

**EXECUTIVE SUMMARY**

**THE EFFECT OF A WATER FLOW TIMER  
ON FOODSERVICE FOOD HANDLERS'  
HANDWASHING BEHAVIOR**

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## 1. INTRODUCTION

### *Importance of proper handwashing*

- Poor personal hygiene is one of five risk factors contributing to foodborne illness in foodservice and retail food stores, and thus proper handwashing is critical (FDA, 2010, 2017; Green et al., 2006, 2007).
- However, compliance with proper handwashing is still problematic (e.g., only 24% in full service restaurants; FDA, 2010).

### *Passive/indirect intervention strategies for behavioral change*

- Mounting evidence suggests that classical education strategies of knowledge transfer are not sufficient to drive behavioral change (Evans & McCormack, 2008; Schroeder et al., 2016).
- Instead, *active/direct* interventions involving motivational or behavior-based training (Pellegrino, Crandall, O'Bryan, & Seo, 2015; Yu, Neal, Dawson, & Madera, 2017) are gaining interest and found effective in improving hand hygiene practices.
- In comparison, *passive/indirect* interventions with only a subtle change in the environment or system (FDA, 2010; Green et al., 2007; Pellegrino et al., 2015; Viator, Blitstein, Brophy, & Fraser, 2015) may also help behavioral changes with less time/cost commitment and fewer financial obligations for restaurant operations.

### *Water flow timer*

- Sufficient duration ( $\geq 20$  sec; ServSafe®) is an important component in proper handwashing to reduce the number of microorganisms on hands (CDC, 2015).

- The presence of a water flow timer may lead food handlers to be more involved in a proper handwashing duration by providing immediate, continuous, real-time, and personalized feedback.

### **1.1. Purpose of the study**

The purpose of this study was to address whether:

- (1) the presence of a water flow timer improves foodservice food handlers' handwashing behavior;
- (2) the presence of a water flow timer in conjunction with an informational poster facilitates the effect; and
- (3) the effects are affected by high consumer volume.

## **2. METHODS**

### ***Site Selection and Sample***

- A student-operated *a la carte* restaurant on a large Midwestern university campus was the site of the experiment.
- The intervention hand sink was centrally located within the kitchen and was most frequently used.
- Sample included sophomore and senior hospitality students ( $n = 70$ ) and non-student employees ( $n = 9$ ), more than 90% of whom were certified with ServSafe® Food Protection Manager Examination.

### ***Design/Instruments/Data Collection***

- A within-group, multiple-intervention experiment was conducted over the course of four weeks from September 12<sup>th</sup> to October 6<sup>th</sup>, 2017.

- Multiple-intervention included:
  - Week 1) baseline phase;
  - Week 2) a single intervention phase using a water flow timer (SaniTimer®);
  - Week 3) multiple intervention phase using the water flow timer and an informational poster (developed based on ServSafe®); and
  - Week 4) withdrawal phase.
- The water flow timer was attached to a faucet and had a digital display face approximately 2" in diameter, which enabled food handlers to observe a thirty second countdown on a display that begins when the water starts flowing and continues until thirty seconds have passed.
- The informational poster highlighted proper five-step handwashing procedures and the minimum duration of scrubbing with soap as well as total five steps.
- Data were collected from Tuesday to Friday, 7:30am to 2:30pm, using a small motion-detecting video camera (AUKEY DR-01 Dash Cam) that included a date and time stamp for recordings.
- The motion-detecting video camera was installed on the top of a sink with the lens directed at the faucet only, thereby capturing handwashing instances without person-identifiable information.

### ***Behavioral measures***

- **Quantitative**
  - Frequency of handwashing instances
  - Overall duration of handwashing instances

- **Qualitative**
  - Compliance to proper scrubbing duration ( $\geq 10$  sec or not)
  - Compliance to proper five-step handwashing sequence (wetting, soaping, scrubbing, washing, and drying)
  - Compliance to complete proper handwashing (meeting both proper scrubbing duration and five-step handwashing sequence or not)

### 3. RESULTS

- A total of 839 handwashing instances were observed over 112 hours (see Table 1 for detailed frequencies and descriptive statistics of all measures).
- The analysis of variance (ANOVA) results showed that frequency of handwashing instances did not significantly vary across the weeks ( $p = .43$ ).
- The ANOVA results showed that, despite the highest consumer traffic, duration of handwashing instances significantly increased in week 2 over week 1 (14.9 sec vs. 11.6 sec;  $p = .002$ ) and significantly dropped in week 4 in comparison to week 3 (12.8 sec vs. 15.7 sec;  $p = .02$ ).
- Although not definitive, the logistic regression results suggested that the compliance rates for proper scrubbing duration ( $p = .095$ ) and complete proper handwashing varied across the weeks ( $p = .071$ ; i.e., higher percentages in week 2 and week 3 than in week 1 and week 4), and that the compliance rate for following the proper five-step sequence increased in week 2 over week 1 (49.1% vs. 40.7%;  $p = .076$ ) despite the high consumer volumes in week 2 and week 3.

- Point-biserial correlation results showed that increased handwashing duration was positively associated with proper scrubbing duration ( $r_{pb} = .51, p < .001$ ), proper sequence ( $r_{pb} = .41, p < .001$ ), and complete proper handwashing ( $r_{pb} = .45, p < .001$ ).

**Table 1.** Handwashing behavioral measures and consumer volume

Week	Frequency <sup>ns.</sup>	Duration <sup>***</sup>	Proper scrubbing duration <sup>†</sup>	Proper sequence <sup>ns.</sup>	Complete proper handwashing <sup>†</sup>	Consumer volume
1	204	11.6	8.3%	40.7%	6.4%	152
2	234	14.9	12.0%	49.1%	10.7%	244
3	186	15.7	11.3%	39.8%	8.1%	187
4	215	12.8	5.6%	46.0%	4.2%	158

*Notes.* Week 1. Baseline; Week 2. Timer; Week 3. Timer + Poster; Week 4. Withdrawal. Duration is in seconds.

Complete proper handwashing indicates compliance to both proper sequence and scrubbing. In the consumer volume, one day of the week 2 included special banquet for 100 consumers, greater than an average daily volume.

Superscripts indicate the significance testing across four weeks.

<sup>\*\*\*</sup> $p < .001$ . <sup>†</sup> $p < .1$ . <sup>ns</sup> $p \geq .1$ .

#### 4. CONCLUSION

- This study provided reliable and quantifiable data about food handlers' handwashing practices.
- Findings provided useful information about whether *passive/indirect* intervention strategies in handwashing practices such as the mere presence of a water flow timer are effective in driving behavioral changes of food handlers.
- If coupled with an *active/direct* training for providing the rationale, the effect of the *passive/indirect* intervention in its constant reinforcement may become even stronger.

## NOTES

1. This report is an executive summary of a manuscript in preparation for journal submission.
2. The authors acknowledge the support provided by SaniTimer®.

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