Autopsy Waste Audit Methodology

Statement of Problem:

- Clinical biohazard waste disposal poses a higher environmental cost compared to general waste streams due to specialist handling processes that are more energy-intensive, such as the use of heat, chemicals, and irradiation; autoclaving; and incineration [1]
    - Between 75-90% of a hospital's waste can be safely disposed in municipal landfills [2]
    - In 2024, only 66% of UH's Pathology waste is being disposed as landfill waste
- The Canadian Council of Ministers of the Environment states that waste audits should be conducted regularly to identify sources and types of waste that the healthcare facility generates [3]
- The LHSC waste management manual guidelines [4] categorises waste using the following system:

Bin Colour	Materials Accepted	Disposal Method	Cost of Disposal ($/kg of waste)
Red Biomedical Bin: Anatomical waste	• Human tissues, organs, and body parts • Does not include hair, teeth or nails	Shipped to Pennsylvania to be incinerated	$1.15
Yellow Biomedical Bin: Non-anatomical waste	• Blood and blood products • Live or attenuated vaccines • Tubing containing blood or bloody body fluids • Items saturated with blood that might release liquid if compressed • Items with non-removable patient identifiers	Autoclaved and then transported to landfill	$0.82
General landfill waste	• Items not classified as biomedical, chemical, radioactive, pharmaceutical, or confidential • Includes plastic bags/film, coffee cups and lids,	Transported to landfill	$0.09

	styrofoam, clean nitrile gloves, clean masks, and clean tubing		
General recycling	• Includes paper, cardboard, boxboard, plastic #1-7, steel, and aluminum products	Transported to recycling facility	Billed at a flat rate per pickup

Objective:

The goal of this initiative is to conduct a waste audit of the autopsy unit at University Hospital to reduce operational costs, minimise the hospital's environmental footprint, and ensure compliance with federal and LHSC waste management guidelines.

Methods:

The following methods were adapted from existing hospital waste audit protocols [5] [6]. The waste audit will be conducted on the physical waste generated within the autopsy area of University Hospital, which consists of two autopsy suites (C1-103 and C1-105). C1-103 has two biomedical waste bins within the suite, as well as a general waste receptacle outside the doors. C1-105 has two biomedical waste bins within the suite.

First, a baseline waste audit will be conducted by Maggie Chen (Western Pathology thesis student) to determine waste generation in the autopsy suite:

1. Record the type of waste containers currently used.
2. Conduct on-site waste audits three times per week for four consecutive weeks, between 2:30 - 3:00 PM, to capture data when waste containers are near maximum capacity. During each visit:
    a. Photograph the waste bags to document contents, ensuring that patient identifiers are excluded.
    b. Determine the type of waste bags generated.
    c. Measure the quantity of bags and record the weight of each bag using a portable scale.
3. Calculate the average waste per autopsy and multiple by the number of yearly autopsies to estimate annual waste generation.
    a. Deduce the economic and environmental (kg CO_2 equivalent) of current disposal practices.
4. Review and catalogue the photographs to identify items disposed of in a manner that does not align with LHSC segregation policies.

For the intervention, the following measures will take place:

1. Add general waste and recycling bins to supplement biomedical bins in autopsy suites.
    a. Figure 2 in Appendix A shows placement options for room C1-103.
    b. Figure 3 in Appendix A shows placement options for room C1-105.
    c. Figure 4 in Appendix A shows placement for the area outside of C1-103.
2. Signage will be added on all of the bins to show items that can go in each bin.
3. The colour of waste bags that will go in each bin will be coded as follows:
    a. Yellow bags will be placed in biomedical bins.
    b. Clear bags will be placed in general waste bins.
    c. Blue bags will be placed in the recycling bins.
4. At the end of each day, MLAs and PAs are to:
    a. Haul biomedical bins to the housekeeping waste collection area. These will be washed by the Daniels Health Team and returned to LHSC to be re-used.
        i. A stockpile of clean biomedical bins will be placed in this same collection area, which will be available for MLAs and PAs to bring back to the autopsy suites.
    b. Transfer the general waste produced inside rooms C1-103 and C1-105 into the larger general waste bin placed outside of the refrigeration room. At the end of the day, this will be moved to the housekeeping waste collection area.
        i. In the case where maggots are present, the garbage must be placed in the maggot-specific garbage bin with a lid by the housekeeping waste collection area and housekeeping must be notified immediately (ext. 35901).
    c. Transfer the recycling produced inside rooms C1-103 and C1-105 into a larger recycling bin outside of the refrigeration room. This is to be wheeled to the housekeeping waste collection area at the end of the day.

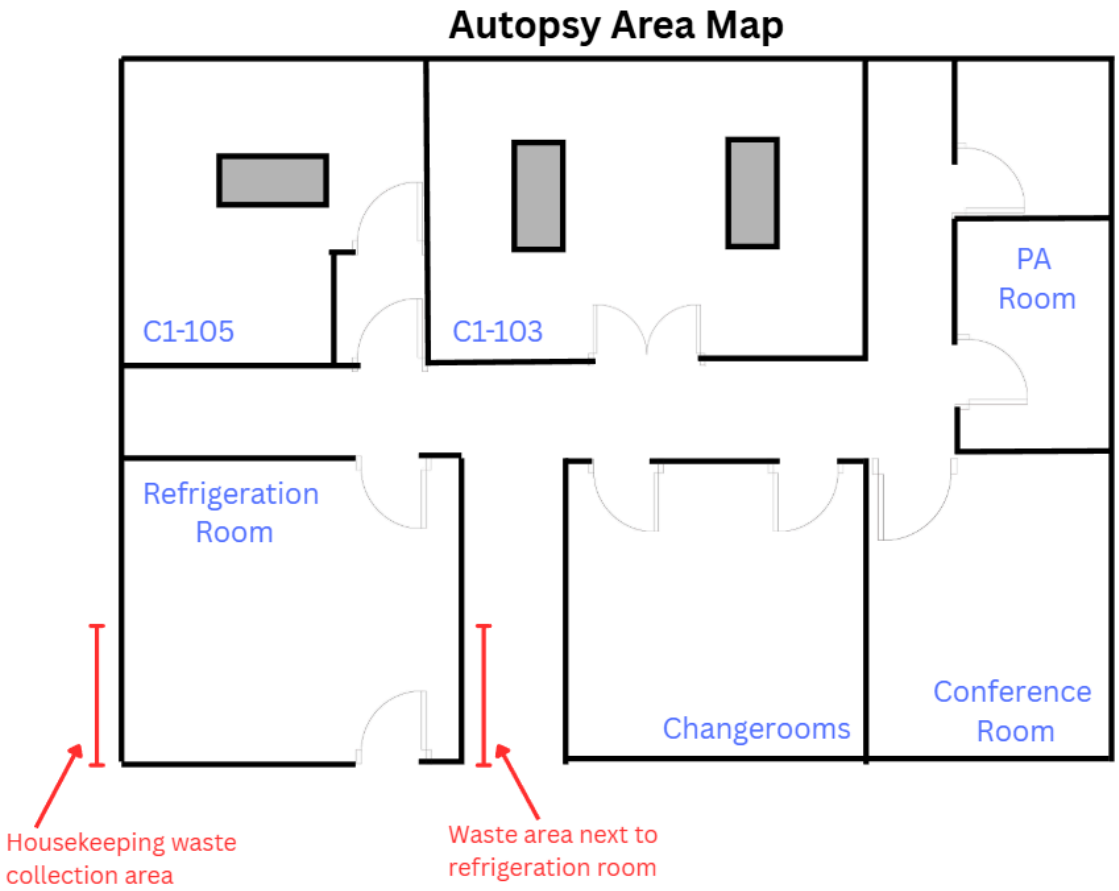

Figure 1. Aerial view of autopsy area representing the location of waste collection areas.

5. Maggie will hold a Lunch & Learn in January to indicate common waste misclassifications and present the new bin placements.
6. Maggie will conduct a follow-up audit after implementation to assess the effectiveness of interventions and measure reductions in waste misclassification.

Timeline:

<u>Performing the initial waste audit:</u>

- Week 1 [Oct 27-21]: Audit waste on Oct 27, 29, and 31
- Week 2 [Nov 10-14]: Audit waste on Nov 10, 12, and 14
- Week 3 [Nov 17-21]: Audit waste on Nov 17, 19, and 21
- Week 4 [Nov 24-28]: Audit waste on Oct 24, 26, and 28

<u>Conducting waste analysis, proposal development, and staff education measures:</u>

- End of November, December, and beginning of January
    - Lunch and learn on Jan 9 from 12:00-1:00 PM

Performing the follow-up waste audit:

- Week 1 [Jan 19-23]: Audit waste on Jan 20, 21, and 23
- Week 2 [Jan 26-30]: Audit waste on Jan 27, 28, and 30
- Week 3 [Feb 2-6]: Audit waste on Feb 3, 4, and 6
- Week 4 [Feb 9-13]: Audit waste on Feb 10, 11, and 13

References:

1. Runcie H. Sort your waste! An audit on the use of clinical waste bins and its implications. Future Healthcare Journal. 2018 Oct;5(3):203–6.
2. Azmal M, Kalhor R, Dehcheshmeh NF, Goharinezhad S, Heidari ZA, Farzianpour F. Going toward Green Hospital by Sustainable Healthcare Waste Management: Segregation, Treatment and Safe Disposal. Health. 2014;06(19):2632–40.
3. Canadian Council of Ministers of the Environment. Guidelines for the Management of Biomedical Waste in Canada. Office of Waste Management, Environment Canada; 1992 Feb.
4. London Health Sciences Centre Facilities Management. Waste Management Manual. 2019 May.
5. Geldenhuys L. Sustainable Anatomical Pathology. Schollenberg E, Bethune G, Adams-Small M, Leblanc S, Chornenko K, Bonert M, editors. CASCADES; 2025.
6. ORTECH International. Hospital Waste Audit Manual. Waste Management Branch Ontario Ministry of the Environment; 1992 Apr.

Appendix A:

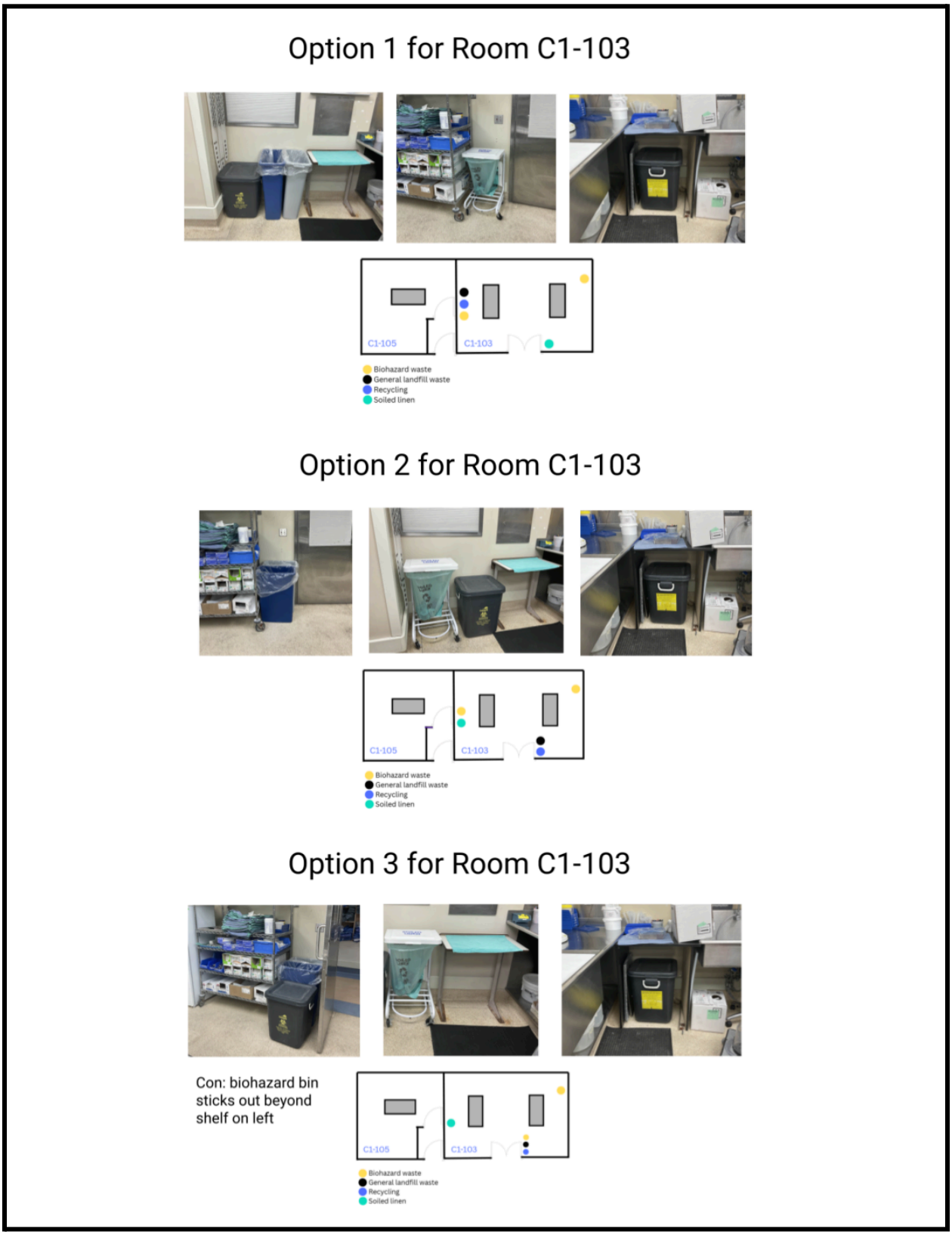

Figure 2. Bin placement options for room C1-103.

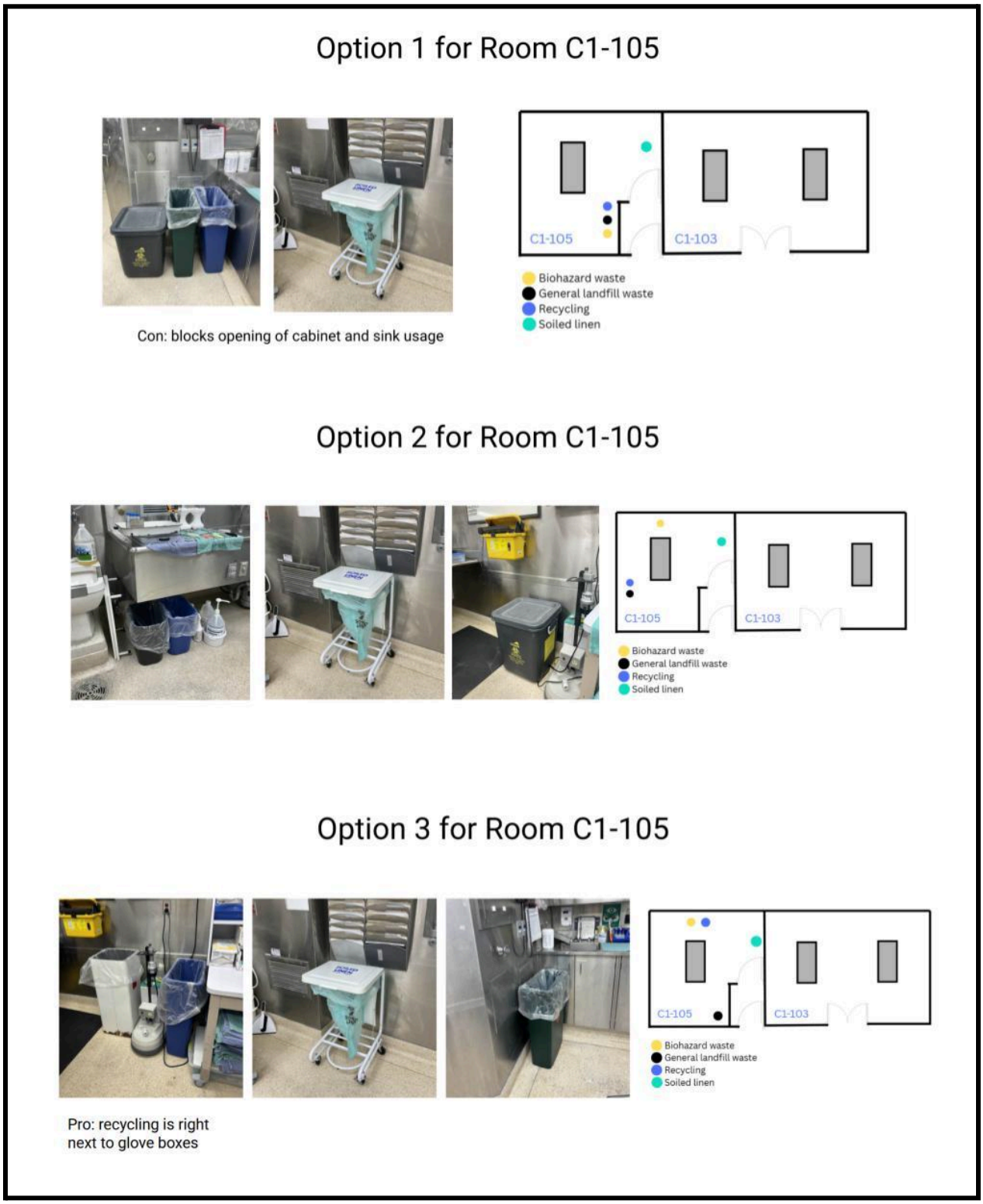

Figure 3. Bin placement options for room C1-105.

Figure 4. Bin placements outside of rooms C1-103.