	10	10
KERRISON (rongeur)	0.56	0.52%	7	7	7
RULER	0.02	0.00%	1	1	1
SCISSOR	0.14	0.00%	4	4	4
SUCTION	0.05	0.30%	2	2	2
SUCTION TIP	0.04	0.00%	6	6	6
TOWEL CLIP	0.07	0.00%	4	4	4
WEAVER	0.08	0.00%	1	1	1

Kerrison separation

- Kerrisons
 - Contain a virtually inaccessible channel
 - Are often delivered to ORs with bioburden
- We separated all 5 kerrisons out of the Minor Neuro set and into their own set



Instrument Set Reconfiguration

Set Configuration Demo Tool

Set Type Name: SET, MINOR NEURO UH

Set Type ID: 500148

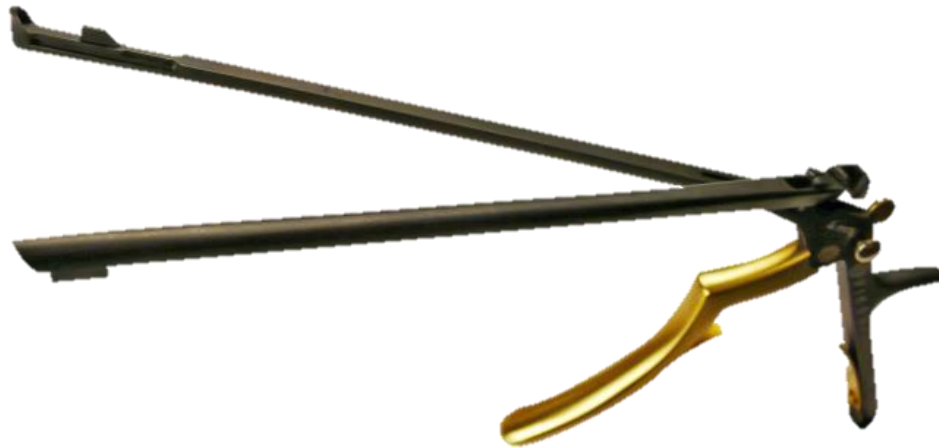
Update Filters

SET, MINOR NEURO UH - 500148

Initial Configuration	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories
		Minor Neuro	12.5%	123	22.33
Reconfiguration Summary	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories
	Minor Neuro Post-Separation	6.8%	118	19.53	21
	Kerrison Subset	6.1%	5	2.80	1

Instrument Set Reconfiguration

- In addition to separating the kerrisons, UMHS bought new, easier-to-clean models
 - New models contain a swivel hinge



Findings and Conclusions

- Since the separation in August 2015
 - UMHS has reported **0 bioburden incidents** related to kerrisons
 - The **per-month average** number of Minor Neuro bioburden incidents **decreased from 15 to 3**

Findings and Conclusions

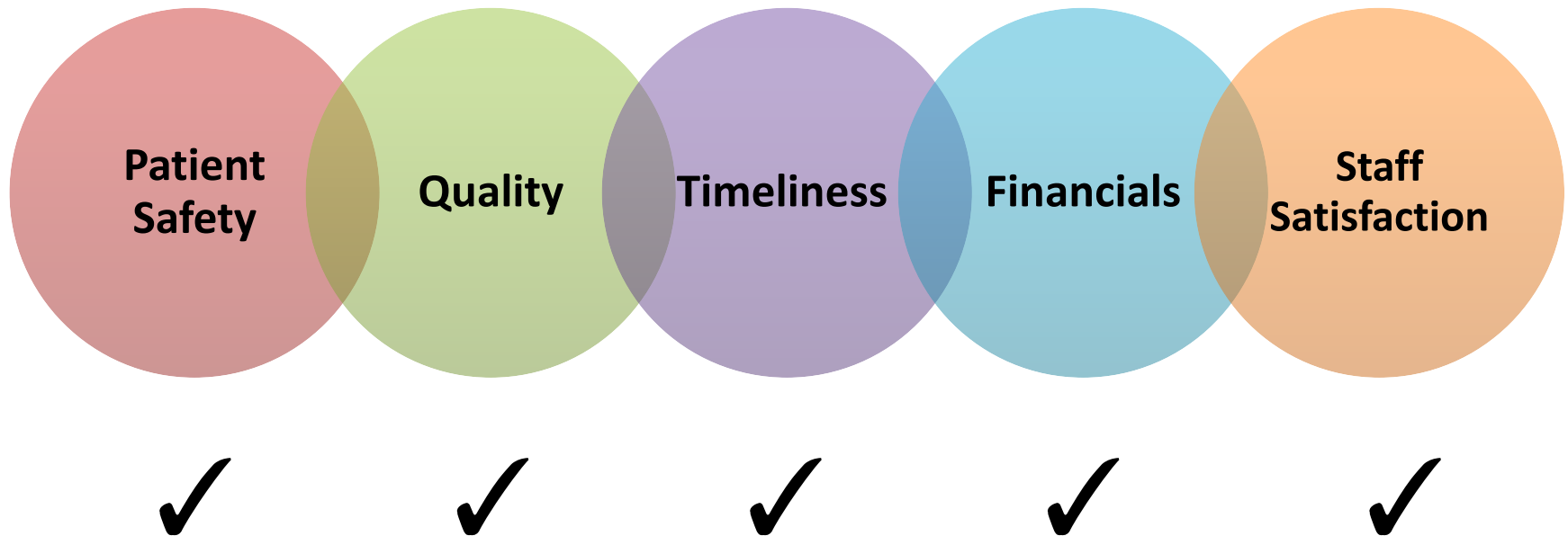
- OR time cost analysis
 - UMHS spends **\$58 per minute**
 - Bioburden incidents may cause OR delays of **5 minutes to 30 minutes**

Findings and Conclusions

- OR time cost analysis
 - With the decrease in Minor Neuro bioburden incidents, UMHS will avoid spending **\$27,490.56 to \$236,290.56** per year
 - These savings will **increase** in subsequent years since the numbers above include the cost of separation (new trays)

Instrument Set Reconfiguration

- Institutional outcome measures positively impacted:



NEXT STEPS

Future Work

- Refine and expand the pilot of the Cleanability Index to include recommendations for cleaning times
- Use the Set Reconfiguration Tool to identify additional bioburden-prone instruments to separate
 - Further **validate** the fact that separation positively impacts the institutional outcome measures
- Publish findings and recommendations

Thank you!

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