



# **IMPACT OF SINGLE-USE CLEAN TOOTBRUSHES ON HEALTHCARE-ASSOCIATED INFECTIONS:**

## **A NARRATIVE REVIEW**

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**Basel, March 1, 2025**

## Executive summary

Dental care with toothbrushes are standard of care to prevent plaques and caries. In the healthcare setting, it has been shown to decrease contamination with hospital pathogens on toothbrushes and to decrease incidence of ventilator-associated pneumonia. Patients undergoing stem-cell transplantation or otherwise severely immunocompromised patients may also take advantage of good dental care, if they suffer from severe mucositis.

Single-use or adequately reprocessed toothbrushes decrease contamination. Contamination of toothbrushes can occur by keeping multiple toothbrushes in the same dental glass, keeping the toothbrush close to a toilet seat, and by mixing tooth brushes from different patients.

The evidence for using toothbrushes clean is well documented to avoid cross-contamination: Several approaches have been published to decontaminate toothbrushes to decrease contamination. However, a link to hospital-acquired infections has not been established so far. In particular, high-quality studies comparing single-use clean toothbrushes vs multiple use in the hospital setting are lacking.

Therefore, single-use, clean toothbrushes are reasonable in the intensive care setting, where during of stay commonly is less than 48 hours, and in the transplant setting where susceptibility of infections is very high. In the general hospital, ease of use, cost and comfort may be regarded as reasons to supply single-use toothbrushes in the hospital setting.



## Toothbrushes and hospital-acquired infections

### Sterile Toothbrushes and Cross-Infection:

The use of sterile toothbrushes and the prevention of cross-infection are critical concerns in both dental and general healthcare settings. Toothbrushes, while essential for oral hygiene, can become contaminated with microorganisms, posing risks of infection transmission. This analysis synthesizes insights from relevant research papers to address the importance of sterile toothbrushes, methods of sterilization, and strategies to mitigate cross-infection risks.

### 1. Toothbrush Contamination and Cross-Infection Risks

Toothbrushes are prone to contamination due to their frequent use and exposure to oral flora, saliva, and blood. This contamination can lead to the transmission of pathogens, contributing to cross-infection in dental settings and beyond.

- **Sources of Contamination:** Toothbrushes can harbor bacteria, viruses, and fungi, which may originate from the oral cavity, the environment, or improper storage (Naik et al., 2015) (Frazelle, 2011).
- **Pathogens Identified:** Studies have isolated pathogens such as *Staphylococcus* spp., *Streptococcus* spp., *E. coli*, *Pseudomonas* spp., and *Salmonella* from contaminated toothbrushes (Saleh, 2015) (Naik et al., 2015).
- **Risk of Cross-Infection:** Contaminated toothbrushes can act as fomites, facilitating the spread of infections between patients and healthcare workers, particularly in settings like ICUs and nursing homes (Frazelle, 2011) (Liu et al., 2016).

### 2. Single-use toothbrushes or methods of Toothbrush Sterilization and Disinfection

Effective sterilization and disinfection of toothbrushes are essential to reduce microbial contamination and prevent cross-infection. Various methods have been studied for their efficacy:

#### Single use sterile or clean toothbrushes

- Disposable, single-use, single packaged toothbrushes, produced under clean-air environment.
- Sterile, disposable, single-use, single packaged toothbrushes

#### Reprocessed toothbrushes: Using Chemical Disinfectants

- **Chlorhexidine Gluconate:** A 0.2% chlorhexidine solution is highly effective in reducing bacterial contamination on toothbrushes. It is commonly recommended for its antimicrobial properties (Naik et al., 2015) (Tomar et al., 2015).

- **Sodium Hypochlorite:** A 1% sodium hypochlorite solution has been shown to significantly reduce microbial growth, making it a viable option for toothbrush disinfection (Naik et al., 2015).
- **Neem and Triclosan:** Studies suggest that 3% neem solution and 2% triclosan are also effective in reducing contamination, with neem showing greater efficacy against *Streptococcus mutans* (Balappanavar et al., 2009).

### Reprocessed toothbrushes: using Physical Methods

- **Ultraviolet (UV) Light:** UV sanitization has been found to drastically reduce bacterial counts on toothbrushes, often more effectively than chemical disinfectants (Tomar et al., 2015).
- **Hot Water:** Soaking toothbrushes in hot tap water (at least 60°C) for 10 minutes can significantly reduce microbial contamination (Saleh, 2015).

### Reprocessed toothbrushes: Other Methods

- **Dettol:** Dettol has been shown to be highly effective in reducing toothbrush contamination, though its use is limited by its unpleasant flavor (Saleh, 2015).
- **Saltwater:** Soaking toothbrushes in saltwater can also reduce contamination, though it is less effective than Dettol or chlorhexidine (Saleh, 2015).

## 3. Strategies to Prevent Cross-Infection

Preventing cross-infection requires a combination of proper toothbrush handling, sterilization protocols, and infection control practices.

### Toothbrush Handling

- **Storage:** Toothbrushes should be stored in a dry, well-ventilated area to prevent moisture accumulation, which can promote microbial growth (Frazelle, 2011) (Tomar et al., 2015).
- **Replacement:** Regular replacement of toothbrushes (every 3–4 months or when bristles are frayed) is recommended to minimize contamination risks (Naik et al., 2015).

### Patient-Specific Measures

- **Oral Care in Vulnerable Populations:** For immunocompromised patients or those in ICU settings, the use of CLEAN toothbrushes and antimicrobial mouthwashes can significantly reduce the risk of secondary infections

#### 4. Challenges and Recommendations

Toothbrushes should be used for an individual patient only. Even then, they can get contaminated, in particular, if they are stored and used in the washroom/toilet area. Contamination is frequently observed, even with pathogenic bacteria. However, there has not been a study published, that could trace down contaminated toothbrushes with hospital-acquired infections.

However, in stem-cell transplant patients, severe mucositis provide ample space for invasion of bacteria in the bloodstream. In this setting, clean or sterile single-use toothbrushes makes sense, in particular, if they are not very expensive. A clinical study should be initiated to evaluate the real risk for patients using contaminated toothbrushes.

#### Conclusion

The use of sterile toothbrushes is a critical component of infection control in both dental and general healthcare settings. Effective sterilization methods, such as chemical disinfectants, UV light, and hot water, can significantly reduce microbial contamination. However, preventing cross-infection requires a broader approach, including proper toothbrush handling, adherence to infection control protocols, and ongoing education for healthcare workers and patients. By addressing these factors, the risk of cross-infection can be minimized, ensuring safer oral hygiene practices for all.

# **MOST IMPORTANT PUBLICATIONS**

## **MARCH 1, 2025**

Frazelle MR, Munro CL. Toothbrush contamination: a review of the literature.  
Nurs Res Pract. 2012;2012:420630. doi: 10.1155/2012/420630.  
Epub 2012 Jan 24. PMID: 22315679; PMCID: PMC3270454. doi: 10.1155/2012/420630

## Abstract

Toothbrushes are commonly used in hospital settings and may harbor potentially harmful microorganisms. A peer-reviewed literature review was conducted to evaluate the cumulative state of knowledge related to toothbrush contamination and its possible role in disease transmission. A systematic review was conducted on adult human subjects through three distinct searches. The review resulted in seven experimental and three descriptive studies which identified multiple concepts related to toothbrush contamination to include contamination, methods for decontamination, storage, design, and environmental factors. The selected studies found that toothbrushes of healthy and oral diseased adults become contaminated with pathogenic bacteria from the dental plaque, design, environment, or a combination of factors. There are no studies that specifically examine toothbrush contamination and the role of environmental factors, toothbrush contamination, and vulnerable populations in the hospital setting (e.g., critically ill adults) and toothbrush use in nursing clinical practice.

Raiyani CM, Arora R, Bhayya DP, Dogra S, Katageri AA, Singh V. Assessment of microbial contamination on twice a day used toothbrush head after 1-month and 3 months: An in vitro study. J Nat Sci Biol Med. 2015 Aug;6(Suppl 1):S44-8. doi: 10.4103/0976-9668.166072. PMID: 26604618; PMCID: PMC4630762. Doi: 10.4103/0976-9668.166072

### **Abstract Purpose**

The purpose of vitro study was to assessment of the bacterial contamination on daily twice-used toothbrushes in different conditions after 1-month and 3 months.

### **Materials and Methods**

Forty children aged between 6 and 12 years were selected for this study. Toothbrushes and toothpaste were distributed among those children. Among those children, 20 children brushed their teeth for 1-month and 20 brushed their teeth for 3 months twice a day. Among those, 10 were kept in same brush box with a family member and 10 were kept in separate brush box after the use. Toothbrush from every child was recollected to investigate the contamination of microorganisms. Head of the toothbrushes transferred to a tube containing 10 ml of tryptone soy broth. This was followed by vortex mixing for 1 min to dislodge suspected adherent bacteria. The bacterial suspension was serially diluted to obtain dilution factors of up to 10<sup>-3</sup>. 1 ml each of the dilution factors was obtained using a sterile pipette and plated on plate count agar. Petri dishes containing agar media were incubated and examined using a compound microscope.

### **Results**

There was high mean difference between 1-month and 3 months, twice a day used toothbrush those kept with family members and those kept separate.

### **Conclusions**

Toothbrush should keep in a separate box. Moreover, toothbrush should to be change after 3-4 weeks.

Ankola AV, Hebbal M, Eshwar S. How clean is the toothbrush that cleans your tooth?  
Int J Dent Hyg. 2009 Nov;7(4):237-40. doi: 10.1111/j.1601-5037.2009.00384.x. PMID: 19832908  
DOI:10.1111/j.1601-5037.2009.00384.x

## Abstract

Until recently, little attention has been directed towards the role the toothbrush may play in human health, even though a report of toothbrush as a significant factor in the infection appeared in 1920. It is common knowledge that the human mouth harbours a wide variety of microorganisms, some of which, at any given time, can be assumed to be potential pathogens. This was not known when toothbrushes were originally designed, yet the common toothbrush has been used in basically the same form for about 200 years. In today's world of organ transplantation and alteration of the immune system, it is important to consider the toothbrush as a source of potential pathogens. Given the fact that very often people will traumatize themselves with their toothbrush, this trauma may become a potential portal of entry for organisms. In this article, we have attempted to demonstrate the importance of toothbrush disinfection, given tips on home toothbrush care and hope to motivate the dentists to educate the patients on the importance of toothbrush disinfection.

Efstratiou M, Papaioannou W, Nakou M, Ktenas E, Vrotsos IA, Panis V. Contamination of a toothbrush with antibacterial properties by oral microorganisms. J Dent. 2007 Apr;35(4):331-7. doi: 10.1016/j.jdent.2006.10.007. Epub 2006 Nov 22. PMID: 17118507. DOI: 10.1016/j.jdent.2006.10.007

## Abstract Objectives

The aim of this study was to examine the contamination and the survival rate of periodontopathic and cariogenic species on new toothbrushes with antibacterial properties (coated bristles with triclosan), after a single use in periodontitis patients. The decontamination effect of the use of toothpaste was also evaluated.

## Methods

Ten patients, who consulted the Department of Periodontology, for treatment of chronic periodontitis, were selected. In each patient four different toothbrushes were used. Two quadrants, randomly selected, were each brushed using a different antibacterial toothbrush. In one of these two quadrants toothpaste was used. The same happened with the remaining quadrants, only with regular toothbrushes. After brushing, the tooth-brushes were rinsed and stored in room temperature and a dry environment. After 0, 4 and 24 h, four tufts, from each toothbrush, were cut and processed for selective and non-selective culturing techniques, followed by identification and quantification of all species found.

## Results

Immediately after brushing the toothbrushes harbored a significant number of microorganisms, with no statistically significant difference between the two types of brushes (regular and antibacterial). The reduction of microorganisms from 0 to 4 h after brushing was statistically significant ( $p < 0.05$ ). The difference was less obvious from 4 to 24 h. When toothpaste was used, brushes harbored significantly ( $p < 0.05$ ) lower numbers of colony-forming units (CFU) compared to those without the use of toothpaste.

## Conclusions

The antibacterial toothbrush with triclosan coated tufts failed to limit the bacterial contamination. The toothpaste, on the other hand, significantly reduced the contamination of toothbrushes.



Blaustein RA, Michelitsch LM, Glawe AJ, Lee H, Huttelmaier S, Hellgeth N, Ben Maamar S, Hartmann EM. Toothbrush microbiomes feature a meeting ground for human oral and environmental microbiota. *Microbiome*. 2021 Jan 31;9(1):32. doi: 10.1186/s40168-020-00983-x. PMID: 33517907; PMCID: PMC7849112.  
• DOI: 10.1186/s40168-020-00983-x CID: PMC7849112 PMID: 33517907

## Abstract Background

While indoor microbiomes impact our health and well-being, much remains unknown about taxonomic and functional transitions that occur in human-derived microbial communities once they are transferred away from human hosts. Toothbrushes are a model to investigate the potential response of oral-derived microbiota to conditions of the built environment. Here, we characterize metagenomes of toothbrushes from 34 subjects to define the toothbrush microbiome and resistome and possible influential factors.

## Results

Toothbrush microbiomes often comprised a dominant subset of human oral taxa and less abundant or site-specific environmental strains. Although toothbrushes contained lower taxonomic diversity than oral-associated counterparts (determined by comparison with the Human Microbiome Project), they had relatively broader antimicrobial resistance gene (ARG) profiles. Toothbrush resistomes were enriched with a variety of ARGs, notably those conferring multidrug efflux and putative resistance to triclosan, which were primarily attributable to versatile environmental taxa. Toothbrush microbial communities and resistomes correlated with a variety of factors linked to personal health, dental hygiene, and bathroom features.

## Conclusions

Selective pressures in the built environment may shape the dynamic mixture of human (primarily oral-associated) and environmental microbiota that encounter each other on toothbrushes. Harboring a microbial diversity and resistome distinct from human-associated counterparts suggests toothbrushes could potentially serve as a reservoir that may enable the transfer of ARGs

Morris DW, Goldschmidt M, Keene H, Cron SG. Microbial contamination of power toothbrushes: a comparison of solid-head versus hollow-head designs. J Dent Hyg. 2014 Aug;88(4):237-42. PMID: 25134956 J Dent Hyg 2014 Aug;88(4):237-42.

<https://pubmed.ncbi.nlm.nih.gov/25134956/>

## Abstract

### Purpose

Microbial contamination of manual toothbrushes relative to their design has been documented for decades, citing concern for cross contamination and self-infection with microorganisms. A pilot study of different power toothbrushes was conducted, to compare a solid-head brush to 2 hollow-head brushes for residual contamination with commonly occurring oral microorganisms.

### Methods

Participants who met inclusion criteria were enrolled and brushed twice daily for 3 weeks with 1 of 3 randomly assigned power toothbrushes. Brush heads were vortexed and cultured using 5 appropriate media for oral microorganisms: anaerobes and facultative microorganisms, yeast and mold, oral streptococci and oral enterococci anaerobes, Porphyromonas gingivalis, and Fusobacterium species. Analysis of covariance was used to compare the brush groups for transformed microbial counts after adjusting for any demographic variables that may have confounded the results.

### Results

The solid-head power toothbrush was found to have significantly less microbial contamination than either of the 2 hollow-head power toothbrushes for all the bacteria tested and less than 1 of the hollow-head brushes for yeast and mold.

### Conclusion

The solid-head power toothbrush studied had significantly less residual microbial contamination than the 2 hollow-head power toothbrushes after 3 weeks of twice daily brushing with non-antimicrobial toothpaste.

### Keywords

Anaerobes; candida species; fusobacterium species; porphyromonas gingivalis; streptococci; toothbrush

Sankaran, S.P., Sonis, S. Network meta-analysis from a pairwise meta-analysis design: to assess the comparative effectiveness of oral care interventions in preventing ventilator-associated pneumonia in critically ill patients. Clin Oral Invest 25, 2439–2447 (2021).  
<https://doi.org/10.1007/s00784-021-03802-1>

## Abstract

### Objective

In this research, we assessed the usefulness of network meta-analysis (NMA), in creating a hierarchy to define the most effective oral care intervention for the prevention and management of ventilation-associated pneumonia (VAP).

### Materials and methods

We applied NMA to a previously published robust pairwise meta-analysis. Statistical analyses were based on comparing rates of total VAP events between intervention groups and placebo-usual care groups. We synthesized a netgraph, reported the ranking order of the interventions, and summarized output by a forest plot with a reference treatment placebo/usual care.

### Results

The results of this NMA are from the low and high risk of bias studies, and hence, we strongly recommend not to use findings of this NMA for clinical treatment needs, but based on results of the NMA, we highly recommend for future clinical trials. With our inclusion and exclusion criteria for the NMA, we extracted 25 studies (4473 subjects). The NMA included 16 treatments, 29 pairwise comparisons, and 15 designs. Based on results of NMA frequentist-ranking P scores, tooth brushing (P fixed-0.94, P random-0.89), tooth brushing with povidone-iodine (P fixed-0.90, P random-0.88), and furacillin (P fixed-0.88, P random-0.84) were the best three interventions for preventing VAP.

### Conclusions

Any conclusion drawn from this NMA should be taken with caution and recommend future clinical trials with the results.

### Clinical relevance

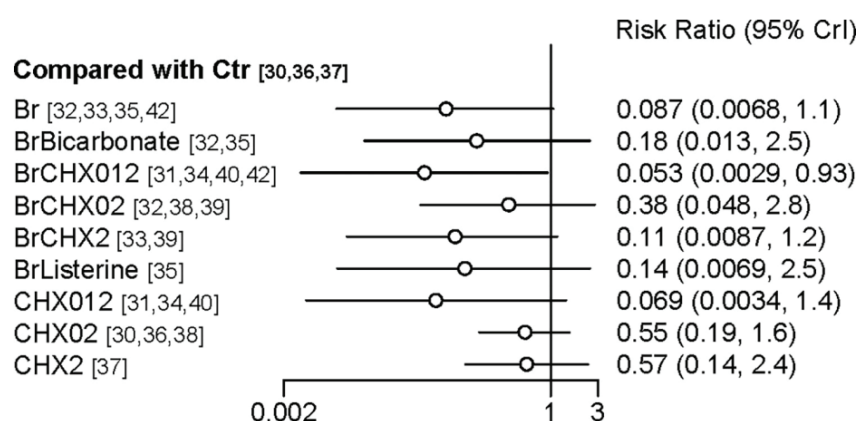
NMA appeared to be an effective platform from which multiple interventions reported in disparate clinical trials could be compared to derive a hierarchical assessment of efficacy in VAP intervention.

Yamakita S, Unoki T, Niiyama S, Natsuhori E, Haruna J, Kuribara T. Comparative efficacy of various oral hygiene care methods in preventing ventilator-associated pneumonia in critically ill patients: A systematic review and network meta-analysis.

PLoS One. 2024 Dec 13;19(12):e0313057. doi: 10.1371/journal.pone.0313057. PMID: 39671440; PMCID DOI: 10.1371/journal.pone.0313057

## Abstract

Oral hygiene care is important for ventilator-associated pneumonia prevention. However, the optimal oral hygiene care approach remains unclear. A network meta-analysis was conducted to compare the efficacy of various oral hygiene care methods for ventilator-associated pneumonia prevention in critically ill patients, and the methods were ranked. A literature search of three representative databases was conducted. We only analyzed parallel randomized controlled trials conducted to analyze the use antiseptics or toothbrushes in oral hygiene care for adult patients undergoing invasive mechanical ventilation in the intensive care unit. The outcome measure was the incidence of ventilator-associated pneumonia. Bias risk was assessed using the Cochrane Risk of Bias 2 tool, and the confidence in the evidence was evaluated using the CINeMA approach. Statistical analyses were performed using R 4.2.0., GeMTC package, and JAGS 4.3.1. The review protocol was registered in PROSPERO (registration number: CRD42022333270). Thirteen randomized controlled trials were included in the qualitative synthesis and twelve randomized controlled trials (2395 participants) were included in the network meta-analysis. Over 50% of the included studies were conducted in medical-surgical intensive care units. Ten treatments were analyzed and 12 pairwise comparisons were conducted in the 12 included studies. Analysis using surface under the cumulative ranking curves revealed that brushing combined with chlorhexidine 0.12% was most likely the optimal intervention for preventing ventilator-associated pneumonia (88.4%), followed by the use of chlorhexidine 0.12% alone (76.1%), and brushing alone (73.2%). Oral hygiene care methods that included brushing had high rankings. In conclusion, brushing combined with chlorhexidine 0.12% may be an effective intervention for preventing ventilator-associated pneumonia in critically ill patients. Furthermore, brushing may be the optimal oral hygiene care method for preventing ventilator-associated pneumonia in the intensive care unit. Further research is needed to verify these findings as the CINeMA confidence rate was low for each comparison.



**Fig 4. Forest plot of efficacy the treatments in preventing VAP compared with the control.** Br, brushing only; BrBicarbonate, brushing combined with bicarbonate; BrCHX012, brushing combined with chlorhexidine 0.12%; BrCHX02, brushing combined with chlorhexidine 0.2%; BrCHX2, brushing combined with chlorhexidine 2%; BrListerine, brushing combined with Listerine; CHX012, chlorhexidine 0.12% only; CHX02, chlorhexidine 0.2% only; CHX2, chlorhexidine 2% only; Ctr, control group.

<https://doi.org/10.1371/journal.pone.0313057.g004>

## Review of the literature

<p>1. Impact of tooth brushing on oral bacteriota and health care-associated infections among ventilated COVID-19 patients: an intervention study</p> <p>Iwona Gregorczyk-Maga, Mateusz Fiema, Michał Kania +7 more</p> <p>08 Mar 2023 - Antimicrobial Resistance and Infection Control</p>	<p>The study found that while tooth brushing reduced the identification of <i>A. baumannii</i> in oral samples, it did not decrease the incidence of healthcare-associated infections (HAIs) among mechanically ventilated COVID-19 patients, indicating no significant impact on cross-infection rates.</p>
<p>2. Influence of time, toothpaste and saliva in the retention of <i>Streptococcus mutans</i> and <i>Streptococcus sanguinis</i> on different toothbrushes</p> <p>Julia C. Schmidt, Miriam Bux, Elisabeth Filipuzzi-Jenny +4 more</p> <p>01 Jun 2014-Journal of Applied Oral Science</p>	<p>Toothbrush contamination is clinically relevant as it facilitates the intraoral transmission of cariogenic and periodontopathogenic species, potentially leading to reinfections. The study highlights the retention of <i>Streptococcus mutans</i> and <i>Streptococcus sanguinis</i> on toothbrushes, emphasizing cross-infection risks.</p>
<p>3. The microbial contamination of toothbrushes.</p> <p>A pilot study S. S. Taji, Anthony H. Rogers</p> <p>01 Apr 1998-Australian Dental Journal</p>	<p>The study suggests that toothbrushes can harbor various microorganisms, including staphylococci and streptococci, but no mutans streptococci or other oral pathogens were found. Thus, toothbrushes may not significantly contribute to cross-infection in healthy individuals.</p>
<p>4. Healthcare-associated viral and bacterial infections in dentistry</p> <p>A.M.G.A. Laheij, James O. Kistler, Georgios N. Belibasakis +2 more</p> <p>12 Jun 2012-Journal of Oral Microbiology</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights the risk of cross-transmission in dentistry, particularly with viruses like HSV and bacteria, emphasizing the need for effective hygiene procedures to mitigate such risks.</p>
<p>5. Beyond the antibiotic prophylaxis of infective endocarditis: the problem of dental surveillance</p> <p>John C. Chambers, Mark Dayer, Bernard D. Prendergast +3 more</p> <p>15 Mar 2013-Heart</p>	<p>The paper highlights that transient bacteraemia with oral bacteria can occur during daily activities like tooth brushing, which may contribute to the risk of infective endocarditis. Maintaining good oral hygiene is crucial to minimize this risk.</p>
<p>6. A scheme for the prevention of cross infection in children's wards</p> <p>N. M. Jacoby</p> <p>01 Mar 1944-Archives of Disease in Childhood DOI</p>	<p>The paper does not specifically address toothbrushes and cross infection. However, it emphasizes preventing cross infection in children's wards through careful patient placement and ward design, which may indirectly relate to hygiene practices, including the use of personal items like toothbrushes.</p>

<p>7. Evaluating the microbial aerosol generated by dental instruments: addressing new challenges for oral healthcare in the hospital infection</p> <p>Xin Yang, Ruolan Liu, Jiakang Zhu +4 more</p> <p>21 Jun 2023-BMC Oral Health DOI</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights the risk of microbial aerosol transmission in dental settings, emphasizing the need for infection control measures to prevent nosocomial infections during dental procedures.</p>
<p>8. Antimicrobial Effects of Essential Oils on Oral Microbiota Biofilms: The Toothbrush In Vitro Model.</p> <p>Andreia Aires, A.S. Barreto, Teresa Semedo-Lemsaddek</p> <p>29 Dec 2020-Antibiotics</p>	<p>The paper suggests that toothbrushes can harbor oral bacteria, potentially leading to cross-infection. The study's toothbrush in vitro model demonstrated essential oils' effectiveness in preventing bacterial biofilm establishment, indicating their potential use in sanitizing toothbrushes to reduce cross-infection risks.</p>
<p>9. Dental Biofilm Removal and Bacterial Contamination of a New Doubled-Side Thermoplastic Polyurethane-Based Toothbrush: A Crossover Study in Healthy Volunteers</p> <p>Ignacio Zúñiga, Margarita Iniesta, Leire Virto +8 more</p> <p>22 Sep 2022-Antibiotics</p>	<p>The study highlights that toothbrushes may present contamination even before use, suggesting previous decontamination or sterilization. Additionally, the storage location during weekly use could lead to possible cross-contamination, warranting caution in interpreting the results regarding bacterial contamination.</p>
<p>10. Public perception of cross-infection control in dentistry.</p> <p>W. Murray Thomson, Judith Frances Stewart, KD Carter +1 more</p> <p>01 Oct 1997-Australian Dental Journal DOI</p>	<p>The paper does not specifically address toothbrushes and cross-infection. It focuses on public perceptions of cross-infection control in dentistry, particularly regarding sterilization procedures and the use of barrier methods by dental practitioners.</p>
<p>11. Risk of cross infection associated with anaesthesia; cleaning procedures for laryngoscopes—a need for Association guidelines</p> <p>R. W. H. Skilton</p> <p>01 May 1996-Anaesthesia Article• DOI</p>	<p>The paper does not specifically address toothbrushes and cross infection. However, it highlights the importance of cleaning and disinfecting medical instruments, suggesting that similar principles of hygiene should apply to personal items like toothbrushes to prevent cross infection.</p>
<p>12. Infection control and contaminated waste disposal practices in Southern Sydney Area Health Service Dental Clinics</p> <p>Santo Cannata, Mark Bek, Pamela Baker +1 more</p> <p>01 Jun 1997-Australian Dental Journal</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of infection control practices in dental settings to minimize risks of cross-contamination, which could extend to the handling and use of toothbrushes.</p>

<p>13. Cross contamination of blood cultures associated with a multiple use venting device.</p> <p>R.E. Holliman, J D Johnson</p> <p>01 Mar 1999-Journal of Clinical Pathology</p>	<p>The paper's title matches your query, but it doesn't address your specific question.</p>
<p>14. Transmission of Staphylococci by Fomites</p> <p>Antonio J. Gonzaga, Edward A. Mortimer, Emanuel Wolinsky +1 more</p> <p>07 Sep 1964-JAMA 27</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on the transmission of Staphylococcus aureus via fomites like blankets, shirts, and diapers, emphasizing the importance of contamination levels in potential transmission to newborns.</p>
<p>15. The role of toothbrush in the transmission of corona- and influenza viruses — results of an in vitro study</p> <p>Gerhard Schmalz, Laura Feindt, Franziska Tanneberger +4 more</p> <p>10 May 2022-Clinical Oral Investigations</p>	<p>The study indicates that toothbrushes play an insignificant role in the self-transmission of coronavirus and influenza viruses. However, proper hygiene practices, such as using individual toothbrushes and avoiding cross-contact, are still recommended to minimize infection risks.</p>
<p>16. Does tooth brushing protect from atrial fibrillation and heart failure</p> <p>Pascal Meyre, David Conen</p> <p>01 Nov 2020-European Journal of Preventive Cardiology DOI</p>	<p>The paper discusses poor oral hygiene as a risk marker for cardiovascular disease, suggesting that inadequate tooth brushing may lead to transient bacteremia, potentially causing systemic inflammation, which could be linked to conditions like atrial fibrillation and heart failure.</p>
<p>17. Saliva is a non-negligible factor in the spread of COVID-19.</p> <p>Yuqing Li, Biao Ren, Xian Peng +6 more</p> <p>01 Aug 2020-Molecular Oral Microbiology</p>	<p>The paper highlights that saliva can lead to potential cross-infection, particularly in dental settings. Contaminated surfaces, including toothbrushes, may harbor SARS-CoV-2, emphasizing the need for stringent hygiene practices to mitigate the risk of transmission among patients and practitioners.</p>
<p>18. Oral and Maxillofacial Infections—A Bacterial and Clinical Cross-Section</p> <p>Bartłomiej Kaminski, Katarzyna Błochowiak, Konrad Kołomański +3 more</p> <p>01 May 2022-Stomatology</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral hygiene in preventing infections, suggesting that poor oral care can lead to increased risk of oral and maxillofacial infections.</p>



<p>19. Integrating infection control into the dental curriculum.</p> <p>Neil W. Savage, Laurence J. Walsh</p> <p>01 Dec 1997-Australian Dental Journal</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of cross-infection control in dental settings, highlighting the need for proper hygiene practices to prevent the transmission of infectious diseases among patients and personnel.</p>
<p>20. Abnormal cytology in oropharyngeal brushings and in oral rinses is not associated with HPV infection: The OHMAR study</p> <p>Maria Benevolo, Francesca Rollo, Massimo Giuliani +7 more</p> <p>01 Sep 2020-Cancer Cytopathology</p>	<p>The paper does not address toothbrushes or cross-infection. It focuses on cytology in oropharyngeal brushings and oral rinses, specifically examining the association between HPV infection and cytologic abnormalities, without discussing dental hygiene practices or infection transmission.</p>
<p>21. Surface Topography-Adaptive Robotic Superstructures for Biofilm Removal and Pathogen Detection on Human Teeth</p> <p>Min-Jun Oh, Alaa Babeer, Yuan Liu +7 more</p> <p>28 Jun 2022-ACS Nano</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it discusses advanced robotic superstructures for biofilm removal on teeth, which could potentially reduce cross-infection risks by effectively eliminating harmful biofilms and pathogens from complex dental surfaces.</p>
<p>22. Effect of HIV/HAART and Other Clinical Variables on the Oral Mycobiome Using Multivariate Analyses.</p> <p>Paul L. Fidel, Zach A. Thompson, Elizabeth A. Lilly +13 more</p> <p>23 Mar 2021-Mbio</p>	<p>The paper does not specifically address toothbrushes or cross-infection. However, it highlights the importance of the oral microbiome's composition, which can be influenced by various factors, potentially impacting oral health and disease transmission.</p>
<p>23. A systematic review of hand-hygiene and environmental-disinfection interventions in settings with children.</p> <p>Leanne J. Staniford, Kelly Ann Schmidtke</p> <p>06 Feb 2020-BMC Public Health</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on hand-hygiene and environmental-disinfection interventions in settings with children, emphasizing the importance of hygiene practices to prevent infections but not detailing toothbrush-related issues.</p>
<p>24. Prevalence of oral infections in chronic kidney disease patients: A cross-sectional study.</p> <p>V. Díaz-Flores-García, Juan José Segura-Sampedro, Juan J. Segura-Egea +1 more</p> <p>01 Jul 2023-Oral Diseases</p>	<p>The paper does not specifically address toothbrushes or cross-infection. However, it highlights the prevalence of oral infections, such as apical periodontitis and periodontal disease, in chronic kidney disease patients, emphasizing the need for oral health management in this population.</p>



<p>25. 2-Methacryloyloxyethyl phosphorylcholine (MPC)-polymer suppresses an increase of oral bacteria: a single-blind, crossover clinical trial</p> <p>Natsumi Fujiwara, Hiromichi Yumoto, Miyamoto Koji +9 more</p> <p>01 Feb 2019-Clinical Oral Investigations</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of suppressing oral bacterial adherence to prevent infections, which could relate to maintaining hygiene practices, including proper toothbrush use, to minimize bacterial transmission.</p>
<p>26. Dental infections may have detrimental consequences</p> <p>Munjed Farid Al Qutob, Jukka H. Meurman</p> <p>01 Jun 2014-Journal of the Royal Society of Medicine</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral hygiene in preventing dental diseases, which could indirectly relate to the risk of cross-infection through shared or improperly maintained dental care tools.</p>
<p>27. Prevalence of Periodontal Disease among Patients at the Outpatient Clinic of Internal Medicine in an Academic Hospital in The Netherlands: A Cross-Sectional Pilot Study</p> <p>Thomas J. T. Leung, Nina Nijland, Victor E. A. Gerdes +1 more</p> <p>01 Oct 2022-Stomatology</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral health and the use of dental aids, suggesting that proper oral hygiene practices can help improve periodontal health among patients.</p>
<p>28. COVID-19 Transmission in Dental Practice: Brief Review of Preventive Measures in Italy.</p> <p>Rossana Izzetti, Marco Nisi, Mario Gabriele +1 more</p> <p>17 Apr 2020-Journal of Dental Research</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of infection control in dental practice to limit COVID-19 transmission, which may imply the need for careful management of dental hygiene tools to prevent cross-infection.</p>
<p>29. Dental professionals' use of personal protective equipment during COVID-19: a cross-sectional study in China</p> <p>Lei Han, Xin Yang, Shao Yu +1 more</p> <p>03 Jul 2023-Frontiers in Public Health</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of personal protective equipment (PPE) in reducing viral transmission risks among dental professionals during the COVID-19 pandemic, which may indirectly relate to infection control practices.</p>
<p>30. Sample adequacy controls for infectious disease diagnosis by oral swabbing.</p> <p>Meagan Deviaene, Kris M. Weigel, Rachel C. Wood +4 more</p> <p>30 Oct 2020-PLOS ONE</p>	<p>The paper does not specifically address toothbrushes or cross-infection. However, it highlights the importance of oral swabs in diagnosing infectious diseases, emphasizing the need for proper sample collection to avoid contamination, which could relate to cross-infection concerns.</p>

<p>31. Preventive dental care reduces risk of cardiovascular disease and pneumonia in hemodialysis population: a nation-wide claims database analysis</p> <p>Risako Mikami, Koji Mizutani, Miho Ishimaru +3 more</p> <p>29 May 2024-Dental science reports</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral health and preventive dental care in reducing systemic health risks, which may indirectly relate to infection control in dental practices.</p>
<p>32. Oral cleaning habits and the copy number of periodontal bacteria in pregnant women and its correlation with birth outcomes: an epidemiological study in Mibilizi, Rwanda</p> <p>Hiroaki Arima, Akintije Simba Calliope, Hideki Fukuda +6 more</p> <p>26 Sep 2022-BMC Oral Health</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights that improper oral cleaning habits, such as infrequent toothbrush replacement, may contribute to higher levels of periodontal bacteria, potentially impacting oral health during pregnancy.</p>
<p>33. Impact of COVID-19 on the oral health of adults in Wuhan and China: results of a nationwide online cross-sectional questionnaire survey.</p> <p>Shuang Zhang, Chang Liu, Chenzheng Zhang +3 more</p> <p>26 Mar 2021-BMC Oral Health</p>	<p>The study highlights the importance of maintaining good oral health behaviors, including regular toothbrushing, to prevent dental problems. It also emphasizes the need for guidelines to avoid nosocomial infections during dental care in the post-epidemic period.</p>
<p>34. Oral mucositis as a pathway for fatal outcome among critically ill patients exposed to chlorhexidine: post hoc analysis of a randomized clinical trial.</p> <p>Wanessa Teixeira Bellissimo-Rodrigues, Mayra Gonçalves Meneguetti, Leandro Dorigan de Macedo +3 more</p> <p>27 Nov 2019-Critical Care</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights that chlorhexidine-induced mucositis may facilitate bacterial translocation, potentially increasing infection risk, suggesting that oral care practices, including toothbrush use, should be carefully managed in critically ill patients.</p>
<p>35. HIV/AIDS-related attitudes and oral impacts on daily performances: a cross-sectional study of Sudanese adult dental patients</p> <p>Elwalid Fadul Nasir, Mihaela Cuida Marthinussen, Anne Nordrehaug Åstrøm</p> <p>26 Aug 2013-BMC Health Services Research</p>	<p>The study highlights that fear of HIV cross-infection in dental environments, including concerns about toothbrushes, can lead to impaired oral health-related quality of life (OHRQoL) among patients, emphasizing the need for accurate information on infection control in dental practices.</p>
<p>36. Composition of subgingival microbiota associated with periodontitis and diagnosis of malignancy—a cross-sectional study</p> <p>Aswathy Narayanan, Birgitta Söder, Jukka H. Meurman +4 more</p> <p>22 May 2023-Frontiers in Microbiology</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on the subgingival microbiota associated with periodontitis and cancer, highlighting the differences in microbial composition among various groups but not discussing oral hygiene practices.</p>

<p>37. Cross-species infection trials reveal cryptic parasite varieties and a putative polymorphism shared among host species.</p> <p>Pepijn Luijckx, David Duneau, Jason P. Andras +1 more</p> <p>01 Feb 2014-Evolution</p>	<p>Of low interest.</p>
<p>38. The oral bacterium <i>Streptococcus mutans</i> promotes tumor metastasis by inducing vascular inflammation</p> <p>Li Yu, Nako Maishi, Erika Akahori +8 more</p> <p>23 Aug 2022-Cancer Science</p>	<p>The paper does not specifically address toothbrushes or cross-infection. However, it emphasizes the importance of oral hygiene in preventing systemic inflammation and tumor metastasis, suggesting that poor oral hygiene could contribute to bacterial spread and related health issues.</p>
<p>39. Genetic Relationships between Respiratory Pathogens Isolated from Dental Plaque and Bronchoalveolar Lavage Fluid from Patients in the Intensive Care Unit Undergoing Mechanical Ventilation</p> <p>Seok-Mo Heo, Elaine M. Haase, Alan J. Lesse +3 more</p> <p>15 Dec 2008-Clinical Infectious Diseases</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights that poor oral hygiene can lead to increased microbial diversity in dental plaque, potentially serving as a reservoir for respiratory pathogens in ICU patients.</p>
<p>40. An Overview of Physical, Microbiological and Immune Barriers of Oral Mucosa.</p> <p>Sevda Şenel</p> <p>22 Jul 2021-International Journal of Molecular Sciences</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights the importance of oral mucosa as a barrier against pathogens, suggesting that maintaining oral hygiene is crucial to prevent potential infections and support overall health.</p>
<p>41. Large-scale identification of pathogen essential genes during coinfection with sympatric and allopatric microbes.</p> <p>Gina R. Lewin, Apollo Stacy, Kelly L. Michie +3 more</p> <p>24 Sep 2019-Proceedings of the National Academy of Sciences of the United States of America</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on the essential genes of <i>Aggregatibacter actinomycetemcomitans</i> during coinfection with various microbes, highlighting interactions and gene essentiality in polymicrobial infections.</p>
<p>42. Inter-bacterial correlations in subgingival biofilms: a large-scale survey</p> <p>Gitte Loozen, Onur Ozcelik, Nico Boon + 4 more</p> <p>01 Jan 2014-Journal of Clinical Periodontology</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on the prevalence and inter-bacterial correlations of oral bacteria in subgingival biofilms related to periodontal health and disease, based on microbiological analyses from patients.</p>

<p>43. An audit of antimicrobial prescribing by dental practitioners in the north east of England and Cumbria</p> <p>Andrew Sturrock, D. Landes, T. Robson +2 more</p> <p>10 Dec 2018-BMC Oral Health</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of appropriate antimicrobial prescribing in dental practice to mitigate infection risks, highlighting the need for further education on infection control measures among dental practitioners.</p>
<p>44. An In Vitro Model for Candida albicans – Streptococcus gordonii Biofilms on Titanium Surfaces</p> <p>Daniel Montelongo-Jau-regui, Anand Srinivasan, Anand K. Ramasubramanian +1 more</p> <p>04 Jun 2018-Journal of Fungi</p>	<p>The paper does not specifically address toothbrushes or cross-infection. It focuses on the development of mixed-species biofilms of C. albicans and S. gordonii on titanium surfaces, relevant to infections associated with dental implants.</p>
<p>45. Factors of Compliance of Dental Patients in Primary Health Care Services during the Pandemic</p> <p>Dimitrios Papagiannis, Ourania S. Kotsiou, Foteini Malli +2 more</p> <p>01 Apr 2023-Vaccines</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of maintaining high hygiene standards in dental clinics to prevent cross-infection, particularly during aerosol-generating procedures, which are relevant to dental care practices.</p>
<p>46. Oral bacteria and cancer.</p> <p>Sarah E. Whitmore, Richard J. Lamont</p> <p>27 Mar 2014-PLOS Pathogens</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it highlights the role of oral bacteria, such as P. gingivalis and F. nucleatum, in cancer development, suggesting that maintaining oral hygiene may help limit bacterial infections.</p>
<p>47. Association between toothbrushing and risk factors for cardiovascular disease: a large-scale, cross-sectional Japanese study</p> <p>Masanari Kuwabara, Yoko Motoki, Kayoko Ichiura +7 more</p> <p>01 Jan 2016-BMJ Open Journal Article•DOI</p>	<p>The paper's title matches your query, but it doesn't address your specific question.</p>
<p>48. Knowledge, attitude, and practice toward self-control of dental plaque among patients with periodontal diseases: a cross-sectional study</p> <p>Jing Sun, D. M. Tong, Chang Sun +7 more</p> <p>02 Sep 2023-BMC Oral Health Open access•Journal Article•DOI</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral hygiene practices, including brushing, in managing periodontal diseases, which indirectly relates to preventing infections through proper dental care.</p>

<p>49. Modeling of the Transmission of Coronaviruses, Measles Virus, Influenza Virus, Mycobacterium tuberculosis , and Legionella pneumophila in Dental Clinics.</p> <p>Charifa Zemouri, Susanne F. Awad, C.M.C. Volgenant +3 more</p> <p>02 Jul 2020-Journal of Dental Research Article•DOI</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the risk of airborne infectious diseases in dental clinics, highlighting the importance of infection control measures to prevent transmission among dental health care workers and patients.</p>
<p>50. A Cross-Talk between Diet and the Oral Microbiome: Balance of Nutrition on Inflammation and Immune System's Response during Periodontitis</p> <p>Simona Santonocito, Amerigo Giudice, Alessandro Polizzi +5 more</p> <p>01 Jun 2022-Nutrients</p>	<p>The paper does not specifically address toothbrushes and cross-infection. However, it emphasizes the importance of oral hygiene in maintaining the balance of the oral microbiome, which is crucial for preventing oral diseases, including periodontitis.</p>