

# Do the pens used by nursing students in clinics cause bacterial contamination?

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## ABSTRACT

**Background:** Health professionals and their medical equipment have long been known to act as vectors of infectious diseases. The aim of the present study was to evaluate the role of pens used by nursing students working in clinics in relation to transmission of bacteria.

**Materials and Methods:** The study was conducted in Sakarya University School of Health Sciences in March 2012, with the voluntary participation of 40 third-grade nursing students during their clinical practice. In total, 40 writing items were surveyed.

**Results:** Twenty-two (55%) of the students were doing their clinical practice at pediatrics department and 18 (45%) were at obstetrics and gynecology department. All the samples consisted of pens and bacterial contamination was observed in 5 (12.5%) of them. The microorganisms identified were: 1 (2.5%) sample was *Staphylococcus hominis*, 2 (5%) were *Staphylococcus epidermidis*, 1 (2.5%) was *Staphylococcus haemolyticus*, and 1 (2.5%) was *Staphylococcus warneri*.

**Conclusion:** This study highlights the risks of nosocomial infections, especially in pediatric units, if not enough attention is paid to the cleanliness of the pens used in the clinics.

**Key words:** Equipment contamination, hygiene, nursing students

## INTRODUCTION

Health professionals and their medical equipments have long been known to act as vectors of infectious diseases. Many microorganisms responsible for hospital-acquired infections are able to stay viable on the surfaces of medical equipment.<sup>[1]</sup> Most equipments harbor potential pathogens. The risk of infection caused by pens in hospitals has not yet been determined, and there are no cleaning guidelines available. However, the pens are used routinely all day long, but not cleaned properly. Health care workers may not wash their hands as often as they should. Recommendations to reduce contamination risks include staff education, strict hand hygiene measures, and guidelines on device cleaning.<sup>[2]</sup> The cleaning agents mostly used for removal of microorganisms from the devices are alcohol swabs, but sterile water swabs are also effective. However, manufacturers mainly recommend (74%) cleaning the devices with water and detergent.<sup>[1,3]</sup> Apparently, the current recommendations of

regular disinfection of medical equipments have not been followed by the health staff.<sup>[4]</sup>

Literature review did not yield any study regarding infection in the clinics related to use of pen or pencil. For this reason, our study was aimed to evaluate the role of pens used by nursing students working in clinics, in relation to transmission of bacteria.

## MATERIALS AND METHODS

The study was performed with a total of 40 students from Health High School in Sakarya in March 2012 by taking samples from the pens/pencils that they used in clinical applications. Before starting the study, all necessary permissions and approvals were taken, both from institutions (Sakarya University School of Health Sciences and State Hospital) and all participants. The study realized during practice clinical application of students in a state hospital. All participants were in third grade in the university. They are also apprentices in the state hospital. Instead of selecting a sample, all students engaged in clinical practice were enrolled in our study.

A meeting was held with the students and information regarding the study was given to them on the same day. Selection of sample was not done as all the students volunteered to participate in the study. The study was performed by taking samples from pens/pencils that

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belonged to 18 students in the maternity clinic and 22 students in the pediatrics clinic.

Students were asked to fill up a self-administered questionnaire that was developed by the researchers. Age, gender, hand washing practice, and type of writing item used by the students were included in the questionnaire. The questionnaire consisted of totally 10 questions. Students were also asked to answer questions regarding their cleaning practices and use of their writing items.

In total, 40 writing items were surveyed. For sampling, a sterile swab moistened with sterile saline was rotated over the surface of the writing item. The sampling were immediately streaked onto two plates that consisted of blood agar and eosin methylene blue agar. The plates were incubated at 37°C for 24 h and 48 h. The isolated microorganisms were identified using colony morphology, Gram stain, catalase and oxidase reaction, and VITEK 2 (bioMerieux, France) system.

Continuous data were presented as mean  $\pm$  standart deviation (SD). Chi-square test, Pearson's and Fisher's exact tests were used for comparing categorical data. Categorical data were presented as number and percentages. The data were analyzed using commercially available statistical software (SPSS 21 demo). A *P* value  $<0.05$  was considered statistically significant.

## RESULTS

The mean age of the participants was 21.8 years (SD 1.20) (min 21 years, max 26 years). Twenty-nine (72.5%) of them were females and 11 (27.5%) were males. Twenty-two (55%) of the students were doing their clinical practice at the pediatrics department and 18 (45%) were at obstetrics and gynecology department. As an answer to the question, "Do you clean the pens/pencils that you use during clinical practices?," 18 (45%) of the participants reported never, 21 (52.5%) said sometimes, and 1 replied (2.5%) always. Twelve (30%) of the students stated that they used alcohol cotton, 3 (7.5%) used antiseptic, and 7 (17.5%) used wet wipes to clean their pens/pencils. Thirty-one (77.5%) of the students responded yes and 9 (22.5%) replied no to the question, "Do you use the pens/pencils that you use during clinical practice anywhere else?" It was found that 6 (15%) of the participants used their pen/pencil for the first time, while 34 (85%) of them had been using it for more than a week.

All the samples consisted of pens; bacterial contamination was observed in 5 (12.5%) of them and there was not any bacterial contamination in 35 (87.5%) of them. The microorganisms identified were: 1

(2.5%) sample was *Staphylococcus hominis*, 2 (5%) were *Staphylococcus epidermidis*, 1 (2.5%) was *Staphylococcus haemolyticus*, and 1 (2.5%) was *Staphylococcus warneri* [Table 1].

In the sample pens of the students practicing at the obstetrics and gynecology department, there was not any bacterial growth. Bacterial contamination was found in 5 (22.7%) samples from the pediatrics department, and in 17 (77.3%) samples, there was not any bacterial growth. The difference between the units was statistically significant ( $\chi^2 = 4.675$ ; *P* = 0.031).

Twenty-nine (72.5%) of the participants in the study were female students. 4 bacterial contamination detected among 5 were male students. There was statistically significant difference between genders, in relation to bacterial contamination (*P* = 0.015).

## DISCUSSION

Coagulase-negative staphylococci (CoNS) are now recognized as a major cause of nosocomial infections in neonatal intensive care units (NICUs) and are responsible for 48% of late-onset sepsis among very-low-birth-weight neonates. Although *S. epidermidis* causes 60-93% of CoNS bloodstream infections, several other CoNS species are reported to cause diseases in infants. Recently, a subspecies of *S. hominis*, *S. hominis* subsp. *novobiosepticus* (SHN), was isolated from blood cultures and other clinical specimens. The name derives from the combination of novobio, which is the property of novobiocin resistance, and septicus, pertaining to the ability to cause sepsis.<sup>[5,6]</sup>

The risk of infection involved in using the pens in the hospital has not yet been determined, as there are no cleaning guidelines available. However, the pens are used routinely all day long, but not cleaned properly, as health care workers do not wash their hands as often as they should.

**Table 1: Bacterial colonization of nursing students' pens in the study**

	<i>n</i>	%
Organisms isolated		
Yes	5	12.5
No	35	87.5
Isolated bacterial agents		
<i>Staphylococcus hominis</i>	1	2.5
<i>Staphylococcus epidermidis</i>	2	5
<i>Staphylococcus haemolyticus</i>	1	2.5
<i>Staphylococcus warneri</i>	1	2.5

Discussion regarding the study is limited due to no similar study exist in the literature. Similar studies were found on computer and mobile phones. In this respect our study is unique by now.

According to these results, it is obvious that providing training students about disinfection is very important. Decontamination of pens with alcohol disinfectant wipes may reduce the risk of cross contamination. Training is being given to nursing students regarding prevention of hospital infections and hand washing practices. This study highlights the risk of nosocomial infections, especially in pediatric units, if not enough attention is paid to the cleanliness of the pens used in the clinics.

### Limitations of the study and suggestion for future studies

The major limitation of the study is absence of control group. It is recommended to conduct studies with a control group and a larger sample size. At the same time, a similar study can be performed together with doctors, nurses, and students who work in clinics.

### CONCLUSION

This study highlights the risks of nosocomial infections, especially in pediatric units, if not enough attention is paid to the cleanliness of the pens used in the clinics.

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