



Prevention of covid-19 transmission with mask and hand hygiene in hospital: A bibliometric analysis

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ABSTRACT

COVID-19 is an infectious respiratory disease caused by a new type of coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). Given the importance of controlling the transmission of COVID-19 and the availability of preliminary data, it is important to conduct research on how compliance and accuracy in using masks and hand hygiene behavior affect prevention of COVID-19 transmission in Hospital. This study included quantitative descriptive approaches as well as bibliometric analyses to map bibliographic data from diverse journal articles. The Scopus database, which has been frequently utilized in academic research to evaluate the trend of publications. The data was downloaded in the Research Information System (RIS) format and analyzed with VOSviewer software. The topic of COVID-19, Health care facility, Hospital, Human, Hygiene, Pandemic, Prevention, Risk assessment, Risk factor, SARS-CoV-2, Surveys and questionnaire are covered in Cluster 1. In cluster 2, the main topics are Contact examination, Coronavirus infection, Coughing, Disease transmission, Dyspnea, Hospital infection, Hospitalization, Infectious disease transmission, Personal protective equipment, Virology, Virus transmission. Cross infection, Hand hygiene, Health care personnel, Mask, Prevention and control, Respiratory tract infection, and Systematic review are among the topics in Cluster 3. The last cluster is concerned with Hand washing, Health personnel, Infection control, Infection prevention, medical staff, Nurse, and Physician.

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ABSTRAK

COVID-19 adalah penyakit pernapasan menular yang disebabkan oleh virus jenis baru coronavirus, *Severe Acute Respiratory Syndrome Coronavirus 2* (SARS-CoV-2). Mengingat pentingnya pengendalian penularan COVID-19 dan tersedianya data, maka penting dilakukan penelitian tentang bagaimana pengaruh kepatuhan dan ketepatan penggunaan masker dan perilaku cuci tangan terhadap pencegahan penularan COVID-19 di Rumah Sakit. Penelitian ini menggunakan metode deskriptif kuantitatif serta analisis bibliometrik untuk memetakan data bibliografi dari berbagai artikel jurnal. Database Scopus digunakan dalam penelitian akademik untuk mengevaluasi tren publikasi. Data diunduh dalam format *Research Information System* (RIS) dan dianalisis dengan *software* VOSviewer. Topik Penyakit COVID-19, Fasilitas Layanan Kesehatan, Rumah Sakit, Manusia, Kebersihan, Pandemi, Pencegahan, Penilaian Risiko, Faktor Risiko, SARS-CoV-2, Survei dan Kuesioner tercakup dalam Kluster 1. Pada Kluster 2, Topik utamanya adalah Pemeriksaan Kontak, Infeksi Coronavirus, Batuk, Penularan Penyakit, Dispnea, Infeksi Rumah Sakit, Rawat Inap, Penularan Penyakit Menular, Alat Pelindung Diri, Virologi, Penularan Virus. Infeksi silang, Kebersihan tangan, Tenaga kesehatan, Masker, Pencegahan dan pengendalian, Infeksi saluran pernapasan, dan Tinjauan sistematik adalah

topik di Kluster 3. Kluster terakhir, berkaitan dengan Cuci Tangan, Tenaga Kesehatan, Pengendalian Infeksi, Pencegahan Infeksi, Staf Medis, Perawat, dan Dokter

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INTRODUCTION

COVID-19 has become a concern and health problem in the world since its initial appearance at the end of 2019 in the city of Wuhan, China. The number of confirmed cases as of November 2022 worldwide has reached 5,030,002 cases. This affects the system of health service delivery in health facilities around the world, especially in service units located in hospitals (Long et al, 2020). It is known that transmission of COVID-19 is through droplets causing transmission rates to grow quickly and easily, so efforts to prevent and control known transmission can be carried out through the use of Personal Protective Equipment (PPE), hand hygiene, and maintaining distance are the main things to protect all health workers. who work mainly in high-risk health facility units (Verbeek et al, 2020). Given the importance of controlling the transmission of COVID-19 and the availability of preliminary data, it is important to conduct research on how compliance and accuracy in using masks and hand hygiene behavior affect prevention of COVID-19 transmission in Hospital.

Corona Virus Disease 2019 (COVID-19)

COVID-19 is an infectious respiratory disease caused by a new type of coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2). This virus is a type of encapsulated virus, has a single RNA strain, and is not segmented. The first case of the novel coronavirus (nCoV) was first detected in China in December 2019 and then there was rapid transmission between countries in the world. This led to the World Health Organization (WHO) declaring an International Public Health Emergency on 30 January 2020, and designating the outbreak a pandemic on 11 March 2020 (*World Health Organization, 2022*). Most coronaviruses infect animals and can cause serious illness in animals such as cattle, horses, pigs, chickens and cats. In general, it is known that the spread of coronavirus from animals to humans and from humans to humans is through droplet transmission, contact transmission, fecal route, and orally. Everyone is at risk of infection in both the healthy population and the immunocompromised patient, and it depends on the amount of exposure to the virus (Perhimpunan Dokter Paru Indonesia, 2020).

Hand Hygiene

The most basic and effective technique in preventing and controlling infection is to perform hand hygiene or hand hygiene (Zulpahiyana, 2013). Hand hygiene can be done by washing hands, which is a process of cleaning hands using soap and running water or handrub with an alcohol-based antiseptic with the aim of preventing or reducing the development of microorganisms on the hands. Proper application of hand hygiene is beneficial and aims to reduce or eliminate the number of microorganisms, especially transient flora that contaminate the skin on the surface of a

person's hands obtained from contact with infected patients or contact with the surrounding environmental surfaces. This is expected to reduce the risk of transmission and cross-contamination of these microorganisms to oneself and others (World Health Organization, 2009).

According to the Centers for Disease Control (2002) hand hygiene in the form of handwashing is done with an indication if the hands look dirty. When the hands don't look dirty but have done activities that can cause microbes to move to the hands, you can do handrubbing with an alcohol-based liquid. According to WHO (2009) the effectiveness of hand hygiene involves awareness of the health of workers, indications for hand hygiene, and time to perform hand hygiene. In health facilities, it is known that 5 moments (five moments) for health workers are required to perform hand hygiene, including:

- 1) Before touching the patient;
- 2) Before performing an asepsis procedure
- 3) After exposure to body fluids
- 4) After contact with the patient
- 5) After touching the environment around the patient

Mask

Masks are one of the Personal Protective Equipment (PPE) used to protect the mouth, nose and face from pathogens that can be transmitted through droplets, air (airborne), or splashes of body fluids from someone who is infected with pathogens. Masks are also known as protecting the respiratory tract which can be used to protect against inhalation of harmful substances or free contaminants in the air. Masks are not intended to eliminate a disease but can protect the wearer ideally (Wibowo, 2016). Surgical masks or medical masks have non-woven, disposable and lose-fitting materials that create a barrier between the mouth and nose so that the user is not exposed to contaminants in the surrounding environment that have the potential to infect and can block droplets or droplets with large particles (Kementerian Kesehatan RI, 2020b). Surgical masks are composed of 3 (three) layers, an outer layer that is waterproof and non-woven, a middle layer as a layer with a high-density filter, and an inner layer that is in contact with the skin, with the function of absorbing liquids or large particles when the user sneezes or coughs. The filter layer on a surgical mask effectively filters out droplets that come out when the user coughs and sneezes, but cannot protect the user from inhaling particles that can be transmitted through smaller airborne (Gugus Tugas Percepatan Penanganan COVID-19, 2020). Surgical masks can block droplets with a size of 0.52 – 2 microns, with a filtration power of 10 – 95% (Yudhasuti, 2020). This type of mask is recommended for use by people with flu symptoms such as coughing, runny nose, sneezing, sore throat, and fever, and is recommended for use by medical personnel on duty at health care facilities (Gugus Tugas Percepatan Penanganan COVID-19, 2020).

METHODS

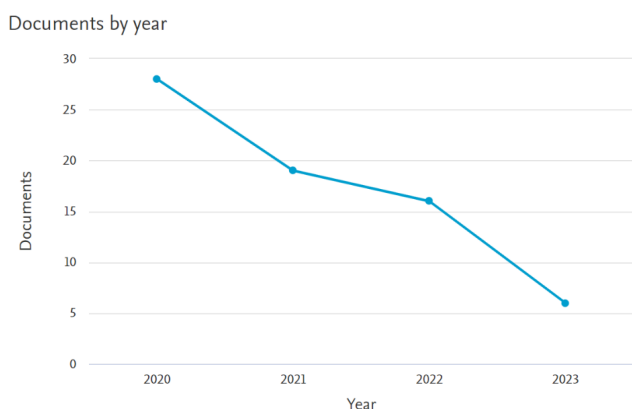
This study included quantitative descriptive approaches as well as bibliometric analyses to map bibliographic data from diverse journal articles. The Scopus database, which has been frequently utilized in academic research to evaluate the trend of publications connected to COVID-19 prevention with mask and hand hygiene, was used to search, gather, and filter bibliographic data. This study retrieves data on February 13, 2023, using the keywords "prevention" AND "covid-19" AND "mask" AND "(hand AND hygiene)" AND "hospital" from an open-access paper. From 2013 to 2023, there are 69 English-language publications journals on COVID-19 prevention with mask and hand hygiene.

The Scopus limit function is used in social science, medicine, nursing, psychology, environmental science, business management and accounting, arts and humanities, economic econometrics and finance, biochemistry genetics and molecular biology, and computer science to arrange articles by subject. The data was downloaded in the Research Information System (RIS) format and analyzed with VOSviewer software. The author, source of the document, country, type, year, subject, and title of publishing are all gathered from the downloaded data.

Bibliometric analysis is performed by examining trends, clusters, and the frequency of terms found in COVID-19 prevention with mask and hand hygiene. VOSviewer mapped and generated clusters to help researchers analyze relevant material connected to keywords or concepts to discover the primary topics of research (Abdullah, 2021; Garcia Carreño, 2020). The research items will be represented by a circle-shaped label, the size of which will be dictated by the number of things. The greater the number of study items, the larger the circle, and the shorter the distance, the stronger the association (Samul, 2020).

RESULTS AND DISCUSSION

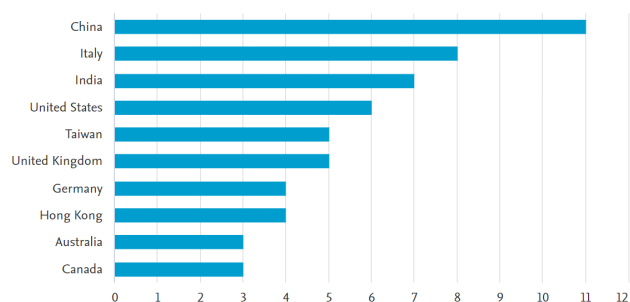
The findings of an examination of 69 articles gathered from Scopus ranged from 2013 to 2023. Data analysis and categorization are performed based on the number of documents each year, the author, the reference, the journal source, the university affiliation, the document type, the topic area, and the nation conducting a study on the subject of COVID-19 prevention with mask and hand hygiene.



Source: Scopus Database
Figure 1. Document by year

According to the graph in Figure 1, the issue of COVID-19 prevention with mask and hand hygiene was first published in 2020 and within 3 years the study conducted was decreasing. From 2020 to 2021, the number of papers decreased from twenty eight to nineteen. Then, from 2021 to 2022, there was a reduction from nineteen to sixteen papers in a year. In 2022, the number of publications again decreased significantly from sixteen to only six papers. This indicates that the research's enthusiasm of COVID-19 prevention with mask and hand hygiene is declining each year.

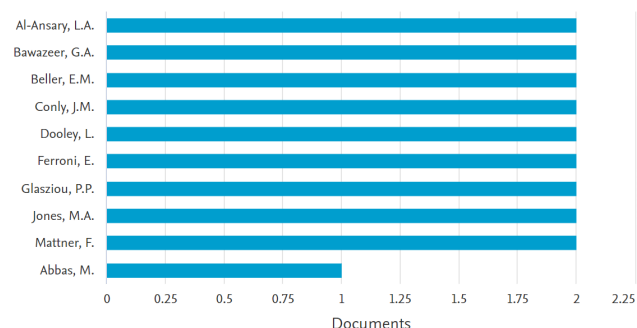
Documents by country or territory
Compare the document counts for up to 15 countries/territories.



Source: Scopus Database
Figure 2. Document by country

According to Figure 2, there are ten most productive nations for undertaking research. China has the most research on COVID-19 prevention with mask and hand hygiene with 11 documents. Then, Italy comes in second with 8 papers, while India comes in third with 7 documents. Other nations with consecutive ranks include The United States (6 papers), Taiwan and United Kingdom (5 documents), Germany and Hong Kong (4 documents), and Australia and Canada (3 documents). There are ten authors with the most documents mentioned in detail in Figure 3 of the 69 journals published in the Scopus database.

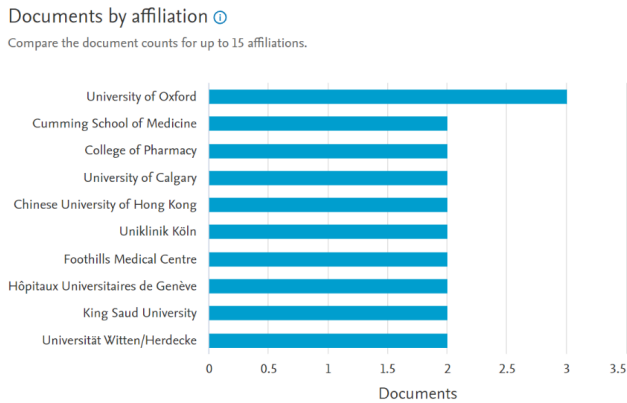
Documents by author
Compare the document counts for up to 15 authors.



Source: Scopus Database
Figure 3. Document by author

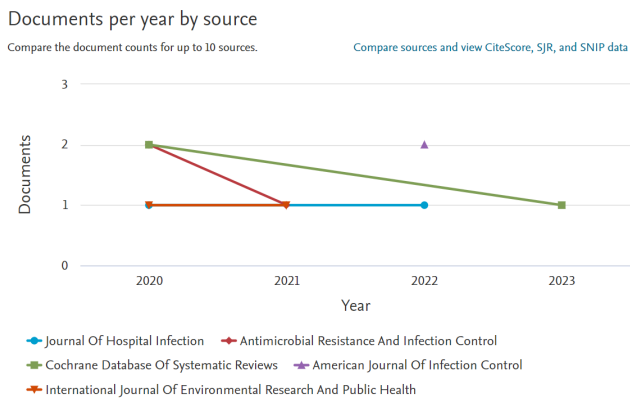
Figure 3 shows that Al-Ansary, L.A., Bawazeer, G.A., Beller, E.M., Conly, J.M., Dooley, L., Ferroni, E., Glasziou, P.P., Jones, M.A., and Mattner, F. has wrote two papers each about COVID-19 prevention with mask and hand hygiene, making

them researchers who conducted the study the most, with two documents compared to one for other authors. Also, the authors have a variety of affiliations that help them publish their work. Figure 3 shows the ten affiliates that produced the most COVID-19 prevention with mask and hand hygiene papers on Scopus between 2013 and 2023.



Source: Scopus Database
Figure 4. Document by affiliation

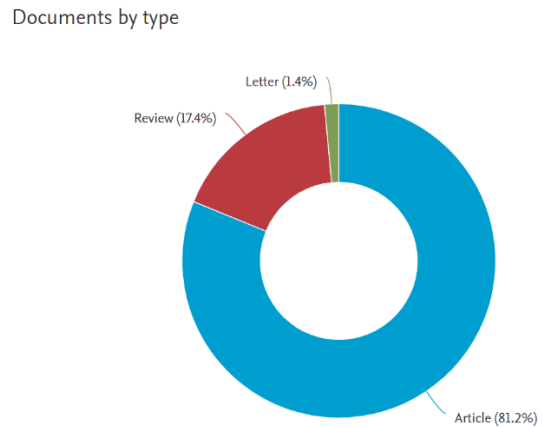
Figure 4 shows that the top 10 university affiliations which one of them has the most papers which is three, compared to the other nine university affiliations, which were two papers on each affiliation. In addition, we can see in Figure 5, from 2020 to 2023, five journal articles have the most COVID-19 prevention with mask and hand hygiene research.



Source: Scopus Database
Figure 5. Documents per year by source

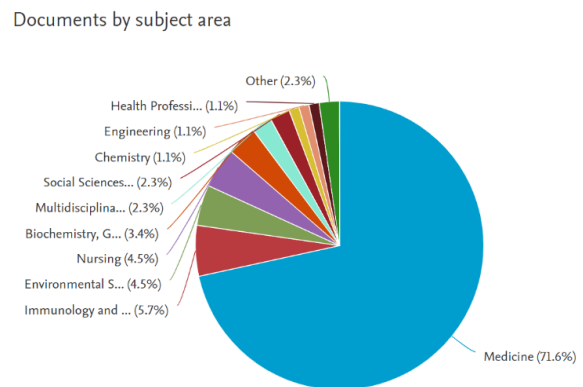
Figure 5 shows that the Cochrane Database of Systematic Reviews is the source of journal publishing with the most publications in 2020 (2 journals) and in 2023 (1 journal), a total of 3 journals published in three years. Then there's Antimicrobial Resistance and Infection Control, which has two papers in 2020 and one paper in 2021, making it the journal that has published the most papers as well (in total of 3 papers). The Journal of Hospital Infection contains two papers, one in 2020 and one in 2022. American Journal of Infection Control also published two papers regarding COVID-19 prevention both in 2022. International Journal of Environmental Research and Public Health has one paper in

2020 and one paper in 2021, making it in total two papers in two years. Then, Figure 6 shows how documents are sorted based on the document type, such as articles and reviews.



Source: Scopus Database
Figure 6. Documents by type

Figure 6 shows the percentage and quantity of papers of each type, with 56 articles (81.2%) and 12 articles (17.4%), and 1 article (1.4%) reviews out of a total of 69 documents. According to the topic area, published journals are split into many groups.



Source: Scopus Database
Figure 7. Documents by subject area

Figure 7 shows the topic areas of published journal research, with Medicine having the highest proportion (71.6%) and the most documents (63 documents). In addition, the top five disciplines of study include 5.7% in Immunology and Microbiology (5 papers), 4.5% in Nursing and Environmental Science (4 documents), and 3.4% in Biochemistry, Genetics, and Molecular Biology (3 documents). Then there are more fields with different percentages. This demonstrates that Medicine, Immunology and Microbiology, Nursing, Environmental Science, Biochemistry, Genetics, and Molecular can all contribute to COVID-19 prevention with mask and hand hygiene understanding. Many journals have been referenced from diverse fields of study, regions, authors, affiliations, document kinds, year of publication, and different sources. Table 1 shows the most prominent citations based on papers in the Scopus database.

Table 1. Document by citation

No	Title	Year	Cited
1	Barriers and facilitators to healthcare workers' adherence with infection prevention and control (IPC) guidelines for respiratory infectious diseases: A rapid qualitative evidence synthesis	2020	308
2	Neonatal management and outcomes during the COVID-19 pandemic: an observation cohort study	2020	172
3	Risk of nosocomial transmission of coronavirus disease 2019: an experience in a general ward setting in Hong Kong	2020	153
4	Risk of SARS-CoV-2 transmission by aerosols, the rational use of masks, and protection of healthcare workers from COVID-19	2020	141
5	The COVID-19 pandemic face mask waste: A blooming threat to the marine environment	2021	118
6	Physical interventions to interrupt or reduce the spread of respiratory viruses	2020	85
7	Sociodemographic predictors of health risk perception, attitude and behavior practices associated with health-emergency disaster risk management for biological hazards: The case of COVID-19 pandemic in Hong Kong, SAR China	2020	83
8	Impact of COVID-19 pandemic on the daily management of biotechnological therapy in inflammatory bowel disease patients: Reorganisational response in a high-volume Italian inflammatory bowel disease centre	2020	31
9	Adherence to personal protective equipment use among healthcare workers caring for confirmed COVID-19 and alleged non-COVID-19 patients	2020	26
10	Enoxaparin for primary thromboprophylaxis in ambulatory patients with coronavirus disease-2019 (the OVID study): A structured summary of a study protocol for a randomized controlled trial	2020	23

Source: Scopus Database

Table 1 shows that journals were the most referenced articles published in 2020, with a total of 308 citations. Furthermore, there were 172 citations in the second position, published in 2020, and 153 citations in the third position, published in 2020 as well.

Clustering and Networking Topics and Abstract of COVID-19 Prevention with Mask and Hand Hygiene

This research is using the term COVID-19 prevention with mask and hand hygiene yielded 69 papers from the Scopus database. Then, bibliometric analysis was done by using VOSviewer, which visualizes the network, overlay, and density. The nodes and edges of a bibliometric network are analyzed. Each node will represent a journal, article, or keyword, with the size of the node indicating the frequency of occurrence of each keyword in proportion to the number of keywords in which it occurs. The line connecting the nodes illustrates the co-occurrence of terms when they appear together or have a connection. The greater the co-occurrence, the thicker the dashes between terms. The network visualization show different colors between cluster themes, each cluster contains nodes and edges that are used to describe the node's theme coverage and the links between subjects (Donthu et al., 2021).

Figure 8 depicts data that has been mapped using VOSviewer that reveals four groupings or clusters. Each cluster will have different themes and colors, and there will be terms that stand out with larger node sizes than the rest.

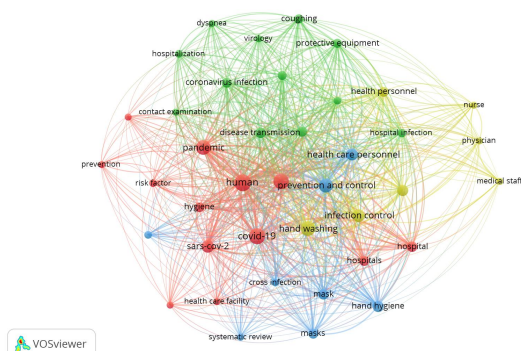


Figure 8. Relation of themes in COVID-19 prevention with mask and hand hygiene

Source: Processed by Researchers using VOSviewer

This analytical mapping is aimed to assist academics in finding interesting ideas and current trends in certain fields based on the topic of interest. This bibliometric analysis research makes it easy for individuals to identify and read papers related to the issue

Table 2. Topic Clustering in COVID-19 prevention with mask and hand hygiene

Cluster	Topic
1	Coronavirus Disease 2019, COVID-19, Health care facility, Hospital, Human, Hygiene, Pandemic, Prevention, Risk assessment, Risk factor, SARS-CoV-2, Surveys and questionnaire
2	Contact examination, Coronavirus infection, Coughing, Disease transmission, Dyspnea, Hospital infection, Hospitalization, Infectious disease transmission, Personal protective equipment, Protective equipment, Virology, Virus transmission
3	Cross infection, Hand hygiene, Health care personnel, Mask, Masks, Prevention and control, Respiratory tract infection, Systematic review
4	Hand washing, Health personnel, Infection control, Infection prevention, Medical staff, Nurse, Physician

The topic of Coronavirus Disease 2019, COVID-19, Health care facility, Hospital, Human, Hygiene, Pandemic, Prevention, Risk assessment, Risk factor, SARS-CoV-2, Surveys and questionnaire are covered in Cluster 1 in red. In cluster 2 with the color of green, the main topics are Contact examination, Coronavirus infection, Coughing, Disease transmission, Dyspnea, Hospital infection, Hospitalization, Infectious disease transmission, Personal protective equipment, Protective equipment, Virology, Virus transmission. Cross infection, Hand hygiene, Health care personnel, Mask, Masks, Prevention and control, Respiratory tract infection, and Systematic review are among the blue topics in Cluster 3. The last cluster, yellow cluster 4 is concerned with Hand washing, Health personnel, Infection control, Infection prevention, Medical staff, Nurse, and Physician. This clustering can help academics in analyzing any connected subjects and make finding references easier. Table 2 lists clusters based on 69 papers in the Scopus database in detail.

Overlay Visualization

Furthermore, VOSviewer displays an overlay depiction of the current trend of the research issue (Hanief, 2021). There are color nodes in Figure 9 that reflect the year the article containing that term was published. The older the topic, the darker the color of the nodes.

Figure 9 shows the keywords used in 2020; dyspnea, virology, coronavirus infection, disease transmission, and other bluish-purple keywords. In more recent times in 2020, infection control, hospital infection, and healthcare facility were frequently mentioned. In 2021, the word hand hygiene, human, pandemic, prevention and control, hand hygiene, mask, COVID-19, hospital, and hygiene were frequently used in keyword field. This indicates that more research is proposed to develop a keyword that does not yet exist or investigate research based on the presence and co-occurrence of the keywords.

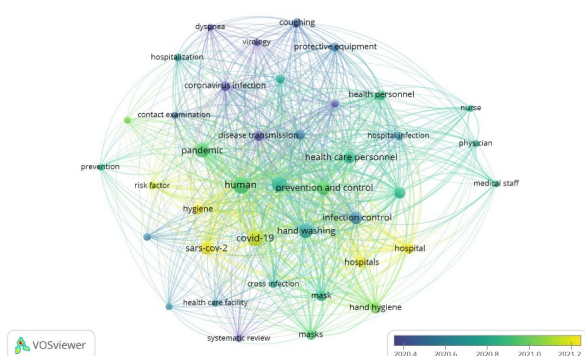


Figure 9. Overlay Visualization

Source: Processed by Researchers using VOSviewer

Density Visualization

VOSviewer has a visualization called density visualization that allow us to see the density level of a topic. This density map is based on the quantity and depth of research, with the thicker the density color indicating more research (Hamidah et al., 2020). You may see the subject density in a certain place, which indicates the amount of closely related terms and the issue's relevance. The closer the distance between keywords, the more significant the effect on the size and density concentration of the keywords.

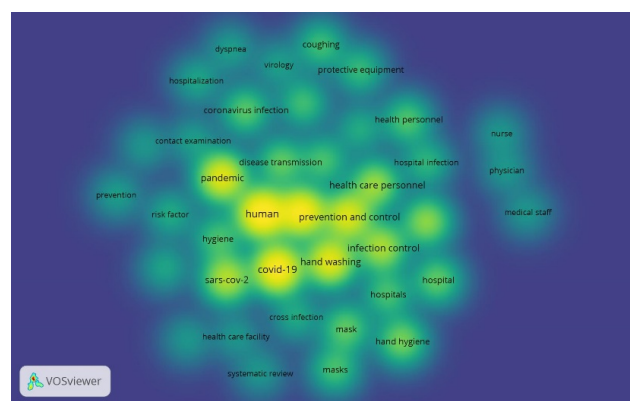


Figure 10. Density Visualization

Source: Processed by Researchers using VOSviewer

Figure 10 shows the keywords with yellow color human, COVID-19, pandemic, prevention and control, and hand washing that appear frequently or most frequently explored in journals on the topic of COVID-19 prevention with mask and hand hygiene. Meanwhile, green keywords are issues that have received little attention. Researchers can do further research by re-examining current research trends to see if they are in conformity with prior research so that they can be more precise, or by using issues that have not been explored extensively as chances for study (Hanief, 2021).

LIMITATION OF THE STUDY

This study still has certain limitations. The study only focused on current research trends about COVID-19 prevention with mask and hand hygiene in healthcare. Further research on COVID-19 prevention in healthcare is needed, either through a literature review or the development of new ideas.

CONCLUSIONS AND SUGGESTIONS

The growth of knowledge about COVID-19 prevention gives a new dimension to the topic of health care by prioritizing the safety of health workers and reducing the risk of exposure to a disease. The issue of COVID-19 prevention research has caught the interest of many academics over the previous years, with the number of studies increasing year after year.

The Scopus database has 69 publications gathered from Scopus ranged from 2013 to 2023 with the keywords Prevention, COVID-19, Mask, Hand Hygiene, and Hospital with China, Italy, and India contributing the most to the study. Since 2020 the Cochrane Database of Systematic Reviews has published the most papers on prevention of COVID-19 transmission in Hospital. The topic areas with the most documents connected to prevention of COVID-19 transmission include Medicine, Immunology and Microbiology, Nursing, Environmental Science, Biochemistry, Genetics, and Molecular Biology.

The analysis using VOSviewer yielded the development of four clusters with diverse subjects. Cluster 1 includes themes such as, health care facility, hospital, and hygiene. Cluster 2 main topics are contact examination, coronavirus infection, coughing and disease transmission. Cluster 3 includes the issues of cross infection, hand hygiene and health care personnel. The last, cluster 4 covers hand washing, infection control and infection prevention.

COVID-19 prevention with mask and hand hygiene cannot be separated from a theory and its link to other terms such as health care facility, health care personnel, infection control and others. This mapping study intends to assist researchers in determining the desired subject based on keywords that are currently trending or have never been investigated. As a result, it may prompt researchers to re-examine or test fresh possibilities. They can lead and aid in looking for references that fit the subjects taken based on the topics or keywords in the cluster that have been examined from the Scopus database. Considering the importance of COVID-19 prevention in hospital, there is a need for more research in the health sector, due to the daily workload of health professionals.

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ETHICAL CONSIDERATIONS

Funding Statement

The authors did not receive support from any organization for the submitted work.

Conflict of Interest Statement

There are no possible conflicts of interest with respect to the authoring and publishing of this work, according to the authors.

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