



## KEY POINT SUMMARY

### OBJECTIVES

The objective of this study was to identify the presence of different viruses in the toilet environment of a hospital unit and an office building.

### DESIGN IMPLICATIONS

High-touch surfaces like door handles, flushing buttons, toilet seats and covers were found to be the most contaminated. The authors identify two sources of contamination – hands and water – this alludes to the need for adequate hand hygiene provisions in and outside toilets in wards and offices.

## Viral contamination of aerosol and surfaces through toilet use in health care and other settings

Verani, M., Bigazzi, R., & Carducci, A. 2014 | *American Journal of Infection Control*. Volume 42, Issue 7, Pages 758-762

### Key Concepts/Context

Aerosol and surface contamination are significant to the transmission of viral infections in hospitals. The contamination of surfaces like door handles, toys, banisters, fabrics, flushing handles on toilets, etc., can occur through direct contact with an infected material or indirectly through unwashed hands or settling down of large aerosol droplets. This study examined the toilet as a probable source of both air and surface viral contamination in a hospital unit and in an office building. Samples collected from multiple surfaces and the air and water from toilets in these two settings revealed the presence of three distinct viruses. Samples also identified a connection between human adenovirus (HAdV) strains found in the water and those found on various surfaces. This led the authors to conclude that toilets are a source for viral contamination, especially in hospitals.

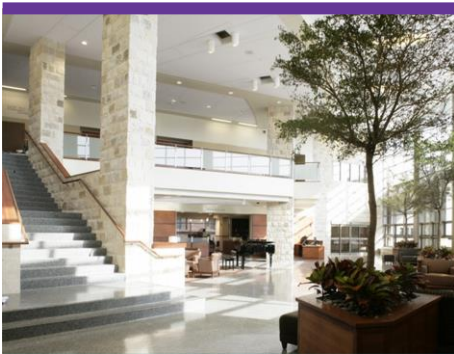
### Methods

Three different types of samples were collected from five toilets of the nephrology ward of a hospital and two toilets of an office building. A total of 172 surfaces were swabbed, 43 air samples were collected, and water samples were collected from 19 toilets. Two sets of samples were collected – one before and one after the toilets were cleaned. The data obtained were subject to statistical analyses to determine the frequencies, differences, and correlation.

### Findings

The following are the findings of the study:

- Viruses were found on 135 of the 172 surfaces tested, in 35 of the 43 aerosol samples, and in 17 of the 19 water samples.



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- In the samples collected from the hospital, 89 of the 108 surfaces tested and 23 of the aerosol samples were found to be contaminated with viruses.
- In the samples collected from the hospital, four of the 108 surfaces tested and 11 of the aerosol samples were found to be contaminated with bacteria.
- Three kinds of virus were found in the samples – HAdV, toque teno virus (TTV), and norovirus (NoV). Of these the frequency count of HAdV was the highest both in the surface and aerosol samples of the hospital and office settings. Only one of the 108 surfaces in the hospital was found to be contaminated with NoV. None of the other samples (from the hospital or the office) had any NoV contamination.
- The surfaces found to be the most contaminated (in descending order of contamination) were door handles, flushing buttons, toilet seats, and toilet covers.
- After cleaning, the frequency of the TTV and bacterial count in the samples collected from 48 hospital and 32 office surfaces was found to be much less, although this was not statistically significant.
- The frequency of the HAdV increased in the hospital surface samples after cleaning (the mean concentration of HAdV increased from 349 to 1371 (P=0.08)).
- Authors identify two sources for contamination – hands and water particles released into the air after the flushing of toilets (the HAdV strains in the water samples corresponded with those found on samples obtained from different surfaces).

### Limitations

The authors did not identify any limitations for this study. However, they do not provide a description of the physical layout of the toilet vis-à-vis the office area and hospital ward. Neither do they provide data pertaining to admitted or examined patients – whether any were infected with the identified virus or bacteria during the time of the study. This information would have added more rigor to the study.

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