



# Surface Contamination of Outpatient Clinics Before and After Routine Cleaning

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## ABSTRACT

This project presents the results of environmental sampling of outpatient clinics to determine the levels of surface contamination with MRSA and Group A Streptococcus (GAS) that existed on contact surfaces in outpatient clinics before and after routine cleaning. The floors, reception desk and chairs in the waiting area as well as the floors, exam table and accessory table in an exam room were sampled with two types of contact plates selective for MRSA and GAS respectively to determine the level of contamination with viable organisms at 3 distinct time points. Surfaces were sampled at the end of the clinic day, at the beginning of the clinic day after routine cleaning had occurred but before patients were present, and after a chlorine dioxide fogging of sampled surfaces. For this project, 5 different clinic types were sampled: an academic primary care clinic co-located with an urban teaching hospital, an academic primary care clinic in a suburban medical office building, a non-academic primary care clinic in a suburban medical office building, an academic infectious diseases clinic, and an occupational medicine and student health clinic.

There was significant variation in the levels of contamination observed on clinic surfaces with the academic primary care clinic co-located with an urban teaching hospital having the highest overall levels of surface contamination both before and after routine cleaning and the occupational medicine clinic having the lowest levels of contamination.

On average, in the patient waiting area, the number of MRSA CFU on a 15x60 mm contact plate for the floor samples increased from 2.3 at the end of the day to 4.6 after routine cleaning. The CFU/plate for the samples of the chairs increased from 7.1 at the end of the day to 17.3 after routine cleaning and the contamination of the reception desks decreased from 2.5 at the end of the day to 1 after routine cleaning.

In the exam rooms, MRSA contamination on floors increased from an average of 2.2 CFU/plate at the end of the clinic day to 4.0 after routine cleaning. The exam table levels also increased from 1.9 CFU/plate at the end of the clinic day to 13.0 after routine cleaning. The exam room accessory surface contamination levels increased from 8.8 CFU/plate to 30.4 CFU/plate after routine cleaning on average.

GAS contamination in patient waiting areas showed a similar but distinct pattern with the average from the floor samples at 3.1 GAS CFU/plate before routine cleaning and 3.8 after. The waiting area chairs increased from 3.7 CFU/plate before cleaning to 5.9 after cleaning. The reception desk however, decreased from 4.2 CFU/plate before cleaning to 0.3 after.

In the exam rooms, the floors and exam table showed decreased levels of contamination after routine cleaning falling from 4.6 to 2 and from 13.9 to 1.6 CFU/plate respectively. The accessory surfaces in the exam room however showed increased GAS contamination after routine cleaning rising from 4.5 to 5.7 CFU/plate on average.

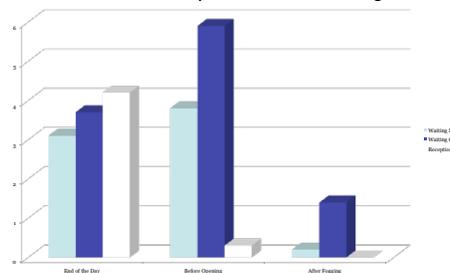
## MATERIALS AND METHODS

Clinic surfaces in both patient waiting areas and patient examination areas were sampled with 15x60mm contact plates containing HardyCHROM™ MRSA CP, a chromogenic medium for the detection of MRSA from environmental surfaces as well as selective beta strep agar respectively. Sampling was conducted according to manufacturers recommendations (Hardy Diagnostics, Santa Maria, CA) with two plates used for each sampling point, incubated, and then the number of colonies on each plate counted and the two plate counts averaged to yield the final value for each point. 3 points were sampled in the patient waiting areas as well as in the patient examination areas of each of 5 outpatient clinics, at the end of the clinic day, at the beginning of the clinic day before patients had arrived, but after routine cleaning, and then after the surfaces had been fogged with a solution of stabilized chlorine dioxide (VitalOxide, Vital Technologies, West Palm Beach, FL) for a total of 90 sampling points.

## RESULTS

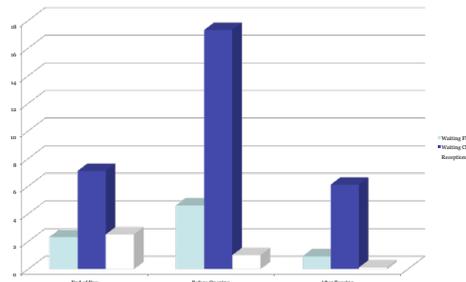
There was significant variation in the levels of contamination observed on clinic surfaces. In patient waiting areas, GAS contamination observed in the floor samples increased from 3.1 GAS CFU/plate before routine cleaning and 3.8 after. The contamination of waiting area chairs increased from 3.7 CFU/plate before cleaning to 5.9 after cleaning. The reception desk however, decreased from 4.2 CFU/plate before cleaning to 0.3 after, with the fogging treatment significantly reducing contamination in all areas

Average CFU of Group A Streptococcus per 15x60mm contact plate- Patient Waiting Areas



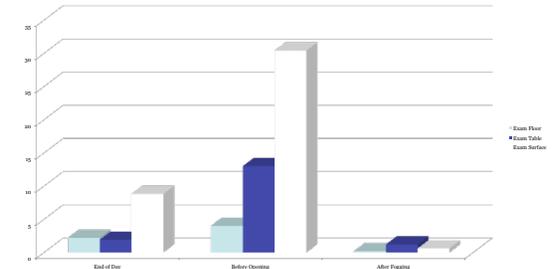
Further, the MRSA contamination in the patient waiting areas increased from 2.3 CFU/plate at the end of the day to 4.6 after routine cleaning. The contamination noted in the samples from the chairs increased from 7.1 at the end of the day to 17.3 after routine cleaning and the contamination after routine cleaning of the reception desks decreased from 2.5 at the end of the day to 1.

Average CFU of MRSA per 15x60mm contact plate- Patient Waiting Areas

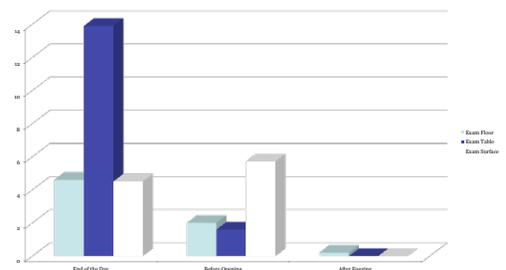


In the exam rooms, MRSA contamination on floors increased from an average of 2.2 CFU/plate at the end of the clinic day to 4.0 after routine cleaning, while GAS contamination fell from 4.6 to 2 CFU. The exam table MRSA levels also increased from 1.9 CFU/plate at the end of the clinic day to 13.0 after routine cleaning with GAS levels likewise falling from 13.9 to 1.6. The exam room accessory surface contamination detected for both MRSA and GAS increased from 8.8 CFU/plate to 30.4 CFU/plate and 4.5 to 5.7 CFU/plate respectively after routine cleaning as well.

Average CFU of MRSA per 15x60mm Contact plate- Patient Examination Areas



Average CFU of Group A Streptococcus per 15x60mm contact plate -Patient Examination Areas



## CONCLUSIONS

These data suggest that detectable Group A Streptococcus and MRSA surface contamination may actually increase during routine cleaning of patient waiting areas in outpatient clinics of a variety of types, particularly on patient waiting area chairs and floors. Additionally, detectable MRSA levels on surfaces in patient examination areas may also increase during routine cleaning as well, such suggesting that a variety of surfaces in both clinical and non-clinical areas of outpatient clinics could serve a role in the transmission of important human pathogens.

Further, simple fogging with a hospital-grade disinfectant appears to be effective at reducing surface contamination in this context and as such may be a useful tool in reducing the risk of the transmission of infection in outpatient settings

## ACKNOWLEDGEMENTS

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