

Practical study

Use of pens and touch pens in health care – what conclusions can be made regarding hygiene?



In health care, written documentation plays an important role, especially since detailed records are essential for the traceability of patient care and treatment. Both ballpoint pens for paper documentation and touch pens for digital devices are frequently used as helpful utensils here. A team of researchers found, however, that there was hardly anything in the scientific literature on pens and their potential to act as a reservoir for pathogens. They therefore conducted a two-stage practical study to investigate if pens can play a noteworthy role as a transmission vehicle for resistant bacteria—and came up with remarkable results.¹

Phase 1 – Which multidrug-resistant microorganisms can be found?

In the first study phase, the research team took swab samples of healthcare workers' pens that they carried in the pockets of their clothes. They included a total of 100 generally used and 100 personally used pens from the following areas: patient registration, treatment rooms, doctors' and nurses' ward rooms in general wards as well as intensive care units. Half of the generally used and half of the personally used pens were either plastic only or plastic with a non-slip rubber coating to cover different material compositions.

The samples were analysed on selective agar plates for the following multidrug-resistant bacteria: *Methicillin-resistant Staphylococcus aureus (MRSA)*, *Vancomycin-*

resistant Enterococcus (VRE) and *multidrug-resistant Acinetobacter baumannii (MDR-AB)*.

Contamination rate

Generally used ballpoint pens	69 %
Personally used ballpoint pens	49 %
Plastic ballpoint pens with a rubber coating	70 %
Pure plastic ballpoint pens	48 %

Basically, the contamination rate of general-use pens was higher than that of those used personally; and that of rubber-coated pens was higher than that of pens

Practical study

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made of pure plastic. Overall, more than half (59 %) of all pens harboured at least one of the three multidrug-resistant pathogens.

In descending order, the highest microbial load – i.e. the highest number of colony-forming units – was found on pens in the patient registration, doctors' ward rooms, nurses' ward rooms, treatment rooms and the intensive care units.

Phase 2 – Are pathogens transmitted by passing on pens?



In the second phase of the study, the researchers investigated if pens can actually pass on a relevant microbial load in daily routine. For this, they selected ten right-handed subjects with similar hand sizes and intact skin and instructed them to perform a thorough surgical hand disinfection at the beginning of the experiment to reduce any bacterial load of the resident and transient skin flora to less than 30 CFU/ml (colony-forming units per millilitre). Then, subject 1 immersed his/her right hand in a non-pathogenic *Escherichia coli* suspension. After five minutes of air-drying, the participant held a previously sterilised pen in his right hand as if writing for 30 seconds, then handed the pen to the right hand of the next participant, who again passed the pen on to the next participant after

30 seconds. This sequence was continued until the tenth participant, while the fingertips of the subjects' right hands were sampled immediately after the pen was handed over. The samples were then incubated. This experiment was repeated ten times.

Analysis showed that the bacteria were transmitted up to the tenth subject, with the microbial load decreasing successively from one subject to the next. The fingertips of the test person on the fourth position still harboured about 2,500 CFU/ml – corresponding to roughly half of the number of germs that had been transferred from the first to the second test person via the pen.

Based on their study results, the researchers recommended disinfecting the pens at least four times a day with an alcohol-based surface disinfectant – in addition to adequate hand hygiene.

Combined use of touch pens and digital devices

Digital devices are commonly used in health care and a comparative study at a German tertiary care hospital found that their use even increased significantly during the coronavirus pandemic compared to the pre-pandemic period. Samples from 26 different departments revealed a bacterial contamination rate of 99 % on all mobile phones – with around 40 % of them being contaminated with clinically relevant bacteria such as *methicillin-resistant Staphylococcus aureus*, *Enterococcus faecalis* or *Acinetobacter baumannii*. Also, 50 % of the users surveyed stated that they only disinfect their devices when they are visibly contaminated.

Accordingly, when using touch pens in combination with digital devices, in addition to hand disinfection as indicated, it is important to not only disinfect the pens but also to regularly disinfect the digital devices used with them in order to eliminate both items as infection vectors.

Practical study

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Conclusion

Pens – both used generally and personally – can often be colonised with multidrug-resistant bacteria, which are then transmitted by passing the pens on to other people. Pens with a smooth plastic surface are better than those with an additional rubber coating – and pens used personally are preferable to those that are shared.

Digital devices may also act as a reservoir of pathogens for clinically relevant bacteria, so when used together with touch pens, not only the pens but also the digital devices need to be disinfected regularly. As a general rule, it is important that hand hygiene is carried out as indicated.



Practical tip

First document, then disinfect – with L+R surfacedisinfekt® alcohol tissues and wipes:

Regular disinfection as indicated reduces the risk of transmission of pathogens via pens and digital devices. Make sure that all contact and difficult-to-reach surfaces are sufficiently wetted. For digital devices, disinfect both the front and the back, avoiding excess disinfectant from getting into the device's recesses. L+R surfacedisinfekt® alcohol wipe products are extensively tested for material compatibility, also with protective films. For detailed test results, please read here: <https://prevent-and-protect.com/media/disinfection-of-surfaces-and-medical-devices/>

For more information on our disinfection products:

<https://www.lohmann-rauscher.com/en/products/disinfection/>



Use surface disinfectants with care.

Always read the label and product information before use.

¹ Zhang J, Wang X, Sun Z, Zhu B. How dirty are the pens in health-care environment? An easily overlooked detail of hand hygiene. *Am J Infect Control.* 2022 Jan;50(1):108-110. doi: 10.1016/j.ajic.2021.07.015

² Tannhäuser R, Nickel O, Lindner M, Bethge A, Wolf J, Borte S, Lübbert C. Bacterial contamination of the smartphones of healthcare workers in a German tertiary-care hospital before and during the COVID-19 pandemic. *Am J Infect Control.* 2022 Apr;50(4):414-419. doi: 10.1016/j.ajic.2021.09.025