

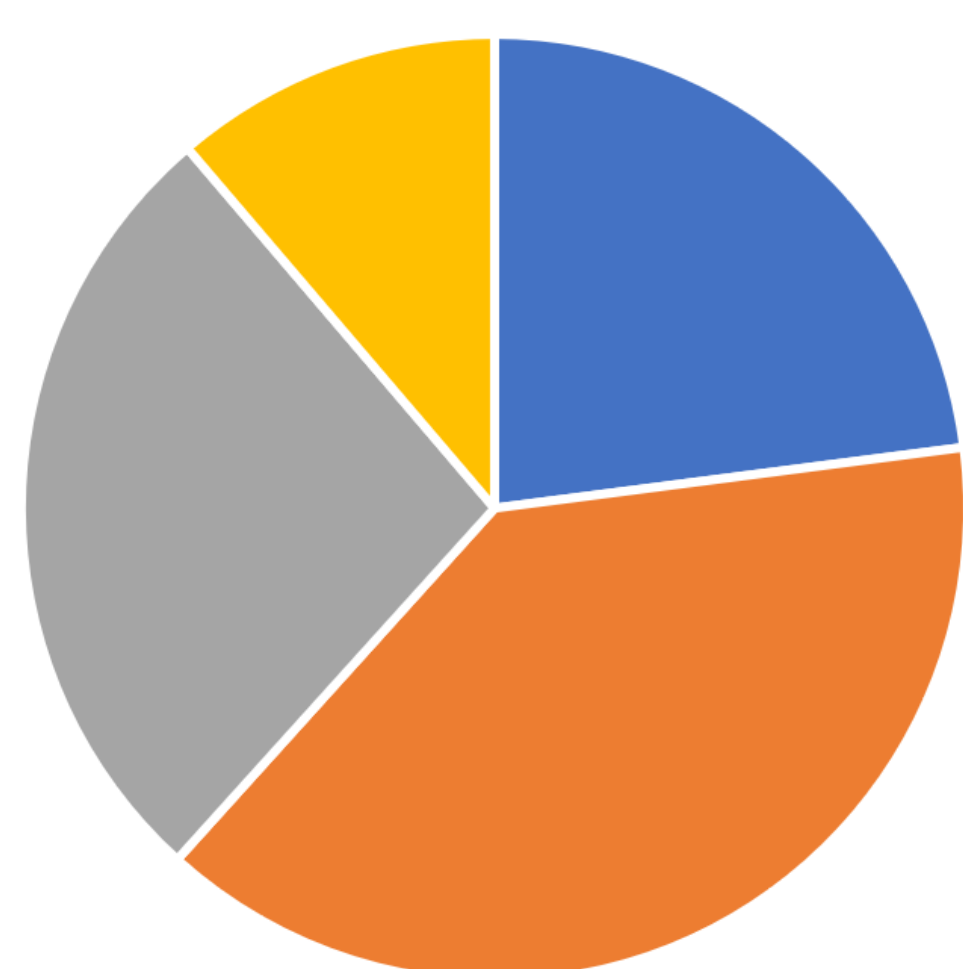
Healthcare Leaders, the Next Allied Carbon Stewards: A Greener Approach to Material Acquisition

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Introduction

- The US healthcare education system provides quality clinical training for students, however it does little to reduce the environmental impact of healthcare delivery. The current US healthcare system generates 12% of national acid rain production, 10% of greenhouse gas emissions, and 10% of smog formation [1].
- With a combined 61.7% of US physicians and dentists owning their practices, a unique opportunity exists for owners to lessen healthcare's ecological footprint [Figure 1].
- As an institution, UCSF is the second largest waste generating organization in San Francisco, second to the city government [3].
- In December 2018 UCSF, excluding the hospital, spent \$180,450 on waste disposal, \$19,438 from the School of Dentistry (SoD) [3].
- UCSF uses Recology, a resource recovery company, to dispose of waste. Recology offers up to 75% on waste removal based on waste diversion, and charges 33% less to remove recyclables over garbage [3].
- Previous research has shown that UCSF predoctoral students are willing to follow signage and comply with waste channeling efforts [Figure 2].
- As of this poster's publication, the UCSF Dental center currently disposes all of its waste as garbage. Furthermore, there are no efforts being made to find environmentally friendly alternatives to current single use clinical materials.



■ Owner Physicians (MD/DO) ■ Owner Dentists (DDS/DMD)
■ Non-Owner Physicians (MD/DO) ■ Non-Owner Dentists (DDS/DMD)

Figure 1. 61.7% of physicians and dentists are practice owners. Data obtained from 2018 surveys.



Waste Channeling Compliance in UCSF Simulation Lab

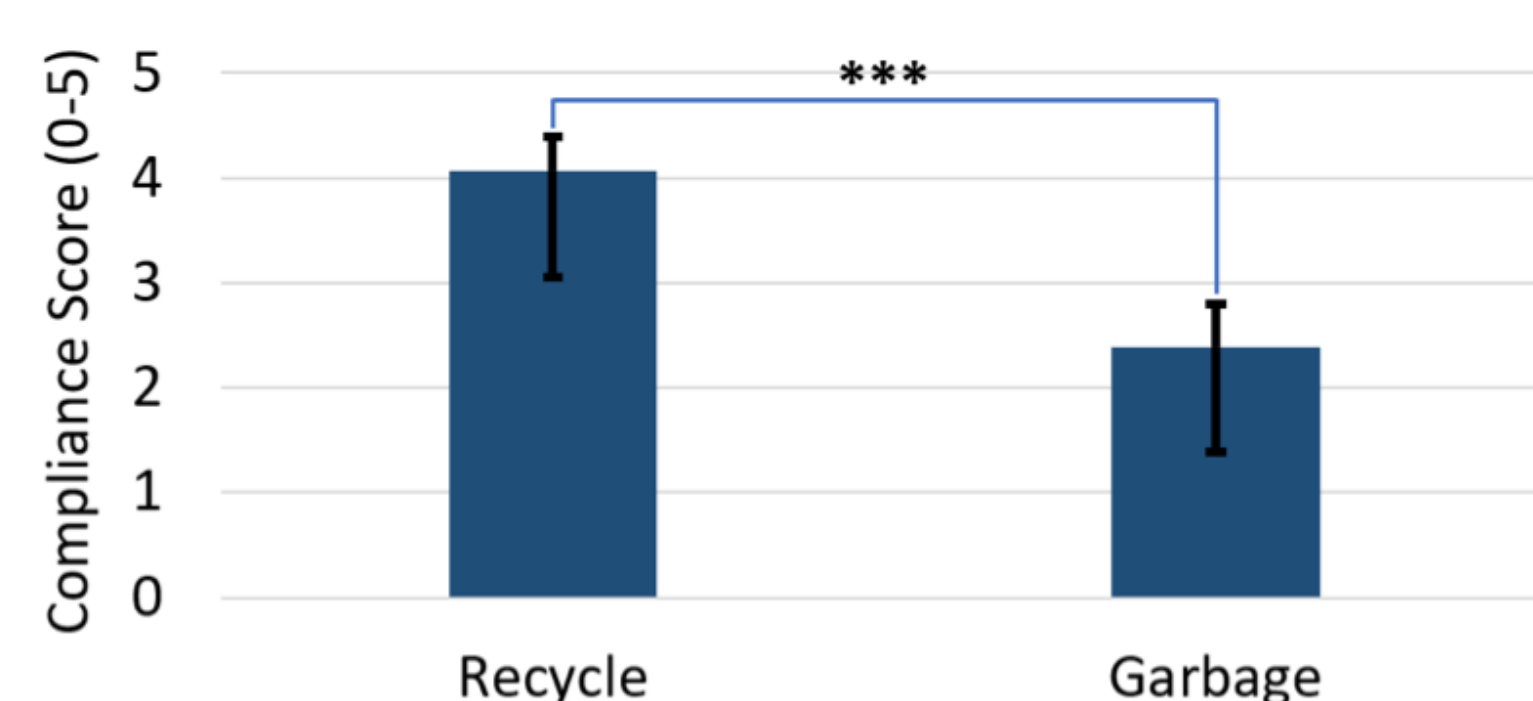


Figure 2. When UCSF pre-clinical students were instructed to follow waste diversion signages, a significant diversion from garbage to recycle bins was observed. Average daily compliance rating (Scale 0-5; n = 5). Mean recycle: 4.06 ± 0.33 . Mean garbage: 2.38 ± 0.41 . (Unpaired Student T-Test $p < 0.0001$).

Project Goals

- 1) Identify compostable or reusable alternatives to current single use dental supplies.
- 2) Estimate cost changes associated with adoption to recyclable, compostable, and reusable alternatives.

Waste Disposal Fees	
Garbage	\$0.24
Recycling	\$0.16
Compost	\$1.07
Reuse	Free

Table 1: UCSF SoD waste disposal fees in December 2018. Value represented in cost/gallon. Compost disposal is higher due to lack of storage space for large centralized compost bins.

Materials and Methods

- 1) A list of single use UCSF SoD clinical materials was generated.

Single Use Clinic Materials	
Direct Procedure Involvement	Indirect Procedure Involvement
Opti-bond	Cotton Stick
Acid-Etch	Impression Trays
Fluoride Varnish	Plastic covers
Dental Cements	High Speed Suction Tips
Composite	Surgical Suction Tips
Amalgam	Saliva Ejectors
Impression Material	Gloves
	Masks
	Gowns
	Cotton Gauze
	Cotton Roll
	Patient Bib
	Rubber Dam
	Autoclave Bags

Table 2. List of common single use clinic materials at the UCSF SoD. Materials divided into those that are directly involved with procedures (Ex: Fillings, crowns, root canals, etc.), and those that are indirectly involved with procedures (Ex: Cubicle setup, patient comfort, etc.). Materials highlighted in red are garbage, blue are recyclable, and green are compostable.



Figure 3. Examples of single use clinic materials. Group A represents materials that are indirectly involved with procedures. From left to right; top to bottom: Saliva ejectors, patient bib, high speed suction tips, butcher paper, autoclave bag, and plastic coverings. Group B represents materials that are directly involved with procedures. From left to right; top to bottom: Optibond, acid-etch, GI cement, polyvinyl siloxane impression material, and dental composites.

2) Single use clinic materials were separated into those that are directly or indirectly involved with procedures. Materials categorized as directly involved with procedures are those that contribute chemical, structural, and/or functional changes that are critical in treatment. Due to the complexity of the materials in this category, identification of sustainable alternatives were limited to materials indirectly involved with procedures. Furthermore, in light of stricter infection controls, eco-friendly personal protection equipment will also be excluded from the search.

3) Alternatives will be ranked by their impact on sustainability in the following order of priority: Reusable>Compostable>Recyclable>No alternatives

4) Search on cost of materials and their alternatives will be conducted using a combination of the Dental Supply Company's website, www.tdsc.com, and Google, www.google.com. Search strings will include item description and 'reusable'. Example: Impression Trays and Reusable Impression Trays.

Results and Outcomes

Indirect Procedure Involvement	Price per Unit	Alternatives	Price per Unit
Impression Trays	\$1.02	Metal Impression Trays	\$30.00
Plastic covers	\$0.10	Washable Covers	\$40.00
High Speed Suction Tips	\$0.03	None	N/A
Surgical Suction Tips	\$0.12	Metal Tip	\$83.75
Saliva Ejectors	\$0.03	None	N/A
Patient Bib	\$0.04	Cloth Bibs	\$5.83
Rubber Dam	\$1.44	None	N/A
Autoclave Pouches	\$0.04	Reusable Pouches	\$30.00

Table 3. Adjusted list of common single use clinic materials at the UCSF SoD following selection criteria outlined in materials and methods section. Reusable alternatives identified for Impression trays, plastic covers, surgical suction tips, patient bibs, and autoclave pouches.

Conclusions

Healthcare and the environment are intertwined. As such, it is important for healthcare leaders to adopt work systems that limits waste, which in turn reduces carbon emissions. The current UCSF dental center's work flow does not incorporate waste reduction principles with its use of clinical materials. Excluding PPE, 3 of the 11 common materials that are used indirectly with procedures are compostable. Searches on Google and TDIC yielded reusable alternatives for an additional 5 items (Table 3). Though the use of reusable materials may drastically reduce waste disposal costs, their initial costs are significantly higher than their current single use equivalents. Furthermore, implementation of reusable clinic materials will require training both staff and students on their use, bringing questions to the feasibility of their deployment.

Information on materials purchased between 2018-2019 was not obtainable. This information would allow for a better understanding on waste generation; in turn, provide an estimate on savings for waste disposal fees.

Literature Cited

- [1] Eckelman MJ, Sherman J (2016) Environmental Impacts of the U.S. Health Care System and Effects on Public Health. PLoS ONE 11(6): e0157014. <https://doi.org/10.1371/journal.pone.0157014>
- [2] Practice ownership is declining. Vujicic, Marko. The Journal of the American Dental Association, Volume 148, Issue 9, 690 - 692
- [3] Data obtained staff in the UCSF department of facility services

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