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Role of Handwashing and Hand Sanitising in Preventing Infection

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ABSTRACT

Health care associated infections are now drawing attention from patients, insurers, governments , health care personnels and regulatory bodies to prevent spread of infection by direct or indirect contact . This is not only due to the range of problems in terms of the related morbidity and mortality, the cost of treatment, but also due to the recognition that most of these can be prevented. The medical community is witnessing unprecedented advancements in understanding pathophysiology of infectious diseases and the global spread of multidrug resistant infections in health care set-ups and among the public. These factors, compounded by the availability of new antimicrobials have necessitated a re-look into the role of basic practices of infection prevention in modern day health care. There is clear evidence that strict protocol to hand hygiene practices reduces the risk of cross-transmission of infections. "Clean Care is Safer Care" , a prime agenda of the global initiative of WHO on patient safety programmes, it is time the developing countries formulate the required policies for implementation of infection prevention practices in health care set-ups. This review focuses on one of the simplest and basic , low cost but yet the least accepted from infection prevention: hand hygiene.

Keywords: Alcohol-based hand rubs; compliance; hand hygiene; hand sanitisers; hand washing; infection control

INTRODUCTION

Nosocomial infections are easily acquired infections through direct on indirect contact. Most common mode of spread by hand on article contamination(Jumaa, 2005)The importance of hand hygiene practices are emphasised to prevent the spread of infection. Bacteria, virus, other microorganisms predominantly present- on hands which is a major cause of 90% of the infections.(Longtin *et al.*, 2011)Hand washing with soap on an alcohol based hand - wash kills germs . This is a common and effective method of preventing infections . It is necessary to create Awareness among doctors , health workers , paramedics personnels. (Thampi, Villeneuve and Longtin, 2019)Hand sanitising is a waterless method of killing germs . As common infectious spread through hand, direct - contact or indirect by article contamination, hand hygiene importance comes into play. Hand hygiene practices are effective in reducing the wish of infection.(Smiline, Vijayashree and Paramasivam, 2018) (Ashwin and Muralidharan, 2015)(Marickar, Geetha and Neelakantan, 2014). Hand-washing helps reduce microorganisms from hands, preventing their transfer. Microorganisms thrive and multiply on human hands,

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creating a pathway to infect others or the host by spread by means of contact. Hand-washing reduces the number of microorganisms on the skin surface. Since hands cannot be sterilised, most organisms can be removed by 30 seconds of effective scrubbing with soap and water. Proper scrubbing includes vigorous motion with the hands rubbing together and fingers working in between the finger web space, including the dorsal and ventral surfaces of the hands. (Girija, Jayaseelan and Arumugam, 2018; Priyadharsini *et al.*, 2018a; Girija *et al.*, 2019; Girija, Priyadharsini and Paramasivam, 2019).

It would help fulfil the deficit of people who are unaware of the importance of hand hygiene or people who do not- practice hygiene measurements. It would bring about awareness especially in the rural sector .The chance of spread of disease is fastened and contagious with improper hygiene practices. The significance of the study is to correlate It with the current situation of the covid -19 outbreak, where globally people are asked to follow hygiene and safety measures.This situation has brought about awareness in proper hygiene practices, which is being expected to follow always. The rural sector, sanitary workers are also not aware of the importance and consequences of hand hygiene practices . (Jackson, 2011; Jenkins, 2011; Wilfinger, 2011; McCalla, Thomas and Reilly, 2014)

Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Ariga *et al.*, 2018; Basha, Ganapathy and Venugopalan, 2018; Hannah *et al.*, 2018; Hussainy *et al.*, 2018; Jeevanandan and Govindaraju, 2018; Kannan and Venugopalan, 2018; Kumar and Antony, 2018; Manohar and Sharma, 2018; Menon *et al.*, 2018; Nandakumar and Nasim, 2018; Nandhini, Babu and Mohanraj, 2018; Ravinthar and Jayalakshmi, 2018; Seppan *et al.*, 2018; Teja, Ramesh and Priya, 2018; Duraisamy *et al.*, 2019; Gheena and Ezhilarasan, 2019; Hema Shree *et al.*, 2019; Rajakeerthi and Ms, 2019; Rajendran *et al.*, 2019; Sekar *et al.*, 2019; Sharma *et al.*, 2019; Siddique *et al.*, 2019; Janani, Palanivelu and Sandhya, 2020; Johnson *et al.*, 2020; Jose, Ajitha and Subbaiyan, 2020).

Aim of the study is to make every citizen aware and practice proper hand hygiene to prevent cross infectious and reduce risk of disease spread directly or by article contamination.

METHODOLOGY:

Articles related to topics like- hand hygiene, Methodology, infection control, types of hand Sanitising, clinical significance, consequences , prevention, awareness related articles were searched are thoroughly analysed and discussed in detail accurately and articles related to the topic were collected, analysed and a detailed study was done. Articles emphasising on the topics mentioned were given move attention to and analysed . The inclusion criteria for the study includes all studies including articles and literature regarding the importance of hand hygiene, its effectiveness in prevention of infection spread ,consequences of improper hygiene practices and

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infection - control methods . The exclusion criteria for the study includes hand hygiene methods than hand hygiene, Irrelevant data - disease spread, poor hand hygiene .

Hand hygiene

Hand hygiene is an easy and simple method, yet the most important way to prevent the spread/transmission of infection. Hand hygiene can be practiced with warm water and liquid soap/soap bars (for cleaning soiled hands), warm water and alcohol containing solution (prior to invasive procedures or after contact with patients or infective materials) or by using a hand sanitiser or a handrub. Hand hygiene is a primary measure for reducing the risk of transmitting infection among patients, public and health care personnel. Hand hygiene methods include the use of alcohol-based hand rubs or hand sanitizers (containing 60%–95% alcohol) and hand washing with soap and water for an effective 20 seconds (Damani, 2011; Savage and Steverman, 2011; Sax, Allegranzi and Pittet, 2017; Mabry, 2019). Hand hygiene is regarded as one of the most important elements of infection control methods. In the wake of healthcare associated infections (HCAIs), the increasing severity of illness and complexity of treatment, superimposed by multi-drug resistant (MDR) pathogen infections, health care practitioners (HCPs) are reversing back to the basics of infection prevention by simple measures like hand hygiene. (McGuckin *et al.*, 2006).

Longtin Y in 2011 emphasised on the correct - hand hygiene and hand drying methods.Another Study by Jumaa PA et,al shows the compliance to hand hygiene by simple and complex methods. A similar study by Packer LJ in 1999 shows the methodology of frequency, duration, effect to practise hand hygiene.

Infection control

Bacteria cause around 90% of the infections , with the remaining 10% through fungus and viruses. Some of the commonly responsible bacteria include :Staphylococcus aureus, Escherichia coli, Enterococci, Pseudomonas aeruginosa. Bacteria, viruses and fungi spread predominantly through person-to-person(direct) contact which can include unclean hands, handling contaminated articles , and other hospital equipment.(Paramasivam, Vijayashree Priyadharsini and Raghunandhakumar, 2020). Cross contamination/infection transmission occurs through a multi-step process. Organisms are present either on skin, or inanimate objects,organisms are then transferred to the hands of other people or objects . The organisms survive on skin for several minutes, improper or absent hand hygiene causes the organisms to remain in direct contact with a patient enabling transmission and infection spread. Simply washing hands or using an alcohol rub immediately after picking up the organisms would prevent their ability to survive on the skin and be passed on to someone. (Priyadharsini *et al.*, 2018b; Girija *et al.*, 2019)(Shahzan *et al.*, 2019).The most common means all of the spread of infection- cross infection, primarily practised in health care settings . This was suggested in a study by Allengrazi B, 2009 . Another

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study by Bolon M shows the infection compliance in hospitals and the system reinforced to incorporate disease management.A similar study by noble WC, 1975 shows that microorganisms on the skin are the major cause and communal method of disease transmission by either direct on Indirect - contact. Most staphylococcal, streptococcus infections are spread by means of hands direct contact. (Pratha, Ashwatha Pratha and Geetha, 2017)(Shahana and Muralidharan, 2016)(M, Geetha and Thangavelu, 2019)

Hand Sanitising

Hand sanitizers are available in a liquid, gel, or foam form and are used to reduce infectious agents on the hands. Care should be taken as they are flammable and can cause injuries. (T, Geetha and Thangavelu, 2019).Alcohol-based hand sanitizer works against a wide range of microorganisms but does not act against spores. Compounds such as glycerol may be added to prevent drying of the skin. Some versions contain fragrances; however, these are discouraged due to the risk of allergic reactions.Hand sanitizer that contains at least 60% alcohol or containing a "persistent antiseptic" should be used. Alcohol based hand rubs kill various kinds of bacteria, including antibiotic resistant bacteria and TB bacteria. They also kill many kinds of viruses, including the flu virus, the common cold virus, coronaviruses, and HIV. (Voss and Widmer, 1997; Pugliese and Favero, 2000; Rahman and Chattopadhyay, 2000). Waterless hand sanitizer or hand rubs provide advantages over hand washing with soap and water. However, they are not reliable if organic matter like dirt, food, or other material is visible on the hands. Benefits of waterless hand cleaning methods include : They consume less time than hand washing, acts faster to kill microorganisms on hands , reduce bacterial counts on hands, do not promote antimicrobial resistance, are less irritating to skin than soap and water, some can even improve condition of skin (Wenzel and Pfaller, 1991). A study by Babeluk R in 2011 gives a detailed analysis of hand sanitisers a waterless method of hand hygiene practice which includes liquids, hand sprays, hand-rubs, which can be gels and can be perfumed or non - perfumed . Another study by Hillburn in 2003, shows the Antimicrobial efficacy of all alcohol based hand sanitisers which can kill most games and is an effective, compatible method. A similar study by P Liu, 2010 shows the efficacy of liquid - sterillium on perfumed alcohol based hand rubs, hand sanitisers or gels.

Clinical significance

Washing hands with soap and water removes substantially more disease causing organisms than washing hands with water alone. People who find soap causing skin irritation, it is important to note that soaps can have a different pH – they may be neutral, slightly alkaline or slightly acidic, and perfumes in soap can also cause irritation. Changing soaps may help people know what suits their skin best. (Allegranzi and Pittet, 2007, 2009; Allegranzi, Nejad and Pittet, 2017; Vermeil *et al.*, 2019). Proper hand washing is the first line of defence against the spread of many infections

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— from common cold to more serious infections, such as meningitis , bronchitis , flu, Hepatitis A and many types of diarrhoea.Hand washing removes visible dirt from hands and helps deduct the number of harmful microorganisms (germs). Harmful bacteria and viruses such as campylobacter, hepatitis A, Shigella, E. coli and Salmonella can be carried by people, animals or equipment and transmitted to food.(Wattal and Khardori, 2013). A study by Argon D in 2005 tells the efficiency, importance and life saving features of practicing hand hygiene. Some of the infection spread, especially by hand can be fatal also. Another study by Evans JR in soul tells that by maintaining proper hygiene and educating every citizen a healthy , reduced disease spread population and a healthy environment for survival can be achieved. A similar study by Gould DJ on Routine hygiene practices and lifestyle changes states that the reason for improper hand hygiene Practices to lead to infections is that hands are the most frequently used to touch eyes, nose, mouth which Is the main entry point for most of the disease causing agents.

Consequences

About 80% of common infections are spread by hands . Washing your hands at least 7 Times a day has been known to significantly decrease the frequency of colds, influenza and other infections .Some types of microbes that can be spread on hands, especially health- care settings, hands of health care staff - Staphylococcus aureus (including MRSA), Streptococcus pyogenes (Group A Strep), Vancomycin-resistant Enterococcus (VRE), Klebsiella, Enterobacter, Pseudomonas, Clostridium difficile Candida, Rotavirus, Adenovirus, Hepatitis A virus Norovirus (Mathai *et al.*, 2011) About 1, 5000 bacteria live on each square Centimetre of skin on one hand . Most-prone Infection carrying areas of hands are underneath the fingernails, between the fingers. While sneezing and coughing help to spread silliness , poor hand hygiene technique are a big culprit as well. Common respiratory illnesses are caused by poor hygiene including common cold , influenza, chicken pox, meningitis. Impetigo is a highly contagious skin infection that is common in children. E. Coli infections, gastrointestinal infections, allergies , nausea and rhinitis can also occur. Certain severe bacterial and viral infections can also occur and some might be fatal as well . (Watkins, 2016)(&na; and &NA;, 2001)(Vaishali and Geetha, 2018)

Prevention of diseases

Clean hands are the only protection against an infection. Washing hands thoroughly with water and soap several times per day helps fight infections. Thorough soap wash removes virus and bacteria, and they get eliminated with hand disinfection. One method cannot be replaced by the other , they must be used together for optimum efficacy. A study by Wendt in 2001 - emphasis on hand hygiene protocol, frequency and infection prevention measures in health care Settings. Practicing hand hygiene is a simple yet effective way to prevent infections . Cleaning your hands can prevent the spread of germs, including those resistant to antibiotics are becoming impossible and difficult to treat.WHO guidelines for infection prevention by hand hygiene. for health care

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workers: hand wash before touching a patient, before aseptic procedures, after body fluid exposure, after touching patient after touching patient surround(World Health Organization, 2009; Ellingson, 2017).Hand washing with soap and water , or Alcohol based hand sanitation techniques are extremely effective . Teaching people about hand washing helps them and their communities to stay healthy in the following ways : reduces diarrhoea illness by 58%, Reduces respiratory illnesses by 16- 21%, Reduces absenteeism due to gastrointestinal illness in school children by 29- 57%. Prevention of sickness, reduces the amount of antibiotics and the likelihood that antibiotic resistance will develop. Frequent hand washing can prevent overuse of antibiotics . (Mcguire-Wolfe, 2017)(Spinazzè, Cattaneo and Cavallo, 2020)Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Vijayashree Priyadharsini, Smiline Girija and Paramasivam, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Chandrasekar *et al.*, 2020; Mathew *et al.*, 2020; R *et al.*, 2020; Samuel, 2021)

Awareness

Awareness of hand hygiene includes the knowledge and understanding of the public , health care workers regarding the consequences and diseases that can spread through improper hand hygiene. Awareness campaigns have taken the initiative to improve the critical importance in maintaining a healthy environment. A study by Testlya A in 2020 shows the awareness levels created by the hygiene rule imposition by the government due to the current covid-19 situation. A study by T wise in 2020, elaborates on the knowledge, advertisements and educating public including all age groups to be aware and educated regarding the importance of hand hygiene . Another study by R Pandey in 2020 focuses on washkaro NCP - rural awareness programmes on Public health safety measurements. Awareness includes the levels of education of gains in hospital settings, duration and frequency of hand washing , correct methodology for hand washing and hand drying, awareness of the consequences. Hand hygiene campaigns , advertisements and programmes can be conducted. (Girija As and Priyadharsini J, 2019)

CONCLUSION

“Clean care is a safer care’’ Hand-washing and hand hygiene practices must be made an educational priority . Emphasis on hand hygiene importance is a basic simple protocol that-must be followed to tackle antibiotic resistant microbes. Infection prevention is an: essential method to save lives and make the environment healthy . These habits are the role models for the future - doctors , nurses , paramedical personnels, public must be property educated and hygiene practices must be followed to ensure a healthy and safe- disease free environment. The objective of the review is to emphasise that washing hands properly can help prevent the spread of the germs (like bacteria and viruses) that cause gastrointestinal and respiratory infections which can

cause serious complications, especially for young children, the elderly, or those with a weakened immune system.

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