

Waste Audit in the Pain Procedure Suites to Evaluate Current Practices and Potential Improvements in Sustainability

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Introduction

- Despite its mission to protect and promote health, the healthcare sector paradoxically plays a significant role in exacerbating the climate crisis, which in turn has harmful repercussions on health.
- The healthcare sector accounts for 4.4% of global net greenhouse gas emissions, with the U.S. being the largest contributor, responsible for 7.6% of the global healthcare climate footprint [7].
- The manufacturing, disposal, and transportation of pharmaceuticals, medical devices, equipment, and instruments contributes to 71% of total healthcare GHG emissions [7]
- Hospitals produce more than 29 pounds of waste per bed per day, amounting to 5 million tons of waste annually [2].
- Given the substantial amount of waste produced and its significant contribution to the healthcare climate footprint, changes need to be made to reduce the consumption of waste.
- Waste audits have been used to identify potential ways for improvement in clinical settings such as operating rooms [1, 6], outpatient medical offices [6], and interventional radiology suites [4].
- However, pain medicine, with its unique set of high-turnover procedures, and frequent use of disposable medical kits, represents a significantly unexplored area of healthcare waste.
- The purpose of this study is to complete a waste audit to measure the amounts and types of waste produced in pain medicine, and identify potential areas for intervention.**

Methods

- For two separate weeks, waste (excluding pharmaceutical and sharp waste) from 3 procedure rooms in the pain medicine department were collected at the end of the day and the weight of each bag was measured and recorded.
- The waste was sorted into the following categories and weighed

- | | |
|---------------------------------------|---------------------------------|
| – Blue wrap | – Recycling (properly disposed) |
| – Cleaning supplies | – Unused material |
| – Medication related supplies | – Used drapes |
| – Packaging | – Used gauze |
| – Personal protective equipment (PPE) | – Used kit supplies |
| – Procedure related equipment | – Sterile glove packaging paper |
| – Recycling (improperly disposed) | – Trash |



Figure 1. Pain procedure suite waste (excluding pharmaceutical and sharp waste) sorted into each category. From left to right: used gauze, sterile glove packaging paper, used kit supplies, cleaning supplies, unused material, procedure related equipment, medication related supplies, used drapes, trash, blue wrap, PPE, packaging.

Results

Figure 2. Categories of waste presented as a percentage of total waste.

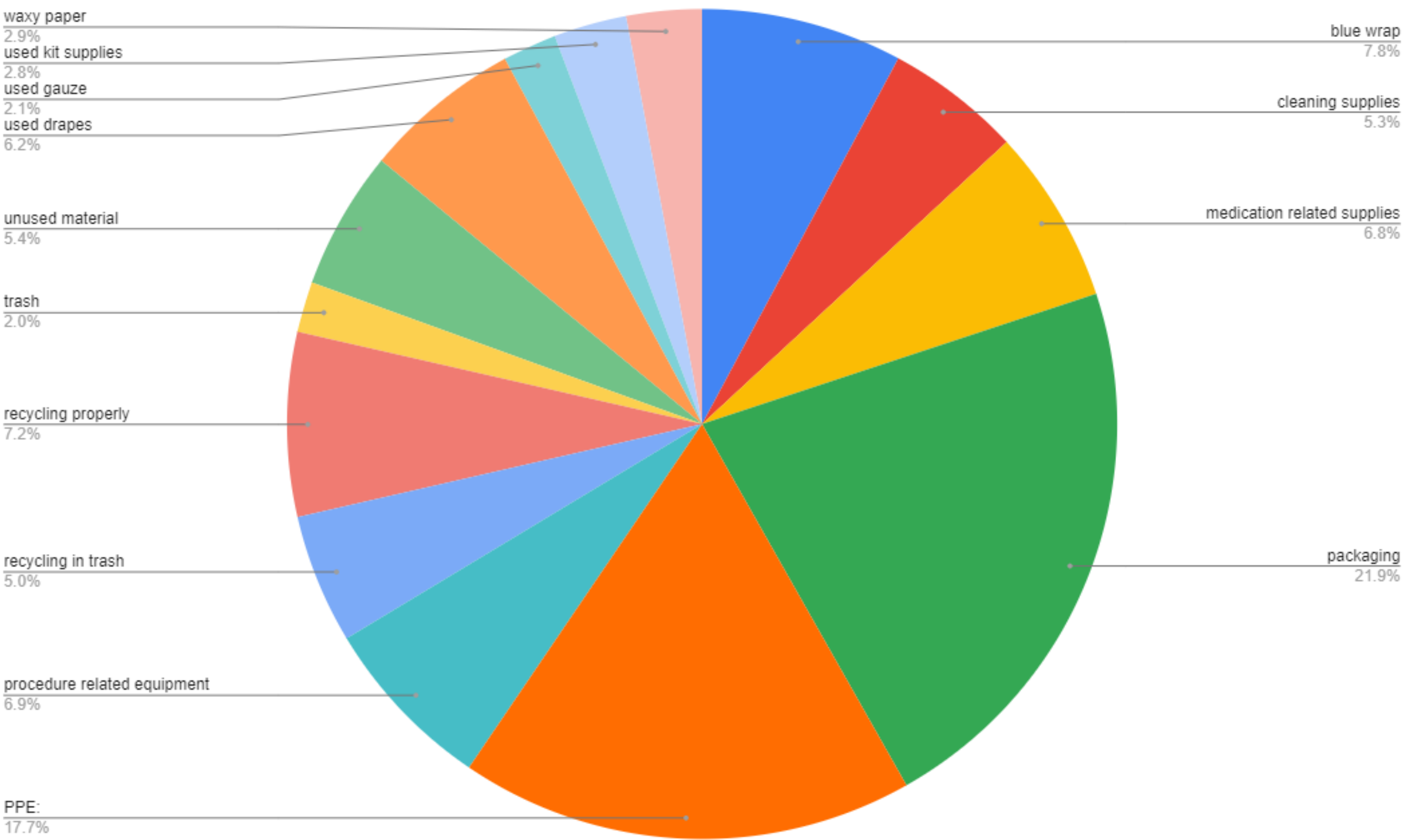
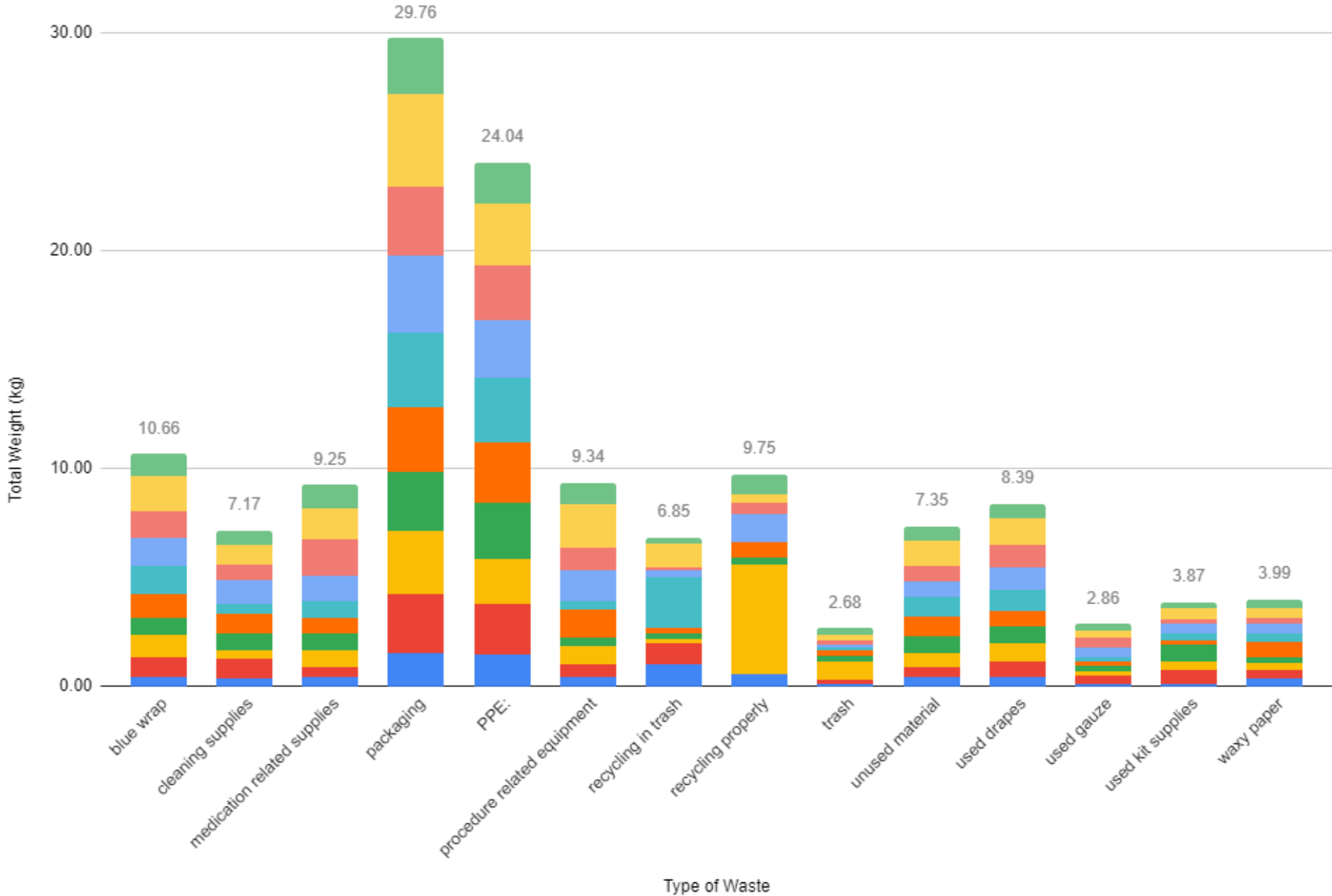


Figure 3. Average daily waste production across 3 pain procedure suites in kilograms (kg) per day

13.60
kg/day

Figure 4. Waste by category (kg) indexed by day



Discussion

- Soft Plastic Recycling Programs:**
 - Given that packaging is the highest contributor to waste and most of the packaging is soft plastic, UCSD Pain Medicine suite has recently implemented a soft plastic recycling initiative what would reduce waste by 1,500 pounds per year.
 - Although the impact of the recycling program remains to be evaluated, this serves as an example of data-driven targeted waste reduction strategy that could be more widely implemented.
- PPE Considerations:**
 - PPE amounted to 17.7% of total waste, making it the second largest contributor.
 - Considerations need to be made on the type of PPE that is needed for low-risk procedures. For example, sterile gloves are not needed for trigger point and peripheral nerve/joint injections, full gowns are not needed for neuraxial procedures
- Medical/Surgical Kits:**
 - Current kits require entire pack of supplies to be open for an individual surgery. Unused supplies leading to unnecessary waste.
 - Customizing medical kits for specific procedures and improving inventory logistics can minimize waste by ensuring that only necessary supplies are included.

Recommendations and Improvements

- Perform waste audits in your own department to understand the current status of waste production and identify potential ways improvement.
- Consider evaluating unused materials in each pain medicine procedure kits to create waste-friendly customized kits
- Encourage fostering a positive climate health culture and discourse amongst team members to support sustainable practices and waste management.



Figure 5 “Art commenting on waste produced in hospitals” prompt, Google, Gemini 1.5

Future Direction

- This waste audit did not include medication or biohazard waste as they were disposed of separately. Medication waste audit could be done to evaluate the most used types and amounts of medication to explore waste-lowering strategies.

References

- de SA, D., Stephens, K., Kuang, M., Simunovic, N., Karlsson, J., & Ayeni, O. R. (2016). The direct environmental impact of hip arthroscopy for femoroacetabular impingement: a surgical waste audit of five cases. *Journal of Hip Preservation Surgery*, 3(2), 132–137. <https://doi.org/10.1093/jhps/hnw085>
- Rammelkamp, Z., Dirnberger, J., Johnson, G., & Waabren, S. (2021). An Audit of All Waste Leaving the Operating Room: Can the Surgical Suite Be More Environmentally Sustainable? *World Medical & Health Policy*, 13(1), 126–136. <https://doi.org/10.1002/wmh3.397>
- Rizan, C., Mortimer, F., Standcliffe, R., & Bhutta, M. F. (2020). Plastics in healthcare: time for a re-evaluation. *Journal of the Royal Society of Medicine*, 113(2), 49. <https://doi.org/10.1177/0141076819890554>
- Shum, P. L., Kok, H. K., Maingard, J., Schembri, M., Baltes, R. M. F., van Damme, V., Barras, C., Slater, L. A., Chong, W., Chandra, R. v., Jhamb, A., Brooks, M., & Asadi, H. (2020). Environmental sustainability in neurointerventional procedures: a waste audit. *Journal of Neurointerventional Surgery*, 12(11), 1053–1057. <https://doi.org/10.1136/neurintsurg-2020-016380>
- Sun, Z., Chen, C., Xu, D., & Li, T. (2018b). Effects of ambient temperature on myocardial infarction: A systematic review and meta-analysis. *Environmental Pollution*, 241, 1106–1114. <https://doi.org/10.1016/j.envpol.2018.06.045>
- Taylor, A. L., Levin, J., Chan, J., Lee, M., Kaslinton, D., Miller, E., & Fox, P. (2021). Improving environmental sustainability in outpatient clinics: Lessons from a waste audit. *The Journal of Climate Change and Health*, 4, 100070. <https://doi.org/10.1016/j.joclim.2021.100070>
- Waste / Practice Greenhealth. (n.d.). Retrieved July 15, 2024, from <https://practicegreenhealth.org/topics/waste/waste-0>

No Conflicts of Interest to Announce for this Study