

Biosafety in imaging: a constant priority

 **Daniel Pinto Agüero**^{1,2},
 **Martina Jácome Hidalgo**³,
 **Hugo Buitano Faúndez**¹

¹ Universidad Finis Terrae, School of Medicine and Health Sciences. Santiago de Chile, Chile.

² Asociación Latinoamericana de Radiología e Imagenología Dentomaxilofacial (ALARID). Santiago de Chile, Chile.

³ Hospital Dr. Sótero del Río, Puente Alto, Chile.

Dear Editor,

I am writing to highlight the critical and ongoing importance of biosafety in the specialized field of dental imaging. This topic encompasses a set of standards to reduce the risk of acquiring or transmitting infectious disease pathogens during routine professional activities, and it is essential for ensuring safe, high-quality care.

In the field of maxillofacial imaging, both conventional and digital radiography can be sources of cross-contamination via saliva and blood and therefore require strict infection-control protocols (1,2). In conventional radiography, intraoral films are disposable, which limits their reuse and reduces the direct risk of contamination of the receptor. However, they may contaminate gloves, remote controls, positioning devices, and surfaces, as can also occur with digital radiography (1). In digital radiography, the risk profile changes because sensors and phosphor plates are not disposable; they are reused and have a high potential for cross-contamination if barrier sheaths fail or are used improperly (1,3,4). Microbiological studies conducted in teaching clinics have reported the growth of fungi, staphylococci, and gram-negative bacilli on intraoral sensors, keyboards, computer mice, and remote controls, demonstrating that digital systems can serve as a vehicle for infection if hygiene practices are inadequate (2).

A classic study conducted in dental offices evaluated cross-contamination between patients during radiographic examinations. It demonstrated that *S. pyogenes*, *S. aureus*, and *S. pneumoniae* could be transmitted between patients through the operator's hands and X-ray equipment (5). Reviews on pathogen persistence on surfaces have reported that *S. pyogenes* can survive from 2 hours to several days or even months, depending on the type of surface, temperature, humidity, and its ability to form biofilms. On glass, metal, and plastic surfaces, survival times of 2 to 48 hours have been described, whereas within biofilms on plastic, the organism may persist for weeks or months (6,7). Given this survival rate, radiographic equipment should be disinfected between patients to reduce the risk of cross-contamination (5,8).

Received: November 04, 2025

Accepted: April 20, 2026

Online: June 30, 2026



Open access article

© The authors

Cite as:

Pinto D, Jácome M, Buitano H. Biosafety in imaging: a constant priority. Rev Estomatol Heredia. 2026;36(2):e7283. doi:10.20453/reh.v36i2.7283

To mitigate these risks, the profession follows standard precautions, which incorporate and expand upon universal precautions to include the safe handling of all body fluids, nonintact skin, and mucous membranes. Essential practices include hand hygiene, the use of personal protective equipment (PPE), and cleaning and disinfection of environmental surfaces (9–12).

Recent reviews indicate that strict adherence to guidelines issued by the Centers for Disease Control and Prevention (CDC), the American Dental Association (ADA), and, in particular, the regional guidelines of the Asia Pacific Society of Infection Control (APSIC 2022) significantly reduces healthcare-associated infections in dental settings (13–15). Nevertheless, despite the availability of these measures, several studies have reported deficiencies in compliance. Alakhras et al. (16) found poor adherence to infection-control measures among dental radiographers: only 10.9% performed complete equipment disinfection and sterilization; 12.6% fully used the recommended PPE; and 66.9% reported washing their hands before or after taking radiographs. Other studies have likewise reported that adherence to biosafety measures in dental radiology is often suboptimal, with deficiencies in vaccination, hand hygiene, PPE use, disinfection, and the use of surface barriers (16–19). Academic institutions and dental care centers must strengthen their continuing education programs and develop strategies to understand the reasons underlying these deficiencies. Ongoing education, auditing, and written protocols specifically tailored to radiology are recommended (16,17,19,20).

Although the transition to digital imaging optimizes workflow and diagnostic accuracy, it does not eliminate biological risks in the clinical environment; rather, it reconfigures the landscape of potential contamination points. The evidence underscores that patient and operator safety does not depend on the technology itself, but on the rigor with which physical barriers and disinfection protocols adapted to new electronic components and reusable sensors are implemented.

Ultimately, compliance with biosafety regulations extends beyond an administrative obligation and has become an ethical imperative and an indispensable standard of quality care. Protecting public health in the radiographic environment requires procedural rigor commensurate with the sophistication of the technology employed.

Therefore, healthcare institutions and regulatory bodies must move beyond the mere adoption of generic guidelines and implement mandatory biosafety protocols specifically tailored to digital radiography, incorporating compliance audits and continuing education programs to ensure clinical practice free from preventable risks.

Authorship contribution:

DPA, HBF: conceptualization, writing of the original draft. MJH: writing - review & editing.

Corresponding author:

Daniel Pinto Agüero

✉ dpinto@uft.cl

REFERENCES

1. Gumru B, Tarçın B, Idman E. Cross-contamination and infection control in intraoral digital imaging: a comprehensive review. *Oral Radiology*. 2021;37(2):180-8. doi:10.1007/s11282-020-00452-z
2. Malta CP, Damasceno NN, Ribeiro RA, et al. Microbiological contamination in digital radiography: evaluation at the radiology clinic of an educational institution. *Acta Odontol Latinoam* [Internet]. 2016;29(3):239-47. Available from: https://actaodontologicalat.com/wp-content/uploads/2017/07/aol_2016_29_3_239.pdf
3. Wenzel A, Møystad A. Work flow with digital intraoral radiography: a systematic review. *Acta Odontol Scand*. 2010;68(2):106-14. doi:10.3109/00016350903514426
4. Peker I, Akça G, Akarslan Z. Cross contamination risk in intraoral phosphor plates. *Turk J Occup Envir Med Saf* [Internet]. 2016;1(Suppl 2). Available from: <https://dergipark.org.tr/tr/pub/turjoem/article/284013>
5. White SC, Glaze S. Interpatient microbiological cross-contamination after dental radiographic examination. *J Am Dent Assoc*. 1978;96(5):801-4. doi:10.14219/jada.archive.1978.0207
6. Marks LR, Reddinger RM, Hakansson AP. Biofilm formation enhances fomite survival of *Streptococcus pneumoniae* and *Streptococcus pyogenes*. *Infect Immun*. 2014;82(3):1141-6. doi:10.1128/iai.01310-13

7. Wißmann JE, Kirchhoff L, Brüggemann Y, et al. Persistence of pathogens on inanimate surfaces: a narrative review. *Microorganisms*. 2021;9(2):343. doi:[10.3390/microorganisms9020343](https://doi.org/10.3390/microorganisms9020343)
8. Ozsevik S, Çiçek E, Bodrumlu E, et al. Bacterial survival in the radiographic processes. *Minerva Stomatol* [Internet]. 2012;61(4):135-40. Available from: <https://www.minervamedica.it/en/journals/minerva-dental-and-oral%20science/article.php?cod=R18Y2012N04A0135>
9. Faller R, Sampathkumar P, Ung S. How standard are standard precautions? Knowledge and attitudes toward standard precautions at an Academic Medical Center. *Infect Control Hosp Epidemiol*. 2020;41(S1):s254. doi:[10.1017/ice.2020.816](https://doi.org/10.1017/ice.2020.816)
10. Boyce JM. Hand and environmental hygiene: respective roles for MRSA, multi-resistant gram negatives, *Clostridioides difficile*, and *Candida* spp. *Antimicrob Resist Infect Control*. 2024;13(1):110. doi:[10.1186/s13756-024-01461-x](https://doi.org/10.1186/s13756-024-01461-x)
11. Prasad V. Compliance of universal precautions: ensures safety to health care providers. *Int J Res Med Sci*. 2021;9(8):2514-9. doi:[10.18203/2320-6012.ijrms20213111](https://doi.org/10.18203/2320-6012.ijrms20213111)
12. Assadian O, Harbarth S, Vos M, et al. Practical recommendations for routine cleaning and disinfection procedures in healthcare institutions: a narrative review. *J Hosp Infect*. 2021;113:104-14. doi:[10.1016/j.jhin.2021.03.010](https://doi.org/10.1016/j.jhin.2021.03.010)
13. Ling ML, Ching P, Cheng J, et al. APSIC dental infection prevention and control (IPC) guidelines. *Antimicrob Resist Infect Control*. 2023;12(1):53. doi:[10.1186/s13756-023-01252-w](https://doi.org/10.1186/s13756-023-01252-w)
14. Isegen SA. Infection control measures in dental practice. *J Med Dent Sci Res*. 2025;12(1):65-74. doi:[10.35629/076X-12016574](https://doi.org/10.35629/076X-12016574)
15. Ahmed FMM, Algalal AAF, Abdalla RSH. The effect of adherence to infection control guidelines at dental clinics: review article. *Egypt J Hosp Med*. 2025;101:5488-91. doi:[10.21608/ejhm.2025.464809](https://doi.org/10.21608/ejhm.2025.464809)
16. Alakhras M, Al-Mousa DS, Mahasneh A, et al. Factors affecting compliance of infection control measures among dental radiographers. *Int J Dent*. 2020;2020(1):8834854. doi:[10.1155/2020/8834854](https://doi.org/10.1155/2020/8834854)
17. Santos RC, Araújo LS, Junqueira RB, et al. Assessment of infection control in oral radiology during the COVID-19 outbreak: an international collaborative study. *Imaging Sci Dent*. 2023;53(4):365-73. doi:[10.5624/isd.20230141](https://doi.org/10.5624/isd.20230141)
18. Gamoh S, Akiyama H, Maruyama H, et al. Compliance with infection control practices when taking dental x-rays: survey of a Japanese dental school. *Clin Exp Dent Res*. 2018;4(5):158-66. doi:[10.1002/cre2.124](https://doi.org/10.1002/cre2.124)
19. Doppalapudi R, Vundavalli S, Salloum M, et al. Rate of compliance with infection control practices while taking dental radiographs in a dental health care center, Saudi Arabia. *Contemp Clin Dent*. 2022;13(1):78-83. doi:[10.4103/ccd.ccd_811_20](https://doi.org/10.4103/ccd.ccd_811_20)
20. Mahasneh A, Alakhras M, Khabour O, et al. Practices of infection control among dental care providers: a cross sectional study. *Clin Cosmet Investig Dent*. 2020;12:281-9. doi:[10.2147/ccide.s261171](https://doi.org/10.2147/ccide.s261171)