

GREEN & HEALTHY AUDITORS PTY LTD

ABN 34532464300

50 Darling Point Rd, Darling Point, NSW 2027 Australia

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Location	Maharakham Hospital
Room	Child PICU Isolate 5 Before and After applying Wellis Disinfectant
Test date	8 – 9 October 2019

Applicable classification as per International Health Facility Guidelines (Part B: Version 5 2017):

Area designation	Air movement relationship to adjacent area	Minimum air changes of outdoor air per hour	air change per hour	All air exhausted directly to outdoor	Recirculated by means of room units	Relative humidity (%)
Isolate room Class S (contact isolation)	-	2	6-12	Preferably	No	30-60
Isolate Room Class N (airborne disease isolation)	Negative, 30Pa	2	6-12	100%	No	30-60

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AIR CIRCULATION			
Alert?	Parameter	Result	Limits and criteria
*	Recirculated by means of room unit?	Yes	Recirculation is not allowed
*	Prominently displayed reason for contact, air or airborne disease precaution. Or immunocompromised in case of positively pressured rooms	No	Required
	All air exhausted directly to outdoor		Yes
*	Label to indicate 'standard' pressure or gauge to indicate negative pressure	No	Required
	Handbasin inside the room	Yes	Required
*	Self closing door	NO	Required
*	Bedpan sanitiser near the room	No	Desirable
*	Total air change per hour	~>22	6-12
	air changes of outdoor air per hour	Not Tested	At least 3
	Room Temp C	25.9 C	22 C
	Room RH%	47.4%	< 60%

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Confidential Notes:

- 1. The room appears to be well designed as a negative or positive pressure isolation room. At the time of inspection the room is used as a standard pressure isolation room. There were no signs to identify the reason for the patient isolation.*
- 2. Wellis unit is capable of reducing microbial levels in the air by 90-99%. And demonstrated an excellent efficacy against substantial levels of what appears to be gram negative Enterobacteriaceae (most likely Acinetobacter or Klebsiella spp) in this test.*
- 3. Air contamination. The airflows of supplied and recirculated air are too high. Causing spread of aircon or droplet-borne microbes.*
- 4. Surface contamination Thee microbial contamination of tested surfaces had varied from good (door handle, bed rails) to rather poor (basin, drip stand) with microbial levels exceeding acceptable 10-50 times. The air purifying-disinfecting equipment is not effective on surfaces and some review of the cleaning protocols is required.*
- 5. Apart from the expected skin-borne microflora (Staphylococci and Micrococci), substantial numbers of gram-negative Pseudomonas spp are present on the surfaces and in the air. The appearance of some observed colonies is very similar to Mycobacteria, but 100% confirmation of the presence of these species requires different sampling techniques and media.*
- 6. We recommend reviewing use of high speed air purification-disinfection devices and attempting to restore the designed airflow patterns. If any air disinfection devices are used, ensure the air speed is not exceeding 3-4 cubic feet per minute (100 Litres per minute).*

On behalf of Green & Healthy Auditors Pty Ltd

Alex Sava, PhD (Chem), MRACI, MIUPAC
Chartered Chemist

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Class S—Standard pressure room Standard pressure rooms are used for patients requiring contact or droplet isolation. A standard room with normal air conditioning is appropriate. Recommended elements • A staff hand washbasin within the room. • An ensuite bathroom. • A self-closing door. Optional elements • Pan sanitiser near the room. • Label to indicate standard pressure isolation room

Class N Recommended elements • Maintain a negative pressure gradient from the room to the anteroom and the ambient air. This is accomplished via a separate exhaust system dedicated to each room that removes a quantity of air greater than that of the supply system. Exhaust air ducts should be independent of the common building exhaust air system to reduce the risk of contamination from back draught. • Maintain an air change rate of 12 air changes per hour, or 145 litres per second per patient, whichever results in the greatest air quantity, when supply or exhaust air filters are at their maximum pressure drop. Introduce supply air through a displacement diffuser.(2,3) • Construct an anteroom with each room with a pressure less than the adjacent ambient pressure. The pressure differential between rooms should be no less than 15 Pascals (Pa). • Install an ensuite bathroom. The ensuite entrance should not be in the anteroom. An ensuite is not a mandatory requirement for a NPR in an emergency department. A clinical risk assessment should be conducted to determine if the ensuite can be excluded. En-suite exhaust shall not be connected to the common building toilet exhaust system. • Provide 100% outside air ventilation. • Duct the exhaust directly to the outside discharging vertically at 10m/s in accordance with Australian Standard (AS) 1668-2002 Part 2(4), Type A exhaust. 6 Guidelines for the classification and design of isolation rooms in health care facilities • Draw exhaust air from low-level exhaust ducts approximately 150 mm above the floor in the room. • Locate the duplex exhaust fans at a point in the duct system that will ensure the duct is under negative pressure throughout its run within the building. • Ensure supply air ducts are independent of the common building supply air system. • Supply air and exhaust systems to be of a constant volume system.(5) • Fit differential pressure built low-pressure instrumentation in a prominent location outside the room. • Fit a local audible alarm in case of fan failure. Interlock supply and exhaust fans to shut down supply fan in the event of exhaust fan failure. Install fan run status on fan using CT's or equivalent. • Ensure the room is as airtight as possible, with monolithic ceilings, well-sealed penetrations, tight fitting doors and windows, and a door grille designed for a controlled air path.(2)


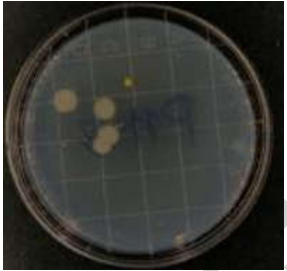

Efficient sealing of the room will result in better maintenance of pressure gradients with less load on the air handling plant. • Fit a Non-hand operated clinical handbasin within the room and anteroom. • Install a self-closing door, with well fitting, durable door seals taking into consideration the direction of door swing in relation to room pressure. Doors can be interlocked. • All mechanical, electrical and building systems shall be designed and constructed to be easily accessible for maintenance. All mechanical plant shall be outside the patient room. • Label as a negative pressure isolation room.

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MICROBIAL				
Alert?	Contaminant	Result	Location	% Of Reduction
*	Sample:P11 Passive air sample 2 hours wash basin 	>100 cfu/4 hours Pseudomona S, Micrococci, Staphylococci i Aspergillus spp		
	Sample:P11-2 Passive air sample 2 hours Hand basin Note : After wellis 	40 cfu /4 hours		>60 %Reduction
*	Sample:P12 Passive air sample 2 hours Under patient bed (on the floor) (2hr) 	>100cfu/4 hours Pseudomona S, Micrococci, Staphylococci i Aspergillus spp		
	Sample:P12-2 Passive air Sample2 hours Above old air purifier Under patient bed (on the floor) Note : After wellis 	9 cfu /4 hours		>90 %Reduction

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MICROBIAL				
Alert?	Contaminant	Result	Location	% Of Reduction
*	Sample:P13 Passive air sample 2 hours Above air purifier 	>100cfu/4 hours Pseudomona S, Micrococci, Staphylococci i Aspergillus spp		
	Sample:P13-2 Passive air sample 24 hours Above air purifier Note : After wellis 	0 cfu /4 hours		>100%Reduction
*	Sample:P13-3 Passive air sample 2 hours Above machine Note : After wellis 	16 cfu /4 hours		

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Alert?	Contaminant	Result	Location	% Of Reduction
*	Sample:P14 Passive air sample 24 hours Above patient head Note : After wellis 	>200 cfu/4 hours		
	Sample:P14-2 Passive air sample 2 hours Above patient head Note : After wellis 	30 cfu /4 hours		85%Reduction
*	Sample:P15 Passive air sample 2 hours Cart low shelf 	>100cfu/4 hours Pseudomona S, Micrococci, Staphylococci i Aspergillus spp		
	Sample:P15-2 Passive air sample 24 hours Cart low shelf Note : After wellis 	0 cfu /4 hours		>100%Reduction

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MICROBIAL				
Alert?	Contaminant	Result	Location	% Of Reduction
	Sample:P16 Passive air sample 2 hours Above drip control 	>100cfu/4 hours Pseudomona S, Micrococci, Staphylococci i Aspergillus spp		
	Sample:P16-2 Passive air sample 2 hours Above drip control Note : After wellis 	12 cfu /4 hours		88%Reduction
	Sample:S25 Surface swab Door handle 	80 cfu /20 sq.cm		
	Sample:S25-2 Surface swab Door handle Note : After wellis 	40 cfu /20 sq.cm		>50%Reduction

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MICROBIAL				
Alert?	Contaminant	Result	Location	% Of Reduction
*	Sample:S26 Surface swab Bed handle 	>100cfu/20 sq. cm		
	Sample:S26-2 Surface swab Bed handle Note : After wellis 	60 cfu /4 sq.cm		>40%Reduction

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