

World Water Day – Mackwell Health’s “White Box” An Innovative Solution

Presented by

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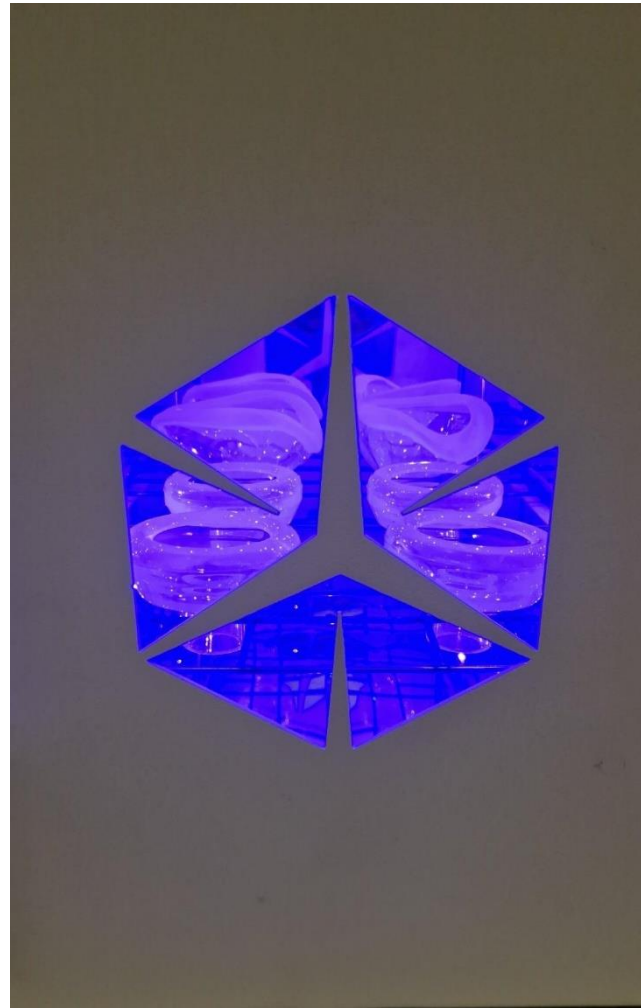
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Agenda

- Background
- Innovative 2-Stage Process
 - Physical cleaning
 - UV-C decontamination
 - Current processes versus innovative process with benefits
 - ROI
- Selection of future applications

Mackwell Health Ltd “White Box” UV-C



UV-C Background

- Niels Finsen Nobel Peace Prize
- PPE, eye protection & respirators
- Shortage late 2022, early 2023
- BS8628-2022 compliant (are others?)
- Tested in UKAS accredited test laboratory
 - Simulation on masks >6Log reduction
- Mackwell Health's "Mini Box" HD2
- Lightweight, low power
- LED technology - 50,000 to 60,000 hours



Innovative 2-Stage Process

Stage-1 Physical Cleaning

- Hypochlorous Disinfectant and Decitex microfibre cloth
- Effective immediately
- 300 times more effective than bleach
- 600ppm (450ppm for C-diff)
- Produced naturally in the body
- 5 sprays with Hypochlorous disinfectant – see pictures on next slide

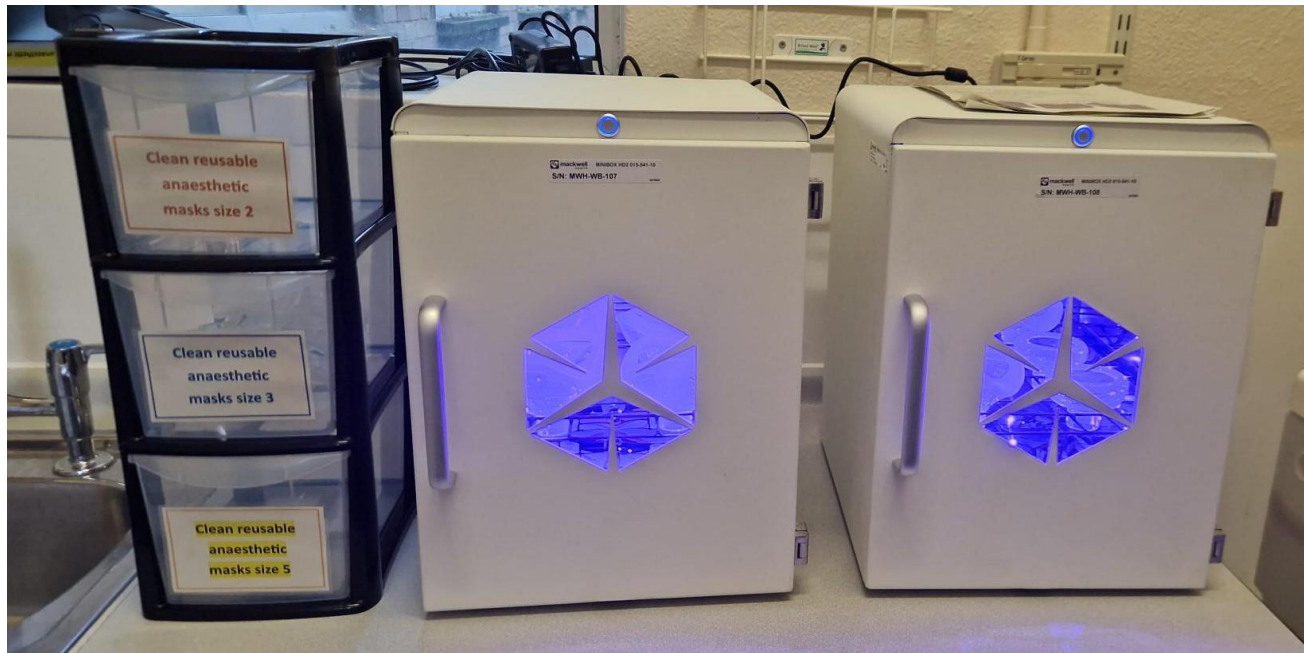
Stage-1 Physical Cleaning Continued



Wipe with microfibre cloth until clean and dry

Stage-2 UV-C Decontamination

- Load the rack, which holds a maximum of 6 masks
- Close the door, press start, it runs silently for 20 minutes



UV-C cabinet



Washer Disinfector

Current Processes v Innovative Process

Per Cycle	WD	Autoclave	UV-C	UV-C Benefits
Water (Litres)	144 - 255	360 - 760	0.74	94% - 98% reduction
Power (kWh)	8	4	0.02	94% - 97% reduction
Gas (kWh)	3.86	46.28	0	100% reduction
CO2(e) (Kg)	3.74	12.13	0.0098	97% - 99% reduction
Installation required	Yes	Yes	No	6Kg plug and play
Logistics (SSD)	Transport and	Time	On site	At point of use
Capacity (masks)	72	35	6	

Currently 12,000 reusable and 2m single use anaesthetic masks in use - assume 50 uses per reusable mask.

Benefits now and in the future

Current usage of reusable anaesthetic masks 22/23				
Volume & equipment	Usage			
12,000	Water Ltrs	Electricity KwH	Gas KwH	Total Kg CO2(e)
WD	2,125,000	68,083	32,167	31,167
Autoclave	13,028,571	73,200	793,371	207,943
UV-C	25,000	1,300	-	980
UV-C Saving	2m-13m Ltrs	~ 70K KwH	32K - 800K KwH	30K - 207K Kg CO2(e)
Replacement of single use (2m) anaesthetic masks @ 50 uses/mask				
40,000	Water Ltrs	Electricity KwH	Gas KwH	Total Kg CO2(e)
WD	7,083,333	226,944	107,222	103,889
Autoclave	43,428,571	244,000	2,644,571	693,143
UV-C	83,333	4,333	-	3,267
UV-C Saving	7m - 43m Ltrs	~ 220K KwH	107K - 2.6m KwH	100K - 700K kg CO2(e)

Current reprocessing is using between 5 and 35 swimming pools of water.

Switching 2m single use to 40,000 reusable will require 18 to 115 swimming pools of water.

Trial update



Single use

- Users really like the process
- Masks aren't popular with some
- Reusable reprocessed 100 times, no degradation
- Single use reprocessed 100 times, no degradation
- Single use supplier won't change IFUs
- Exploring off-label use
- Exploring other options - AMDR
- Will MHRA permit a study off-label?
- Will NHS Supply Chain apply more sustainability criteria to procurement?



Reusable

ROI v Existing Reprocessing and Single Use

Usage p.a based on a trial in three Day Surgery Theatres using circa 2,500 single use masks

2,500	Capacity	Mask Costs	Water litres	Power KwH	Gas KwH	Total Cost	Total Kg CO2(e)	Cost £249/T	Waste Kg	Waste £340/T	Total Cost	UV-C Savings exc CO2(e)
WD	72	£ 1,375	8,854	284	134	£ 1,446	130	£ 32	20	£ 7	£ 1,485	£ 1,304
Autoclave	35	£ 1,375	54,720	307	3,332	£ 1,660	873	£ 217	20	£ 7	£ 1,884	£ 1,518
UV-C	6	£ 138	104	48	-	£ 148	4	£ 1	3	£ 1	£ 150	
Single Use	2,500	£ 3,117				£ 3,117	1,412	£ 352	150	£ 51	£ 3,519	£ 3,019

Notes:

Cabinet costs are circa £3k, slightly more for a start up kit. **ROI 1 year if using single use, 26 months if using reusables.** Storage and handling costs for 2,500 single use masks, or reusable transportation off site to WD/autoclave not included. Additional masks to cover for off-site reprocessing is a factor of 4, but could be higher or lower, laundry is 7 to 10 times demand, for off-site reprocessing.

Costs for detergent in any machine isn't included, but for Hypochlorous it is <£3/ltr, 0.27ml used per mask.

Energy costs: electricity at 22p/kWh, gas .065p/kWh from BEIS December 2022 industrial average costs.

Mackwell Health LED UV-C - Other Compatible Products?

