

Improving Operating Theatre Waste Segregation through Education

Vincent Wang¹, Dr Russell Hodgson^{1,2}, Jialin Du¹
¹The University of Melbourne, ²Department of General Surgery, Northern Health

BACKGROUND

- Operating theatres produce 3-6 times more emissions than other areas of the hospital and 50-70% of a hospital's waste too^{1, 2}.
 - Clinical waste is usually identified by the presence of visible blood; faeces, urine, vomit and sputum are considered non-clinical waste³.
 - Clinical waste costs up to 20 times more to dispose of and emits 3 times more CO2 than non-clinical waste³.
 - Up to 60% of clinical waste is being misclassified, resulting in unnecessary financial and environmental costs³.
- This study aims to use education to reduce rates of misclassified clinical and non-clinical waste in Northern Health Operating theatres.

METHODS

3-phase study design

- Pre-interventional audit (outlined below)
- Educational intervention (1 week)
 - Posters
 - Staff-wide email
 - Speeches at each AM & PM surgical team huddle
 - Presence in theatre
- Post-interventional audit (2 weeks post-intervention)

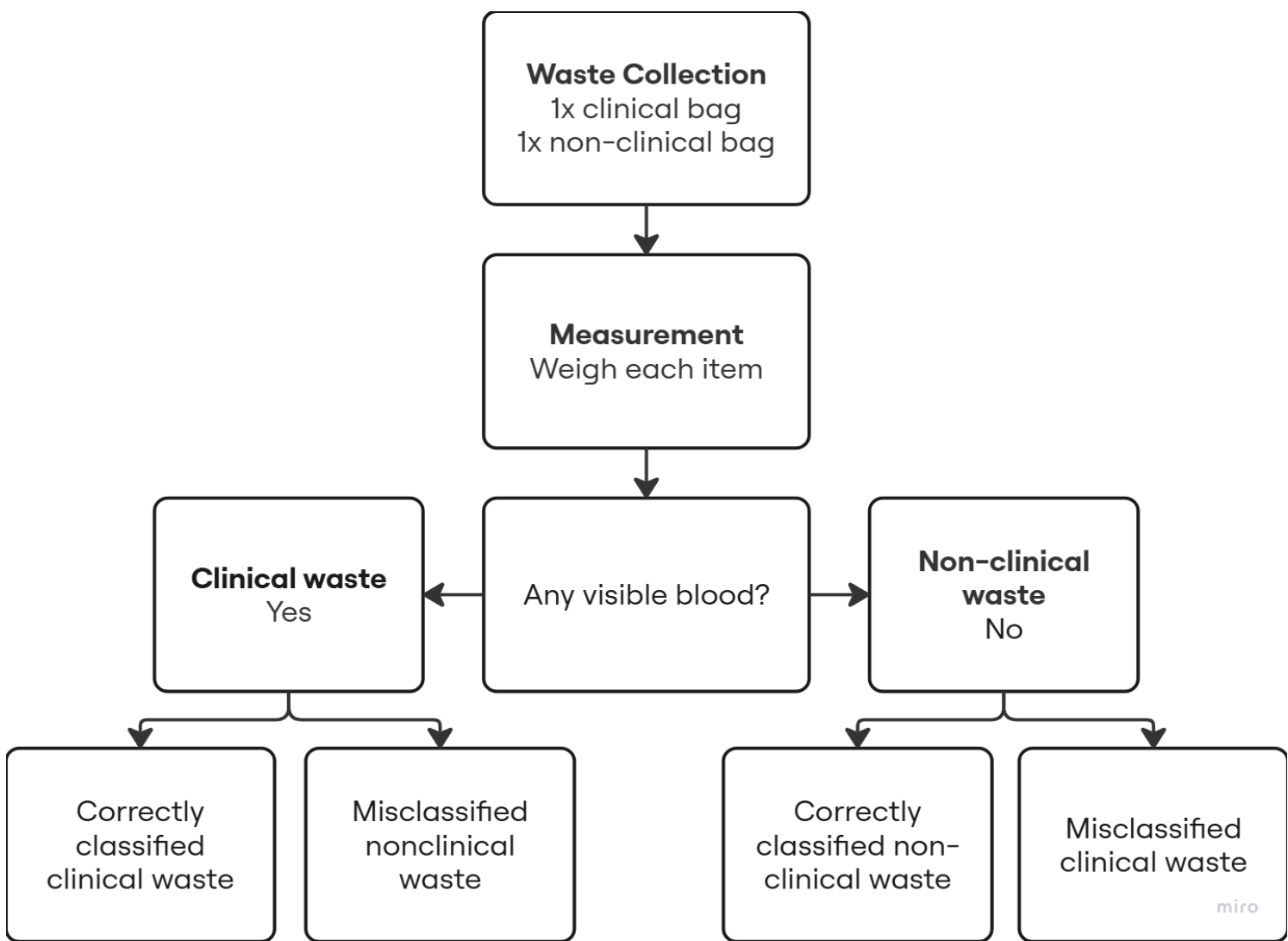


Figure 1. Waste audit pathway

- Laparoscopic cholecystectomies selected due to their frequency at Northern Health. Laparoscopic appendicectomies and LUSCS were also audited in the post-intervention period for comparison.
- Descriptive statistics were used; Mann Whitney U tests were used to compare waste misclassification rates by operation with a significance of $p < 0.05$.

RESULTS/DISCUSSION

Key Findings

- Education did not significantly decrease rates of misclassified clinical or non-clinical waste.
- Drapes & gowns represent 57.5% of misclassified clinical waste & 24.1% of misclassified non-clinical waste.

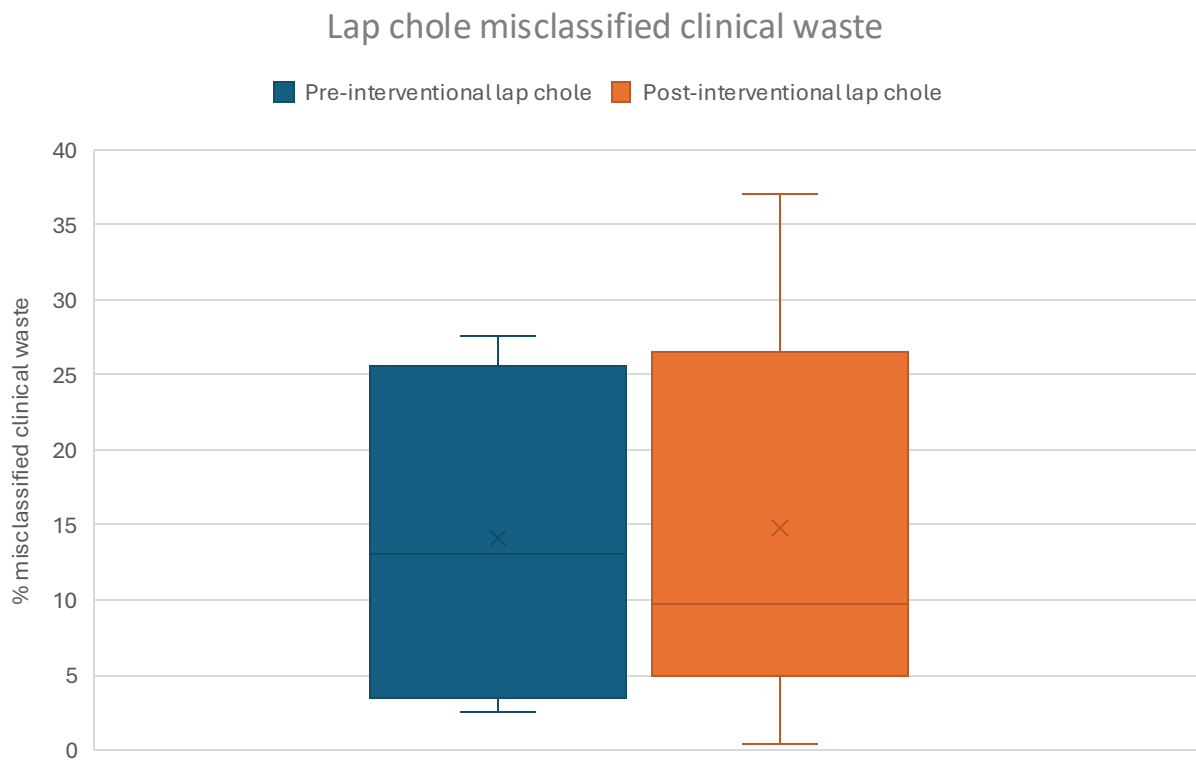


Figure 2. Comparison of misclassified clinical waste between pre- and post-interventional lap choles

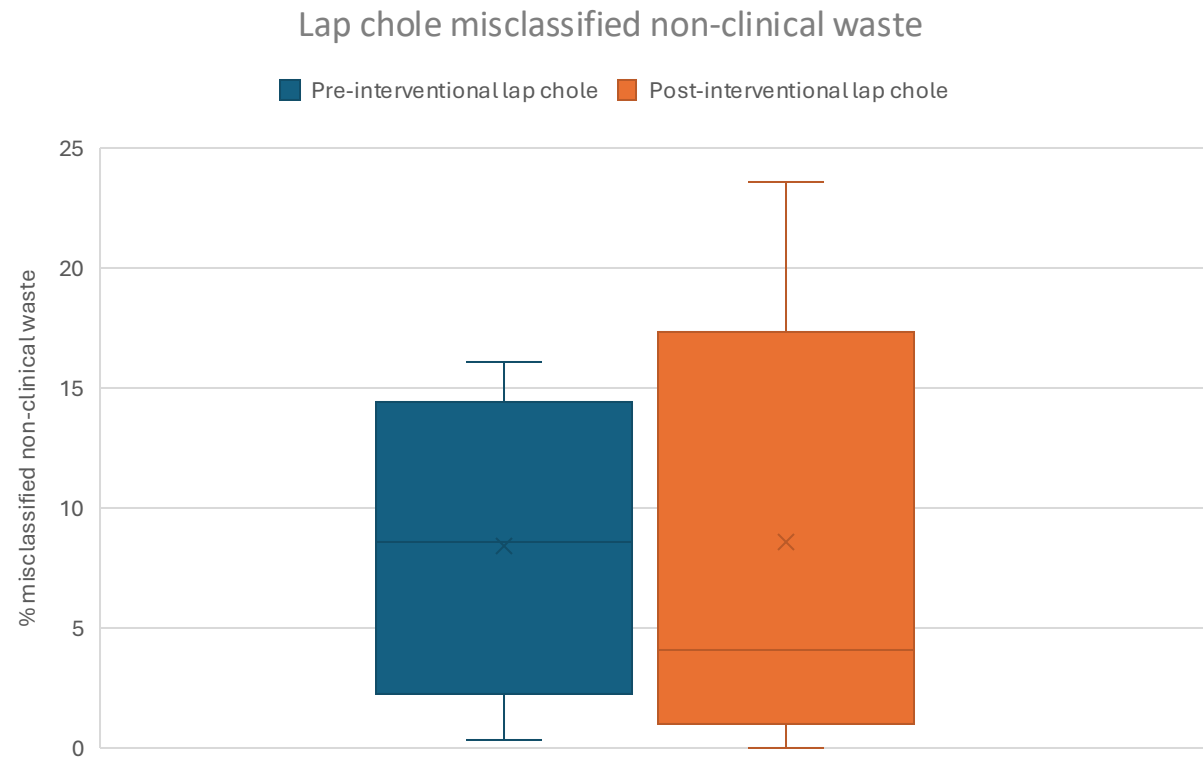


Figure 3. Comparison of misclassified non-clinical waste between pre- and post-interventional lap choles

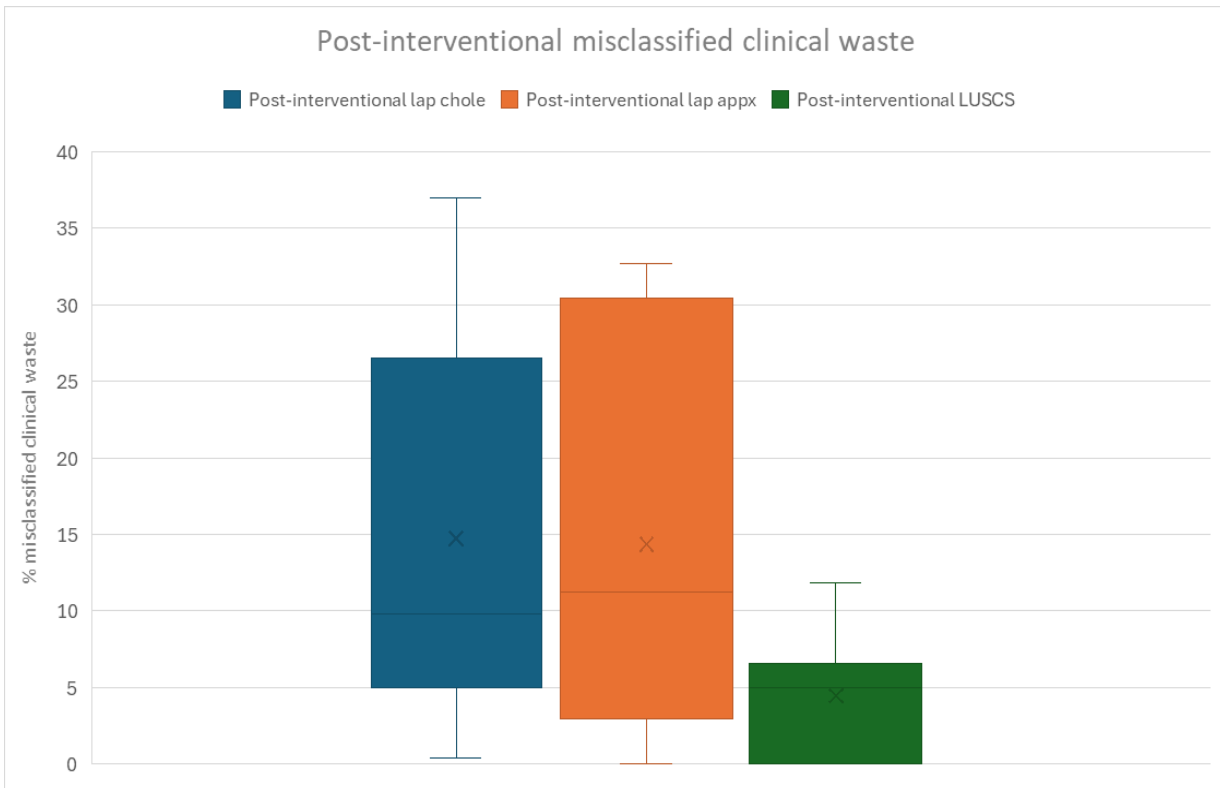


Figure 4. Comparison of misclassified clinical waste between post-interventional lap choles, lap appx & LUSCS

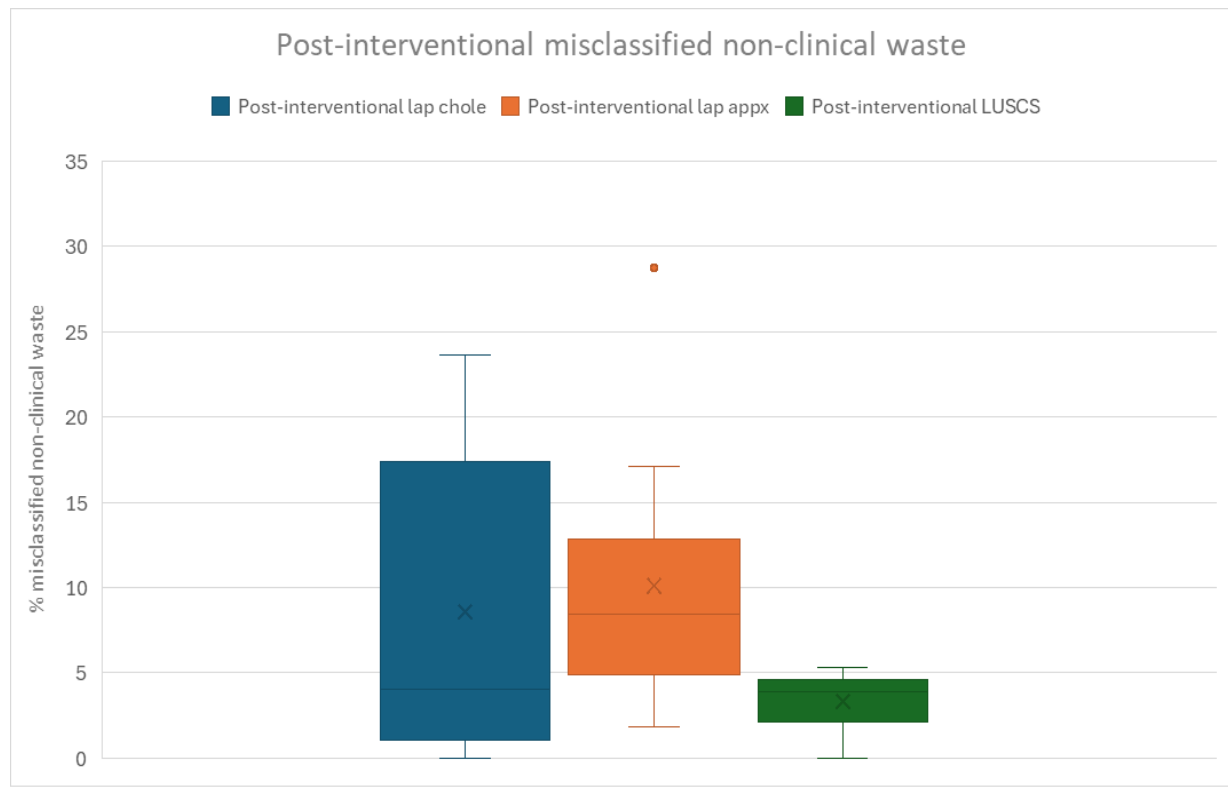


Figure 5. Comparison of misclassified non-clinical waste between post-interventional lap choles, appx & LUSCS

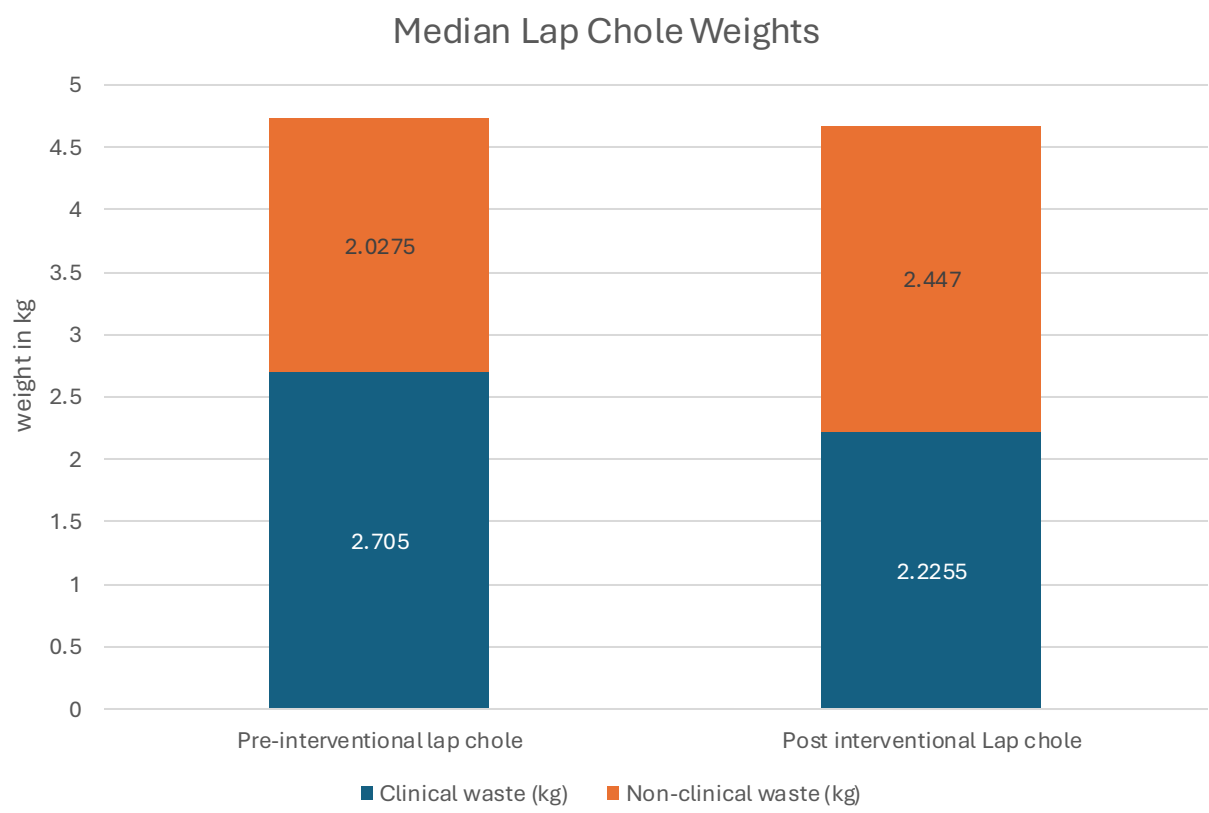


Figure 6. Median pre- & post-interventional lap chole waste weights

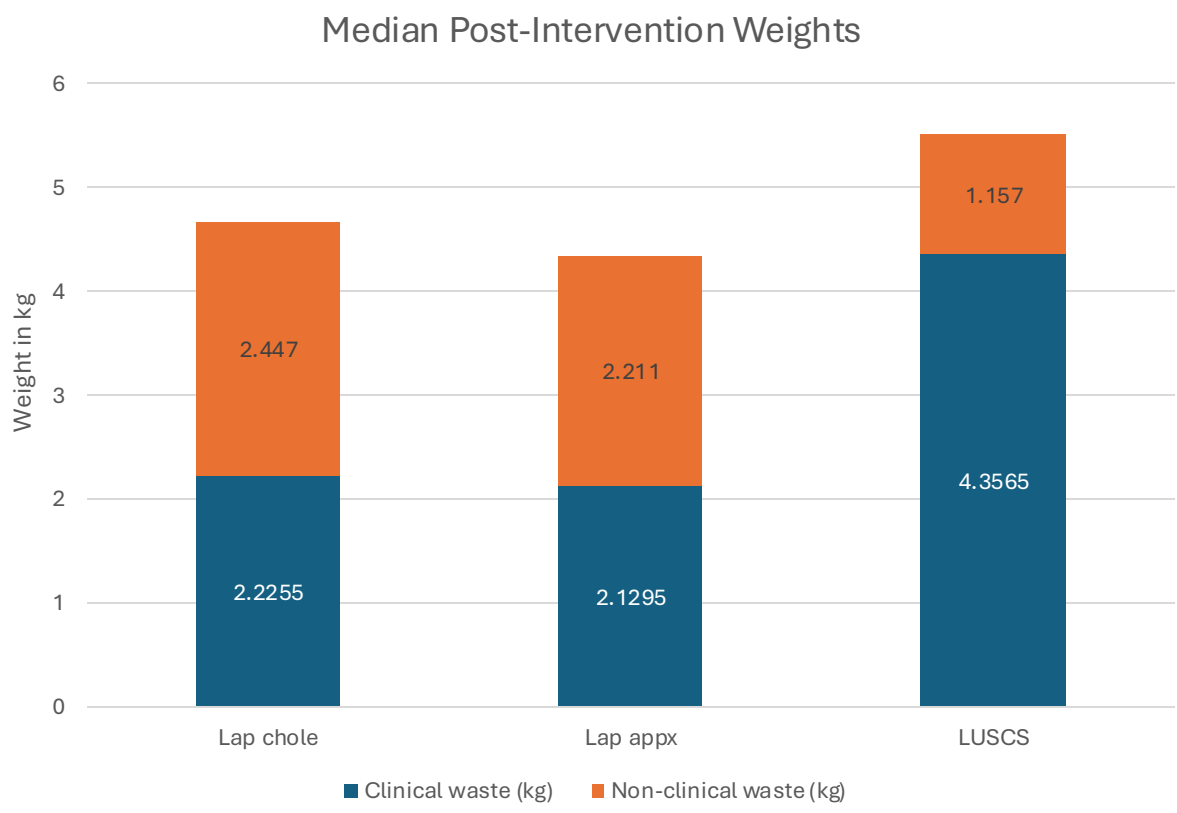


Figure 7. Median post-interventional lap chole, appx & LUSCS waste weights

	Lap Chole (Pre)	Lap Chole (post)	Lap appx (post)	LUSCS (post)
Operations	4	10	10	10
% misclassified clinical waste	14.1	14.2	14.3	4.4
% misclassified non-clinical waste	8.4	8.6	9.7	3.3
% misclassified waste (total)	23.5	22.7	24.0	7.7

Figure 8. Comparison of waste misclassification rates between different operations

Clinical Implications

Results are at odds with other similar studies^{4,5}.

There are several potential explanations to this

- Education initiatives disproportionately engaged nurses/technicians over doctors
- Contrary waste segregation education elsewhere
- Time constraints

Limitations

- Hawthorne effect
- Betadine vs blood on dark waste
- Only 4 pre-interventional lap cholecystectomies
- Pre-interventional audit conducted by different person
- Contamination of misclassified non-clinical waste in a clinical bin bag with a lot of blood
- Several waste items too light for 5g scale

CONCLUSION

Education initiatives did not significantly improve operating theatre waste segregation at Northern Health.

Future directions

- More surgeon-oriented education
- Standardised waste education across health networks
- Future study on bin placement/accessibility in theatre

REFERENCES

- Foran, P. (2015). Education report. *ACORN: The Journal of Perioperative Nursing in Australia*, 28(1), 28-30.
- Southorn, T., Norrish, A. R., Gardner, K., & Baxandall, R. (2013). Reducing the carbon footprint of the operating theatre: a multicentre quality improvement report. *J Perioper Pract*, 23(6), 144-146. <https://doi.org/10.1177/175045891302300605>
- VICNISS. (2024). *Clinical waste guidelines supplement for healthcare staff*. Victorian Department of Health Retrieved from <https://www.vicniss.org.au/media/2129/clinical-waste-guidelines-supplement-for-healthcare-staff.pdf>
- Cunha Neves, J. A., Roseira, J., Queirós, P., Sousa, H. T., Pellino, G., & Cunha, M. F. (2023). Targeted intervention to achieve waste reduction in gastrointestinal endoscopy. *Gut*, 72(2), 306-313. <https://doi.org/10.1136/gutjnl-2022-327005>
- Fraifeld, A., Rice, A. N., Stamper, M. J., & Muckler, V. C. (2021). Intraoperative waste segregation initiative among anesthesia personnel to contain disposal costs. *Waste Management*, 122, 124-131.

ACKNOWLEDGEMENTS

I would like to sincerely thank my supervisor Mr Russell Hodgson for his ongoing support and guidance; Jialin Du for her invaluable help with the data collection and waste auditing.