

National Policy Workshop Webinar Series On
Countermeasures for Riverine and Marine Plastic Litter in India
12–22 May 2020

Session 5: Impact of COVID-19 on plastics consumption, innovation, logistics and waste generation (including PPEs and wastes from Health Care Facilities) and related challenges

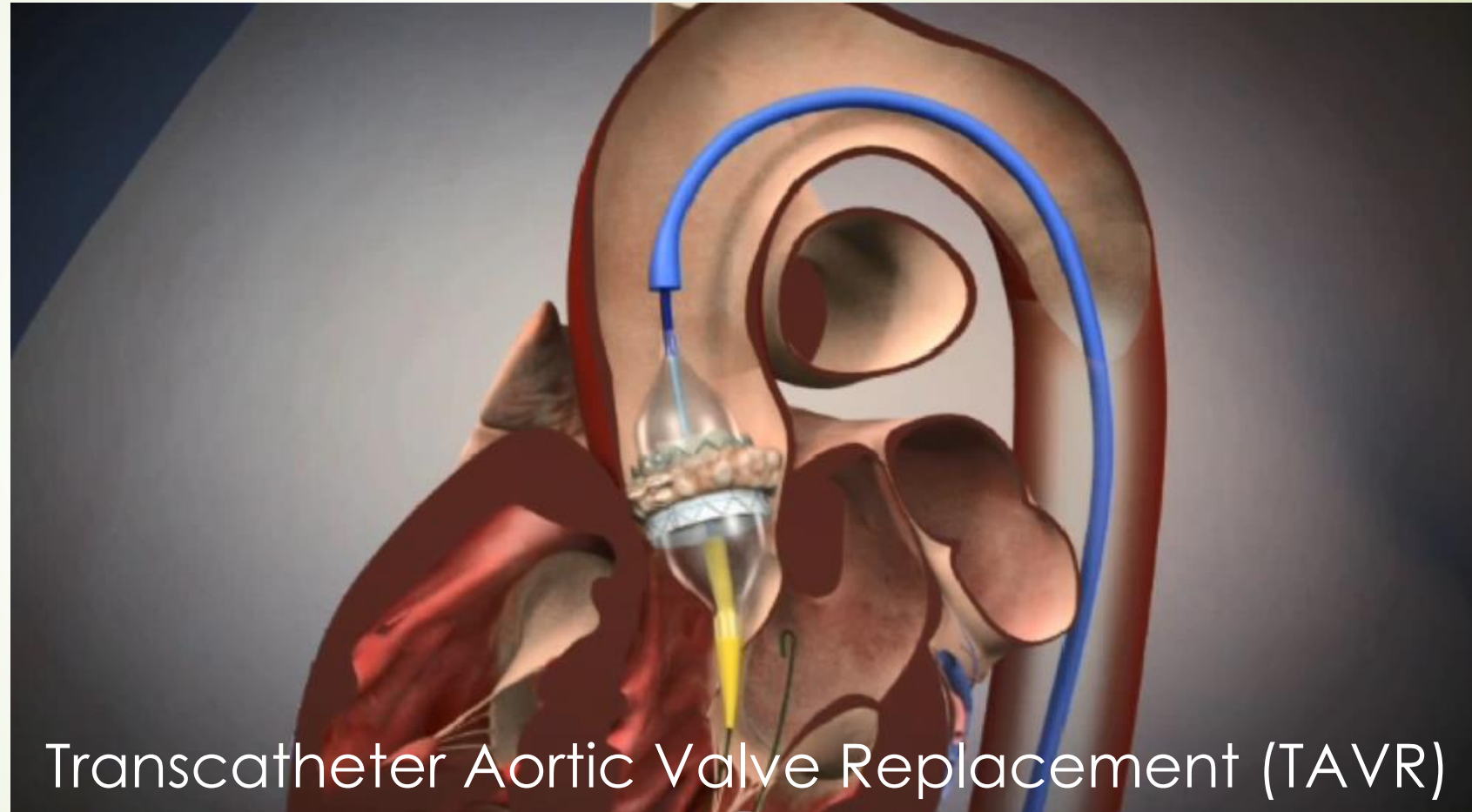
**Plastics in Medical Devices/Equipment and PPEs:
Designs and Innovations for Plastics/Polymer Usage
and Need for Reuse/Recycling**

Presented by **ASHISH MITRA**

AGENDA

- Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers
 - Cardiovascular Devices
 - Neurosurgery Devices
- Waste Management in Healthcare: Design Considerations
- Design for Recycling
 - Case Study: Ventilators
- Design for Reusability
 - Case Study: PPE

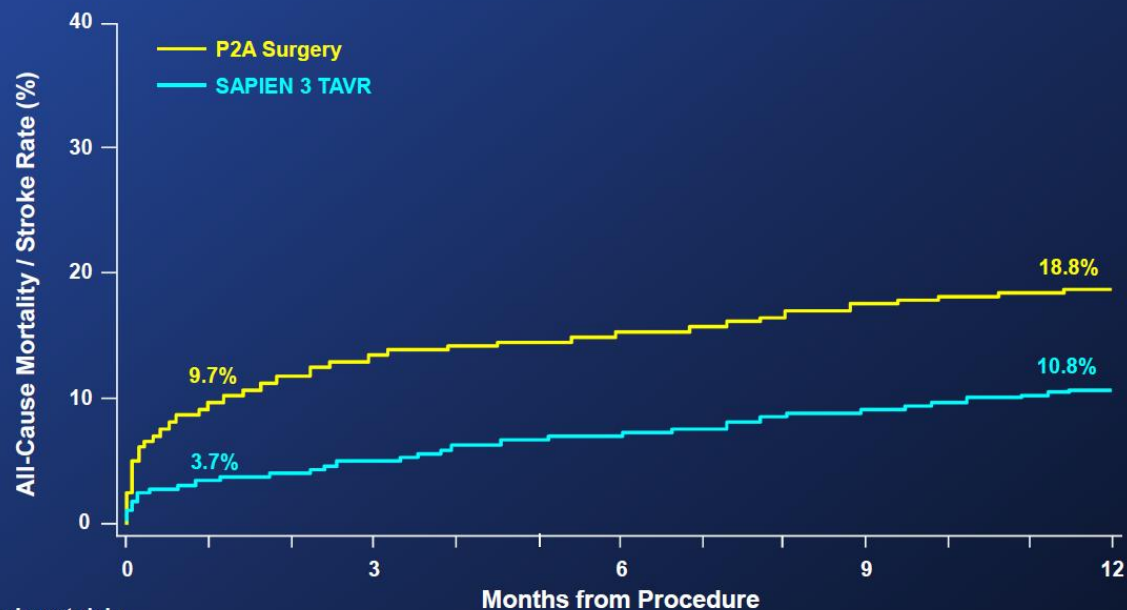
Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers



Transcatheter Aortic Valve Replacement (TAVR)

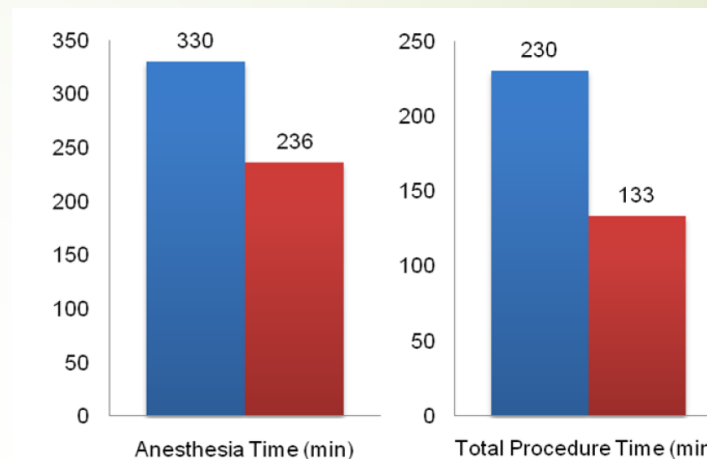
Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers

Unadjusted Time-to-Event Analysis All-Cause Mortality and All Stroke (AT)

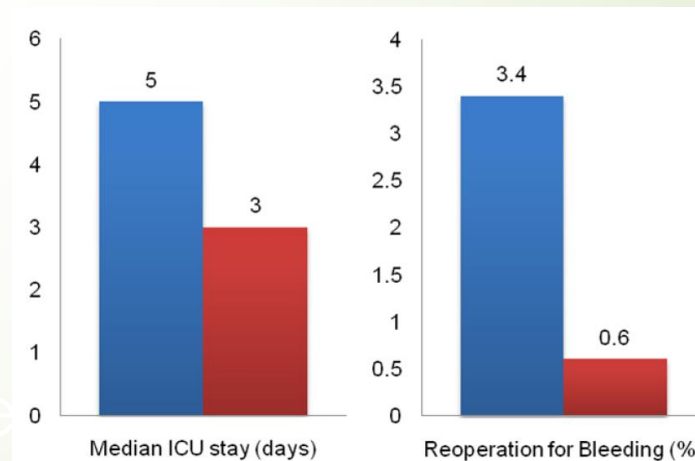


Number at risk:

Months from Procedure	0	3	6	9	12
P2A Surgery	944	805	786	757	743
S3 TAVR	1077	1012	987	962	930



■ SAVR ■ TAVI



Leon et al. *N Engl J Med* 2016; 374: 1609-20

SAVR: Surgical Aortic Valve Replacement
TAVI: Transcatheter Aortic Valve Implantation



Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers

Delivery Catheter for TAVR Devices
[REPRESENTATIVE IMAGE]



Balloon Catheter
[REPRESENTATIVE IMAGE]



Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers

[Open Heart] Surgical Aortic Valve Replacement (SAVR) Operating Room



Transcatheter Aortic Valve Replacement (TAVR) Operating Room



SHIFT
[Metal to Plastic]

Demonstration of Breakthrough Medical Devices/Equipment Using Plastics/Polymers



Stereotactic Surgery

SHIFT
[Metal to Plastic]



Micro Stereotactic Surgery

Lin et al. J Med Sci 2014; 34(5): 224-34

Waste Management in Healthcare: **REUSE** and **RECYCLE**

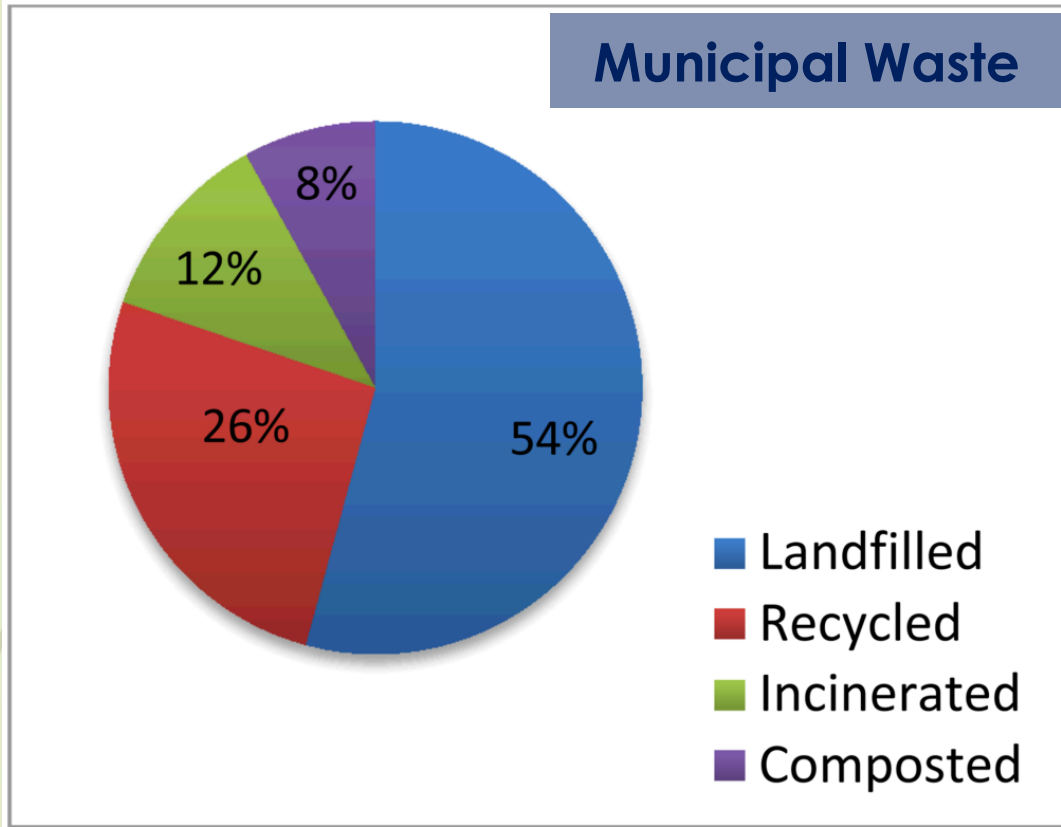


Figure 1. Disposal by percentage of the approximately 250 million tons of municipal waste generated in the United States in 2010 (Figure was created from data contained in reference [52]).

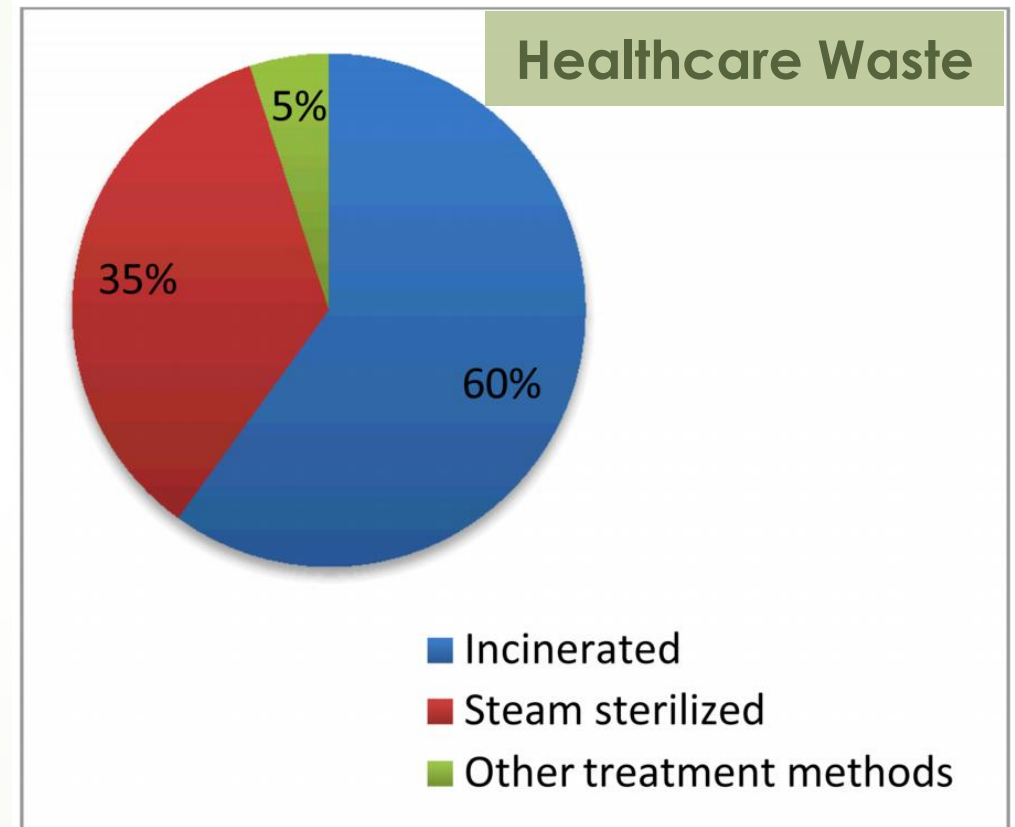


Figure 3. Treatment of regulated medical wastes (RMW) by treatment method. (Figure 3 was created from data contained in reference [54].)

DESIGN for **RECYCLING**

Case Study: Ventilator/Oxygen Masks

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SHIFT

[Metal to Plastic]

DESIGN for **RECYCLING**

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Case Study: Ventilator/Oxygen Masks



- As far as possible, the medical equipment should be designed in one polymer
- An oxygen mask consists of a soft and hard part. It can be made either in PVC of varying softness **[GOOD DESIGN]**, or of two different types of polymers **[BAD DESIGN]**
- Choosing the latter option means recycling is impossible, partly because of the plastics' different melting points

DESIGN for **REUSE**

Case Study: PPE for COVID19 Pandemic



DESIGN for REUSE

Case Study: PPE for COVID19 Pandemic

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REUSABLE PPE

- Novel PPE designed for reusability by Pune-based startup TRISHUL PPE Pvt Ltd
- Washable with detergent/bleach
- Sterilizable by Autoclave, ETO, H₂O₂
- **Reusable up to 5 times**
- Allows for waste minimization
- Allows for increased availability


DESIGN for REUSE

DESIGN for RECYCLING

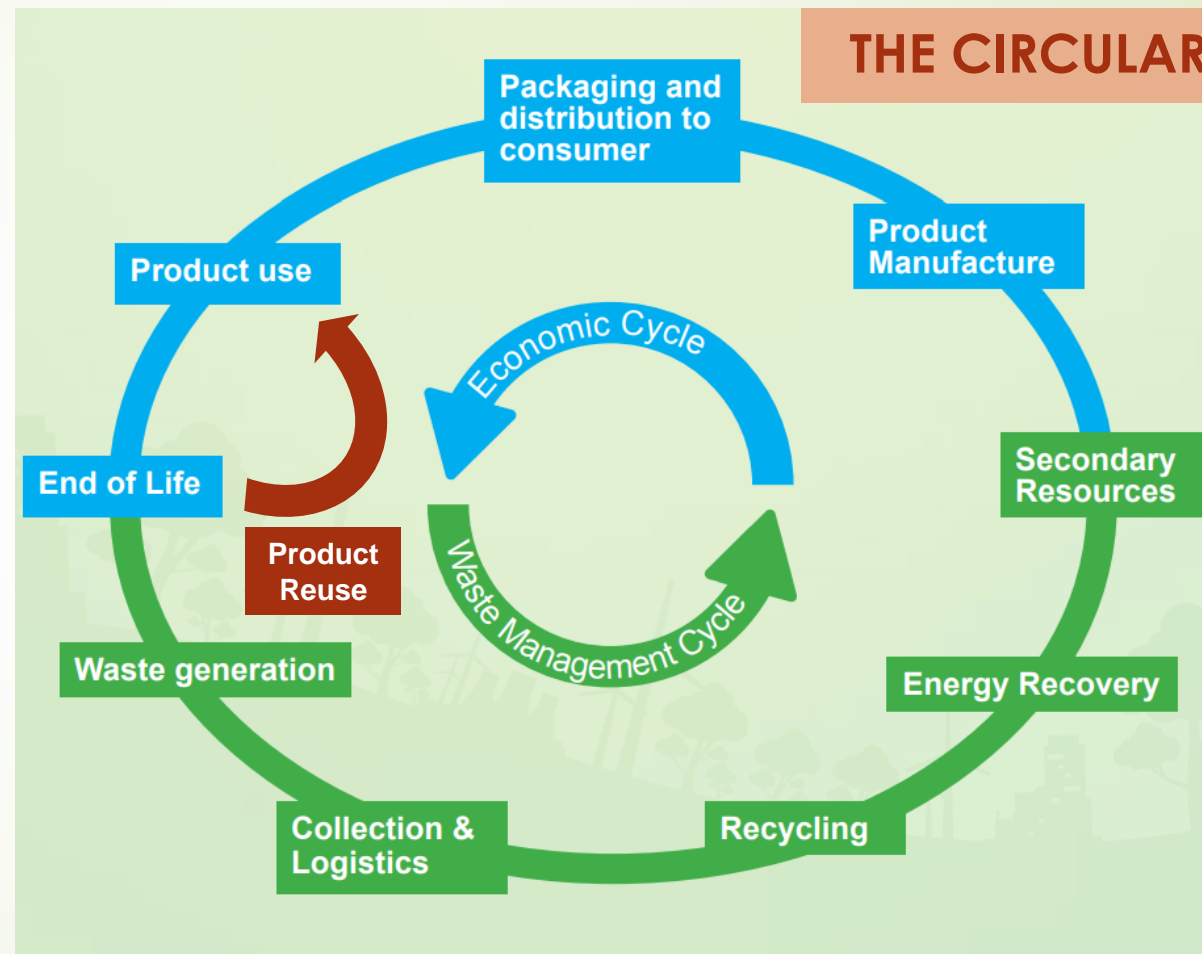
Secure disposal of your PPE



PPE RECYCLING SERVICE



BUNZL GREENHAM
Protecting People Everyday



SUMMARY

- Breakthrough Medical Devices/Equipment providing significant clinical and economic benefit are possible due to innovations enabled by Plastics/Polymers
- Waste Management should be included as a critical Design Consideration in Healthcare
 - Design for Reusability
 - Design for Recycling
- Recommendations
 - Strengthen focus on Waste Management in Design Principles
 - More impactful incentives for Recycling

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