Hazardous Exposure Prevention in the Operating Theatre

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Disclosures of interest

I declare that in the past three years I have:

- held shares in: nil
- received royalties from: nil
- done consulting work for: Stryker
- given paid presentations for: Stryker
- received institutional support from: nil

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- Nursing experience across general, psychiatric, community, midwifery, neurology, and orthopaedic surgery
- Theatre management
- Quality Projects
  - Tourniquets in Orthopaedic surgery
  - Orthopaedic orientation for OT
  - Procedure pack working group
  - Neurosurgery learning package for new staff

Legislation: Waste Management

Your WHS obligations

Australian Government

safe work australia

Under WHS legislation you are obliged to provide:

- safe premises
- safe machinery and materials
- safe systems of work
- information, instruction, training and supervision
- a suitable working environment and facilities.

Complying with these duties can prevent you from being prosecuted and fined, and help you to retain skilled staff.

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Safety/
Manual
Handling

Efficiency

Environmental

Staff
Satisfaction

Cost

Challenges

Hazardous exposure risk in the OT

- OT staff are particularly at risk of being exposed to blood-borne pathogens and body fluids during surgical procedures
- Accidental exposure of the skin or mucosa to body fluids remains a major occupational hazard for healthcare workers[1]
- In one Australian study[2]:
  - 48.1% of all blood and body fluid exposures occurred in the emergency, perioperative, and surgical divisions
  - 57% of the 337 mucocutaneous exposures documented involved splashes of blood and blood products

1. Mohammadi N, Allami A, & Malek Mohamadi R (2011). Percutaneous exposure incidents in nurses: Knowledge, practice and exposure to hepatitis B infection: Percutaneous exposure incidents in nurses. Hepatitis Monthly, No. 11, pp. 186-90.

2. Bi P, Tully PJ, Pearce S, & Hiller JE (2006). Occupational blood and body fluid exposure in an Australian teaching hospital. Epidemiology & Infection, Vol. 134, pp. 465-71.

Current methods of fluid disposal

Traditional canisters

Canister with wall disposal

Closed mobile system

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Study Title: *Canister-based open waste management system versus closed system: hazardous exposure prevention and operating theatre staff satisfaction*

Study objectives

Primary objectives:

- Quantify the opportunity for hazardous exposure to HCPs by counting the number of contact events when using the closed system vs. an open system
- Quantify the incidence of manual handling when using the closed vs. open system

Secondary objectives:

- Amount of time typically spent setting up, maintaining, and cleaning each system
- Amount of time and distance involved to transport and dispose of fluid waste
- Volume of waste generated for disposal in landfills
- Ascertain level of staff satisfaction with both systems

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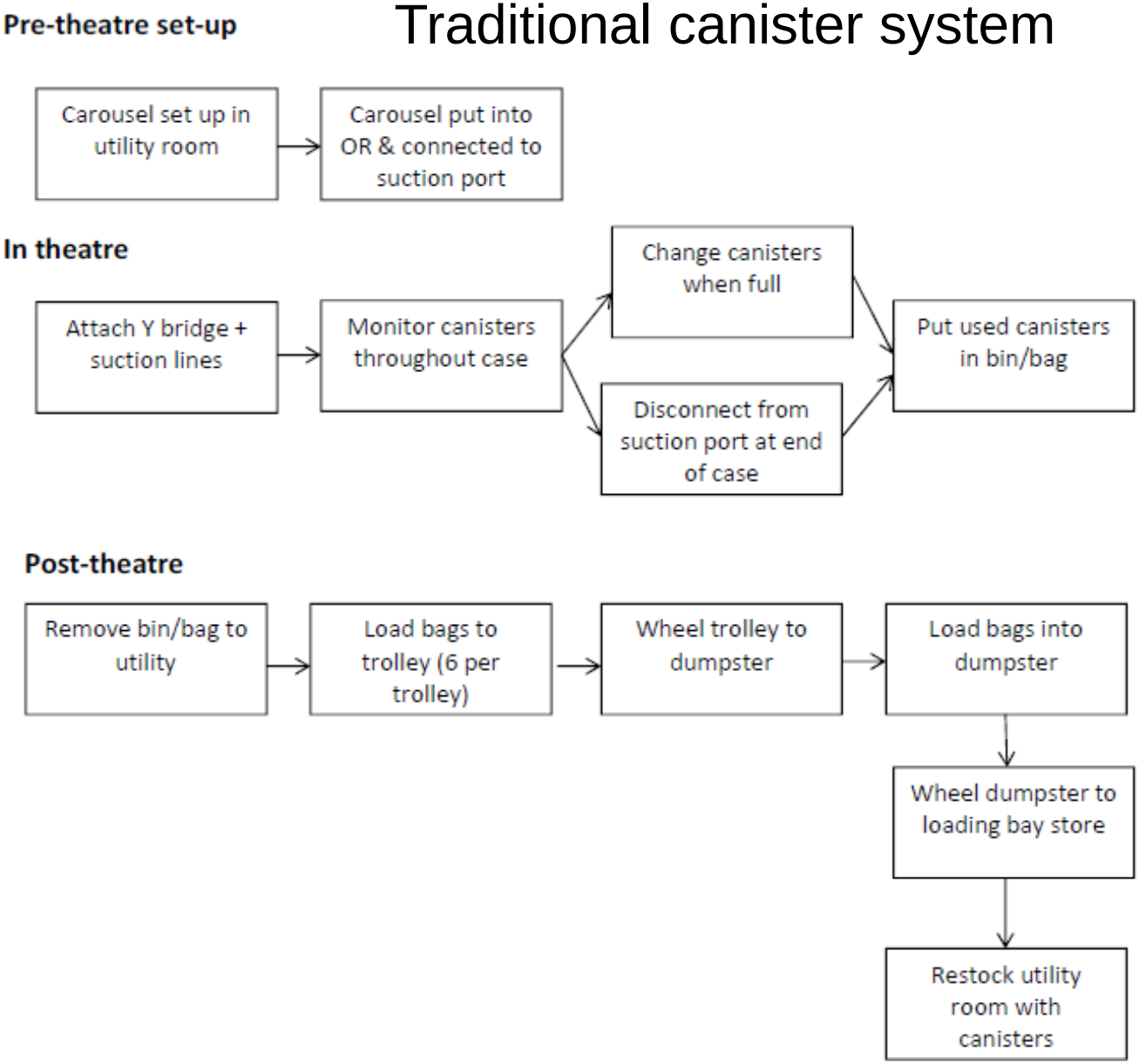
Method

- 1 Sydney metropolitan hospital
- 6 operating suites
- 6 surgeons
- 30 operations; arthroscopic, orthopaedic, and urology
- Conducted by KM&T (a global healthcare consulting firm)

Traditional canister system



Closed system

Pre-theatre set-up

Wheel to OR & connect closed system to power socket

In theatre

Attach manifold & suction lines → Select suction & switch on → At end of procedure switch off & reset volume → When case completed manifold is changed

Post theatre

Wheel to docking station when full or not required for other cases → Dock, select wash cycle → Restock manifolds

Data collection

For each procedure the following observations were recorded on an observation chart:

- Name of surgeon
- Type of surgery
- Equipment used (i.e. open or closed canister)
- Distance covered (measured by tape measure)
- Total time taken to perform each of the steps involved in using either system (measured by stopwatch)
- Total number of contact events
- Duration of contact event
- Total amount of waste fluid generated

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Data collection-Staff satisfaction

- Ease of use
- Safety - Spills and splashes and manual handling
- Time taken to set up equipment, maintain during surgery and clean/dispose of fluid waste
- System preference

Study results

Observed incidence of hazardous exposure in the operating theatre

- **Zero** hazardous exposure events were observed when the **closed system** was in use
- **Three** events were observed when the **open system** was in use

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Incidence of manual handling

- Manual handling was observed to be minimal with the closed system
  - 40% less contact events in arthroscopy
  - 25% less contact events in urology

Time savings in set-up, maintenance, and disposal

	Closed system	
Process	**Time (secs)**	**Distance (metres)**
Wheel to OR and connect to power socket	50	50
Attach manifold, suction lines/select suction setting	7	6
Wheel to docking station	30	50
Dock, select wash cycle	2	0
Restock manifolds	3	0
Total	**92**	**103**

92 secs for the closed system vs. 320 seconds for the open system

Time savings

- Set-up, handling and maintenance time was **3.5 times longer** with the **open system** than that required with the closed system

- Based on an average of 450 cases per week (arthroscopy, urology, and orthopaedic), it is estimated the **open system** would require an **additional 25 hours** of theatre staff's time

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Waste generation

- **Closed system**: After each case, the only items requiring separate disposal were the manifold and attached tubing (weighing approximately 150 g in total).
- **Open system:** the full canisters were disposed of in contaminated-waste bags and eventually transferred to landfill.

Neptune 2 Manifold

VS

**Images not to scale*

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Staff satisfaction

Overall satisfaction

- **90% closed system**
- **60% open system**

Conclusions

- Results suggest the **closed system is more efficient** than the open system
- Risk of exposure to blood and bodily falls when fluid is collected into a closed system
- Compared with a traditional canister-based open waste management system, **a closed system:**
  - **reduces** the number of opportunities for theatre staff to be exposed to hazardous fluid waste during surgical procedures
  - offers superior **ease-of-use** and has **less environmental impact**

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A few tips and tricks

- Implementation of the Neptune system
  - Department buy-in
  - Set-up
  - Policy documentation
  - Training
- Ongoing maintenance

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Future research

- Costing tool
  - Budget impact
  - ROI
  - Cost-effectiveness, cost-consequences etc.
- Sustainability Assessment