Research report: computer surfaces and cross-infection

Maggie Gulliford • Registered Nurse, Infection Control Unit, Royal Brisbane Hospital, Queensland

Glenn Gardner • Senior Lecturer, Nursing, Griffith University, Brisbane, Queensland

Abstract

The computer is fast becoming part of the furniture in many hospital settings. Increasing reliance on the computer for documentation and dissemination of information in patient-care areas has increased the need to consider this equipment as a potential environmental reservoir for microorganisms. This paper reports on a small experimental study which investigated the potential role of computers in cross-infection. The results indicate that computer surfaces are similar to other environmental surfaces and carry the same risks for cross-infection.

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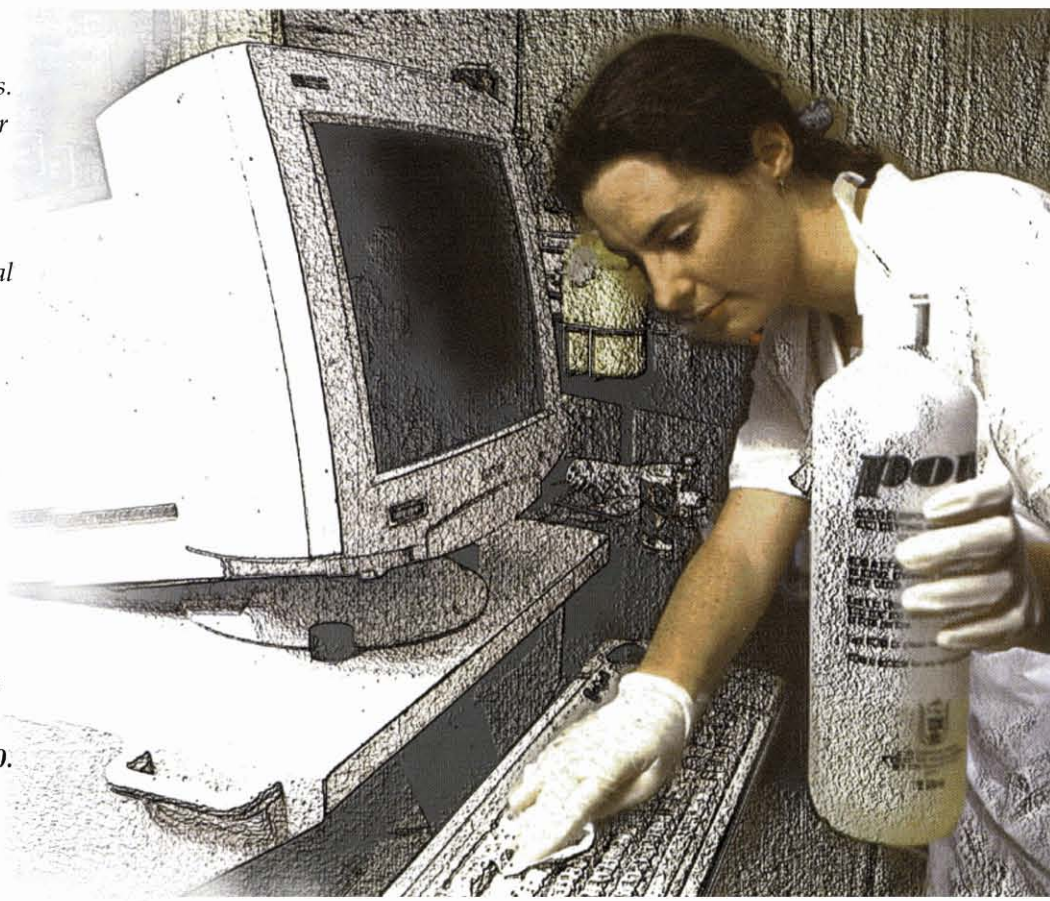

Introduction

Certain physical environments within the hospital have been recognised as high-risk in terms of transmission of nosocomial organisms; examples of these are the dialysis setting [1] and endoscopy clinics [2]. The risk in these areas relates particularly to the types of equipment used in patient care. Notwithstanding the specific risk in these areas, there is increasing evidence that the inanimate environment in hospitals is not a major factor in the incidence of nosocomial infection. For example, a classic study by Maki and Alvarado [3] demonstrated that moving from an old hospital with high levels of contamination to a new hospital with low levels of contamination had no effect on the incidence of nosocomial infections. More recent studies support this finding, with the focus on the human factor as a major role in the incidence of such infections.

Despite these arguments, it is recognised that the inanimate environment of the hospital setting in general does play a role in cross-infection [4,5]. Aggregation of environmental contamination increases the chance that microorganisms will reach susceptible hosts. Hence, maintaining a clean environment is an essential aspect of infection control. There is much accumulated knowledge on the cleaning and decontamination of surfaces and equipment in the hospital environment [6] and the processes concerned are incorporated into the daily work practices of health-care professionals.

One piece of equipment that is slowly but steadily becoming 'part of the furniture' in the hospital environment is the

computer. The addition of this technology to the array of health-care equipment has been subtle, with the major focus being on its role in patient care. Less attention, to date, has been paid to the implications for infection control.

This paper describes a small experimental study designed to determine whether computers are potential reservoirs of microorganisms and, if so, whether there is a risk of cross-infection via this equipment.

Background

There is no literature on the possible impact of computer keyboards and mice on cross-infection in the clinical area. Nor does any provide recommendations on the decontamination of computers in clinical areas. However, there is a significant amount of literature to indicate that organisms are present on environmental surfaces. Computers, and the ways in which they are used in the clinical setting, bring a new dimension to environmental factors in the area of cross-infection.

Computers are now standard equipment within specialist wards in some hospitals, and current trends indicate they will be commonplace in most general wards in the near future. As previously argued, other equipment – such as medication and dressing trolleys, intravenous infusion pumps and monitors – are already considered the norm in the hospital environment. The surfaces of such equipment are flat, and cleaning protocols already in place. The computer, by contrast, is a new innovation in patient care and not yet common in all clinical areas. There is, therefore, the need to develop an awareness of computer decontamination.

The questions that guided this study were:

- 'Do computer surfaces act as a reservoir for micro-organisms?' and
- 'What decontamination methods are effective for computer surfaces?'

Research design

Setting

The study was conducted at the Royal Brisbane Hospital, a 962-bed acute-care facility which, in addition to its general wards, has an intensive care unit, a neurosurgical intensive care unit, three operating suites, a day surgery and minor operating theatres. Within the clinical areas that use computers in patient care, decontamination is carried out by nursing staff at the end of each 8-hour shift, using 1 per cent neutral detergent.

Method

The experimental design used involving swabbing the computer surfaces before and after decontamination. A control was also used, enabling us to judge whether the introduction of computers had increased the risk of cross-infection in the clinical area.

The surfaces of the 12 computers in the intensive care unit and operating suites were swabbed. The swabs were taken, without the prior knowledge of clinical staff, on random days and in three sequences:

- at 0800 and 1200 hours on the same day;
- immediately pre-decontamination, and
- immediately post-decontamination.

Pre- and post-decontamination swabs were taken, to ascertain the appropriateness of using 1 per cent neutral detergent as a cleaning agent. As a control, swabs were taken from patients' charts in the neurosurgical intensive care unit, where computers are not used for patient documentation.

Results

Results indicate that computer surfaces are similar to other environmental surfaces and carry the same risks for cross-infection.

Computer and chart swab results

Swabs from the operating room (OR) and intensive care unit computers, taken 2 and 6 hours after decontamination, showed the following:

- coagulase-negative *staphylococci*;
- *Micrococcus* sp.;
- *Corynebacterium* sp., and
- *Staphylococcus aureus*.

No multi-resistant organisms were detected. One computer in the OR also grew a fungus.

These findings indicate that computers in patient-care areas are similar to other environmental surfaces in their capacity to act as a reservoir for microorganisms.

Analysis of the swabs taken from charts in the neurosurgical unit showed a small growth of *S. aureus* only. Therefore, while further research in this area is warranted, these preliminary results indicate that computers harbour more, and more varied, microorganisms than the traditional patient's chart.

Pre- and post-decontamination swabbing results

There was a significant reduction in the number of organisms following decontamination with a 1 per cent neutral detergent, a finding which supports the practice of environmental decontamination as an important infection control strategy.

Conclusion

This small study has examined an area of health-care practice not previously researched. With the increasing reliance on computers in patient care, this equipment must be considered an additional environmental factor for consideration in infection control. We have shown that both environmental and skin microbes are present on computer keyboards and charts.

Currently, the policy for decontamination of most hospital equipment involves the use of a 1 per cent solution of neutral detergent. With our environmental swabs of computer keyboards and previous swabs of other equipment, we have shown that this method of cleaning can dramatically reduce the numbers of organisms present. The potential for cross-infection from keyboard organisms is significantly reduced when the number of organisms is kept low.

The manufacturer of the computer systems, in response to the concerns of nursing staff regarding the potential for cross-infection from keyboards, provided plastic covers which protect them from moisture and spills and facilitate cleaning. It is essential that appropriate cleaning methods are used frequently, to decrease the number of microbes present. This study has indicated that the decontamination method currently in use at the Royal Brisbane Hospital is effective.

Further, the study has highlighted the need to educate staff regarding the importance of frequent, appropriate environmental cleaning and provided empirical evidence to reinforce teaching in this area.

References

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