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Medical Center

Radiology

Reducing Waste of Iodinated Contrast and Plastic in a Multi-Site Academic CT Practice

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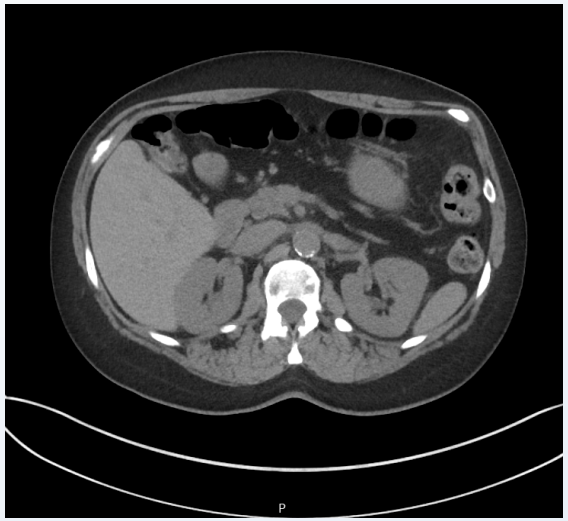
BACKGROUND

- 300 million CTs use **10 million liters of iodinated contrast every year**
- Iodine is a **nonrenewable** natural resource
- Iodine supply expected to last 200 years, but demand is **increasing**



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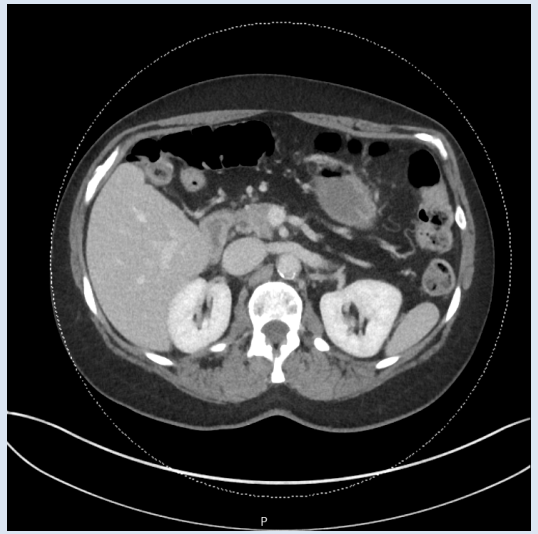

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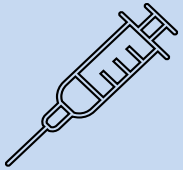
- **Sustainable practices** often save money and time
- Improving processes in a high-volume CT department can result in **significant workflow enhancements and/or cost savings**

CONTRAST AND CONSUMABLES: What options do CT practices have?

What options are out there?

IODINATED CONTRAST

- **Single-use bottles:** available in 50mL, 75mL, 100mL, and 150mL sizes (1-2 bottles per patient depending on contrast volume injected)
- **500 mL multi-use bottles** (4-6 patients per bottle, expire after 8 hours)



CONTRAST INJECTOR

- **Traditional dual headed syringe injector**: uses 2 large syringes and plastic tubing per patient. May use single or multi-use bottles.
- **Syringeless injector**: only uses 1 plastic tubing per patient & multi-use bottles

CONTRAST WASTE DISPOSAL

- Disposal in the **trash**
- Extra contrast disposed of in a contrast-specific **recycling receptacle** provided by the vendor
- Recycled & **redistributed** for clinical use

What does our practice do?

- **100-mL single-use bottles** of iodinated contrast exclusively stocked

- **Traditional dual headed syringe injector** used at outpatient sites
- **Syringeless injector** used in the hospital

- Unused contrast disposed of in **trash**

AIM

- To reduce the amount of iodinated contrast waste per injection by 50% while implementing environmentally conscious processes, such as reducing plastic consumables and recycling of iodinated contrast waste, from January 2023 to December 2023.

Example of existing contrast injection process resulting in large amount of wasted contrast

INTERVENTION #1: Multi-Use Bottles with Syringe-Based Injectors (Outpatient)

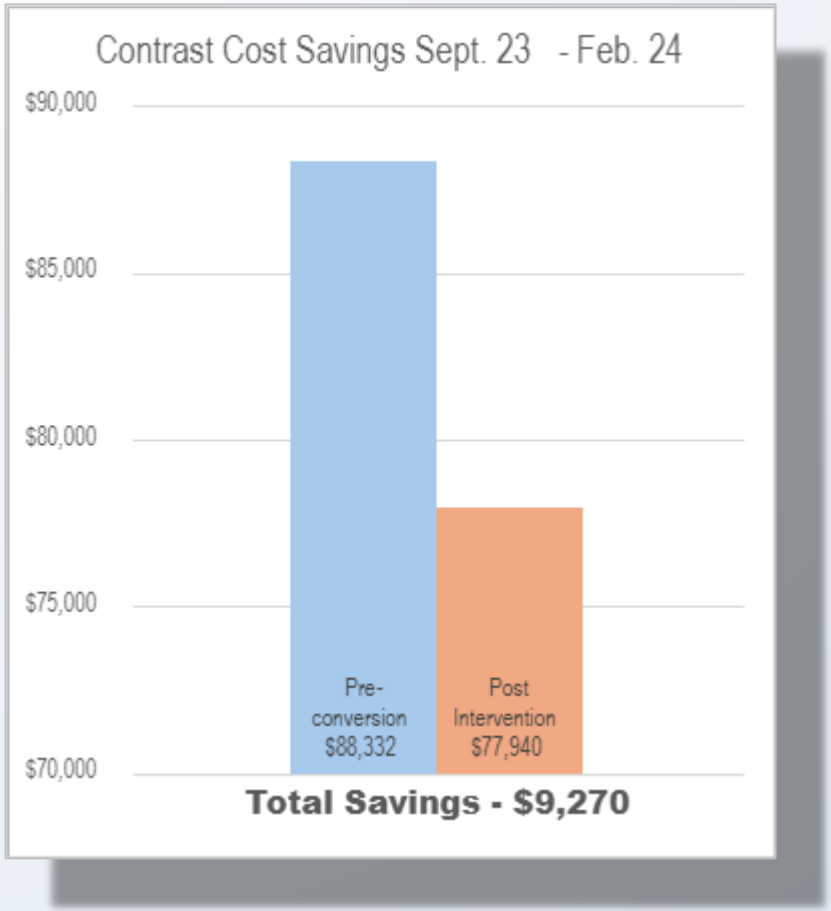
Pre-Conversion:

- 100mL single-use contrast bottles exclusively used
- Depending on type of CT exam and patient size (weight-based dosing), some patients required >100 mL, resulting in multiple bottles opened for a single patient

Intervention:

- 500mL multi-use contrast bottles (expire 8 hours after opening, multiple patients per bottle)
- No change in injector or syringe supplies

INTERVENTION #1 Results



- Multi-use bottles decreased contrast waste by 12.6mL (89%) per injection
- Converting also decreased price of iodinated contrast by $0.02 per mL
- Sept 2023 – Feb 2024: 4,330 injections were administered ≈ $9,270 savings

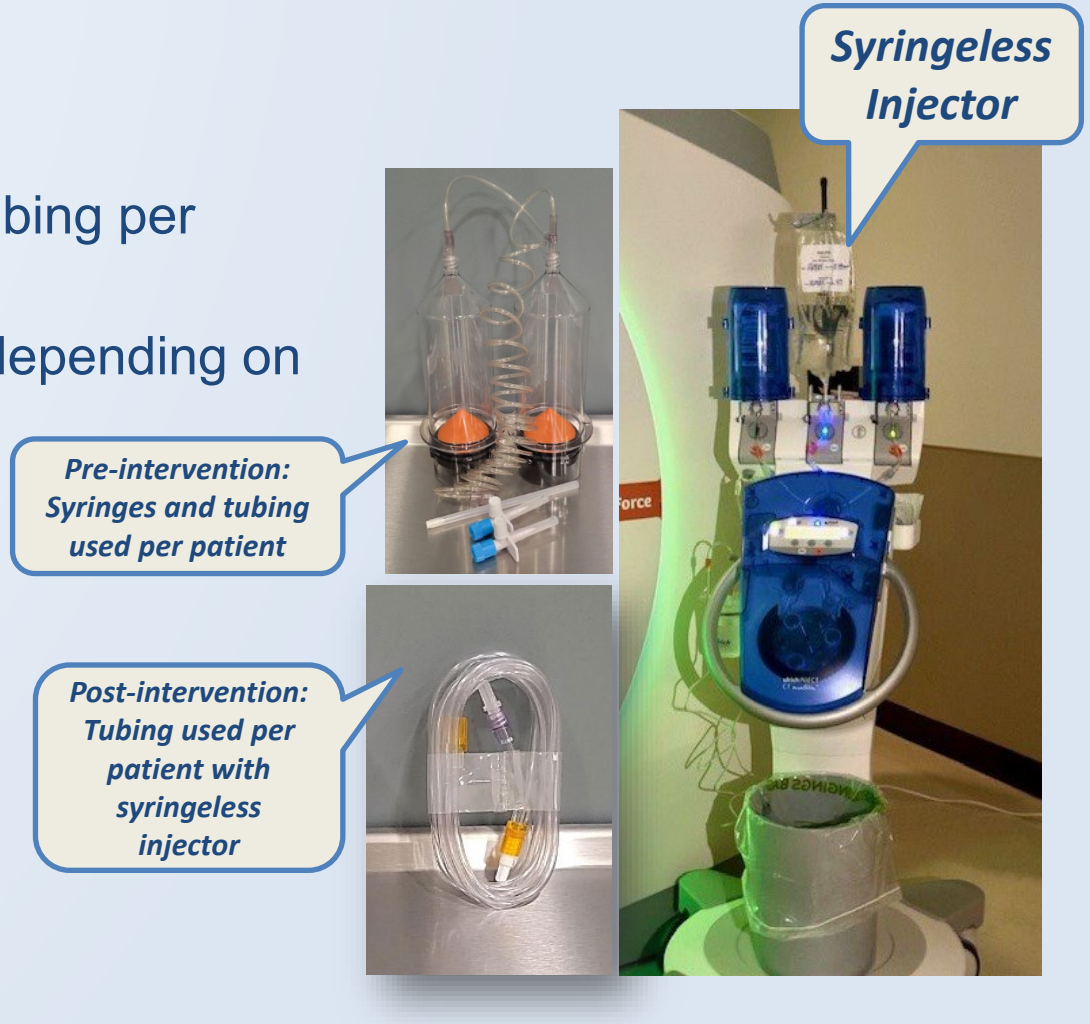
INTERVENTION # 2: Multi-Use Bottles with Syringeless Injectors (Inpatient)

Pre-conversion:

- Dual headed syringe injector used
- Injection kit with 2 syringes, 2 spikes, and patient tubing per injection
- Single use contrast bottles (1-2 bottles per patient depending on contrast volume injected)

Intervention:

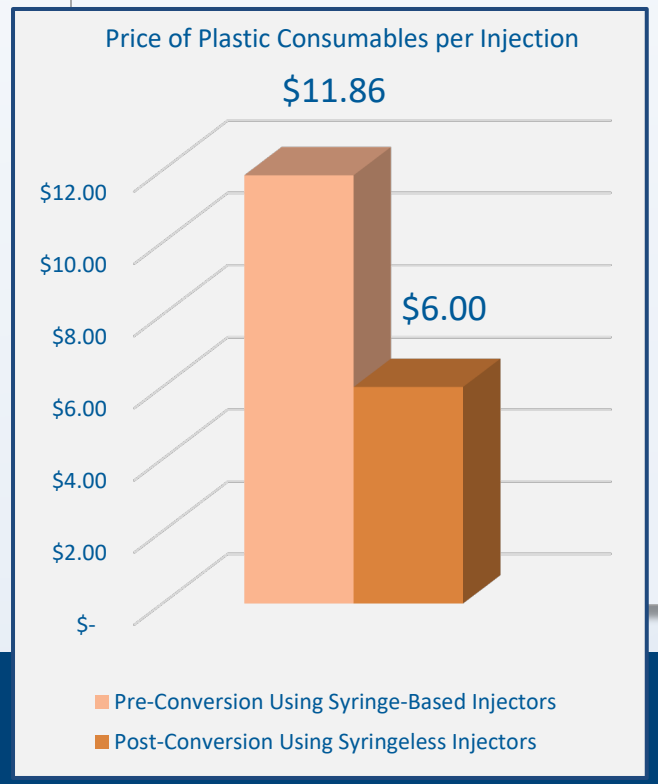
- Converted to syringeless injectors
- Injector system tubing is good for 24 hours
- Injection kit with 1 patient tubing per injection
- 500mL multi-use contrast bottles – 2 loaded onto injector



INTERVENTION # 2 Results

Wins

- Syringeless injectors **decreased plastic consumable** (syringes and tubing) waste per injection
  - In 2023, 10,197 injections were administered at CUH ≈ $59,700 savings
  - Subjective time savings and increased satisfaction for technologists



Challenges

- Unexpected **increased contrast waste** by an average of 68mL per injection
  - Unpredictable case volume of contrast-enhanced CTs
  - Limited staffing, particularly during overnight shifts, caused some CT scanners to sit idle
  - ***--> larger multi-use contrast bottles reached the 8-hour expiration time and had to be discarded***

Ongoing Strategies to address contrast waste

- Routing patients with contrast-enhanced CTs to select scanners during off-hours
- Loading only 1 bottle at a time (syringeless injector holds 2 bottles)
- Opening a bottle when patient arrives (instead of prepping ahead of time)

INTERVENTION # 3: Contrast Recycling Project (Outpatient)

Pre-conversion:

- Unused iodinated contrast was disposed of in the trash can

Intervention:

- 3L contrast recycling containers provided by the contrast vendor placed in CT suites at one outpatient location
- Technologists educated on use (only contrast from that vendor could be disposed into the recycling container)
- Staff disposed of unused contrast in recycling container
- Recycling containers shipped to the recycling plant when full

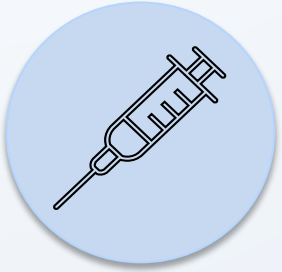
Results:

- Between Jan 2023-Oct 2023, **2.8%** of contrast pulled from the Pyxis was recycled, for a total of 19.5L

2.8%

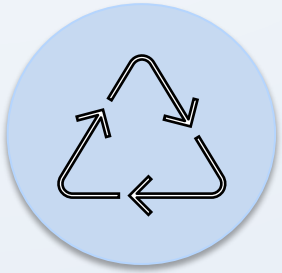
CONCLUSION

- Multi-use iodinated contrast bottles can reduce iodinated contrast waste and associated costs in the outpatient setting where scheduled case volumes are more predictable.



- Care should be taken when multi-use iodinated contrast bottles are used in the inpatient setting, as unpredictable case volume and staffing may result in unexpected increase in contrast waste due to expiration of bottles.

- Syringeless injectors may be used to decrease plastic waste.



- Iodinated contrast recycling programs can harvest unused iodinated contrast that would have otherwise been discarded.

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