



GIG
CYMRU
NHS
WALES

Bwrdd Iechyd Prifysgol
Betsi Cadwaladr
University Health Board

“ Sustainable Surgery: Cutting carbon emissions in Trauma Care ”

Mr. Pushkar Joshi

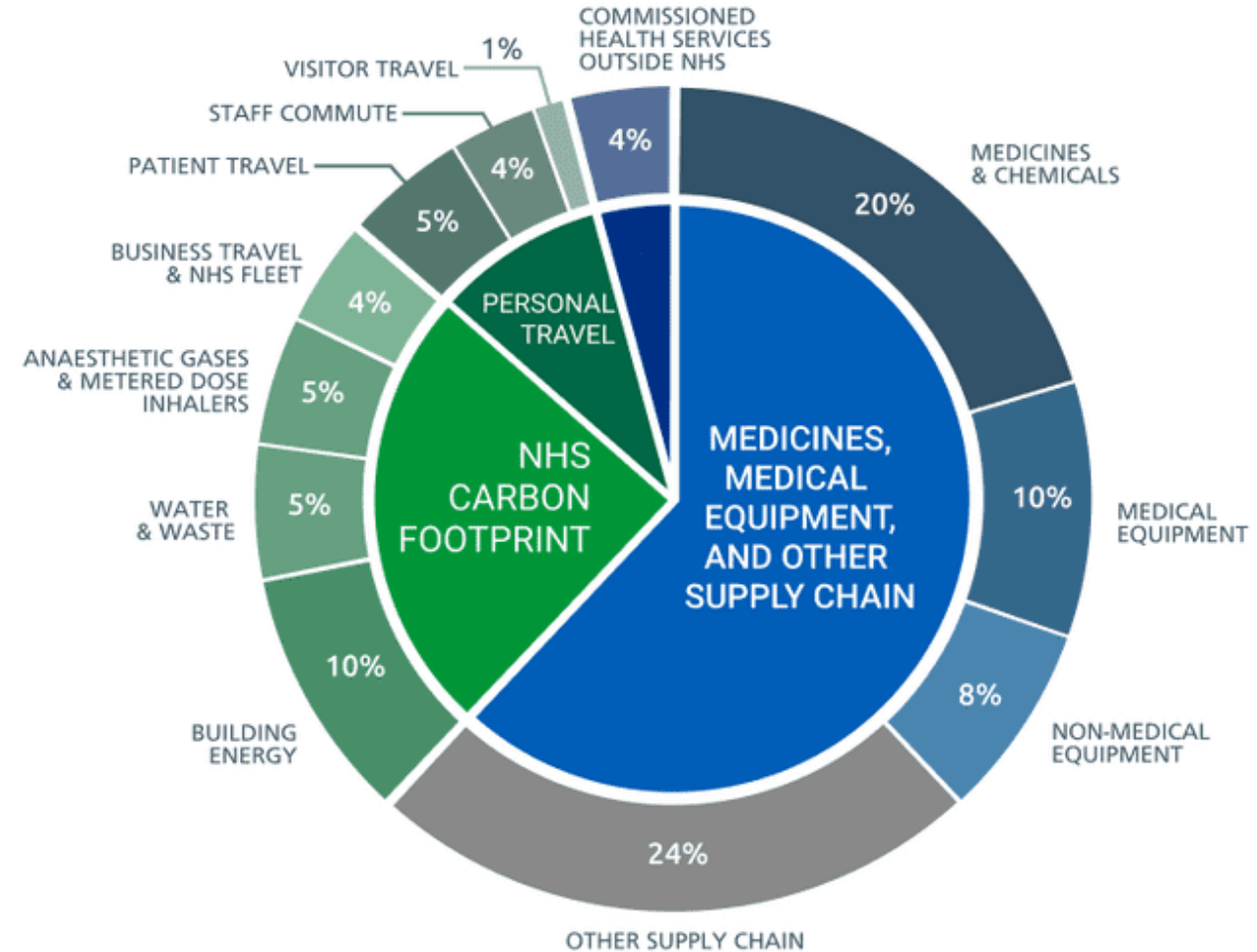
Senior Arthroplasty Fellow



NHS CARBON FOOTPRINT

• RATIONALE

- Healthcare 5th largest CO2 emissions
- Operating theatres contribute 70 % to hospital waste
- NHS- 75000 Hip fractures admitted each year to hospitals
- Trauma surgery – Immense environmental, social and economic burden
- Net Zero NHS goal 2040



Aim: Reduce carbon footprint of Orthopaedic trauma surgery

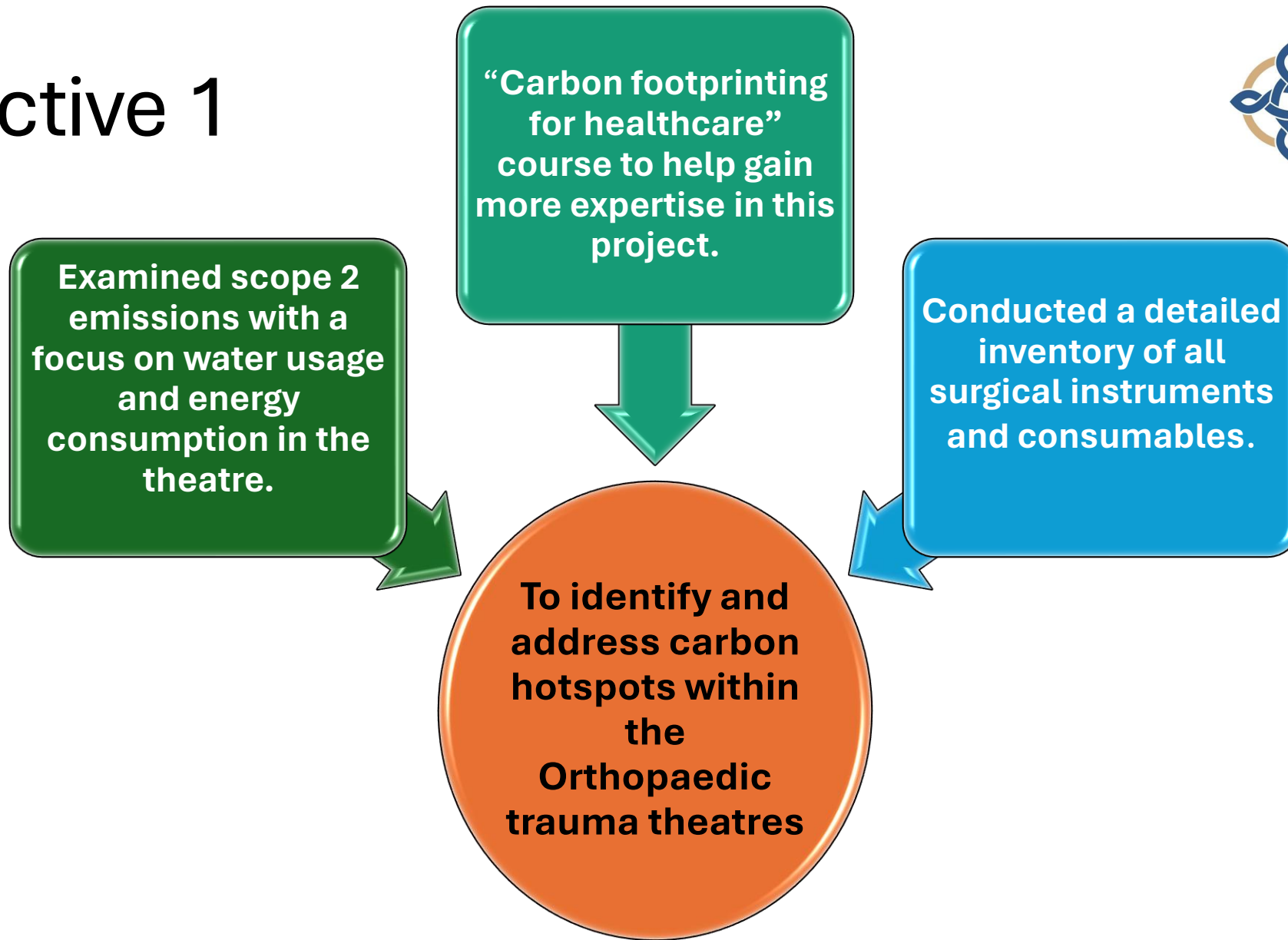
- Objective 1

To assess waste generated and identify hotspots to reduce the carbon footprint in trauma theatre for Hip hemiarthroplasty, DHS, Femur nailing, Ankle fracture and minor procedures .

- Objective 2

To assess the impact of planned day case trauma surgery.

Objective 1



HIP HEMIARTHROPLASTY



RESULTS

HIP HEMIARTHROPLASTY 49.637 KgCO₂e

DHS 39.458 KgCO₂e

FEMUR NAILING 39.462 KgCO₂e

ANKLE FRACTURE FIXATION 35.759 KgCO₂e

MINOR OPS 29 KgCO₂e

LIFE CYCLE ANALYSIS (LCA) APPROACH

Hip Pack:

Name	Material
Drape 150 x 240 cms	Polypropylene
Hip drape	Polypropylene
Adhesive op sheet 260 x 175 cm	Polypropylene
Op sheet 90 x 150 cm x 4	Polypropylene
Table covers 150 x 190 cm x 2	Polypropylene
Bowls 500 mls x 2 (plastic)	Plastic
Hypodermic needle	Hard plastic + st
Bowls 250 mls x 5 (plastic)	Plastic
Blades 23 x 2	stainless steel
Spinal needle	Hard plastic + st
60 mls Syringe x 4	Plastic
Sharp holder set (plastic)	Plastic
Bandage 15 cm	cotton
Suction cannula	Polypropylene
Suction tubing	Polypropylene
5 x Gauze (7.5 x 10 cm)	Wool
10 x gauze (30 x 30cm)	Wool
Light handle covers x 2	Plastic
Skin stapler	Stainless steel
Diathermy holder	Plastic
Kidney bowls 800 mls x 2	Plastic
Stockinette 31 x 122 cm	Cotton + wool
Mayo stand cover 79 x 145 cms	Polypropylene
Table cover 150 x 190 cm	Polypropylene
Tray wrap 130 x 150 cms plastic	Polypropylene
Plastic outer cover	Plastic
TOTAL	

LIGHTING	Watts	Number	Duration	kWh	co2
OPERATING LIGHT					
Halogen (ALM X ten)	(100W)	128		12.8	2.984
LED (KLS Matrin marLED)	(24 W)	104		2.496	0.582
NON OPERATING LIGHTS T5					
THEATRE		44		3.234	0.754
ANAESTHETIC ROOM		12		0.882	0.206
PREP ROOM		4		0.294	0.068
VENTILATION					
HOWMEDICA EXFLOW 90			120 MIN	13	3.031
HEATING (British Thermal Unit calculation)					
volume	210 m3		120 min	24	5.595
WATER CONSUMPTION					
handwash					
First case	14 litres				
Subsequent	8 litres				8.493
Average per case	9.5 litres	X 3	28.5 litres		
			1 litre = 0.298 Co2		
STERILISATION COST					
7 trays - 2 cycles				1.531	2.218
TOTAL					23.878

**CARBON FOOTPRINT FOR HIP HEMIARTHROPLASTY IN THEATRES
IS 25.759.+ 23.878=49.637 KgCo2e**

Weight (kg)	Conversion Factor	Footprint KgCo2e
2	6.145	25.809/2040= 0.012
7	6.145	28.881/2040=0.014
15	6.145	37.791/2040=0.018
10	6.145	43.629/2040=0.021
370	6.145	20.708/2040=0.010
	6.145	30.725/2040=0.015
		0.09
004 x 2= 008	1.54	0.012
070	6.145	0.430
004	1.54	0.006
001	6.78	0.006
		0.454

IR CONSUMABLES AND

CARBON HOTSPOTS IN OR

- Electricity
- Water
- Instrument sets
- Single use disposables



SUGGESTIONS

- LED lights for OR, switch off lights and computers when not in use i.e. sensors to turn off
- Water sensors/foot pedals for taps in OR
- Rationalize surgical instrument sets
- Reusable kits

Objective 2

- Electivise trauma care with a “one stop shop”



ONE STOP SHOP

- Trauma teams structured
- Sub-specialty Orthopaedic consultant input
- On call registrar in fracture clinic
- AE direct referrals on the day to fracture clinic
- Trauma board in clinic
- Physiotherapy led clinics
- Day case surgery beds

DAY CASE PATHWAY

CLINIC

- Direct AE referral/ Fracture clinic/MIU referral
- Joint decision making for surgery and consented
- Date for surgery confirmed during clinic consultation

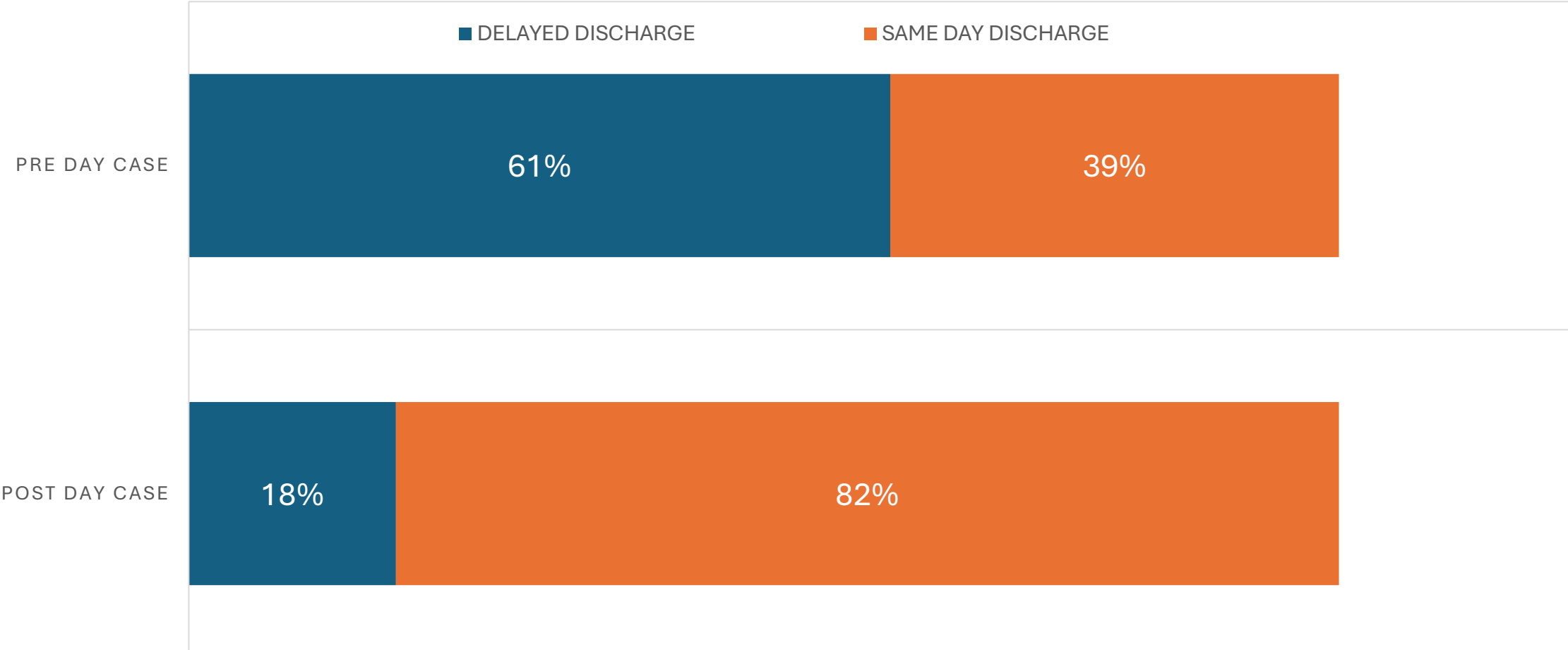
PRE-OP

- Booked for pre op assessment

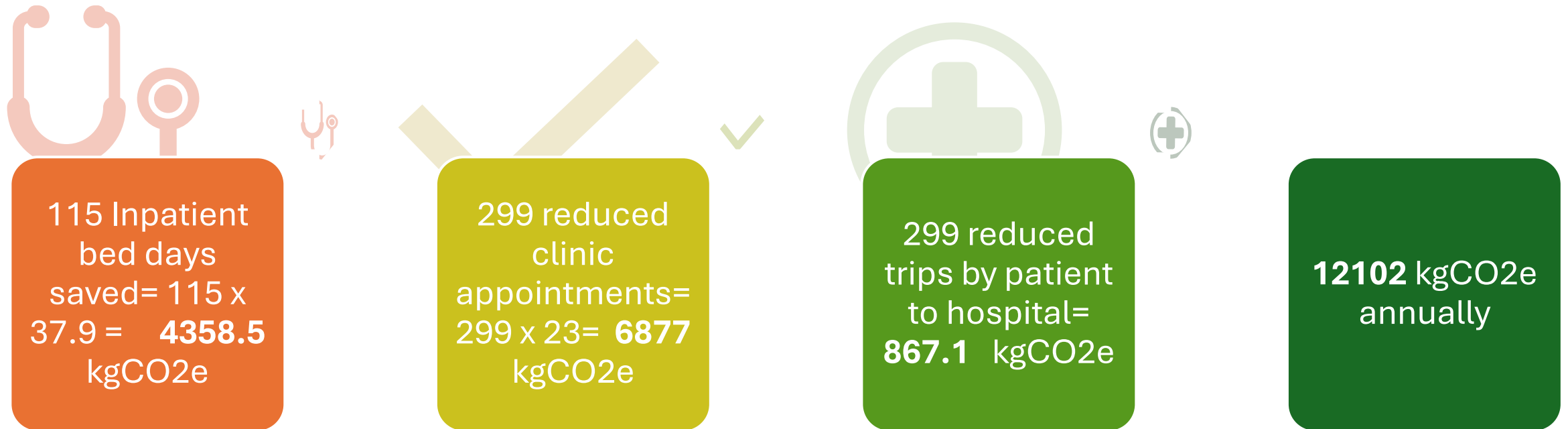
SURGERY

- Admit to day case bed, transfer to theatre, post recovery back to day case
- Safety assessment, discharge from day case bed

RESULTS



REDUCTION IN CARBON FOOTPRINT



SAFETY & COST EFFECTIVENESS

No failed discharges/ readmissions

No post operative complications during day case episode

299 patients treated in 2023 with 115 inpatient bed days saved

Potential financial savings of £142,025

77% same day discharge rate

CONCLUSION

- Fracture clinic day case surgery and one stop shop service is safe and cost effective and environment friendly.
- Useful model to utilize during flu crisis/ pandemics.
- Limitations of infrastructure, man-power, temporary model.

VALUABLE CONTRIBUTORS

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