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Case Study

Personal Hygiene Protocols in Infectious Disease Control-Lessons from the Spread of SARS-CoV-2

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Abstract

In a world that is no more a stranger to infectious diseases, personal hygiene should be embraced as a part of life. While there are many means through which infectious diseases are transmitted from person to person, most modes of transmission can only reach individuals through self-infection from the hand. Scientists in various relevant fields continue working on the process of understanding the nature and virulence of pathogens as well as developing vaccines and treatment pills. However, the challenges of microbial drug resistance and lack of cure and vaccines mean, in some cases that other helpful options must be maximized. Everyone must master the simple art of personal hygiene, especially, hand washing and benefit from their unheralded roles in controlling the spread of diseases.

Keywords: Handwashing, Infectious Diseases, Personal hygiene, SARS-coV-2

Introduction

Personal hygiene is promoting self-sanitary practices [1]. The importance of personal hygiene is not a novel concept. Its relevance in the prevention and control of diseases is well documented. However, it can never be overemphasized, especially in a planet that is not new to infectious diseases ranging from diarrhea, tuberculosis, HIV to lower respiratory tract infections. The emergence of SARS, Ebola, and most recently, the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) have highlighted the increased need for effective personal hygiene protocols even as scientific advancements continue to seek solutions per time in a world of increasing epidemics and pandemics. However, it has been reported that infectious diseases are responsible for an annual death of over 15 million globally [2]. The prevention of infectious diseases is highly possible through the application of proper personal hygiene [3].

Infectious diseases are disorders caused by pathogenic microorganisms, such as bacteria, viruses, parasites, or fungi that can be spread directly or indirectly (vector-borne) from one individual to another [4]. Infectious diseases may spread through direct contact (person to person, animal to person, and mother to child) and by indirect contact (food contamination, insect bites, and contact with contaminated inanimate surfaces and objects) [1]. The World Health Organization WHO (2016), ranked three infectious diseases in the top 10 leading causes of death worldwide namely; lower respiratory infections (3.0 million deaths), diarrheal diseases (1.4 million deaths) and tuberculosis (1.3 million deaths); with lower respiratory infections and diarrheal diseases the top 2 in the ten leading causes of death in low-income countries, Nigeria inclusive [5].

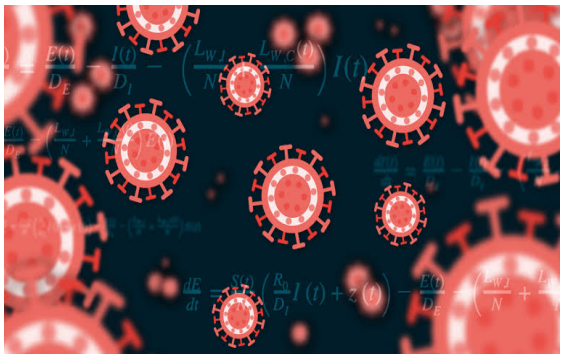

Figure 1: How SARS-CoV-2 and other infectious diseases spread (www.triplebyte.com).

Infectious disease control

The WHO has extensively described approaches in preventing transmission of diseases. These, include immunization, screening, and public health-oriented laws, including strategies in limiting contact with infectious persons [6]. Overwhelming evidence demonstrates the benefits of immunization as one of the most successful and cost-effective health interventions known [7]. Immunization prevents about 2 to 3 million deaths each year, as well as serious disability from vaccine-preventable diseases including yellow fever, diphtheria, tetanus and pertussis, rubella, rotaviruses, polio, pneumococcal diseases, mumps, measles, human papillomavirus, polio, hepatitis B, and *Haemophilus influenzae* type b [8]. Screening individuals to determine if they have been infected with or exposed to an infectious disease is a core public health strategy. Screening enables health care providers to begin treatment promptly, to manage co-morbidities more effectively, to encourage patients to reduce high-risk behaviour and, in certain cases, to identify the need for compulsory treatment [9,10]. Isolating persons who are exposed to a serious contagious disease, to prevent transmission, is a long-established public health strategy recommended for both individuals and groups. Where an outbreak of a serious contagious disease occurs, it is often impractical or impossible to identify all cases and carriers of the disease accurately. For this reason, public health laws authorize officials to evacuate or to order the closure of premises (e.g., markets, schools, and movie theatres) and to prevent access to public spaces where people would otherwise gather [9,10].

Despite significant advances in research and treatment of infectious diseases, challenges abound both globally and regionally in the fight against infectious diseases [2]. A WHO report released in 2007 warns that infectious diseases are spreading more rapidly than ever before and new infectious diseases are being discovered at a higher rate than at any time in history [5]. Some of the challenges in combating infectious diseases are; increasing resistance of pathogens to current antimicrobial drugs, breakdowns in public health systems, and communication between Nations, the potential for intentional introduction of infectious agents by bioterrorists [5,11,12]. Also, some infectious diseases do not yet have a cure or vaccine. With these challenges and more facing the world as exemplified by the SARS-CoV-2 pandemic, there is a need to emphasize the perennial role of personal hygiene in the control of infectious diseases both for the present time and the future. After all, some global successes over certain diseases such as HIV did not come because vaccines and treatment pills were made available but with the support of some preventive measures and then, the highly active antiretroviral therapy (HAART).

Personal hygiene

The term cleanliness is different from hygiene. Cleaning, in many cases, is removing dirt, wastes, or unwanted things from the surface of objects using detergents and necessary equipment. Hygiene practice, however, focuses on the prevention of diseases through the use of cleaning as one of several inputs. Hygiene practices aim at preventing the spread of disease-causing organisms [4].

Personal hygiene is all-encompassing, it covers body hygiene, oral hygiene, eye hygiene, face hygiene, and handwashing. Understanding how these relatively simple practices are crucial in infectious disease control is necessary. These are not only applicable to individuals avoiding infection but also prevent infected individuals from spreading diseases. Body hygiene involves taking a bath or shower using body soap at least daily or after periods of sweating or having contact with a possibly contaminated environment. SARS-CoV-2, just like some infectious diseases, are transmissible through contact with infected persons or contact with fomites/ surfaces that have been contaminated [13,14]. Changing into clean clothes after a bath is also important since pathogens might be deposited on them. Sharing of soaps and towels should be avoided because of the danger of cross-infection. Skin infections such as scabies, pimples, and ringworm are results of poor body hygiene.

The mouth is the area of the body most prone to collecting harmful bacteria and generating infections [15]. Oral hygiene (oral care) involves rinsing the mouth after each meal, brushing your teeth with fluoride-containing toothpaste twice a day – before breakfast and before you go to bed. Unpleasant smelling breath (halitosis or stinking odour), teeth, and periodontal (gum) infections could be a result of poor oral hygiene [15].

Understanding hand washing

Figure 2: Handwashing techniques (www.debgroup.com).

Hand hygiene is one of the most important elements of infection control activities [16]. Some pieces of evidence show an association between improvements in hand hygiene and reductions in rates of infectious illnesses in communities [17,18]. Its relevance cuts across other aspects of personal hygiene. The first Global Handwashing Day was observed on October 15, 2008,

highlighting the place of significance handwashing occupies in disease prevention and control. Mathur (2011) summarized it epically thus- One of the reasons microbes have survived in nature is probably their simplicity: a simple genomic framework with genetic encryption of basic survival strategies. To tackle these microbes, human beings will have to follow basic and simple protocols of infection prevention [16]. This thus brings us to the simplicity and wide acceptability of handwashing as a method of controlling the spread of infectious diseases. However, it is important to be aware of when and how to properly maximize this protocol to achieve its desired result. To know when to wash hands at home and at work, the person must first identify critical situations; that is, situations, activities, or incidents that indicate the possibility that pathogenic microorganisms are present on hands, fingers, and nail surfaces [15]. These situations include; food preparation (before, during, and after preparing food), when caring for someone who is vomiting or has diarrhoea, before and after treating a cut or wound, after using the toilet, after changing diapers or cleaning up a child who has used the toilet and after blowing your nose, coughing or sneezing. More so, with the potential of spread of known and unknown infectious diseases through animals [19,20], it also extends to washing hands after touching an animal, animal feed, or animal waste, after handling pet food or pet treats and after touching garbage. Also, with the obvious potential of surface contamination [13,14], the ritual of handwashing should be done after someone has been in a public place and touched an item or surface that may be frequently touched by other people and animals, such as door handles, tables, gas pumps, shopping carts, or electronic cashier registers/screens and shelves. More importantly, hand washing should be done before touching one's eyes, nose or mouth to prevent infectious agents from entering the body [15].

While the need for handwashing cannot be over-emphasized, there is a need to highlight the effective procedures involved. To wash hands properly, the guidelines by Centre for disease control and prevention could be very helpful [21]:

***Wet your hands with clean, running water, turn off the tap, and apply soap*:** This is important because hands can become re-contaminated if washed in a container of standing water [22]. The advantage of using soap (whether plain or antibacterial) to wash hands over using only water is not without evidence. The surfactants in soaps remove microbes from the skin, and the tendency of scrubbing hands more with soap further removes germs [23,24].

***Use the soap and lather well by rubbing hands for 20 seconds (or longer if the dirt is ingrained)*:** Microbes can be in all surfaces of the hand and wrist, and in high concentration under the nails; hence, the need for total scrubbing [25,26]. If possible, remove rings and watches before washing the hands or ensure the rings are moved to wash under them, as microorganisms can exist under them. Evidence suggests that handwashing for 15 to 30 seconds removes more germs from the hand [26].

***Rinse well under running water and make sure all traces of soap are removed, and dry hands using a clean towel or air dry them*:** To avoid re-contamination, rinsing should also be done in running water [22]. Using a clean towel or air drying has been recommended [27].

It is best to use paper towels (or single-use cloth towel) [15].

Warm water may be better than cold for hand washing as soap lathers (soaps up) better with warm water [3]. However, in other researches, the temperature of the water does not appear to affect microbe removal; warmer water may even cause more skin irritation and is more environmentally costly [28].

The use of an alcohol-based hand sanitizer that contains at least 60% of ethanol has also been recommended where washing with water is not attainable. One can tell if a sanitizer contains at least 60% ethanol by looking at the product label. Sanitizers can quickly reduce the number of germs on hands in many situations [15]. Sanitizers can be applied by applying the gel product to the palm of one hand (read the label to learn the correct amount). Similar to hand washing, the gel is rubbed over all the surfaces of the hands and fingers until hands are dry. This should take around 20 seconds [15].

There are common antimicrobial modes of action for disinfectants, antiseptics and sanitizers. They may damage the lipids and/or proteins of the semipermeable cytoplasmic membrane of microorganisms resulting in leakage of cellular materials needed to sustain life. They may also denature microbial enzymes and other proteins, usually by disrupting the hydrogen and disulfide bonds that give the protein its three- dimensional functional shape, hence blocking metabolism [29].

Handwashing may be the single most important action to control the spread of infection and stay healthy, hence the need to make it universal for children and adults [30].

With the intention of making personal hygiene practices attainable in low income rural areas, some reviews have suggested the use of ash and mud as effective alternatives to soap and sanitizers. While there is need for more researches to buttress this, the use of ash is better than washing with only water [31,32].

The obvious need to raise the bar of personal hygiene in every corner of society; in schools, market places, religious centres, cities, and villages are becoming much more significant. Leaving these practices for health care professionals to carry out only within health facilities is becoming barbaric. Researchers may need to show from surveys how much the recent infectious epidemics in various regions of the world and the SARS-CoV-2 pandemic has

helped in strengthening the ideals of personal hygiene as the world braces up to handle the challenges that may lie ahead in disease control and prevention.

Conclusion

The battle against infectious diseases cannot be left to the ingenuity of scientists alone in developing vaccines and treatment pills. The mastery of disease control can be implemented by every individual in the society irrespective of class and exposure, through the practice of simple and cheap personal hygiene.

With lots of emphasis placed on evidence-based promotions and practice, more researches are needed in the details of personal hygiene and handwashing, in particular, to define more effective means of maximizing the protection they offer. With the SARS-CoV-2 pandemic showing the need to make personal hygiene a part of life, it would only be in order for governments, especially in developing countries to develop and strengthen policies and community programs that would enhance public health tenets in prevention and control of infectious diseases through basic approaches like personal hygiene.

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