



Hand Hygiene Effectiveness in Controlling the Spread of COVID-19: A Scoping Review

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Abstract: Encouraging proper hands, including regular handwashing with soap and water or the use of hand sanitizers, is crucial in preventing the transmission of COVID-19 and other infectious diseases. This preventive measure helps to eliminate or reduce the presence of the virus on hands, particularly after contact with potentially contaminated surfaces or objects. The study was comprehensively searching databases and other sources to identify literature on hand hygiene and COVID-19 between 16 April, 2020 and 30 May 2023. We analyzed various aspects of the retrieved articles and studies, including the sources, publication dates, types and topics covered. In the initial stage of the review process, the researchers identified 463 records from various sources. After removing 56 duplicate records, they were left with 407 unique articles for further screening. During the screening process, 280 articles were excluded for various reasons. This resulted in 127 articles that passed the initial screening. The next step involved assessing the eligibility of the full text of these 127 articles. Out of these, 108 articles were excluded based on the eligibility criteria, and the research obtained the full texts of the remaining 19 articles for further analysis. By creating a collective awareness and understanding of the importance of hand hygiene, we can create a positive impact on public health and reduce the transmission of diseases such as COVID-19

Keywords: Cases; COVID-19; Hand hygiene; Impact

Introduction

SARS-CoV-2 or Novel Corona Virus 19 (COVID-19) is severe acute respiratory syndrome. It was started on December 2019 in Wuhan, Hubei Province, China. This disease has spread fastly worldwide as well in Indonesia, first cases were found from two people on January 3, 2020, who were contaminated by Japanese people from Malaysia. It cases February, 3 2020 30 to August, 4 2020 at 17:00 West Indonesia Time, 1,575,043 people were examined with the results of the examination of 793,110 negative people (including Indonesian student in Hubei Province, crew of world

dream and diamond princess ships), and 115,056 positive COVID-19 confirmed cases in 34 Provinces (68,975 recovered and 5,388 died) (Indonesia, 2020).

Decreasing activity of people outside their home, social distancing, the halt of almost all working activities and the appeal of community to use protective masks have the purposes of minimizing the contact with those who are already infected and potentially still asymptomatic. However, people activity could not be longer time inside home, they need social activity and work outside. This condition needs changing social behavior such as hand hygiene (Jakobsson et al., 2020).

How to Cite:

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In the context of hand hygiene behaviors and their relationship to decreasing COVID-19 State the objectives of the work and provide an adequate background, avoiding a detailed literature survey or a summary of the results.

Method

This scoping review is reported in accordance with the Extended Preferred reporting items for Systematic reviews and Meta-Analyses Statement for Scoping Reviews (PRISMA-ScR) (Tricco et al., 2018).

Data Sources and Searching

We conducted a systematic literature review on PubMed, Embase, Scopus, and Web of Science using the following search strategies (Coronavirus* OR "Coronavirus Infection" OR "Coronavirus Disease 2019" OR "SARS-Cov-2" OR Coronavirus disease 2019" OR "Novel Coronavirus") AND "Hand hygiene" OR hand-washing" OR "hand sanitizer *.

Inclusion and Exclusion Criteria

We included all literature related to COVID-19 published both English and Indonesia languages between 16 April, 2020 and 30 May 2023. The inclusion criteria for the review encompassed various types of publications, including reviews, basic research, epidemiological studies and brief reports. The review also aimed to capture documents and guidance/guidelines posted by international organizations, government institutions, associations and societies, indicating a comprehensive approach to gathering relevant literature from different sources.

However, certain exclusions were made in the review process. News reports that were not published in scientific journals were excluded, which suggests a focus on scholarly and peer-reviewed sources. Additionally, articles were excluded if the full text could not be accessed, even after attempting to contact the authors. This exclusion criterion ensures that the review includes only those studies for which the complete information was available for analysis.

Article Selection and Data Extraction

Two reviewers (SA and TN) screened all titles, abstracts and full texts independently and solved disagreements by consensus or consultation with a third reviewer (D.S). Then the following information was extracted: (i) title, (ii) type of article/study, (iii) first author, (iv) first author's country, (v) whether peer-reviewed or not, (vi) journal, (vii) sources, (viii) publication or posted date, (ix) main findings. The details are shown in Table 1 (Appendix).

Data Analysis

The study performed a descriptive analysis on the characteristics of the literature included in the research. We provided details on the source, publication date, article/study type, and topic of the article/study or guidance/guideline related to COVID-19 in order to identify any research gaps. The literature was classified into several categories, including guidance/guidelines and consensus statements, reviews, clinical studies (including randomized controlled trials and observational studies), basic research, epidemiological studies, and editorial comments on COVID-19. Additional categories were included if identified. The researchers analyzed these characteristics to gain insights into the current state of COVID-19 research, identify knowledge gaps or areas needing further investigation, and contribute to the understanding of the disease.

Result and Discussion

Search Results

In the initial stage of the review process, the researchers identified a total of 463 records from various sources. After removing 56 duplicate records, they were left with 407 unique articles for further screening. During the screening process, 280 articles were excluded as they were deemed unrelated to the topic of COVID-19 and hand hygiene, not published in English, not published between April 16, 2020, and May 30, 2023, or did not report on hand hygiene and its impact on decreasing the number of COVID-19 cases. This left 127 articles that passed the initial screening. The next step involved assessing the eligibility of the full text of these 127 articles. Out of these, 108 articles were excluded based on the eligibility criteria, and the researchers retrieved the full text of the remaining 19 articles for further analysis. Additionally, they performed a supplementary search for articles published or posted between 16 April 2020 and 1 May 2023. The process and results of this screening and selection process are depicted in Figure 1 (Appendix).

Characteristics of Included Articles/Studies

All included articles/studies 100 % were published in peer-reviewed journals, and the most sources from Embase. The article/study type varied vastly, which we broadly characterized into 4 types (Table 1). Among this type research was the most prevalent, accounting 8 articles (42.1%). This suggests that a considerable number of articles in the review provided recommendations or expert consensus on various aspects of COVID-19 and hand hygiene. Table 1 presents the main characteristics of the included studies in this review.

Country & Publication Year

The earliest included five study published in 2020, followed by three studies in 2021. The number of publications increased in 2022, with six studies identified, and in 2023, three studies were identified. The distribution of studies across different countries is as follows: the majority of studies were conducted in the United States (n=4), followed by United Kingdom (n=3), Saudi Arabia (n=2), and then France, Greece, Russian, Netherland, Germany, Poland and Indonesia.

Discussion

The importance of hand hygiene in the context of the COVID -19 pandemic and the relevance of the scoping review to protect the Indonesia population. Hand hygiene indeed plays a crucial role in limiting the transmission of harmful germs, including the SARS-CoV-2 virus that causes COVID-19 (Gammon & Hunt, 2020; Szczuka et al., 2021). The scoping review, as previously described, can help identify the requirements for technical and didactical implementation, evaluation methods, and results related to hand hygiene practices. By conducting a transparent and reproducible search strategy following the JBI methodology, the scoping review can provide stakeholders with concise and relevant information on crucial aspects of hand hygiene. The review can examine a broad range of published literature, including studies, such as Porzig-Drummond et al. (2009); (White et al., 2020), which have highlighted the importance and impact of hand hygiene in disease prevention. The scoping review can build upon these studies and explore additional research to provide a comprehensive overview of evidence on hand hygiene practices, interventions, and their effectiveness in reducing COVID-19 cases (Munn et al., 2018).

By synthesizing the findings of the scoping review, stakeholders, including policymakers, healthcare professionals, and the general public, can gain valuable insights into design and implementation and regulations and interventions to promote improved hand hygiene. This knowledge can contribute to efforts aimed at inhibiting the spreading of viral infections, not only COVID-19, but also other infectious diseases (Park & Min, 2023).

People have various reasons not for not following hand-washing practices, both physical and mental. Some barriers include a lack of appropriate facilities such as soap and water or hand sanitiser, a lack of knowledge about the benefit of clean hands, overconfidence in one's immune system, and personal characteristics like gender, wealth, and education (Koshechko & Saltykova, 2022)

Keller et al. (2022) two separate hand-washing behaviors. known as inherent and elective. In inherent condition refer to situation where hands are perceived

as physically or emotionally dirty, thus requiring the use of soap and water to keep hands clean. On the other hand, elective condition involve situation where hands are not considered dirty, leading to handwashing not being performed in specific circumstance. This perception complicates the fight against COVID-19 and contributes to the transmission of the pathogens that may exist on human hands. Shaikan et al. (2021) proposed three physiological processes -reactive, motivated, and cognitive process- to explain handwashing behavior. Reactive processes triggered automatically by certain stimuli and become habitual. Pogrebna and Kharlamov (2021) reported that at least 50% of people did not have a habit of automatically washing that could lead to increased pathogen exposure. Motivated processes involve perceiving a discrepancy between one's current state and an ideal state. Cognitive processes, on the other hand, involve consciously planned actions to achieve a long-term goal. Despite efforts to educate people about the benefits of hand hygiene, campaigns focusing on cognitive processes have failed to show a measurable effect over the long term (Agarwal et al., 2023; Keller et al., 2022).

Implementing technology to gather hand hygiene data evaluate behaviors could be beneficial for hospitals, especially in monitoring hand hygiene performance during the ongoing pandemic (Hess et al., 2020; Woolbert et al., 2023). This approach may help overcome the challenges associated with direct observation and provide valuable insights for improving hand hygiene practices. However, as we continue to navigate this situation, there is still much to learn and explore regarding hand hygiene and its role in reducing the transmission of germs, viruses, and bacteria that can potentially cause diseases (Koshechko & Saltykova, 2022; Zhang et al., 2022).

Conclusion

Creating collective awareness and comprehension of hand hygiene is essential for promoting public health and reducing disease transmission, including COVID-19. Hand hygiene is one of the most effective and straightforward methods for preventing the transmission of infectious pathogens and diseases. It is essential to involve multiple stakeholders, including governments, healthcare organizations, educational institutions, and community leaders, in order to improve public health. Together, these entities can develop and implement comprehensive hand hygiene programs, disseminate accurate information, provide resources, and ensure that the message reaches all segments of society. By emphasizing the significance of hand sanitation, we can collectively contribute to

healthier communities, reduce the spread of disease, and lessen the impact of COVID-19 outbreaks.

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Author Contributions

"Conceptualization D.S. And T.N.; methodology S.A.; software, E.B.; validation, L.F., S. and L.A.; formal analysis, S.A.; investigation, D.S.; resources, T.N.; data curation, S.; writing – original draft preparation, E.B.; writing – review and editing, D.S.; visualization, L.F.; supervision, S.A.; project administration, L.A.; funding acquisition, D.S. and T.N. All authors have read and agreed to the published version of the manuscript.

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Conflicts of Interest

The authors declared no conflict of interest.

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Apendix

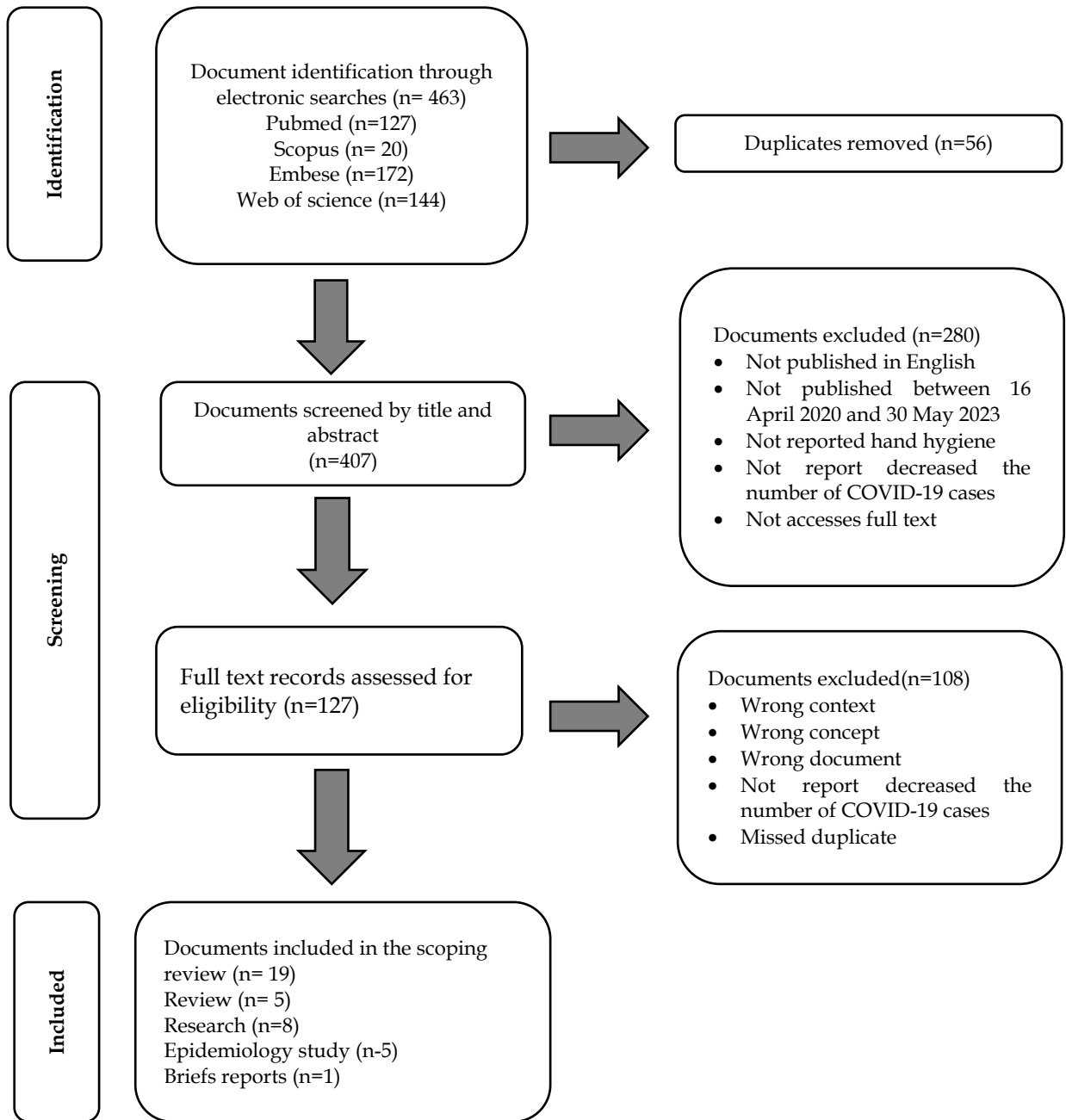


Figure 1. Flow chart of documents records through selection eligibility criteria

Table 1. Article selection and data extraction

Title	Type of article	First author	Journal	Posted date	Main findings
COVID-19 outbreak and healthcare worker behavioural change toward hand hygiene practices	Review	Huang, F	<u>J Hosp Infect.</u>	16 April 2020	A positive relationship between hand hygiene during patient care and hand hygiene on room exit and the local COVID-19 epidemic. This indicates that practicing proper hand hygiene in healthcare settings, specifically during patient care activities and when existing patient rooms is associated with a reduced spread of COVID-19 within the local community (Huang et al., 2021).
The effectiveness of hand hygiene interventions for preventing community transmission or acquisition of novel coronavirus or influenza infections: A systematic review	Review	<u>Gozdzielowska, L</u>	BMC Public Health	2 July 2022	Effectiveness of hand hygiene for prevention of community transmission or acquisition of respiratory viruses that have caused epidemics or pandemics, including SARS-CoV-1, SARS-CoV-2 and influenza viruses. The evidence supporting the protective effect of hand hygiene was heterogeneous and limited by methodological quality(Gozdzielewska et al., 2022).
Improving hand hygiene in community settings: A scoping review of current international guidelines	Review	MacLeod, C	MedRxiv BMJ Yale	29 September 2022	The importance of hand hygiene in preventing disease transmission in various community settings. Hand hygiene is a fundamental measure that can be implemented in households, public spaces, workplaces, schools, and other similar environments to reduce the spread of infectious diseases (MacLeod et al., 2022)
A systematic review of nudges on hand hygiene against the spread of COVID-19	Review	Tzikas A	J. Behav. Exp.Econ	30 May 2023	The review findings indicate that nudging interventions have had a positive effect on promoting hand hygiene. Nudges are subtle and indirect prompts or cues that influence individuals] behaviour without limiting their choices. In the context of hand hygiene, nudges can be used to encourage and remind individuals to practice proper hand hygiene, such as placing hand sanitizers in visible locations or using signage to prompt handwashing. The positive impact of nudging interventions on hand hygiene suggests that they should be considered as a valuable component of existing and future public health interventions. Rather than being seen as alternative or unconventional tools, nudges can be integrated into public health policies and strategies to prevent the spread of COVID-19 and other potential future pandemics(Tzikas & Koulirakis, 2023)
Effectiveness of handwashing with soap for preventing acute respiratory infections in low-income and middle-income countries: a systematic review and meta-analysis	Review	Ross, I	The Lancet	20 May 2023	Interventions that promote handwashing with soap have been shown to effectively reduce the incidence of Acute Respiratory Infections in low-income and middle-income countries. Implementing and promoting proper handwashing practices can contribute to preventing the burden of respiratory diseases and improving public health outcomes(Ross et al., 2023)
Knowledge and practice regarding prevention of COVID-19 among the Saudi Arabian population	Research	Siddiqui, A.A	Work	17 September 2020	Out of the 443 respondents, 356 respondents (84%) knew they had to wash their hands for 20 seconds and did this as well, 303 respondents (75%) knew that sneezing or coughing into the arm/elbow can prevent the spread of COVID-19 and were doing this as well, 357 respondents (82%) knew that COVID-19 can be

Title	Type of article	First author	Journal	Posted date	Main findings
A systematic review of observational methods used to quantify personal protective behaviours among members of the public during the COVID-19 pandemic, and the concordance between observational and self-report measures in infectious disease health protection	Research	Davies, R	BMC Public Health	28 July 2022	transferred by shaking hands and avoided this, 333 respondents (79%) knew that they had to maintain a safe distance of at least one meter and kept this distance, 315 respondents (76%) knew that touching one's face can transfer the virus and avoid this, and 414 respondents (95%) knew that staying at home can decrease the chances of getting infected. The relationship between different regions and most of the knowledge-based and practice-based questions was significant ($p < 0.05$) (Siddiqui et al., 2020) The importance of measuring actual behaviour rather than relying solely on self-reported data, especially in the field of behavioural science during the COVID-19 pandemic. Many studies have focused on promoting behaviours that are believed to reduce infection transmission, but there has been a heavy reliance on self-report measures rather than direct observation of behaviour. This can lead to potential biases and limitation in accurately assessing behaviour change. When it comes to hand hygiene, studies have shown that observed adherence to hand hygiene practices tends to be lower than self-reported estimates. This suggests that self-reporting may overestimates that actual practice of hand hygiene. Similarly, there are few studies that have examined the validity of self-reported face covering use or physical distancing, but the existing evidence suggests that self-reports may be biased and not entirely accurate (Davies et al., 2022)
The impact of the covid-19 pandemic on the formation of the attitude of the population of the Russian federation to the prevention of infectious diseases	Research	<u>Koshechko, LI</u>	Probl Sotsialnoi Gig Zdravenn iia Istor Med	15 Decem ber 2022	More than 65% of respondents confirmed positive changes of one's attitude to sanitary hygienic activities to better sense. Among them, 63.3% began to wash hands more regularly and 62.2% began to apply hand antiseptic more often. The comparing of study results by individual characteristics revealed a significant effect of primary hygienic status of respondents on magnitude of fixed changes. It is established that during 5 months the population readiness to be vaccinated by one of the registered national vaccines was increasing and level of uncertainty was decreasing. Among respondents 73.5% marked increasing of individual responsibility of citizens for hygienic practices (Koshechko & Saltykova, 2022)
Use of ultraviolet light in graduate medical education to assess confidence among residents and fellows in handwashing instruction	Research	Aoutham any, S	<u>Antimicrob Steward Healthc Epidemiol</u>	20 April 2022	A survey was conducted in July 2020 at The University of Toledo to determine 114 residents/fellows confidence levels in conducting proper hand hygiene. A WHO questionnaire was utilized to ascertain residents and fellows confidence before and after the hand washing demonstration. Glo-germ lotion and UV light were used as visual tools to aid in assessing confidence. A visual analog scale was used to indicate confidence levels. Analysis of the data was performed using paired T-tests at a 95% CI. Results: We surveyed 115 first year residents and fellows and identified 114 individuals that met inclusion criteria, of which none were excluded or lost to follow up. There was found to be a significant decrease in confidence of hand hygiene after the proper handwashing presentation and when using UV light with glo-germ

Title	Type of article	First author	Journal	Posted date	Main findings
Habit formation of preventive behaviours during the COVID-19 pandemic: a longitudinal study of physical distancing and hand washing	Research	Zhang, C	BMC Public Health	20 August 2020	lotion (95% CI-0.86 to-0.40). While first year residents had a significant change in confidence (95% CI-0.94 to-0.46), there wasn't a significant change in confidence amongst fellows (95% CI-0.72 to 1.2), possibly due to individuals being further along in their medical career. It is suggested that fellows prove to have higher initial confidence levels due to more accurate understanding of proper hand washing procedure. Our analysis also indicated that the internal medicine department had a significant change in confidence (95% CI-1.7 to-0.8) (Aouthamany et al., 2022)
Hand Washing and Related Cognitions Following a Brief Behavior Change Intervention During the COVID-19 Pandemic: a Pre-Post Analysis	Research	Keller, J	Int J Behav Med	29 October 2022	CDC continues to recommend hand hygiene behaviors to protect against SARS-CoV-2 transmission (Zhang et al., 2022)
The trajectory of Covid-19 pandemic and handwashing adherence: Finding from 14 countries	Research	<u>Szczuka</u> , Z	BMC Public Health	5 October 2021	Hand hygiene practices are important not only during the corona virus disease 2019 (COVID-19) pandemic, but also critical to prevent the possible spread of other infectious diseases. ffect hygiene behavior is not only important to improve health promotion strategies during the pandemic, but also to improve promotion to sustain hand hygiene behavior after the pandemic as basic prevention measures, which is still crucial in developing countries(Keller et al., 2022)
Public perception and hand hygiene behaviour during covid-19 pandemic in Indonesia	Research	Dwipayanti, N.M.U	Frontiers in Public Health	13 May 2021	To better explain levels of protective behaviours such as handwashing, future research should account for indicators of the trajectory of the COVID-19 pandemic (Szczuka et al., 2021)
The impact of coronavirus disease 2019 (COVID-19) on provider use of electronic hand hygiene monitoring technology	Epidemiological Study	Hess, O.C.R	Infect Control Hosp Epidemiology	13 November 2020	Identifying the importance of addressing social norms related to hand hygiene practices as a potential health promotion strategy. Social norms play a significant role in shaping individual behaviours, including hand hygiene practices. By creating and promoting positive hand hygiene norms within a community, it is possible to encourage and reinforce the adoption of proper hand hygiene behaviours(Dwipayanti et al., 2021)
Enhancing compliance rate of hand hygiene before and after Covid-19: An interference analysis in Abu Dhabi, UAE hospitals	Epidemiological Study	Agarwal, D	Journal of Hospital Infection	8 May 2023	Hand hygiene (HH), the foundation of infection prevention, ¹ is important both in the context of the coronavirus disease 2019 (COVID-19) pandemic and as it relates to concerns about viral contamination of the inanimate environment (Hess et al., 2020)
Sharp decline in rates of community respiratory viral detection among patients at the National	Epidemiological Study	Woolbert, M.E	<u>Infection Control and Hospital</u>	18 January 2023	Based on this study, we evaluated overall hand hygiene compliance rate including the intake of hand wash liquid agent, alcohol-based hand rub (ABHR), the paper wipes, medical waste consumption and personal protective equipment's (gloves, masks etc.) before and after Covid-19 intervention to improve the hand hygiene compliance rate in Abu Dhabi hospitals (Agarwal et al., 2023)
					The decrease in viral respiratory infections detected in NIHCC patients during the pandemic was likely due to the layered COVID-19 prevention and mitigation

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Institutes of Health Clinical Center during the coronavirus disease 2019 (COVID-19) pandemic			<u>Epidemiology</u>		measures implemented in the community and the hospital (Woolbert et al., 2023).
Factors affecting the infection control behaviours of Korean dental hygienists in response to the coronavirus disease 2019 pandemic	Epidemiology Study	Park, H.R	Int J Dent Hyg	1 May 2023	Most dental health workers recognize the need for the implementation of basic protection through improved infection control measures, a high fear of infectious diseases and disease transmission persists, while the actual compliance rate is low (Park & Min, 2023).
COVID-19-Related Knowledge and Practices Among Health Care Workers in Saudi Arabia: Cross-sectional Questionnaire Study	Epidemiology Study	Shaikhain, T.A	JMIR Form Res	25 January 2021	The majority agreed that social distancing, face masks, and hand washing are effective methods for preventing disease transmission. However, only 63.7% (n=359) knew the correct duration of hand washing (Shaikan et al., 2021)
African American Adherence to COVID-19 Public Health Recommendations	Brief reports	Block, R	Health Literacy Research and Practice	7 July 2020	Weighted to represent a national sample, intent to always adhere to public health recommendations was wash awareness of opportunities for testing and treatment, hands (72%), social distancing (67%), avoid touching face (55%), and wear mask (65%) and understanding of how behavior may modify disease risk (Block et al., 2020)