



Food Worker Handwashing Practices: An EHS-Net Observation Study

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The findings and conclusions in this presentation are those of the authors and do not necessarily represent the views of the Centers for Disease Control and Prevention.

Introduction

- The Environmental Health Specialists Network (EHS-Net) conducted this study. EHS-Net is
 - a collaborative network of environmental health specialists from
 - the Centers for Disease Control and Prevention (CDC)
 - the U.S. Food and Drug Administration (FDA)
 - the U.S. Department of Agriculture (USDA)
 - nine U.S. states (California, Connecticut, New York, Georgia, Iowa, Minnesota, Oregon, Rhode Island, and Tennessee; Colorado participated until 2005)
 - focused on investigating factors that contribute to foodborne illness, including food preparation practices

Introduction (continued)

- A substantial proportion of foodborne illness outbreaks are caused by restaurant worker hand contact with food.
- Proper handwashing is critical to preventing food contamination from restaurant workers' hands.
- Improving food workers' handwashing practices is dependent upon a clear understanding of current practices and the factors that influence those practices.
- The goals of this study, therefore, were to
 - characterize food worker handwashing practices, and
 - identify factors related to those practices.

Method

- Participants were randomly selected restaurants in six EHS-Net states (Colorado, Connecticut, Georgia, Minnesota, Oregon, and Tennessee)
- 41% (333) of eligible restaurants contacted agreed to participate



Method (continued)

■ **Manager Interview**

- Restaurant ownership: chain vs. independent
- Presence of complex preparation processes (cooling, holding, reheating)
- Hand hygiene taught to food workers
- Food safety training provided to food workers
- Management certification required
- Management encouragement of handwashing

■ **Environment Observation**

- Number of sinks in work area
- Presence of handwashing supplies (soap, drying methods) at hand sinks
- Presence of gloves supplies in work area

Method (continued)

■ Worker Observation

- Recorded each time worker engaged in seven activities for which handwashing should occur

Activity	Description	Handwashing should occur:
Food preparation	Engaging in food preparation, including working with exposed food, clean equipment and utensils, and unwrapped single-use articles	Before the activity
Putting on gloves for food preparation	Putting on gloves to engage in food preparation (see above)	Before the activity
Preparing raw animal products	Preparing raw animal products (animal products that have not been cooked or processed; uncooked eggs, meat, poultry, and fish)	After the activity
Eating, drinking, using tobacco¹	Eating, drinking, or using tobacco	After the activity
Coughing, sneezing, using tissue¹	Coughing, sneezing, or using a handkerchief or disposable tissues	After the activity
Handling dirty equipment	Handling dirty equipment, utensils, or cloths	After the activity
Touching the body	Touching human body parts other than clean hands and clean, exposed arms	After the activity

¹These two activity types were combined for analyses.

Method (continued)

■ Worker Observation

- Each time the observed worker engaged in one of the seven activities, recorded whether **handwashing** and **glove use** occurred
 - Handwashing:
 - removing gloves, if worn at the point handwashing should occur
 - placing hands under running water
 - using soap
 - drying hands with paper or cloth towels

Method (continued)

■ Worker Observation

- Recorded data on other factors
 - Worker's visibility to managers
 - Worker's visibility to customers
 - Hand sink in worker's sight
 - Hand sink distance from worker

Data collectors were trained to promote coding consistency

Results-Descriptive data on handwashing

Analyses

- Calculated proportion of activities for which handwashing occurred

Activity	Activities in which hands were washed		
	Activities N	n	%
Food preparation ¹	514	209	41
Putting on gloves ¹	224	67	30
Preparing raw animal product	384	89	23
Eating/coughing	90	23	26
Handling dirty equipment	786	181	23
Touching body	197	19	10
All activities	2,195	588	27

¹For these activities, handwashing occurred before the activity; for all other activities, handwashing occurred after the activity.

- Calculated median estimated number of activities that required a handwash per hour- **8.6**

Results- Factors associated with handwashing

Analyses

- Conducted multivariate logistic regression model
 - Outcome variable: whether appropriate handwashing occurred in conjunction with the activity
 - Explanatory variables included in initial model:

Worker activity

- Activity: food preparation, etc.
- Worker busyness (busy = >8.6 activities per hour)
- Glove use

Restaurant demographics

- Restaurant ownership
- Presence of complex preparation processes

Employee training

- Hand hygiene taught to food workers
- Food safety training provided
- Management certification required

Physical environment

- Multiple hand sinks
- Hand sink in worker's sight
- Hand sink distance from worker
- Presence of handwashing supplies at hand sinks
- Presence of glove supplies in food preparation areas

Social environment/Management

- Worker visibility to managers
- Worker visibility to customers
- Management encouragement of handwashing

Results- Factors related to handwashing (continued)

	Odds ratio	Lower 95% CI	Upper 95% CI
Activity			
Food preparation (reference) ¹	--	--	--
Putting on gloves for food preparation ¹	.64	.34	1.22
Preparing raw animal product	.44***	.31	.61
Eating/coughing	.48***	.31	.74
Handling dirty equipment	.13***	.07	.23
Touching body	.39**	.20	.74
Worker wore gloves along with activity			
No	--	--	--
Yes	.45***	.30	.66
Worker was busy			
No	--	--	--
Yes	.41***	.26	.67
Food safety training provided to workers			
No	--	--	--
Yes	1.81*	1.06	3.12
Multiple hand sinks			
No	--	--	--
Yes	1.63*	1.07	2.47
Hand sink in worker's sight			
No	--	--	--
Yes	1.93**	1.15	3.23

* $p < .05$, ** $p < .01$, *** $p < .001$ ¹ These figures refer to handwashing *before* the activities, whereas all other figures refer to handwashing *after* the activities.

Results- Factors related to handwashing (continued)

- Handwashing occurred significantly more often
 - with **food preparation** than with most other activities
 - when **gloves were *not* worn** than when they were worn
 - when **workers were *not* busy** than when they were busy
 - when **food safety training** was provided to workers than when it was not
 - when there were **multiple hand sinks** in the work area than when there was only one hand sink
 - when there was a **hand sink in the observed worker's sight** than when there was not

Summary and Discussion

- Handwashing did not occur often- workers failed to wash their hands in 73% of the activities in which they should have.
- Workers engaged in 8.6 activities requiring handwashing per hour. Restaurants should consider reorganizing their food preparation activities to reduce the need for handwashing.
- Workers washed their hands significantly less often when gloves were worn than when gloves were not worn, suggesting that glove use may reduce handwashing.
- Multiple factors were related to handwashing: worker busyness, glove use, activity, food safety training, hand sink visibility, and number of sinks.
- Handwashing improvement programs must be multidimensional.

Limitations

- Risk of contamination varies by work activity sequence. We did not address this.
- Data does not allow us to assess the causality of the relationships between explanatory factors and handwashing.
- The relatively low response rate likely resulted in an overrepresentation of better, safer restaurants in the sample.
- No data were collected on several aspects of handwashing considered to be important, e.g., water temperature, handwashing duration.
- Workers knew they were being observed.
- However, these last three conditions likely caused worker handwashing practices to appear more, rather than less, prevalent than they are.

Strengths

- Data are observational- more accurate than self-report
- Study provides detailed data on how often and in what situations handwashing practices do and do not occur
- Study points to next questions



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