CENTER FOR HEALTHCARE ENGINEERING & PATIENT SAFETY
UNIVERSITY OF MICHIGAN

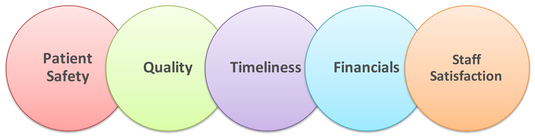
2016 Healthcare Systems Process Improvement Conference

A Systematic Approach to Improving the Reprocessing of Surgical Instruments

Bill Zhang, Leah Raschid, Nina Scheinberg, Amy Cohn PhD, James P. Bagian MD PE, Joseph DeRosier PE CSP, Shawn Murphy MSN RN

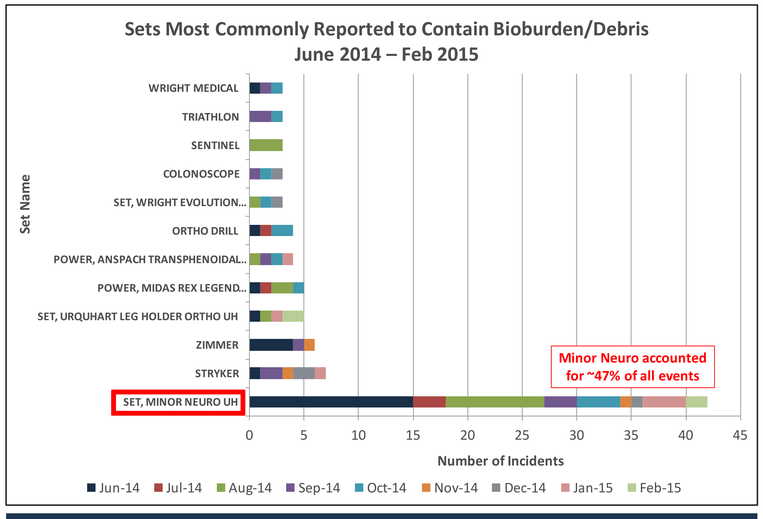
Background

- **Efficiency** in surgical instrument reprocessing is a critical challenge for hospitals nationwide
- Meeting reprocessing standards requires complex coordination of multiple hospital **functions**, **resources**, and **stakeholders**
- The University of Michigan Health System (UMHS) conducted **51,583 cases** and reprocessed **~15,000 items/day** in FY14
- Insufficiently cleaned instruments containing "bioburden" or debris negatively impact institutional outcome measures, most notably **patient safety**



Problem Statement

- OR Staff reported frequent problems related to the reprocessing and delivery of surgical instruments
- 51% of problems reported were due to bioburden/debris
  - 47% of these were caused by the Minor Neuro set

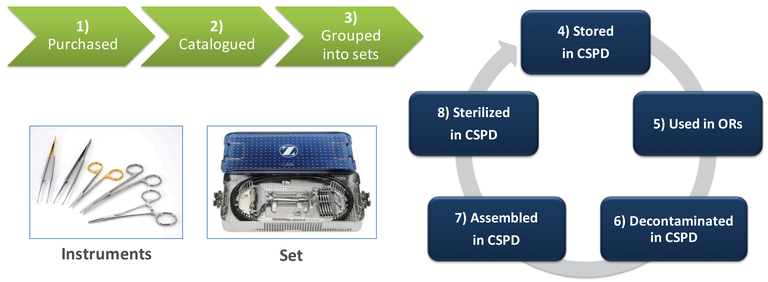


Goal

*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.*

Surgical Instrument Cycle

- **Operating Rooms (ORs)** – Dictate surgical instrument needs
- **Central Sterile Processing Department (CSPD)** – Reprocesses and manages all instruments flowing to and from the ORs



Solution Approach

- Examined the impacts that i) **instrument cleanability** and ii) **set configurations** have on reprocessing outcomes
  - *Hypothesis 1*: Instrument design features impact cleanability
  - *Hypothesis 2*: Separating high- from low-risk instruments improves reprocessing outcomes
- Used process-flow mapping techniques to define the current state
- Created a tool to evaluate how configuration impacts reprocessing outcomes and to recommend optimal set configurations
- Currently developing a Cleanability Indexing system in partnership with clinicians

Pilot

- Separated **kerrisons** (the highest-risk instruments) from Minor Neuro Set
- Demonstrated how the cleanability and configuration of instruments in a set directly impact outcome measures

Scenario 1: No Separation

Set Configuration Demo Tool

Set Type Name: SET, MINOR NEURO UH
Set Type ID: 500148
Update Filters
SET, MINOR NEURO UH - 500148

	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories	Original Tray Size	Std. Reprocessing Cost
Initial Configuration	Minor Neuro	12.5%	123	22.33	22	Large	$ 18.57

	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories	New Tray Size	Std. Reprocessing Cost
Reconfiguration Summary							

Scenario 2: Kerrison Separation

Set Configuration Demo Tool

Set Type Name: SET, MINOR NEURO UH
Set Type ID: 500148
Update Filters
SET, MINOR NEURO UH - 500148

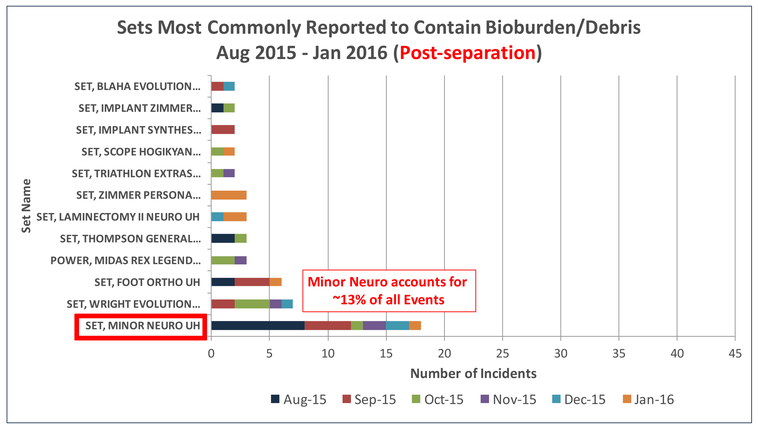
	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories	Original Tray Size	Std. Reprocessing Cost
Initial Configuration	Minor Neuro	12.5%	123	22.33	22	Large	$ 18.57

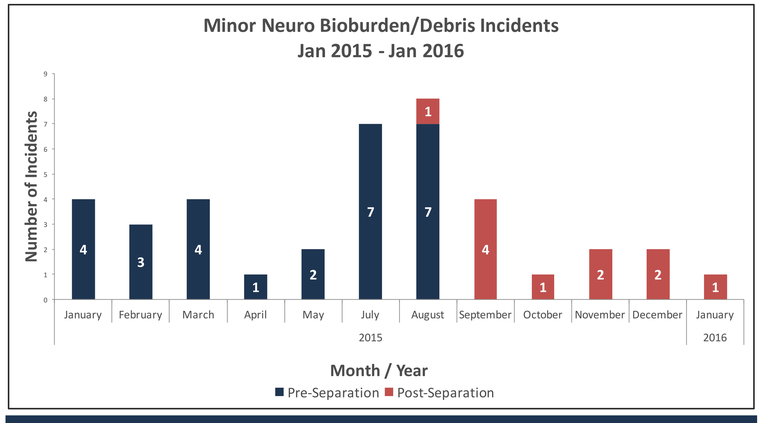
	SET TYPE	% sent back	# Instruments	Weight (lb)	# Categories	New Tray Size	Std. Reprocessing Cost
Reconfiguration Summary	Minor Neuro Post-Separation	6.8%	118	19.53	21	Large	$ 18.57
	Kerrison Subset	6.1%	5	2.80	1	Small	$ 9.29

Impact/Results

Benefits observed associated with this intervention:

1. No bioburden incidents with the kerrison sets
2. The average number of monthly bioburden incidents in Minor Neuro **decreased from 15 to 3**
3. The amount of time saved in the ORs will result in annual savings of **$23,490 to $236,290** (calculated using average bioburden event delays of 5 minutes to 30 minutes)
4. An engineering approach to configuring sets (e.g., high-risk instrument separation) can increase quality





Acknowledgements

- IOE Collaborators: Mark Grum, Rama Mwenesi
- UMHS Collaborators: Pat Buchanan, Elvie Casper, Nicole Farquhar, Laura Giuffrida, Julia Jackson, Renee Prince, Amy Redmond, and Jania Torreblanca
- This research is generously supported by the Center for Healthcare Engineering and Patient Safety, the Seth Bonder Foundation, the Doctors Company Foundation, the UM College of Engineering, and the Michigan Quality System Group