Public Health Challenge during COVID 19 and Government Initiatives

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ABSTRACT

The outbreak of COVID-19 has posed a major public health challenge globally. The transmission of the virus can occur through respiratory droplets, direct contact with infected individuals, and contact with contaminated surfaces. Infection control measures play a crucial role in preventing the spread of COVID-19. This review paper aims to provide an overview of the infection control measures implemented during the COVID-19 pandemic. The paper examines the effectiveness of these measures in preventing the spread of the virus, and identifies gaps in current knowledge that need to be addressed.

Keywords: COVID-19, dentistry, SARS-CoV-2, preventive measures, corona virus infection, preventive dentistry.

INTRODUCTION

The COVID-19 pandemic has led to an unprecedented global health crisis. The virus spreads rapidly from person to person, and this has led to a significant number of infections and deaths. Infection control measures have been implemented to prevent the spread of the virus. These measures include wearing masks, hand hygiene, social distancing, and isolation of infected individuals. This paper aims to review the current knowledge on these measures, and to identify areas that require further research.

The main reasons for COVID-19 infection during the pandemic are primarily due to the transmission of the SARS- CoV-2 virus from person to person. The virus is primarily spread through respiratory droplets that are produced when an infected person talks, coughs, or sneezes. These droplets can land on nearby surfaces or can be inhaled by others who are in close contact with the infected person.

Additionally, the virus can also be spread by touching a surface contaminated with the virus and then touching one's mouth, nose, or eyes. The virus can survive on surfaces for several hours to days depending on the surface type and environmental conditions.

Another reason for the spread of the virus during the pandemic was the high level of community transmission, particularly in areas where the virus was not effectively contained. Crowded indoor spaces, where individuals are in close proximity to one another, such as workplaces, public transportation, and social gatherings, were also significant sources of transmission.

Lack of adherence to public health measures, such as hand hygiene, wearing masks, and social distancing, were also contributing factors to the spread of the virus.

Finally, the emergence of new variants of the virus, which are more transmissible and potentially more severe, have also contributed to the ongoing transmission of the virus during the pandemic.

REVIEW OF LITERATURE

Healthcare associated infection (HCAI) is a worldwide problem. It is estimated that 6.4% of hospitalized patients in England (Health Protection Agency 2012) and 7.1% in Europe develop HCAI and 37,000 people in Europe die as a consequence (European Centre for Disease Prevention and Control 2013). Between 15 and 30 percent of HCAI are thought to be avoidable through the application of existing interventions such as standard precautions (National Audit

Office 2009). However, compliance with infection prevention and control precautions has been consistently highlighted to be low across a broad spectrum of precautions worldwide (Gammon et al 2008).

Standard precautions are seen as fundamental to the prevention and control of HCAI and are an effective way of protecting healthcare workers, patients and members of the public. However, it is widely acknowledged and has been identified in a systematic review that compliance with standard precautions is sub-optimal on an international basis (Gammon et al 2008).

Hand hygiene is the most important intervention in the control of cross-infection but levels of compliance can be poor (Bukhari et al 2011, Fuller et al 2011, Naderi et al 2012). In relation to glove use similarly poor compliance levels have been highlighted (Kuzu et al 2005, Chau et al 2011). There has also been a link established between glove use and hand hygiene compliance. Girou et al (2004), for example, in their observational study in France involving 120 healthcare workers identified that hand hygiene was not undertaken as a result of improper glove use in 64% of instances. Flores and Pevalin (2006) also reported that hand hygiene was adversely affected by the overuse of gloves on the basis of an observational study on 12 randomly selected wards. There is therefore a clear indication that staff see glove use as negating the need for hand hygiene when this is not the case. Poor compliance with standard precautions has been found to be a risk factor for sharps injuries, with the risk of injury almost doubling in the United Arab Emirates due to poor compliance (Jacob et al 2010). Compliance with isolation precautions has also been reported to be as low as 37% (Mashet al 2007).

When considering other less researched precautions, there are still low levels of good practice. In one study, only 46% of staff did not resheath needles after use and only 55% used eye protection when appropriate (McGaw et al 2012). It is clear, then, that compliance is universally sub-optimal. This can have a negative impact on rates of infection (Fendler et al 2002) with infection rates rising as practice deteriorates as demonstrated in a neonatal intensive care unit (LeMyre et al 2012) . We therefore need to consider strategies which might improve practice and thereby reduce infection rates. There is strong evidence to confirm that compliance varies and that healthcare workers are selective in their application of infection prevention and control precautions. Poor levels of compliance have significant implications for patient and staff safety and quality of care and issues which affect or improve compliance therefore need to be considered.

Reasons for non-compliance with infection prevention
The existing literature identifies many factors that impact on compliance with infection prevention and control precautions. A lack of knowledge, for example, has been reported to be associated with sub-optimal use of personal protective equipment with only 22% of staff having the correct knowledge about standard precautions (Timilshina et al 2011). A correlation has also been reported between knowledge and hand hygiene practices in nursing and medical students, with less knowledge leading to lower levels of compliance (Suchitra and Lakshmi Devi 2007, van de Mortel et al 2012, Sodhi et al 2013). There is, however, some confusion regarding whether improvements in knowledge increases levels of compliance with infection prevention and control precautions. DeJoy et al (2000), for example, reported that better knowledge predicted better general compliance with standard precautions. However, it was later found that theoretical knowledge of hand hygiene guidelines did not have any impact on hand hygiene practices (De Wandel et al 2010).

Other reasons for non-compliance reported in the literature include increased workload (Pittet et al 2004, Knoll et al 2010), poor risk perception (DeJoy et al 2000, Dinelli et al 2009, Chor et al 2012) and detrimental skin effects (Creedon 2005). The facilities available to support infection prevention and control practices have also been considered. A lack of appropriate facilities have been found to hinder compliance (Chelenyane and Endacott 2006), though no link has been found between the number of facilities available and rates of hospital infection (Borg et al 2009). In contrast to this,

however, Lankford et al (2003) reported that an increase in the number of hand hygiene basins did not improve hand washing compliance. It therefore seems that while we may be able to identify factors which adversely affect compliance, addressing these factors may not lead to positive changes in practice. This speaks to the implementation literature in infection prevention and control.
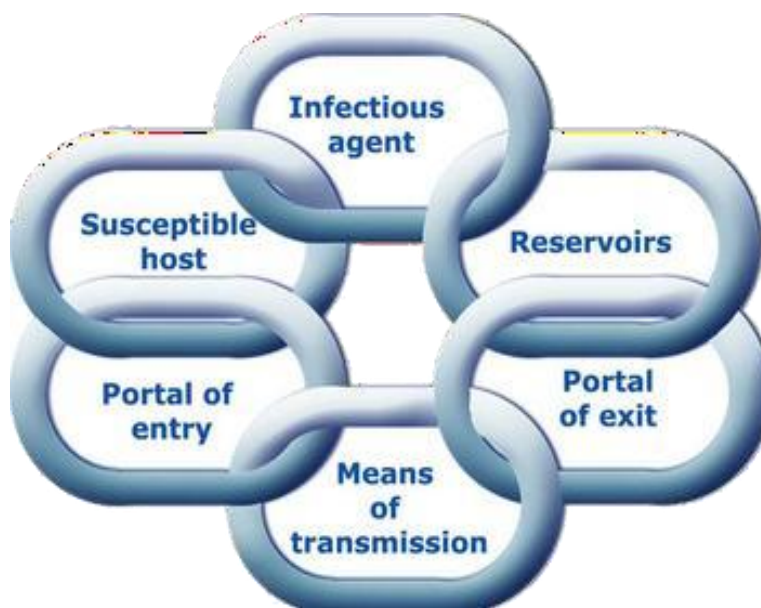
Infection Prevention and Control in Health Care

Education is stressed internationally as an important aspect of infection prevention and control programmes. The Health and Social Care Act 2008 (Department of Health 2009) states that education should be provided to all staff undertaking infection prevention and control precautions. The Welsh Assembly Government's (2007) strategy places emphasis on the need for healthcare workers to receive education to develop their knowledge and awareness. In Australia, education and training are highlighted as an aspect of organisational support which should be provided for clinical staff (Australian Government 2010). Despite this emphasis on education, there is little detail provided regarding what this education should entail. Each individual organisation within healthcare therefore decides what should be included in their educational interventions which can mean a lack of consistency in approach and detail.

Education in infection prevention and control has developed in the UK as an emphasis has been placed on infection prevention and control in healthcare. The Department of Health (DH) has been a leader in this in terms of publications and guidance advocating education. In 1998, for example, the Department of Health recommended that the education of healthcare workers was needed to improve awareness of antimicrobial resistance (DH 1998). In *Getting Ahead of the Curve* (DH 2002), it was identified that stronger professional education and training programmes were needed to combat infectious diseases in the UK. Specific to healthcare associated infection, *Winning Ways* (DH 2003) recommended that infection prevention and control education be included in the induction of all healthcare staff and that it should be considered as part of personal development plans for all staff.

Education of infection prevention and control

Infection prevention and control is one of the five essential skills clusters for nursing set down by the Nursing and Healthcare Council (2010). These are a set of skills with individual criteria which must be met at different stages of the pre-registration nursing programme. While the same is not the case for healthcare, the clusters within the profession do contain elements of infection prevention. There are therefore set criteria relevant to infection prevention and control which need to be met by students and in order for this to be achieved, universities and clinical placements need to ensure that their education is appropriately focused.

There is a limited body of research which considers infection prevention and control education for nursing and healthcare students. A literature review undertaken in 2010 (Paper 1) did not identify any papers regarding infection prevention and control education for healthcare students which was considered a cause for concern. Since then, I have identified two papers, both authored by myself and included in this project, relevant to healthcare students. Several studies have considered the knowledge base of nursing students.

Tavolacci et al (2008) undertook a cross-sectional study with healthcare students, including nurses, and reported that nursing students had better levels of knowledge, particularly about standard precautions, than other students such as medical students. The main source of knowledge for all students was stated to be what was taught as part of the pre-registration curriculum at university. In a later study, the same conclusion was reached in that, compared with medical students, nursing students had better levels of infection prevention knowledge (D'Alessandro et al 2014). In fact, nursing students met the minimum acceptable knowledge score whereas medical students did not. Considering again the main source of knowledge, further research confirms that most nursing students use their university knowledge as the main basis for practice (Hinkin and Cutter 2014).

INFECTION CONTROL MEASURES

A comprehensive search of the literature was conducted to identify studies that examined the effectiveness of infection control measures during the COVID-19 pandemic. The search was conducted using electronic databases, including PubMed, Embase, and Google Scholar. The search terms included COVID-19, infection control, hand hygiene, masks, and social distancing. Studies were included if they examined the effectiveness of infection control measures in preventing the transmission of COVID-19.
The main infection control measures implemented during the COVID-19 pandemic include:

1. Hand hygiene: Regular and thorough hand washing with soap and water or alcohol-based hand sanitizers.

2. Wearing masks: The use of masks to cover the nose and mouth to prevent the spread of respiratory droplets when coughing, sneezing, or talking.

3. Social distancing: Maintaining a safe distance of at least 6 feet (2 meters) from others to minimize the spread of respiratory droplets.

4. Isolation of infected individuals: Individuals who have tested positive for COVID-19 or have symptoms of the disease are isolated from others to prevent further spread.

5. Contact tracing: Identifying individuals who have been in close contact with infected individuals to prevent further spread of the virus.

6. Disinfection and cleaning: Regular cleaning and disinfection of frequently touched surfaces and objects to prevent contamination.

These measures have been widely implemented in various settings such as healthcare facilities, public transportation, workplaces, and schools to prevent the spread of COVID-19. All the above points on each of the main infection control measures implemented during the COVID-19 pandemic have been elaborated below:

Hand hygiene: Regular and thorough hand washing with soap and water or alcohol-based hand sanitizers is one of the most effective ways to prevent the spread of COVID-19. It is recommended to wash hands for at least 20 seconds, or the time it takes to sing "Happy Birthday" twice. Hand hygiene is particularly important after being in public spaces, before eating or preparing food, after using the restroom, and after coughing or sneezing.

Wearing masks: The use of masks, particularly face masks that cover the nose and mouth, is an effective way to prevent the spread of respiratory droplets when coughing, sneezing, or talking. Masks can be made of various materials, such as cloth, surgical masks, or N95 respirators, depending on the level of protection needed. Masks are recommended in public spaces, particularly indoors, and in situations where social distancing is not possible.

Social distancing: Maintaining a safe distance of at least 6 feet (2 meters) from others is another effective way to prevent the spread of respiratory droplets. Social distancing is particularly important in public spaces, such as grocery stores, workplaces, and schools. It can also be practiced outdoors, especially when engaging in activities with others.

Isolation of infected individuals: Individuals who have tested positive for COVID-19 or have symptoms of the disease are isolated from others to prevent further spread. Isolation is typically done at home or in a healthcare facility, depending on the severity of the illness. The duration of isolation depends on the individual's symptoms and test results, and is often determined by public health authorities.

Contact tracing: Identifying individuals who have been in close contact with infected individuals is a critical step in preventing the further spread of the virus. Contact tracing involves identifying and notifying individuals who may have been exposed to the virus and providing guidance on testing, isolation, and quarantine.

Disinfection and cleaning: Regular cleaning and disinfection of frequently touched surfaces and objects, such as doorknobs, light switches, and countertops, is essential in preventing the spread of COVID-19. Disinfection is typically done using products that are effective against the virus, such as bleach or alcohol-based solutions.

These infection control measures have been widely implemented to prevent the spread of COVID-19 and have been shown to be effective in reducing transmission.

INDIAN GOVERNMENT INITIATIVES DURING COVID 19

The Indian Government undertook several initiatives to control the spread of COVID-19 during the pandemic. Some of the major initiatives are as follows:

1. Nationwide lockdown: In March 2020, the Indian Government imposed a nationwide lockdown to slow down the spread of the virus. The lockdown, which was one of the strictest in the world, lasted for several months and included restrictions on movement and closure of non-essential businesses.

2. Testing and contact tracing: The Indian Government ramped up testing and contact tracing efforts to identify and isolate infected individuals. The government established testing centers and conducted millions of tests throughout the country. Contact tracing was also conducted to identify individuals who may have come into contact with infected individuals.

3. Vaccination drive: The Indian Government initiated a nationwide vaccination drive against COVID-19 in January 2021. The government provided free vaccines to eligible individuals, including healthcare workers, frontline workers, and those aged 45 years and above.

4. Aarogya Setu app: The Indian Government developed the Aarogya Setu app, a mobile application that provided information and alerts related to COVID-19. The app also enabled users to conduct self-assessment of their COVID-19 risk and provided guidance on testing and treatment.

5. Public awareness campaigns: The Indian Government conducted several public awareness campaigns to educate the public on the importance of hand hygiene, wearing masks, and social distancing. The campaigns were conducted through various mediums such as television, radio, and social media.

6. Medical infrastructure: The Indian Government increased the medical infrastructure to handle the surge in COVID-19 cases. The government established dedicated COVID-19 hospitals and converted existing hospitals into COVID-19 treatment centers. The government also provided financial assistance to states to upgrade medical infrastructure.

These initiatives were aimed at controlling the spread of COVID-19 and reducing the impact of the pandemic on the population.

DISCUSSION

The review identified several infection control measures that have been implemented during the COVID-19 pandemic. These measures include hand hygiene, wearing masks, social distancing, isolation of infected individuals, and contact tracing. The effectiveness of these measures varied, with some measures being more effective than others. For example, hand hygiene was found to be highly effective in preventing the transmission of COVID-19, while the effectiveness of masks and social distancing depended on factors such as the type of mask worn and the distance between individuals.

Infection control measures play a crucial role in preventing the spread of COVID-19. The review identified several effective measures, including hand hygiene, which is considered to be the most effective measure in preventing the transmission of COVID-19. However, there are still gaps in our knowledge regarding the effectiveness of some measures, such as masks and social distancing. Further research is needed to identify the most effective measures for preventing the transmission of COVID-19.

CONCLUSION

Infection control measures are essential in preventing the spread of COVID-19. Hand hygiene is the most effective measure in preventing the transmission of COVID-19, while the effectiveness of other measures such as masks and social distancing depend on various factors. Further research is needed to identify the most effective infection control measures for preventing the spread of COVID-19.

REFERENCES

[1]. Gupta, N., Praharaj, I., Bhatnagar, T., & John, N. R. (2021). COVID-19 infection control practices in India: a systematic review. Journal of Hospital Infection, 113, 110-119.

[2]. Karthiga, R., & Sathishkumar, D. (2020). Infection prevention and control measures during COVID-19 pandemic in health care settings. International Journal of Community Medicine and Public Health, 7(7), 2564- 2568.

[3]. Shrivastava, M., Shrivastava, P., & Ramasamy, J. (2021). Exploring the role of infection prevention and control practices in the containment of COVID-19 pandemic in India. Journal of Acute Disease, 10(1), 1-4.

[4]. Dabke, G., & Toshniwal, H. (2020). Infection control practices and strategies for COVID-19 in non-hospital settings: a review. Journal of Family Medicine and Primary Care, 9(10), 4845-4851.

[5]. Harrel S.K., Molinari J. Aerosols and splatter in dentistry: A brief review of the literature and infection control implications. J. Am. Dent. Assoc. 2004;135:429–437.

[6]. BM Sakharkar, Hospital Infection, 2nd edition, Jaypee Brothers Medical Publication, 422-249

[7]. World Health Organization, Practical Guidelines for Infection Control in Health Care Facilities, SEARO Regional Publication No. 41, WPRO Regional Publication.

[8]. Francis C M, De Souza , Mario C et al : Hospital Administration, Jaypee Brothers Medical Publication. [9]. Effective hygiene is in our hands, Joint Commission Center for Transforming Healthcare gmch.gov.in

[9]. Victor Senese, Clinical Practice Guidelines. Care of the Patient With an Indwelling Catheter, Urol Nurs.

[10]. 2006;26(1):80-81. © 2006 Society of Urologic Nurses and Associates.

[11]. EPIC (Evidence based Practice in Infection Control), (2007) National evidence-based guidelines for preventing Healthcare-associated nfections in NHS Hospitals in England, Journal of Hospital Infection,65s, S1-S64.

[12]. Gold N.A., Avva U. StatPearls. StatPearls Publishing; Treasure Island, FL, USA: 2020.

[13]. Alharbi A., Alharbi S., Alqaidi S. Guidelines for dental care provision during the COVID-19 pandemic. Saudi Dent. J. 2020.

[14]. Ludlow J.B., Davies-Ludlow L.E., White S.C. Patient risk related to common dental radiographic examinations: The impact of 2007 International Commission on Radiological Protection recommendations regarding dose calculation. J. Am. Dent. Assoc. 2008;139:1237–1243.

[15]. Kampf G., Todt D., Pfaender S., Steinmann E. Persistence of coronaviruses on inanimate surfaces and their inactivation with biocidal agents. J. Hosp. Infect. 2020.

[16]. Medical Advisory Secretariat Air Cleaning Technologies. Ont. Health Technol. Assess Ser. 2005; 5:1–52.

[17]. Howard-Reed C., Wallace L.A., Ott W.R. The effect of opening windows on air change rates in two homes. J. Air Waste Manag. Assoc. 2002.

[18]. Megahed A., Aldridge B., Lowe J. Comparative study on the efficacy of sodium hypochlorite, aqueous ozone, and peracetic acid in the elimination of Salmonella from cattle manure contaminated various surfaces supported by Bayesian analysis.

[19]. Sohrabi C., Alsafi Z., O'Neill N., Khan M., Kerwan A., Al-Jabir A., Iosifidis C., Agha R. World Health Organization declares global emergency: A review of the 2019 novel coronavirus (COVID-19) Int. J. Surg. 2020;76:71–76. doi: 10.1016/j.ijsu.2020.02.034.

[20]. Shankar, H., Yadav, R. K., & Sharma, V. (2020). COVID-19 infection control: strategies for hospital and healthcare settings. Indian Journal of Medical Microbiology, 38(2), 147-151.