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Review

Climbing the Intervention Ladder to handwashing compliance: A review and directions for future research

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ABSTRACT

Proper handwashing is a simple, cost effective means for reducing the risk of foodborne disease transmission. Low compliance rates are often observed among food handlers, and a wide range of interventions have attempted to increase compliance, often with little success. Promoting lasting behavior change is difficult, and theoretical models like the Intervention Ladder developed by the Nuffield Council on Bioethics function as useful paradigms to help guide and promote behavior change.

While the Intervention Ladder was developed to address issues like infectious disease, obesity, and drug use, it is applicable to the food industry with regards to promoting food safety practices like handwashing. The aim of this review is to expand on the Intervention Ladder and describe its application in the food industry. We believe the Intervention Ladder can serve as a model to benefit food industry stakeholders through providing strategies to promote handwashing compliance. We have modified the original model to include various levels of employee freedom that might impact which strategy is most appropriate depending on the circumstances. Limitations for each strategy are also considered, and directions for future research are included to help guide and expand the knowledge base of food safety behavior change strategies.

Contents

1. Introduction

Food safety is a public health issue of prime importance. Worldwide, foodborne hazards were estimated to cause 600

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million illnesses and 420,000 deaths in 2010 (World Health Organization, 2015). Foodborne diseases in the United States cost an estimated to $151 billion annually when accounting for damage to human lives, decreased work output, and healthcare expenses (Scharff, 2010). There are an estimated 48,000,000 illnesses, 128,000 hospitalizations, and 3000 deaths annually linked with foodborne disease in the United States. (Scallan, Hoekstra, et al., 2011; Scallan, Griffin, Angulo, Tauxe, & Hoekstra, 2011). Foodborne outbreaks are defined by the FDA as the occurrence of two or more individuals acquiring the same illness from a suspected food item (Center for Food Safety and Applied Nutrition, n.d.), and an estimated 1000 outbreaks occur each year in the United States (Scallan, Hoekstra, et al., 2011; Scallan, Griffin, et al., 2011). Poor hygiene of foodservice workers is among the leading contributing workplace factors that may lead to foodborne disease (FDA, 2009). This is significant in light of cross-sectional data of dietary patterns showing increases in the proportion of food consumed outside the home (Smith, Ng, & Popkin, 2013), and over a third of every dollar in the United States spent eating out (Canning, 2011).

Observations of institutional, retail, and restaurant food establishments show proper personal hygiene as ranking consistently lower on compliance compared to other risk factors like inadequate cooking and improper holding. In a study of 300 foodborne outbreaks, insufficient personal hygiene was the second highest factor leading to outbreaks, with close to 60% of total outbreaks caused by bare hand contact with food (Michaels et al., 2004). Both hand hygiene and handwashing are instrumental in mitigating the spread of disease. Hand hygiene refers to any form of hand cleansing, including use of alcohol-based hand rubs or soap and water, while handwashing (HW) refers exclusively to hand cleansing with soap and water (Larson, 1995). FDA guidelines prohibit use of alcohol-based hand rubs as a substitute for handwashing (FDA, 2013), making HW necessary for following government standards in a number of food establishments.

HW compliance refers to both how often an employee should clean their hands and how well they clean their hands (Todd, Greig, et al., 2010), based upon current FDA guidelines for food service (FDA, 2013). Compliance rates among foodservice workers are highly variable, with a review by Todd, Greig, et al. (2010) and Todd, Michaels, et al. (2010) indicating values in the range of 5–60%. One extensive study that observed over 31,000 food handler actions found proper HW occurred just a third of the time (Clayton & Griffith, 2004). Problematic compliance extends to the restroom as well, as researchers who observed HW rates in restaurant restrooms found proper HW compliance to be just over 50% (Cha, Borchgrevink, & Kim, 2011).

Sustainable behavior change is difficult to achieve, especially when considering how foodservice establishments like restaurants can experience employee turnover at a 50% higher rate compared to the rest of the private sector (Bureau of Labor Statistics, 2016). Employers are faced with a number of challenges in encouraging workers to habitually clean their hands when considering strict guidelines, production constraints that sometimes override food safety standards, and lack of employee motivation (Arendt, Strohbehn, & Jun 2015; Clayton, Clegg Smith, Neff, Pollack, & Ensminger, 2015). Employers must design effective, affordable, timely, gender, and culturally-specific interventions that incorporate strategies maximizing HW compliance to reduce foodborne disease risk, while being mindful of employee freedom and ethical considerations. Promoting changes in employee behavior must be well thought out from beginning to end before strategies are implemented in the workplace. Managers must achieve long-term HW compliance while maintaining the optimal balance of employee satisfaction with the time and money available.

The aim of this review is to provide an expanded model to improve HW compliance in the food industry through modification and expansion of the Intervention Ladder. We elaborate on its relevance in allied industries such as healthcare, give examples of how it might be practically implemented in a foodservice establishment, shed light on limitations in the model, as well as introduce directions for future research to aid in increasing the knowledge base for food safety behavior change interventions.

2. The original intervention ladder

The Nuffield Council on Bioethics created an intervention ladder, IL, as part of their report “Public Health: Ethical Issues,” designed to guide public health officials in designing effective interventions (Nuffield Council on Bioethics, 2007). The ladder (Table 1) consists of 8 “rungs” or strategies that government and policy makers can use in their approach to behavior change in the general population. The IL has been used in whole or in part in a range of contexts to address issues like infectious disease spread, obesity, and drug use. While the IL was initially geared towards government and health care policy makers in the public health domain, we believe it can serve as model for the foodservice industry that will help increase HW compliance. To the best of our knowledge, the IL has never been adapted as an employee motivation model for guiding food safety interventions, and yet offers a unique perspective to better understand and approach significant food safety issues like poor HW compliance.

3. The Handwashing Intervention Ladder

The original IL model carries the underlying assumption that as one progresses up the ladder, the more an individual’s freedoms are

Table 1
The Intervention Ladder: Level of freedom transitions from Low (Eliminate choice) to High (Do nothing).

Steps	Definition	Example
Eliminate choice	Regulate in such a way as to entirely eliminate choice	Compulsory isolation of patients with infectious diseases.
Restrict choice	Regulate in such a way as to restrict the options available to people with the aim of protecting them	Removing unhealthy ingredients from foods
Guide choice through disincentives	Fiscal and other disincentives can be put in place to influence people not to pursue certain activities	Taxes on cigarettes
Guide choices through incentives	Regulations can be offered that guide choices by fiscal and other incentives	Tax-breaks for the purchase of bicycles that are used as a means of travelling to work
Guide choices through changing the default policy	Make ‘healthier’ choices the default option on restaurant menus	Menus could be changed to provide healthier options as standard (i.e. salad as the default side rather than chips)
Enable choice	Enable individuals to change their behaviors	Building cycle lanes
Provide information	Inform and educate the public	Campaigns to encourage people to walk
Do nothing	Simply monitor the situation	Collecting longitudinal data on obesity rates

Note: Reprinted from *Public Health: Ethical Issues*, by Nuffield Council on Bioethics, 2007.