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A STUDY OF DOOR HANDLES, THEIR CONTAMINATION LEVELS AND THE EFFECT OF A HANDLE HYGIENE SANITISING SYSTEM ON THEM, IN A BUSY HOSPITAL ENVIRONMENT.

Introduction

CONTEXT

Door handles and particularly washroom door handles are a well-documented source of cross contamination. (1)

It is a simple fact, not everybody washes their hands after using the toilet. (2)

Indeed, studies have shown that washing and drying your hands in an improper manner, can be even more harmful than not washing them at all, resulting in door handles becoming contaminated more easily with microbes commonly associated with washrooms (3), which in turn creates a source of contamination for Clean Hands and Clean Hands, as we all know, are essential for maintaining good standards in any Healthcare Facility, for protecting the vulnerable and avoiding the socioeconomic impact of Hospital Acquired Infections. (4)

It is therefore important to ensure that unavoidable commonly touched surfaces, such as door handles, are constantly sanitised, in order to help prevent the contamination of clean hands (5) and support any strategy designed to limit avoidable pathogen transmission.

TRIAL

The purpose of the trial is twofold:

A. To demonstrate the level of contamination, if any, on a number of commonly touched door handles in the hospital.
B. To demonstrate the efficacy of the Handle Hygiene Sanitising System on contaminated door handles in a hospital.

To ensure we complied with best practice, for the purpose of this trial,

it was agreed to engage the use of

Nordia Hygicult TPC contact slides, a means recommended for

such testing by Infection Control Specialist

Dr. Stephanie Dancer, NHS. Lanarkshire, Scotland.

PLACEMENTS

Twelve doors on two different levels in the hospital, the A&E Dept. and Men's Ward 8, were selected for inclusion in the trial.

1. The inside handle of the entrance door to the isolation room in A&E
2. The inside handle of the toilet in the isolation room.
3. The inside handle of the Sluice room door in A&E
4. The outside handle of the Sluice room door in A&E
5. The inside handle of the Sluice room door in Ward 8.
6. The outside handle of the Sluice room door in Ward 8.
7. The outside handle (ward side) on the exit door to the toilet in 2nd Men's ward.
8. The inside handle (toilet side) on the exit door to the toilet in 2nd Men's ward.
9. The outside handle (ward side) on the exit door to the toilet in 1st Men's ward.
10. The inside handle (toilet side) on the exit door to the toilet in 1st Men's ward
11. The inside handle on the toilet door in isolation room ward 8.
12. The inside handle on the entrance door to the isolation room in ward 8.

STAFF INCLUSION

Before commencing the trial, the system was introduced where possible to staff on the ground in both areas, so as to gain their support and to give them an understanding of what it was about and how it worked and to alleviate any concerns that can surround the introduction of any new product into the work place.

The system gained huge approval amongst staff and was spoken about positively throughout the course of the trial, demonstrating staff support for a system that can help reduce infections without interfering with normal day to day workflow.

TRIAL PROCEDURE

Prior to the installation of the Handle Hygiene door units, all handles on the assigned doors were monitored for microbial contamination, using the Hygicult Contact Slides, to test the various parts of each handle, top, bottom, front and back.
All the handles were swabbed and the swabs subsequently incubated at 31-33^{o} C for 48 hours to highlight microbial growth and provide a base line for comparison purposes. (Nov. 3rd H/H 1.)

Handle Hygiene Door Unit

The Handles were further tested on November 8th, 10th, 14th and 20th and all swabs again incubated for 48 hours.

Included in the swabbing on Nov. 10th (H/H.3) were two randomly selected high use handles, namely the Ladies and Gents toilet door handles in the main reception area.

Again, throughout the course of swabbing on Nov.14th (H/H.4) two more handles were randomly selected in a Staff toilet and Patient toilet for comparison purposes, so as to give an indication of the efficacy of the Handle Hygiene units.

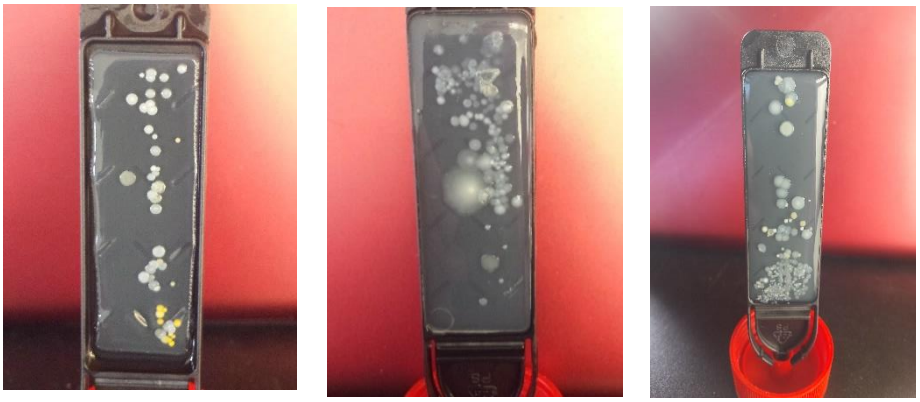
Swabbing of the door handles was completed one week later on Nov. 20th (H/H.5) as the trial drew to a close.

RESULTS

Upon completion of the trial, the swabs were all grouped and documented along with all data collected and forwarded to Trinity College Dublin for analysis. The results are seen here with typical examples of swabs from each test.

H/H 1

Typical swabs from baseline collected Nov.3rd.



H/H 2

Typical swabs with units installed collectedNov.8th

H/H 3

Typical

Swabs with

Units installed

collected

Nov.10th



H/H 3

Sample of randomly selected doors,

1 ladies and 1 Gents

with no door units in place.

Collected Nov. 10th


H/H 4

Typical

Swabs with units

Installed.

Collected Nov 14th



H/H 4

Samples of randomly selected doors, 1 staff and

1 patient toilets, with no units, Collected Nov.14th


H/H 5

Typical

Swabs with units

installed

Collected Nov. 20th

ANALYSIS

The analytic report by Dr. Ronnie Russell of Trinity College Dublin in section 2 of this report, outlines how the handles, prior to installation of the Handle Hygiene units, harboured considerable contamination, with a range of Bacteria, Yeast and Fungi, sufficient to ensure that any clean hand that touched them was vulnerable to contamination.

Some of the bacterial colonies found on the handles included species of Staphylococcal, Klebsiella, Micrococcus, Prevotella, Bacillus, Stenotrophomonas and Pseudomonas all of which pose a risk to any Healthcare Environment and its occupants.

Dr. Russell's report also clearly demonstrates the effect of the Handle Hygiene Sanitising System on such contaminated door handles, reducing the "Colony Forming Units" from an average of 49 cfu's per swab on the original baseline, to an average of just 1 cfu and then levelling at an average 2.2 cfu's on each of the swabs subsequent to the introduction of the Handle Hygiene system, with a guide for even greater reduction.

CONCLUSION

Our study concluded that in hospitals, door handles are a potential source for the transfer of bacterial and fungal pathogens on to the hands of health care workers, patients and visitors alike, in turn promoting the transmission of germs throughout that cause HAI's.

Hospitals by their very nature are susceptible to germs and cross contamination exasperates this problem, because there is simply no single hard and fast way to eliminate it.

It is only through multipronged strategies that success can be achieved.

Systems such as Handle Hygiene play an important part in any multipronged approach, by addressing the problem of contaminated door handles.

The system not only cleans handles, but it keeps them clean permanently, preventing them from being a source of cross contamination, while at the same time transferring traces of sanitiser onto the hands of people who use them, helping **keep Clean Hands Clean** while **Disrupting the Chain of Infection**.

THE END.

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2. A Study on Hand Contamination and Hand Washing Practices among Medical StudentsWatutantrige Ranjit De Alwis, Premalatha Pakirisamy, Lum Wai San, and Evelyn Chen Xiaofen

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5. **Hospital Door Handle Design and Their Contamination with Bacteria: A Real Life Observational Study. Are We Pulling against Closed Doors?**

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Vishnu Chaturvedi, Editor

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Section 2

Analysis of Swabs from H/H …. Hospital

Throughout the course of a trial at H/H Hospital of the Handle Hygiene Sanitising System for door handles, 12 doors in different areas of the hospital were selected for inclusion in the trial.

The handles on these 12 doors were microbiologically monitored using Hygicult TPC contact slides to determine if any and if so, how much and what, microbial growth was on each handle.

All handles were monitored both pre. Installation of the Handle Hygiene units and post installation, so as to give a comparison that would help determine the efficacy of the Handle Hygiene system.

Randomly selected handles within the hospital were also monitored throughout the course of the trial for comparison purposes.

All the swabs were incubated in accordance with the manufacturers recommendations in the laboratory at the hospital and all data gathered submitted to Trinity College Dublin for analysis.

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Brian

I have looked at the slides you have sent and the simplest way of explaining the efficacy is as follows:

On Nov. 3rd prior to introducing your system, 18 samples were taken from door handles in the hospital. There were 888 colony forming units recovered from these handles which averages out at 49 per sample.

The next set of samples after commencement of use of the handle hygiene units, taken on Nov. 8th had only 26 colony forming units between all 24 samples, which is an average of just over one per sample.

Samples taken on Nov 10th were all terrific apart from 7A. Even though it looks bad there are only three colonies on it and one of them is bacillus which is motile and swims all over the place. The extra swabs taken from the ladies and gents toilets at the reception area showed mixtures of everything including staphylococci.

The samples taken on 14 November had 66 colony forming units on 19 samples which was an average of 3.5 colony forming units per sample, also on 14 November four extra samples were taken from staff and patient toilet door handles. These produced 65 colony forming units plus an amount of probably pseudomonas biofilm per sample which is an average of over 16 colony forming units per sample.

The final set of samples from 20 November had 44 colony forming units on 20 samples which is an average of 2.2 colony forming units per sample.

Note: the bacterial colonies seen in these samples suggest a wide range of species including those typical of staphylococcal species, Klebsiella, general coliforms, micrococcus, prevotella, Bacillus species, possibly stenotrophomonas and very definitely pseudomonas. These would need to be speciated properly in a laboratory however. There are doubtless many opportunistic species and pathogenic species present here and it would be worthwhile looking at their antibiotic resistance patterns also. They do present risk in a healthcare environment.

From the results obtained, it is clear that the handles sampled prior to use of disinfectant were a vector of microbial dissemination between users and further dissemination to the healthcare environment. Although the figures from these handles which were subjected to normal hospital cleaning procedures averaged 49 per sample, one should remember that these contact slides can only sample a fraction of each handle, therefore the total counts per handle are much much higher.

After use of the disinfectant, the average bacterial count per sample dropped to 1, 3.5 and 2.2 on the respective days or an average of 2.1 colony forming units per sample overall. This is quite a significant reduction and would contribute to infection-control measures in the hospital.

An observation regarding the samples: there are one or two anomalous results both before and after implementation of the disinfection system. These, in my experience, are caused by users whose hands are wet and where disinfectant is used, it takes longer for the disinfectant to work due to dilution. There is also evidence in these cases that quite a number of bacterial species may have come from the hot water system or taps indicated by the pseudomonas and Bacillus species particularly.

In this series of tests, although quite limited, it can be seen that the disinfection system almost eliminates microbial carriage on the door handles.

If you need any clarification on any of this, drop me an email as I will be lecturing at a research conference in Turkey next week and then working at the United Nations the week after. I will not have my phone on much of the time.

Kind regards,

Ronnie

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