Handwashing Research Summary: What we learned about handwashing in the third quarter of 2015

Between July and September 2015, 15 relevant peer-reviewed handwashing studies were identified.

Measurement of handwashing behavior

The two main studies of handwashing frequency this quarter both used the self-report method. In rural Chennai, India, 95% of participants reported washing their hands before eating and 68% after eating; however only a third considered handwashing after defecation to be a critical time for handwashing, and just a fifth of participants reported actually washing their hands after defecation.[1] Meanwhile, in Port Harcourt, Nigeria, 30% of mothers of children under the age of five reported washing their hands with soap before feeding infants.[2] Self-reported handwashing typically overestimates observed behavior and, thus, these findings should be interpreted with caution.

A study in Ethiopia identified the following factors to be associated with over-reporting in studies involving self-reporting of handwashing behavior: the perception of handwashing as a social norm, social desirability, and the personal tendency to overestimate other events. Health knowledge was associated with over-reporting at food-related events but not fecal contact events; answering in the presence of a spouse or another adult did not seem to influence responses.[3]

Behavior change

Approaches

A study in southern Ethiopia assessed the impact of different approaches to handwashing behavior change on aspects of motivation. Using combinations of an education-only approach, public commitment to handwashing, and infrastructure promotion (i.e. construction of a handwashing station), investigators found infrastructure promotion had the most impact in improving motivational self-efficacy and social norms; reducing impediments; and addressing forgetting to wash hands. However, volitional self-efficacy, which refers to one's belief in their ability to maintain a behavior, was only achieved through public commitment. The interventions proved to be more effective for food-related handwashing than defecation-related handwashing.[4]

Other studies also examined motivations for handwashing. Mothers in Nigeria were more likely to wash their hands after contact with feces than before contact with food. The likelihood of handwashing was significantly associated with their levels of education.[2] In households in rural India, key reported motivations for handwashing were health and hygiene.[1]

While there has been anecdotal evidence to indicate that increased handwashing frequency was not maintained after the 2014 Ebola outbreak, routine maternal, neonatal and child health

services saw an increase in handwashing frequency in association with the Ebola outbreak in Guinea.[5]

Handwashing 'hardware'

A study in Kenya found that children who lived in a household with a toilet were more likely to have access to a handwashing station with soap. Schools with handwashing stations were more likely to provide access to handwashing water and soap. However, handwashing facilities with reliable availability of soap were reported to be available in less than 3% of schools. Of note, 9% of students reported soap was "never" available for handwashing yet it was observed in situ while 5% of students reported soap was "always" available, yet it was not observed in situ.[6]

Tracking handwashing impact on global burden of disease

The first annual update to the Global Burden of Disease 2010 study has added handwashing practices to its list of tracked risk factors. In 2010, "no handwashing with soap" was ranked as the 17th leading cause of Disability-Adjusted Life Years (DALYs) globally. By 2013, handwashing was found to have dropped slightly to 21st place. This change is associated with a rise in non-communicable risk factors, rather than an increase in the frequency of handwashing, particularly in high income countries. The report concluded: "the finding that no handwashing with soap is a global risk present in all regions is a reminder that this nexus of risks is relevant to all countries, not just the poorest."[7]

Benefits of handwashing

Diarrhea

The Cochrane Database of Systematic Reviews has published an updated review of high-quality evidence quantifying the impact of handwashing as a means of preventing diarrhea. The review concluded that:

a) Handwashing promotion in child day centres and schools in high-income countries prevents about 30% of diarrheal episodes. The effect is likely to be similar in low- and middle-income countries but there is insufficient data available to quantify this.
b) Community-based handwashing promotion initiatives in low- and middle-income countries prevents about 28% of diarrheal episodes by increasing handwashing at key moments; and including soap provision in interventions seems to increase the size of the effect.

The review did not address long-term impact of interventions.[8]

Stunting

An Armenian study found that two of the seven independent predictors of stunting in children under the age of five were the number of times a child's hands were washed per day, and whether soap was used during handwashing. In the study, each additional handwashing episode during a day decreased the likelihood of child's stunting by 24%. Never or rarely using soap during child's handwashing was associated with a 3.6-times higher risk of stunting.[9]

Maternal mortality

A study of the handwashing practices of birth attendants in South East Asia found handwashing was associated with a 49% reduction in the odds of post-partum maternal death after adjusting for confounding factors.[10]

Helminth infections

A study in rural South Africa identified *E. vermicularis*, hookworm, and *Toxocara canis* eggs on schoolchildren's hands and children who did not report washing their hands before eating had significantly more *E. vermicularis* eggs on their hands. In addition to helminth infection, these eggs have been found to carry *Dientamoeba fragilis*, a gastrointestinal parasite.[11] A study in Kenya found that children attending a school with access to handwashing facilities with soap were less likely to have helminth infections. Children with handwashing stations at home, however, were *more* likely to have helminth infections. This finding is counterintuitive but may be associated with inadequate use of handwashing stations.[6] A study in Ethiopia found that children under the age of five whose parents did not regularly wash their hands were more likely to have intestinal helminth infections.[12]

Bacterial infections

A small study in rural Kenya explored an outbreak of the foodborne bacterial infection *Providencia alcalifaciens*, which causes gastroenteritis in children. This study identified that the infection was likely passed from mother to child after the infected mothers visited the toilet and then fed their children without washing their hands with soap.[13] Meanwhile in rural Peru, good handwashing technique were found to be associated with reduced *E. Coli* contamination of stored water supplies.[14]

Viruses

Researchers who contaminated healthy adults' hands with a surrogate for rhinovirus, rotavirus, and norovirus found that the use of hand sanitizer in addition to routine handwashing with soap reduced the risk of infection by 47-98%.[15]

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