Report: Analysis of Handle Hygiene Hygicult TPC slides

Identification of the test laboratory:
Abbott Analytical Ltd
Unit 2, Hickmans Road, Birkenhead, CH41 1JH, United Kingdom

Identification of the client:
Clever Hygiene Solutions Ltd
95 Ranelagh Village, Dublin, D06 V1W5, Ireland

Identification of the sample(s):

Sample type: Hygicult TPC Slides

Dates of delivery:

Week1	09 October 2019
Week 2	16 October 2019
Week 3	22 October 2019
Week 4	30 October 2020
Week 5	06 November 2019
Week 6	12 November 2019
Week 7	19 November 2019
Week 8	27 November 2019
Week 9	10 December 2019
Week 10	10 December 2019
Week 11	17 December 2019
Week 12	15 January 2020
Week 13	21 January 2020
Week 14	30 January 2020
Week 15	04 February 2020
Week 16	11 February 2020

Storage conditions: Room temperature in darkness

Notes:

1) The test results in this report relate only to the sample(s) tested.
2) This test report may not be reproduced except in full, adapted, altered or used to create a derivative work, without written approval from Abbott Analytical Ltd.

Introduction:

Environmental surfaces play a key role in the spread of infection, not just in healthcare but throughout society as a whole.

Door handles are one of the biggest culprits, due to the manner in which they are firmly grasped and held while in use, giving any transmissible microbes they harbour a chance to contaminate hands. These hands could then contaminate further handles or surfaces, supporting what is known as the Chain of Infection.

With door handles requiring only as little as one hand to contaminate their surface, regardless of how well they are cleaned, it is important not to give opportunistic pathogens the chance to spread on to the hands of users as they perform their daily routines.

Background:

Door Handles, are known to harbour a wide variety of contaminants resulting from their frequent and common use, with bacteria known to survive for long periods on inanimate surfaces, especially in washrooms, where compliance rates with hand-washing protocols often leave much to be desired.

In healthcare, commonly touched surfaces such as door handles, act as fomites, that can support the spread of infectious disease by facilitating the transmission of pathogens on to the hands of healthcare workers, patients and visitors touching them.

Because of this, door handles require enhanced cleaning and ideally after every use, since as little as one hand is all it takes to contaminate a handle and pose a risk to other users.

Objective:

The objective of the study is to highlight how easily and readily commonly touched door handles become contaminated, even in locations where cleaning protocols are of a high standard.

Good cleaning protocols have been proven to reduce the spread of infection, not just in healthcare, but all sectors, however even good cleaning regimens have their weaknesses: the cleaning of surfaces such as door handles is sporadic at best, while the recontamination of these surfaces is ongoing.

As door handles are known to harbour a wide variety of potentially pathogenic microorganisms, that are not only capable of causing serious illness but may also be antibiotic resistant, it is vital to ensure such surfaces are cleaned on an ongoing basis.

Sampling procedure:

The hospital unit where the study took place was the Active Rehab unit, consisting of two wards: a patient side room and their facilities along with the public toilet facilities in the main reception area.

It was agreed for the purpose of this study to opt for various doors with different usage patterns, so as to ascertain how much the microbial load on handles varied between locations.

The study was conducted over a sixteen-week period. A total of 1120 samples were taken from the door handles, to evaluate the microbial growth on each.

Initially 10 doors were selected for testing throughout the course of the study, with a further 3 doors added as alternatives due to the nature of their usage.

The doors selected were as follows:

1. Door 1 (St Anthony's Ward: Shower/WC Opposite Room 7)
2. Door 2 (St Anthony's Ward: ARU Gym Entrance)
3. Door 3(St Anthony's Ward: St Paul's Entrance, Staff Only)
4. Door 4 (St Mary's Ward: Sluice Room)
5. Door 5 (St Mary's Ward: Shower/WC Opposite Side Room)
6. Door 6 (St Mary's Ward: Clean Linen Room Opposite Ward 2)
7. Door 7 (St Mary's Ward: Patient Side Room)
8. Door 8 (Staff Toilet, Corridor Opposite Restaurant)
9. Door 9 (Public Toilet, Opposite Restaurant, Outer Door)
10. Door 10 (Public Toilet, Reception Area)
11. Door 11 (St Anthony's Ward: Shower/WC Opposite Room 5)
12. Door 12 (St Mary's Ward: Shower/WC Opposite Room 3)
13. Door 13 (St Mary's Ward: Patients' Toilet)

Doors 11, 12 & 13 replaced doors 1, 4 & 6 from week 4.

For the duration of this study, it was agreed that the IPC team at the hospital would take responsibility for the collection of samples, so as to avoid any fear of the "Hawthorne Effect" as cleaning staff continue with their normal daily cleaning routines.

The hospital involved in this study employ their own cleaning staff directly, a system generally regarded as being the best and most effective means of cleaning any environment, healthcare or otherwise.

To further protect against any sudden up-lifting of normal standards while the study was in progress, the IPC lead confirmed:

"We changed the timing of the samples so essentially, they were a mixture as this is a very busy active ward, it could be hard to pin down a specific time that was conducive to sampling. I would say it was easily half and half mixture of am and pm sampling, but we always tried to do it when household department were not around."

To this end it was also agreed that it was not necessary to sample every day each week, but to be strategic about the various amount of samples collected and the timing of collections, so that an accurate analysis of the overall findings could be attained giving a true version of how things were in real time.

The Hygicult TPC slides used have agar on both sides and were used to sample the handles on both sides, either top and bottom or front and back, giving a clear indication of the microbial levels over the entire handle.

The Hygicult TPC slides were collected and shipped weekly by the IPC team direct to the Abbott Analytical laboratory.

Week 1

After considering the various options, it was agreed the best method to adopt in order to evaluate accurately the efficacy of the Handle Hygiene System was simply to monitor microbial growth on the various handles for a period as they were in situ, the Base Week.

Week 2

Introduction of the Handle Hygiene system onto 6 of the door handles involved, leaving the remaining doors as they were, for comparison purposes.

Week 3

The Handle Hygiene system was removed and again all the door handles were monitored as they were in situ under the normal cleaning protocols.

Weeks 4 – 8

Substitution of 3 doors with 3 more suitable doors, while again all door handles were monitored over this period while normal cleaning practices continued throughout.

Weeks 9 – 11

Re-introduction of the Handle Hygiene system on to all of the door handles, except for door handle number 11, which although having a Handle Hygiene unit fitted it was never activated, but instead used as a test handle for verification purposes. Again, throughout this period normal cleaning routines remained in place on a daily basis.

Weeks 12 – 14

Once more saw the removal of the Handle Hygiene system, so yet again the handles could be microbially monitored as they were in situ, under normal cleaning practices.

Week 15

The Handle Hygiene system was re-introduced on to all doors, except for door number 11, the test door, which was not activated for verification purposes. Week 15 also saw the introduction of an alternative disinfectant for use in the Handle Hygiene system, so comparisons could be drawn between the efficacy rates for alternative disinfectants when used in the system.

Week 16

Wash-out week with the Handle Hygiene systems again removed, the handles were monitored as before as normal cleaning practices continued.

Counting procedure:

1) On receipt, slides were incubated for 24 h ± 4 h at 36°C ± 1°C, in accordance with the manufacturer's instructions.
2) Counts were performed on both sides of the slides and totalled for each slide.
   Note: These slides have a total surface area approximately one third of that of a standard 90 mm Petri dish. Counts were therefore limited to 100 cfu per slide and anything above this was recorded as > 100 cfu.
   Counts are recorded in the results section of this report.
3) In addition to the counts, the colony morphology of the most commonly occurring bacteria on each slide was also recorded. This information was then used to select colonies for further testing, as detailed below.
4) Five of the most common types of bacterial colony seen over all of the slides were sub-cultured and sent to Charles River for identification using their AccuPRO-ID® MALDI-TOF service. Charles River are an international laboratory specialising in microbial identification of unknown bacterial and fungal samples. They are accredited to ISO 9001:2015 and ISO 17025:2017.
   A summary of the results are included in this report but see the referenced Charles River AccuPRO-ID® reports for more details.
5) Several colonies suspected of being *Staphylococcus aureus* were sub-cultured onto Mannitol Salt agar. Four of these colonies were subsequently confirmed to be *Staphylococcus aureus* and were then tested for resistance to the antibiotic Methicillin using antimicrobial susceptibility discs. Methicillin-resistant *Staphylococcus aureus* (MRSA) is common in hospitals, prisons and nursing homes.
   The results are included later in this report.
6) Ten colonies suspected of being Streptococci – which can be responsible for a number of bacterial infections including meningitis, bacterial pneumonia and endocarditis – were tested using a Lancefield Grouping kit.
   The results are included later in this report.

Findings:

Findings from the study confirmed that commonly touched door handles harbour a variety of microorganisms. They also showed how these microorganisms can be both pathogenic and antibiotic-resistant, as shown in the results section of this report. They also show how readily and easily such handles can become contaminated, even where enhanced cleaning practices are employed.

The results show that the normal cleaning regimen within the hospital was of a good standard to begin with, with cfu counts regularly below the desired level of <5 cfu/cm² or less for frequently hand touched surfaces in hospitals. (The overall surface area used from the contact slides for sampling was approximately 4 cm² so cfu counts of ≤20 equate to ≤5 cfu/cm².)

The results also show that even with what is regarded as a good standard of cleaning, High counts occur frequently, with some occurring on 2, 3 and even 4 occasions in a row.

Using handle 11 as the control handle, it was possible to show how cleaning regimens with a Handle Hygiene system in place produced far better results, with a count of ≤5 cfu/cm² or less in over 90% of samples tested. This figure was only achieved with 50% of samples taken where the Handle Hygiene system was not fitted.

High counts were found while the Handle Hygiene system was in use, but only appear in isolated incidents. The “Automated Disinfectant Dispensing System” soon eradicated growth, bringing the cfu counts back to zero.

Included on the following pages is a summary of the findings in a single spreadsheet showing:

1) The total count (in cfu) recorded for each handle over the 16 week study period.
2) A colour coded background for each count showing whether the Handle Hygiene systems was in place (yellow or blue background) or not (brown background).
3) A yellow background indicates that the Handle Hygiene system was using Fluid A, the blue background that it was using Fluid B.
4) A green background indicates that the Handle Hygiene system was in place but was not in operation (contained no fluid), being used for comparison purposes (Gazebo Effect).
5) Counts of >100 cfu (also referred to as TMTC or TNTC) are highlighted in red.

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Summary of Results: (See following pages for breakdown of results by door)

Week	Date	Total Counts (cfu)								
		Door 1	Door 2	Door 3	Door 4	Door 5	Door 6	Door 7	Door 8	Door 9
1	30 Sep 19	2	6	11	1	5	0	18	36	61
	01 Oct 19	11	11	16	8	67	5	11	3	19
	02 Oct 19	50	15	17	41	> 100	10	19	13	> 100
	03 Oct 19	2	3	1	2	43	6	5	0	23
	04 Oct 19	47	94	0	8	49	11	1	17	3
2	07 Oct 19	17	0	0	0	1	0	0	9	0
	08 Oct 19	35	0	3	> 100	1	1	1	1	0
	09 Oct 19	53	0	14	33	56	0	1	0	0
	10 Oct 19	3	2	10	> 100	38	6	0	16	1
	11 Oct 19	12	0	9	100	6	0	0	0	0
3	15 Oct 19	16	1	2	1	0	0	0	5	6
	17 Oct 19	12	6	35	10	2	7	5	19	16
4	22 Oct 19		3	5		13		2	> 100	38
	25 Oct 19		25	16		2		0	5	30
5	29 Oct 19		> 100	0		6		7	8	> 100
	30 Oct 19		7	14		6		6	10	> 100
	31 Oct 19		3	1		> 100		9	0	6
	01 Nov 19		1	0		> 100		4	0	> 100
6	04 Nov 19		7	0		1		8	3	> 100
	05 Nov 19		9	18		8		3	5	30
	06 Nov 19		12	2		5		5	10	34
	07 Nov 19		> 100	2		3		22	24	0
	08 Nov 19		35	6		8		> 100	8	6
7	11 Nov 19		16	2		> 100		8	2	20
	15 Nov 19		35	7		3		10	19	8
8	18 Nov 19		2	7		4		0	14	> 100
	22 Nov 19		> 100	8		4		10	24	> 100
9	28 Nov 19		2	0		0		0	0	0
10	03 Dec 19		> 100	75		0		0	17	9
	04 Dec 19		0	0		0		0	0	0
	05 Dec 19		0	0		0		0	0	0
	06 Dec 19		0	0		5		0	0	0
11	09 Dec 19		0	0		0		0	0	> 100
	10 Dec 19		> 100	0		> 100		2	0	0
	11 Dec 19		0	0		0		11	0	5
	12 Dec 19		12	13		0		> 100	0	0
12	07 Jan 20		1	10		> 100		14	0	> 100
	09 Jan 20		4	5		> 100		17	9	39
13	13 Jan 20		3	3		0		0	39	6
	15 Jan 20		8	12		0		8	8	7
	16 Jan 20		2	0		7		0	43	39
14	20 Jan 20		0	17		> 100		0	5	7
	21 Jan 20		2	8		7		1	0	> 100
	22 Jan 20		0	0		0		4	5	39
	23 Jan 20		2	29		5		> 100	6	3
	24 Jan 20		3	17		7		39	10	17
15	27 Jan 20		0	0		0		> 100	12	21
	28 Jan 20		0	0		0		22	0	4
	29 Jan 20		0	0		0		18	3	11
	30 Jan 20		2	4		0		15	13	13
	31 Jan 20		2	0		0		21	9	> 100
16	03 Feb 20		7	> 100		0		4	> 100	> 100
	04 Feb 20		7	> 100		0		4	> 100	> 100
	05 Feb 20		9	9		17		> 100	> 100	> 100
	06 Feb 20		29	4		24		> 100	7	4
	07 Feb 20		7	> 100		4		29	24	17

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Total Counts (cfu)			
Door 10	Door 11	Door 12	Door 13
1			
8			
12			
1			
43			
23			
2			
7			
59			
0			
26			
>100			
3	9	58	4
4	1	2	>100
6	1	0	2
2	0	0	2
6	50	36	7
10	12	13	0
35	>100	16	17
17	22	33	3
27	19	15	10
19	15	3	8
12	22	4	28
24	>100	11	17
9	3	12	12
3	37	3	0
3	0	4	3
0	0	0	0
0	29	0	0
0	59	0	0
0	67	0	0
0	>100	0	0
>100	16	0	0
0	>100	>100	0
0	25	0	0
0	0	0	0
>100	>100	4	12
>100	>100	7	12
10	>100	0	19
9	>100	3	0
11	3	0	5
7	2	2	>100
0	>100	4	3
2	11	2	>100
3	7	0	5
>100	7	0	0
0	30	0	0
17	0	0	0
6	10	0	0
37	23	1	0
4	29	0	0
7	3	0	0
>100	>100	0	0
>100	54	0	0
0	14	5	0
>100	17	>100	17

Legend:

Boxes this colour show handles without the Handle Hygiene system in place.

Boxes this colour show handles with the Handle Hygiene system in place using Fluid A.

Boxes this colour show handles with the Handle Hygiene system in place using Fluid B.

Boxes this colour show handles with the Handle Hygiene system in place but without any fluid in it, for comparison purposes.

>100 Indictaes that the colonies on the slide were too numerous to count (some times referred to as TNTC or TMTC).

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Results: Door 1 (St Anthony's Ward: Shower/WC Opposite Room 7) Z2-SA-097

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	2	0
	01 Oct 19	11	0
	02 Oct 19	50	0
	03 Oct 19	2	0
	04 Oct 19	47	0
2	07 Oct 19	17	0
	08 Oct 19	34	1
	09 Oct 19	53	0
	10 Oct 19	3	0
	11 Oct 19	12	0
3	15 Oct 19	16	0
	17 Oct 19	12	0
4	22 Oct 19	-	-
	25 Oct 19	-	-
5	29 Oct 19	-	-
	30 Oct 19	-	-
	31 Oct 19	-	-
	01 Nov 19	-	-
6	04 Nov 19	-	-
	05 Nov 19	-	-
	06 Nov 19	-	-
	07 Nov 19	-	-
	08 Nov 19	-	-
7	11 Nov 19	-	-
	15 Nov 19	-	-
8	18 Nov 19	-	-
	22 Nov 19	-	-
9	28 Nov 19	-	-
10	03 Dec 19	-	-
	04 Dec 19	-	-
	05 Dec 19	-	-
	06 Dec 19	-	-
11	09 Dec 19	-	-
	10 Dec 19	-	-
	11 Dec 19	-	-
	12 Dec 19	-	-

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	-	-
	09 Jan 20	-	-
13	13 Jan 20	-	-
	15 Jan 20	-	-
	16 Jan 20	-	-
14	20 Jan 20	-	-
	21 Jan 20	-	-
	22 Jan 20	-	-
	23 Jan 20	-	-
	24 Jan 20	-	-
15	27 Jan 20	-	-
	28 Jan 20	-	-
	29 Jan 20	-	-
	30 Jan 20	-	-
	31 Jan 20	-	-
16	03 Feb 20	-	-
	04 Feb 20	-	-
	05 Feb 20	-	-
	06 Feb 20	-	-
	07 Feb 20	-	-

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Results: Door 2 (St Anthony's Ward: ARU Gym Entrance) Z2-CL-094

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	6	0
	01 Oct 19	11	0
	02 Oct 19	15	0
	03 Oct 19	3	0
	04 Oct 19	94	0
2	07 Oct 19	0	0
	08 Oct 19	0	0
	09 Oct 19	0	0
	10 Oct 19	2	0
	11 Oct 19	0	0
3	15 Oct 19	0	1
	17 Oct 19	6	0
4	22 Oct 19	3	0
	25 Oct 19	25	0
5	29 Oct 19	> 100	0
	30 Oct 19	7	0
	31 Oct 19	2	1
	01 Nov 19	1	0
6	04 Nov 19	7	0
	05 Nov 19	9	0
	06 Nov 19	12	0
	07 Nov 19	> 100	0
	08 Nov 19	35	0
7	11 Nov 19	16	0
	15 Nov 19	35	0
8	18 Nov 19	2	0
	22 Nov 19	> 100	0
9	28 Nov 19	2	0
10	03 Dec 19	> 100	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	> 100	0
	11 Dec 19	0	0
	12 Dec 19	12	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	1	0
	09 Jan 20	4	0
13	13 Jan 20	3	0
	15 Jan 20	8	0
	16 Jan 20	2	0
14	20 Jan 20	0	0
	21 Jan 20	2	0
	22 Jan 20	0	0
	23 Jan 20	2	0
	24 Jan 20	3	0
15	27 Jan 20	0	0
	28 Jan 20	0	0
	29 Jan 20	0	0
	30 Jan 20	2	0
	31 Jan 20	2	0
16	03 Feb 20	7	0
	04 Feb 20	7	0
	05 Feb 20	9	0
	06 Feb 20	29	0
	07 Feb 20	7	0

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Results: Door 3 (St Anthony's Ward: St Paul's Entrance, Staff Only) Z2-ST-691

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	11	0
	01 Oct 19	16	0
	02 Oct 19	17	0
	03 Oct 19	1	0
	04 Oct 19	0	0
2	07 Oct 19	0	0
	08 Oct 19	3	0
	09 Oct 19	14	0
	10 Oct 19	10	0
	11 Oct 19	9	0
3	15 Oct 19	2	0
	17 Oct 19	34	1
4	22 Oct 19	5	0
	25 Oct 19	16	0
5	29 Oct 19	0	0
	30 Oct 19	14	0
	31 Oct 19	0	1
	01 Nov 19	0	0
6	04 Nov 19	0	0
	05 Nov 19	18	0
	06 Nov 19	2	0
	07 Nov 19	2	0
	08 Nov 19	6	0
7	11 Nov 19	2	0
	15 Nov 19	7	0
8	18 Nov 19	7	0
	22 Nov 19	8	0
9	28 Nov 19	0	0
10	03 Dec 19	75	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	0	0
	11 Dec 19	0	0
	12 Dec 19	13	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	10	0
	09 Jan 20	5	0
13	13 Jan 20	3	0
	15 Jan 20	12	0
	16 Jan 20	0	0
14	20 Jan 20	17	0
	21 Jan 20	8	0
	22 Jan 20	0	0
	23 Jan 20	29	0
	24 Jan 20	17	0
15	27 Jan 20	0	0
	28 Jan 20	0	0
	29 Jan 20	0	0
	30 Jan 20	4	0
	31 Jan 20	0	0
16	03 Feb 20	> 100	0
	04 Feb 20	> 100	0
	05 Feb 20	9	0
	06 Feb 20	4	0
	07 Feb 20	> 100	0

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Results: Door 4 (St Mary's Ward: Sluice Room) Z2-SA-106

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	1	0
	01 Oct 19	8	0
	02 Oct 19	41	0
	03 Oct 19	2	0
	04 Oct 19	8	0
2	07 Oct 19	0	0
	08 Oct 19	> 100	0
	09 Oct 19	33	0
	10 Oct 19	> 100	0
	11 Oct 19	100	0
3	15 Oct 19	0	1
	17 Oct 19	10	0
4	22 Oct 19	-	-
	25 Oct 19	-	-
5	29 Oct 19	-	-
	30 Oct 19	-	-
	31 Oct 19	-	-
	01 Nov 19	-	-
6	04 Nov 19	-	-
	05 Nov 19	-	-
	06 Nov 19	-	-
	07 Nov 19	-	-
	08 Nov 19	-	-
7	11 Nov 19	-	-
	15 Nov 19	-	-
8	18 Nov 19	-	-
	22 Nov 19	-	-
9	28 Nov 19	-	-
10	03 Dec 19	-	-
	04 Dec 19	-	-
	05 Dec 19	-	-
	06 Dec 19	-	-
11	09 Dec 19	-	-
	10 Dec 19	-	-
	11 Dec 19	-	-
	12 Dec 19	-	-

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	-	-
	09 Jan 20	-	-
13	13 Jan 20	-	-
	15 Jan 20	-	-
	16 Jan 20	-	-
14	20 Jan 20	-	-
	21 Jan 20	-	-
	22 Jan 20	-	-
	23 Jan 20	-	-
	24 Jan 20	-	-
15	27 Jan 20	-	-
	28 Jan 20	-	-
	29 Jan 20	-	-
	30 Jan 20	-	-
	31 Jan 20	-	-
16	03 Feb 20	-	-
	04 Feb 20	-	-
	05 Feb 20	-	-
	06 Feb 20	-	-
	07 Feb 20	-	-

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Results: Door 5 (St Mary's Ward: Shower/WC Opposite Side Room) ZD-BD-110

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	4	1
	01 Oct 19	67	0
	02 Oct 19	> 100	0
	03 Oct 19	43	0
	04 Oct 19	49	0
2	07 Oct 19	1	0
	08 Oct 19	1	0
	09 Oct 19	56	0
	10 Oct 19	38	0
	11 Oct 19	6	0
3	15 Oct 19	0	0
	17 Oct 19	2	0
4	22 Oct 19	13	0
	25 Oct 19	2	0
5	29 Oct 19	6	0
	30 Oct 19	6	0
	31 Oct 19	> 100	0
	01 Nov 19	> 100	0
6	04 Nov 19	1	0
	05 Nov 19	8	0
	06 Nov 19	5	0
	07 Nov 19	3	0
	08 Nov 19	8	0
7	11 Nov 19	> 100	0
	15 Nov 19	3	0
8	18 Nov 19	4	0
	22 Nov 19	4	0
9	28 Nov 19	0	0
10	03 Dec 19	0	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	5	0
11	09 Dec 19	0	0
	10 Dec 19	> 100	0
	11 Dec 19	0	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	> 100	0
	09 Jan 20	> 100	0
13	13 Jan 20	0	0
	15 Jan 20	0	0
	16 Jan 20	7	0
14	20 Jan 20	> 100	0
	21 Jan 20	7	0
	22 Jan 20	0	0
	23 Jan 20	5	0
	24 Jan 20	7	0
15	27 Jan 20	0	0
	28 Jan 20	0	0
	29 Jan 20	0	0
	30 Jan 20	0	0
	31 Jan 20	0	0
16	03 Feb 20	0	0
	04 Feb 20	0	0
	05 Feb 20	17	0
	06 Feb 20	24	0
	07 Feb 20	4	0

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Results: Door 6 (St Mary's Ward: Clean Linen Room Opposite Ward 2)

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	0	0
	01 Oct 19	5	0
	02 Oct 19	10	0
	03 Oct 19	6	0
	04 Oct 19	11	0
2	07 Oct 19	0	0
	08 Oct 19	1	0
	09 Oct 19	0	0
	10 Oct 19	6	0
	11 Oct 19	0	0
3	15 Oct 19	0	0
	17 Oct 19	7	0
4	22 Oct 19	-	-
	25 Oct 19	-	-
5	29 Oct 19	-	-
	30 Oct 19	-	-
	31 Oct 19	-	-
	01 Nov 19	-	-
6	04 Nov 19	-	-
	05 Nov 19	-	-
	06 Nov 19	-	-
	07 Nov 19	-	-
	08 Nov 19	-	-
7	11 Nov 19	-	-
	15 Nov 19	-	-
8	18 Nov 19	-	-
	22 Nov 19	-	-
9	28 Nov 19	-	-
10	03 Dec 19	-	-
	04 Dec 19	-	-
	05 Dec 19	-	-
	06 Dec 19	-	-
11	09 Dec 19	-	-
	10 Dec 19	-	-
	11 Dec 19	-	-
	12 Dec 19	-	-

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	-	-
	09 Jan 20	-	-
13	13 Jan 20	-	-
	15 Jan 20	-	-
	16 Jan 20	-	-
14	20 Jan 20	-	-
	21 Jan 20	-	-
	22 Jan 20	-	-
	23 Jan 20	-	-
	24 Jan 20	-	-
15	27 Jan 20	-	-
	28 Jan 20	-	-
	29 Jan 20	-	-
	30 Jan 20	-	-
	31 Jan 20	-	-
16	03 Feb 20	-	-
	04 Feb 20	-	-
	05 Feb 20	-	-
	06 Feb 20	-	-
	07 Feb 20	-	-

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Results: Door 7 (St Mary's Ward: Patient Side Room) Z2-BD-113

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	18	0
	01 Oct 19	8	3
	02 Oct 19	19	0
	03 Oct 19	5	0
	04 Oct 19	1	0
2	07 Oct 19	0	0
	08 Oct 19	1	0
	09 Oct 19	1	0
	10 Oct 19	0	0
	11 Oct 19	0	0
3	15 Oct 19	0	0
	17 Oct 19	5	0
4	22 Oct 19	2	0
	25 Oct 19	0	0
5	29 Oct 19	7	0
	30 Oct 19	6	0
	31 Oct 19	9	0
	01 Nov 19	4	0
6	04 Nov 19	8	0
	05 Nov 19	3	0
	06 Nov 19	5	0
	07 Nov 19	22	0
	08 Nov 19	> 100	0
7	11 Nov 19	8	0
	15 Nov 19	10	0
8	18 Nov 19	0	0
	22 Nov 19	10	0
9	28 Nov 19	0	0
10	03 Dec 19	0	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	2	0
	11 Dec 19	11	0
	12 Dec 19	> 100	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	14	0
	09 Jan 20	17	0
13	13 Jan 20	0	0
	15 Jan 20	8	0
	16 Jan 20	0	0
14	20 Jan 20	0	0
	21 Jan 20	1	0
	22 Jan 20	4	0
	23 Jan 20	> 100	0
	24 Jan 20	39	0
15	27 Jan 20	> 100	0
	28 Jan 20	22	0
	29 Jan 20	18	0
	30 Jan 20	15	0
	31 Jan 20	21	0
16	03 Feb 20	4	0
	04 Feb 20	4	0
	05 Feb 20	> 100	0
	06 Feb 20	> 100	0
	07 Feb 20	29	0

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Results: Door 8 (Staff Toilet, Corridor Opposite Restaurant) Z2-SA-027

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	35	1
	01 Oct 19	3	0
	02 Oct 19	13	0
	03 Oct 19	0	0
	04 Oct 19	17	0
2	07 Oct 19	9	0
	08 Oct 19	1	0
	09 Oct 19	0	0
	10 Oct 19	16	0
	11 Oct 19	0	0
3	15 Oct 19	4	1
	17 Oct 19	19	0
4	22 Oct 19	> 100	0
	25 Oct 19	5	0
5	29 Oct 19	8	0
	30 Oct 19	10	0
	31 Oct 19	0	0
	01 Nov 19	0	0
6	04 Nov 19	3	0
	05 Nov 19	5	0
	06 Nov 19	10	0
	07 Nov 19	24	0
	08 Nov 19	8	0
7	11 Nov 19	2	0
	15 Nov 19	19	0
8	18 Nov 19	14	0
	22 Nov 19	24	0
9	28 Nov 19	0	0
10	03 Dec 19	17	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	0	0
	11 Dec 19	0	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	0	0
	09 Jan 20	9	0
13	13 Jan 20	39	0
	15 Jan 20	8	0
	16 Jan 20	43	0
14	20 Jan 20	5	0
	21 Jan 20	0	0
	22 Jan 20	5	0
	23 Jan 20	6	0
	24 Jan 20	10	0
15	27 Jan 20	12	0
	28 Jan 20	0	0
	29 Jan 20	3	0
	30 Jan 20	13	0
	31 Jan 20	9	0
16	03 Feb 20	> 100	0
	04 Feb 20	> 100	0
	05 Feb 20	> 100	0
	06 Feb 20	7	0
	07 Feb 20	24	0

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Results: Door 9 (Public Toilet, Opposite Restaurant, Outer Door) Z2-SA-022

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	61	0
	01 Oct 19	19	0
	02 Oct 19	> 100	0
	03 Oct 19	23	0
	04 Oct 19	3	0
2	07 Oct 19	0	0
	08 Oct 19	0	0
	09 Oct 19	0	0
	10 Oct 19	1	0
	11 Oct 19	0	0
3	15 Oct 19	6	0
	17 Oct 19	16	0
4	22 Oct 19	38	0
	25 Oct 19	30	0
5	29 Oct 19	> 100	0
	30 Oct 19	> 100	0
	31 Oct 19	6	0
	01 Nov 19	> 100	0
6	04 Nov 19	> 100	0
	05 Nov 19	30	0
	06 Nov 19	34	0
	07 Nov 19	0	0
	08 Nov 19	6	0
7	11 Nov 19	20	0
	15 Nov 19	8	0
8	18 Nov 19	> 100	0
	22 Nov 19	> 100	0
9	28 Nov 19	0	0
10	03 Dec 19	9	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	> 100	0
	10 Dec 19	0	0
	11 Dec 19	5	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	> 100	0
	09 Jan 20	39	0
13	13 Jan 20	6	0
	15 Jan 20	7	0
	16 Jan 20	39	0
14	20 Jan 20	7	0
	21 Jan 20	> 100	0
	22 Jan 20	39	0
	23 Jan 20	3	0
	24 Jan 20	17	0
15	27 Jan 20	21	0
	28 Jan 20	4	0
	29 Jan 20	11	0
	30 Jan 20	13	0
	31 Jan 20	> 100	0
16	03 Feb 20	> 100	0
	04 Feb 20	> 100	0
	05 Feb 20	> 100	0
	06 Feb 20	4	0
	07 Feb 20	17	0

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Results: Door 10 (Public Toilet, Reception Area) Z1-SA-003

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	1	0
	01 Oct 19	8	0
	02 Oct 19	12	0
	03 Oct 19	0	1
	04 Oct 19	43	0
2	07 Oct 19	22	1
	08 Oct 19	2	0
	09 Oct 19	7	0
	10 Oct 19	59	0
	11 Oct 19	0	0
3	15 Oct 19	26	0
	17 Oct 19	> 100	0
4	22 Oct 19	3	0
	25 Oct 19	4	0
5	29 Oct 19	6	0
	30 Oct 19	2	0
	31 Oct 19	6	0
	01 Nov 19	10	0
6	04 Nov 19	35	0
	05 Nov 19	17	0
	06 Nov 19	27	0
	07 Nov 19	19	0
	08 Nov 19	12	0
7	11 Nov 19	24	0
	15 Nov 19	9	0
8	18 Nov 19	3	0
	22 Nov 19	3	0
9	28 Nov 19	0	0
10	03 Dec 19	0	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	> 100	0
	10 Dec 19	0	0
	11 Dec 19	0	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	> 100	0
	09 Jan 20	> 100	0
13	13 Jan 20	10	0
	15 Jan 20	9	0
	16 Jan 20	11	0
14	20 Jan 20	7	0
	21 Jan 20	0	0
	22 Jan 20	2	0
	23 Jan 20	3	0
	24 Jan 20	> 100	0
15	27 Jan 20	0	0
	28 Jan 20	17	0
	29 Jan 20	6	0
	30 Jan 20	37	0
	31 Jan 20	4	0
16	03 Feb 20	7	0
	04 Feb 20	> 100	0
	05 Feb 20	> 100	0
	06 Feb 20	0	0
	07 Feb 20	> 100	0

Results: Door 11 (St Anthony's Ward: Shower/WC Opposite Room 5) Z2-SA-104

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	-	-
	01 Oct 19	-	-
	02 Oct 19	-	-
	03 Oct 19	-	-
	04 Oct 19	-	-
2	07 Oct 19	-	-
	08 Oct 19	-	-
	09 Oct 19	-	-
	10 Oct 19	-	-
	11 Oct 19	-	-
3	15 Oct 19	-	-
	17 Oct 19	-	-
4	22 Oct 19	9	0
	25 Oct 19	1	0
5	29 Oct 19	1	0
	30 Oct 19	0	0
	31 Oct 19	50	0
	01 Nov 19	12	0
6	04 Nov 19	> 100	0
	05 Nov 19	22	0
	06 Nov 19	19	0
	07 Nov 19	15	0
	08 Nov 19	22	0
7	11 Nov 19	> 100	0
	15 Nov 19	3	0
8	18 Nov 19	37	0
	22 Nov 19	0	0
9	28 Nov 19	0	0
10	03 Dec 19	29	0
	04 Dec 19	59	0
	05 Dec 19	67	0
	06 Dec 19	> 100	0
11	09 Dec 19	16	0
	10 Dec 19	> 100	0
	11 Dec 19	25	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	> 100	0
	09 Jan 20	> 100	0
13	13 Jan 20	> 100	0
	15 Jan 20	> 100	0
	16 Jan 20	3	0
14	20 Jan 20	2	0
	21 Jan 20	> 100	0
	22 Jan 20	11	0
	23 Jan 20	7	0
	24 Jan 20	7	0
15	27 Jan 20	30	0
	28 Jan 20	0	0
	29 Jan 20	10	0
	30 Jan 20	23	0
	31 Jan 20	29	0
16	03 Feb 20	3	0
	04 Feb 20	> 100	0
	05 Feb 20	54	0
	06 Feb 20	14	0
	07 Feb 20	17	0

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Results: Door 12 (St Mary's Ward: Shower/WC Opposite Room 3) Z2-SA-109

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	-	-
	01 Oct 19	-	-
	02 Oct 19	-	-
	03 Oct 19	-	-
	04 Oct 19	-	-
2	07 Oct 19	-	-
	08 Oct 19	-	-
	09 Oct 19	-	-
	10 Oct 19	-	-
	11 Oct 19	-	-
3	15 Oct 19	-	-
	17 Oct 19	-	-
4	22 Oct 19	58	0
	25 Oct 19	1	1
5	29 Oct 19	0	0
	30 Oct 19	0	0
	31 Oct 19	36	0
	01 Nov 19	13	0
6	04 Nov 19	16	0
	05 Nov 19	33	0
	06 Nov 19	15	0
	07 Nov 19	3	0
	08 Nov 19	4	0
7	11 Nov 19	11	0
	15 Nov 19	12	0
8	18 Nov 19	3	0
	22 Nov 19	4	0
9	28 Nov 19	0	0
10	03 Dec 19	0	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	> 100	0
	11 Dec 19	0	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	4	0
	09 Jan 20	7	0
13	13 Jan 20	0	0
	15 Jan 20	3	0
	16 Jan 20	0	0
14	20 Jan 20	2	0
	21 Jan 20	4	0
	22 Jan 20	2	0
	23 Jan 20	0	0
	24 Jan 20	0	0
15	27 Jan 20	0	0
	28 Jan 20	0	0
	29 Jan 20	0	0
	30 Jan 20	1	0
	31 Jan 20	0	0
16	03 Feb 20	0	0
	04 Feb 20	0	0
	05 Feb 20	0	0
	06 Feb 20	5	0
	07 Feb 20	> 100	0

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Results: Door 13 (St Mary's Ward: Patients' Toilet) Z2-SA-121

Week	Date	Counts (cfu)	
		Bacteria	Fungi
1	30 Sep 19	-	-
	01 Oct 19	-	-
	02 Oct 19	-	-
	03 Oct 19	-	-
	04 Oct 19	-	-
2	07 Oct 19	-	-
	08 Oct 19	-	-
	09 Oct 19	-	-
	10 Oct 19	-	-
	11 Oct 19	-	-
3	15 Oct 19	-	-
	17 Oct 19	-	-
4	22 Oct 19	4	0
	25 Oct 19	> 100	0
5	29 Oct 19	2	0
	30 Oct 19	2	0
	31 Oct 19	7	0
	01 Nov 19	0	0
6	04 Nov 19	17	0
	05 Nov 19	3	0
	06 Nov 19	10	0
	07 Nov 19	8	0
	08 Nov 19	28	0
7	11 Nov 19	17	0
	15 Nov 19	12	0
8	18 Nov 19	0	0
	22 Nov 19	3	0
9	28 Nov 19	0	0
10	03 Dec 19	0	0
	04 Dec 19	0	0
	05 Dec 19	0	0
	06 Dec 19	0	0
11	09 Dec 19	0	0
	10 Dec 19	0	0
	11 Dec 19	0	0
	12 Dec 19	0	0

Week	Date	Counts (cfu)	
		Bacteria	Fungi
12	07 Jan 20	12	0
	09 Jan 20	12	0
13	13 Jan 20	19	0
	15 Jan 20	0	0
	16 Jan 20	5	0
14	20 Jan 20	> 100	0
	21 Jan 20	3	0
	22 Jan 20	> 100	0
	23 Jan 20	5	0
	24 Jan 20	0	0
15	27 Jan 20	0	0
	28 Jan 20	0	0
	29 Jan 20	0	0
	30 Jan 20	0	0
	31 Jan 20	0	0
16	03 Feb 20	0	0
	04 Feb 20	0	0
	05 Feb 20	0	0
	06 Feb 20	0	0
	07 Feb 20	17	0

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Results: AccuPRO-ID® MALDI-TOF

Commonality	Identification	AccuPro-ID® Report Number
1	*Staphylococcus haemolyticus*	C4046370 - 20200410184
2	*Staphylococcus hominis*	C4046371 - 20200410184
3	*Micrococcus luteus*	C4046372 - 20200410184
4	*Micrococcus luteus*	C4046373 - 20200410184
5	*Staphylococcus haemolyticus*	C4046374 - 20200410184

Notes:

These are the five isolates sent to Charles River for identification by MALDI-TOF, as described in the Counting Procedure (4).

While five visually different types of colony were sent for identification, there were found to be two duplicates when processed by Charles River.

Staphylococcus haemolyticus is a member of the coagulase-negative staphylococci (CoNS). It is part of the skin flora of humans. It is a well-known opportunistic pathogen, and is the second-most frequently isolated CoNS (*Staphyloccus epidermidis* being the first).

Staphylococcus hominis (also a CoNS member) may occasionally cause infection in patients whose immune systems are compromised, for example by chemotherapy or predisposing illness.

Micrococcus luteus is a gram-positive bacterium found in soil, dust, water and air, and as part of the normal microbiota of the skin. *Micrococcus luteus* is considered a contaminant in sick patients and is resistant by slowing of major metabolic processes and induction of unique genes.

Results: Methicillin-resistance testing

Sample	Methicillin-resistance identified (no zone of inhibition)
1	No
2	No
3	Yes
4	No

These samples were tested in-house by Abbott Analytical Ltd As per Counting Procedure (5).

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Results: Lancefield Grouping

Lancefield Group [a]	Species	Haemolysis	Most Common Human Diseases	Number of Isolates
A	*Streptococcus pyogenes*	β	Pharyngitis, skin infection, wound infection, necrotizing pneumonia, conjunctivitis, postinfectious glomerulonephritis and rheumatic fever	4
B	*Streptococcus agalactiae*	β	Neonatal septicaemia, meningitis, osteomyelitis, pneumonia	0
C [b,c]	*Streptococcus dysgalactiae* subsp *equisimilis*	β	Wound infection, cellulitis, endocarditis, epidemic pharyngitis, pyogenic arthritis	0
	Streptococcus equi subsp *zooepidemicus*	β	Septicaemia, nephritis	0
D	**Enterococci** *Enterococcus faecalis* *Enterococcus faecium* **Non-enterococcal species** *Streptococcus bovis*	γ	Neonatal septicaemia, intestinal and peritoneal infection, urinary tract infection, opportunistic infection	3
G [b,c]	*Streptococcus dysgalactiae* subsp *equisimilis*	β	Puerperal infection, skin and wound infection, endocarditis, pyogenic arthritis	1
Not groupable [d]	*Streptococcus pneumoniae*	α	Pneumonia, otitis media, sinusitis, meningitis	0
	Other viridans Streptococci Streptococcus mitis Streptococcus salivarius *Streptococcus anginosus* group *Streptococcus mutans* group *Streptococcus vestibularis* *Streptococcus parasanguis*	α [e]	Endocarditis, septicemia, dental infections, intravascular catheter–related infection	0

a) Serogroups E, F, H, and K through V are rarely associated with human infections.
b) Other group C and group G Streptococci are unusual causes of human infections.
c) *Streptococcus equi* subsp *equisimilis* can have other Lancefield antigens, including groups A, G, and L.
d) Minute, colony-forming organisms of Lancefield groups C, D, and G are included with the viridans Streptococci.
e) Occasional viridans streptococci are non-haemolytic, and others are β-haemolytic.

These samples were tested in-house by Abbott Analytical Ltd As per Counting Procedure (6).
Two of the ten colonies tested did not match any of the above groupings.

Report prepared by:

Signed: 

Name: Tony Watson

Position: General Manager

Date: 15 July 2020

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