

## Review Article

# Handwashing: a household social vaccine against COVID 19 and multiple communicable diseases

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## ABSTRACT

Handwashing is the most cost-effective measure for prevention of a wide spectrum of diseases from respiratory, intestinal, soil transmitted helminthiasis, health-care associated illness to infection with pandemic potential like SARS, MERS and COVID 19. Experts view that handwashing can be the greatest investment in the mankind as it reduces under nutrition, morbidity, mortality and paves way for growth, development, educational attainment of people and thereby achieving healthier communities. Though the evidence of handwashing on health is two centuries old but change in human behaviour seems critical in both developing and developed countries. Hand hygiene is rarely practiced during crucial moments and even rarely soap is used. Therefore emphasis should be given towards a societal shift in behaviour change among children, caretakers and people of all age groups. Every school, community and hospital should be provided with Safe water, Sanitation and adequate Hygiene (WASH) services. Hand hygiene to be given top priority in national health plans by which millions of unnecessary deaths and burden on health care system can be avoided. Nevertheless under the looming threat of the current COVID 19 pandemic, where the exact epidemiology is still evolving and a vaccine doesn't seem feasible as an immediate measure to control the disease, handwashing should be considered as a 'social vaccine' for everyone at every household level.

**Keywords:** COVID 19, Handwashing, Hand hygiene, Social vaccine, Vaccine

## INTRODUCTION

Hand washing with soap and water is a simple and most cost-effective solution to prevent spread of various communicable diseases.<sup>1,2</sup> Evidence suggests hand hygiene protects children from killer diseases of childhood like diarrhoea and pneumonia.

Nearly one third diarrhoeal illnesses and one fifth of respiratory illnesses among under five are prevented by hand washing.<sup>2</sup> Hand hygiene is also considered as a highly effective measure to reduce spread of SARS, MERS and influenza virus.<sup>3</sup> Presently the mankind has

sustained serious threat from the novel Corona virus (SARS-CoV-2) pandemic.<sup>4</sup>

Handwashing has been considered as an important strategy for prevention of transmission in households and communities. Appropriate hand hygiene among health care providers has shown to protect patients from health-care associated infections.<sup>5</sup> This review aims to provide evidence on how hand hygiene is an effective method in controlling not only COVID 19 but other diseases including diseases with pandemic potential.<sup>6</sup> This study highlights the importance of health promotion measures such as hand washing practices in daily routine by the

community on a large scale, is critical for people's health, wellbeing, education and economic growth.<sup>2</sup>

## REVIEW OF LITERATURE

Since time immemorial hand hygiene has been incorporated in cultural and religious beliefs of mankind. But present link between health and hand hygiene had been established in less than two centuries. Ignaz Semmelweis in Vienna, Austria and Oliver W Holmes in USA in mid 1800s had shown the medical fraternity that hand washing practices by physicians was linked to decrease in hospital acquired infections. Semmelweis hypothesized puerperal fever and hence maternal mortality cases were higher when doctors do not practice hand washing before physical examination of patients. For this theory, Semmelweis is considered as 'Father of hand hygiene' and this intervention showed new epidemiological strategy to prevent hospital acquired infection.<sup>7,8</sup>

During the Crimean war in Italy, Florence Nightingale's effort on hand washing before patient care showed better results in terms of decreased infection and reduced mortality. Since then many studies conducted has proven the role of hand hygiene practice among health care workers and consequent decrease in health-care associated infection.<sup>8</sup> For universalizing hand hygiene practices "Global hand washing partnership" has been established which tries to identify gaps and articulate the way forward in behaviour change. Every year 15th October is observed as "Global Handwashing Day" to create awareness on handwashing with soap and water.

## DISCUSSION

### *Why hand hygiene is crucial for infection control*

Hand hygiene is considered as simple, yet effective way to prevent spread of germs.

- Persons blow their nose, cough or sneeze in to their hands and then touch others' hands or objects. Studies have found people rarely wash their hands after sneezing and coughing in to their hands. Hand washing with soap removes germs, breaks the chain of transmission and protects people.
- Germs get entry in to food and drinks from dirty hands and gains access to the digestive system. Thus hand washing after toilet use, before food preparation and before feeding children is crucial for control of enteric infections.
- Germs from unclean hands get transferred to and deposited on table tops, taps, hand rails, door knob, toys and other objects. Germs get transferred to healthy persons' hands when they use these objects. Pathogens get deposited on control panel of lift, hand rails of community transport, ATM and biometric system. Therefore, washing hands with soap and

water frequently is useful in containing spread of infection.<sup>9</sup>

### *Impact of hand washing on disease prevention*

#### *Diarrhoeal morbidity*

In a metaanalysis there was 40% reduction in diarrhoeal morbidity among underfive when handwashing is practiced at household and community level.<sup>10,11</sup>

#### *Respiratory illness*

Hand hygiene can decrease respiratory infection by around 20% among underfive age group.<sup>11</sup>

#### *Handwashing practice in perinatal period*

Handwashing practices by traditional birth attendant before delivery has been found to decrease umbilical cord infection by 31% in rural Nepal. When mothers washed hands before handling their babies there was 29% lower risk of umbilical cord infection.<sup>11</sup> Mullay et al revealed that use of soap provided in clean delivery kits was associated with 49% lower risk of infection in neonates.<sup>12</sup>

#### *Tetanus*

Evidence from studies conducted in South East Asian countries suggest that odds of neonatal tetanus is reduced by one-half among neonates for whom birth attendants washed their hands before delivery compared to those who do not.<sup>11</sup>

#### *Neonatal mortality*

Studies from Nepal revealed that the rate of mortality among neonates is 44% lower whose mothers reported handwashing compared to newborn whose mothers didn't handwash.<sup>13</sup> Pooled analysis of observational data from India, Bangladesh and Nepal showed 11% reduction in mortality when birth attendants washed hands before delivery.<sup>11</sup>

#### *Impact of hand hygiene on incidence of antibiotic resistance*

Hand washing prevents likelihood of rise in antibiotic resistance and thereby reduces sickness, hospitalization and out-of-pocket expenditure.<sup>9,14</sup> The benefits of hand hygiene go beyond prevention of infection.<sup>9</sup>

#### *Prevention of diseases with pandemic potential*

Infectious agents such as MERS CoV, SARS-CoV-2, influenza and other respiratory diseases have the capacity to survive on dry stuff for sufficient duration before leading to onward transmission.<sup>6</sup> Studies support that proper hand hygiene stops indirect transmission of

pathogens from contaminated fomites to healthy susceptible and is effective in reducing transmission of respiratory illnesses in shared living settings.<sup>6,15</sup>

*Impact of hand washing practices on child development*

Needless to say hand washing saves children from two killer diseases of childhood i.e., pneumonia and diarrhoeal diseases. Everyday around 800 children die from diseases related to unsafe water and hygiene.<sup>4</sup> Promotion of hand hygiene can lead to healthier communities.

There has been 23 - 40% reduction in diarrhoeal episodes and 16 - 21% decrease in respiratory illnesses in general population.<sup>9</sup> Apart from illness and mortality, growth and development of children are affected, which is a key parameter for socioeconomic progress and human development of a country. Repeated childhood infection is considered as a causal factor related to stunting, undernutrition and other micro nutrient deficiencies.

**Table 1: Diseases prevented by proper hand washing.<sup>1,9,14</sup>**

Infections	
Intestinal infections	<i>Salmonella</i>
	<i>E Coli 0157</i>
	Cholera
	Giardiasis
	Norovirus
	Diarrhoeal diseases
	Food poisoning
Respiratory infections	Hepatitis A & E
	Common cold
	Influenza
	RSV
	SARS-CoV MERS-CoV
Soil-transmitted helminthiasis	<i>Ascaris lumbricoides</i>
	<i>Trichuris trichuria</i>
Parasitic infection	Cryptosporidium
	Scabies
Group A streptococcus	
<i>Staphylococcal aureus</i>	
Hospital acquired/ Nosocomial infection	
Conjunctivitis, Trachoma	
Hand foot mouth disease	

*Hand washing and education*

Multiple studies reveal diarrhoeal episodes in children less than 24 months of age leads to delayed school entry, poor performance, low IQ and early school dropout.<sup>2</sup> The children too are indirectly benefitted as rate of under nutrition, stunting and anaemia goes down. Proper hand washing early in life may help improve child growth and development. Thus handwashing is effective in

prevention of many communicable diseases including diseases of pandemic potential (Table 1).

**When to wash hands**

Hand hygiene is necessary during certain key times.

- Before food preparation.
- Before ingestion of food.
- Before and after caring for a sick person.
- Before and after treating wound management.
- After using toilet.
- After cleaning up a child who has used toilet.
- After blowing nose.
- After touching or feeding animals or pets.
- After handling garbage.<sup>16</sup>

**How to maintain hand hygiene**

WHO has advocated for frequent hand washing using soap and water. In general, washing hands properly would take about 20 seconds.



**Figure 1: Steps of hand washing.<sup>17</sup>**

If soap is not available alcohol based hand rub (ABHR) can be used for disinfection of hands. ABHR formulations with at least 60% ethanol have been proven effective. According to WHO, ABHR containing ethanol 80% v/v or isopropanol 75% v/v have marked virucidal

effect against SARS-CoV-2. WHO gives emphasis on the six step process of hand hygiene after applying a palmful of ABHR covering all surfaces of hand, to be rubbed until dry.<sup>17</sup>

### ***Hand hygiene practice for health care providers***

Hands are the main pathways of pathogen transmission in health care settings. Different studies have revealed that health care providers (HCP) clean their hands almost less than half times they should be doing. Around 31 patients per day suffer from at least one health-care associated infection which could easily be avoided by proper hand hygiene.<sup>17,18</sup>

WHO emphasized on practice of 5 moments of hand hygiene by HCP.

- Before touching a patient
- Before aseptic procedure
- After exposure to body fluids
- After touching a patient
- After touching patient surroundings

WHO guidelines on hand hygiene in health care sector were developed to promote hygiene globally in health care settings. An implementation strategy “WHO multimodal hand hygiene improvement strategy” was developed as a guidance towards how hygienic practices can be implemented.<sup>19</sup>

### ***Recommendation for health promotion measures among people regarding hand hygiene***

- By sharing of knowledge on behaviour change through mass media (both electronic and print). Community radio has far reaching role in dissemination of information in remote areas of the country. In countries like India with a varied cultural characteristics mid media is considered as important and powerful tool for educating communities. Role of leaders, faith healers, teachers, parents are immense in demonstrating hand hygiene practices. Emphasis should be given towards behaviour change among children, adolescents, women and caretakers.<sup>20</sup> Despite the evidence in favour of handwashing it is rarely practiced during key moments and even rarely involves use of soap. A “ladder approach” has been suggested by scientists where improvements in behaviour change are made in step wise manner.<sup>11</sup>
- By implementing hand hygiene self-assessment framework: This tool developed by WHO can obtain information on hand hygiene promotion and practice in health care settings. This will help in analysing gaps and challenges faced by HCP in health care facilities. Based on the issues, future action plan can be developed and implemented by hospital administrators.<sup>21</sup>

- Community participation: UNICEF led Community Approaches to Total sanitation (CATS) principles can bring about behaviour change regarding hand washing in communities.<sup>22</sup>
  - Broadly different members of the community, leaders, households, schools, health centres can be engaged in good practices.
  - Each and every person including health care personnel shows leadership and accepts and demonstrates change behaviour.
  - Communities can assess vulnerable groups, tribal people, hard to reach areas, people living in water scarce areas, people with disabilities, elderly, women as care providers and find out locally feasible solutions to promote hand washing at least during key moments.<sup>22</sup>
- Government leadership is equally important. Government should provide rational evidence based information, safe water to the people with focus on equity and community participation.<sup>23</sup> There is increasing evidence that accessible plentiful water supply to households facilitate better hygienic practices by people.<sup>1</sup> Studies reveal good hand washing practices adopted by adolescents with at-home water supplies than among their peer using other water sources distant from households.<sup>11</sup> Increased proximity to water source improves safe hygienic behaviour. Therefore hygiene, safe water supply should be a political priority for achieving sustainable development goals (SDG).<sup>4</sup>
- Research need to be geared up to find the perception of people and ways to improve practice of hand hygiene.<sup>8</sup>

#### Box 1

“Washing your hands is such a simple act, and yet such an essential step in halting infectious disease transmission and saving lives,” notes Oliver Schmol, Programme Manager for Water and Climate at the WHO European Centre for Environment and Health in Bonn, Germany. “But in order to be able to maintain good hand hygiene, hospitals, schools and communities require a continuous supply of safe water and the availability of functional hand hygiene facilities and soap.”

Source: World Water day 2020 highlight, essential role of handwashing<sup>24</sup>

### **CONCLUSION**

Promoting practice of hand washing with soap and water is one of the simplest, low tech and most cost effective public health measure to prevent transmission of COVID 19 as well as many other communicable diseases. It

prevents enteric and respiratory infections and promotes growth and development of children leading to less of school dropouts and overall productivity of a nation.

Provision of Safe water, Sanitation and adequate Hygiene (WASH), protection of environment and a societal shift towards routine hand washing promotion are essential in protecting human health during epidemics. Hospital associated infection will be reduced by hand hygiene practice among HCP making the hospital a safer place for patients. Educational models should be developed to make the practice of hand washing a social responsibility too. However at this juncture of COVID 19 pandemic some experts raise concern about false sense of protection by hand washing among people. Nevertheless in absence of any vaccine against SARS-CoV-2, “Social Vaccine” in form of hand washing and social distancing will remain important public health measures for prevention and control of SARS-CoV-2 pandemic.

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