

An Assessment of the Ability of Routine Restaurant Inspections to Predict Food-Borne Outbreaks in Miami–Dade County, Florida

ABSTRACT

Objectives. This study sought to determine the usefulness of restaurant inspections in predicting food-borne outbreaks in Miami–Dade County, Fla.

Methods. Inspection reports of restaurants with outbreaks in 1995 (cases; $n=51$) were compared with those of randomly selected restaurants that had no reported outbreaks (controls; $n=76$).

Results. Cases and controls did not differ by overall inspection outcome or mean number of critical violations. Only 1 critical violation—evidence of vermin—was associated with outbreaks (odds ratio=3.3; 95% confidence interval=1.1, 13.1).

Conclusions. Results of restaurant inspections in Miami–Dade County did not predict outbreaks. If these findings are representative of the situation in other jurisdictions, inspection practices may need to be updated. (*Am J Public Health*. 2001;91:821–823)

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Routine restaurant inspections are intended to prevent food-borne illness by ensuring safe food handling and preparation. Although practices and standards vary considerably across jurisdictions, inspections are required by food sanitation codes throughout the United States and have been recommended in model food codes and sanitation ordinances published by the federal government since 1934.¹

Although restaurant inspections are based on scientifically sound principles of food safety, they have not been rigorously evaluated to determine whether they actually prevent food-borne outbreaks. The single US study published to date, completed in 1987 in Seattle–King County, Washington, found that restaurants with poorer results on inspections were more likely to have food-borne disease outbreaks.²

We conducted a study to test the hypothesis that violations found during routine restaurant inspections predicted food-borne outbreaks in Miami–Dade County, Fla, in 1995.

Methods

Responsibility for restaurant safety in Florida is divided between the Florida Department of Business and Professional Regulation (DBPR), which conducts routine restaurant inspections, and the Florida Department of Health, which investigates food-borne outbreaks. The Department of Health also regulates food served in institutions, such as schools, nursing homes, and jails, while the Department of Agriculture and Consumer Services inspects grocery stores. In 1995, DBPR had 31 inspectors for the more than 8000 food establishments in Miami–Dade County; each restaurant was to be inspected 4 times per year, regardless of its size or type. Inspectors conducted a minimum of 6 inspections per day, using a 57-item checklist based on the 1976 federal food service sanitation manual³; most of the items were similar to those used in the Seattle checklist. Twelve of these items, including ones related to food preparation, handling, and storage, are defined as areas of “critical concern” because they are thought to have a significant impact on food safety.

On the basis of the inspection, a restaurant receives 1 of 4 ratings, ranging from an order to correct any violations by the next routine inspection to a warning that legal action may be taken against the restaurant’s license.

In Florida, county health departments investigate reports of food-borne outbreaks in restaurants, usually defined as incidents in which 2 or more persons experience similar illnesses after ingestion of a common meal or food item. A confirmed food-borne outbreak is one in which epidemiologic analysis implicates the food as the source of illness.

For study purposes, a case restaurant was defined as a Miami–Dade County restaurant with a DBPR permit, in operation during 1995, with a confirmed food-borne illness outbreak during the year. A control restaurant had an active permit and no confirmed food-borne outbreaks that year. For each case, we obtained the last restaurant safety inspection report before the outbreak. Two controls were randomly selected for each case and matched by year and month of inspection.

We calculated matched odds ratios and 95% confidence intervals for predictor variables obtained from the inspection reports.⁴ Variables that were associated with outbreaks in univariate analyses were entered into a conditional logistic model to control for confounding.⁵

Results

During 1995, the Miami–Dade County Health Department received 187 reports of food-borne illnesses associated with restaurants and confirmed 60 of them (32.1%). Of

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TABLE 1—Matched Odds Ratios (MORs) for the Association Between the Outcomes of Restaurant Inspections and the Occurrence of Food-Borne Outbreaks: Miami–Dade County, Fla, 1995

Characteristics Measured in 51 Restaurants With Outbreaks and 76 Restaurants With No Reported Outbreaks in 1995	% of Restaurants With/Without Outbreaks	MOR for Association of Characteristic With Outbreak	95% Confidence Interval
Univariate MORs			
Violation of a critical inspection item			
Food in sound condition, no spoilage	No violations	NA	NA
Potentially hazardous food meets temperature requirements	19.6/11.8	1.9	0.6, 6.2
Restaurant has appropriate facilities to maintain product temperature	2.0/1.3	2.0	0.03, 157.0
Unwrapped and/or potentially hazardous food is discarded after its shelf life expires	No violations	NA	NA
Personnel with symptoms of illness are excluded from food handling	No violations	NA	NA
Employees have clean hands, observe good hygienic practices	7.8/2.6	3.0	0.3, 256.0
Food equipment and utensils are sanitized	5.9/7.9	0.7	0.1, 3.2
Safe water source; hot and cold water are under pressure	3.9/7.9	0.3	0.01, 2.5
Appropriate sewage, wastewater disposal	0/2.6	0.0 ^a	0.0, 7.9
Adequate plumbing; backflow prevention, no cross connections	3.9/7.9	0.2	0.01, 2.2
Adequate toilet, hand-washing facilities	19.6/10.5	2.0	0.6, 7.2
No vermin (insects or rodents); outer openings protected; no animals	23.5/9.2	3.3	1.1, 13.1
Violation of any critical inspection item	54.9/44.7	1.3	0.6, 3.3
4 or more noncritical violations	60.0/50.0	1.1	0.5, 2.4
Overall inspection rating satisfactory	70.6/80.3	0.6	0.2, 1.7
Seating capacity ≥ 50	58.8/43.4	2.1	1.0, 5.0
Inspection lasted ≤ 42 minutes ^b	43.6/48.0	0.8	0.2, 2.6
Adjusted MORs^c			
Seating capacity ≥ 50	58.8/43.4	2.2	1.0, 4.9
Evidence of vermin	23.5/9.2	3.1	1.1, 8.6

Note. NA = not applicable.

^aUnmatched odds ratio.

^bData are available for 39 cases and 50 controls.

^cRestaurant characteristics associated with outbreaks after conditional logistic regression was used to control for confounding.

those, 80% involved fewer than 5 persons and 17% involved 6 or more persons. An etiologic agent was identified for 32% of the outbreaks and a vehicle for 47%. The last inspection report before the outbreak was available for 51 (85%) of the 60 restaurants.

Complete information about seating capacity and violations was available for all 51 case restaurants and for 76 of the 102 selected control restaurants; the 26 control restaurants with missing information were excluded from further analysis.

Case restaurants were somewhat less likely to receive the most favorable overall rating, with 80% of control restaurants given “next inspection” ratings, compared with 70% of case restaurants, but this difference was not significant ($P = .2$).

For the 39 case and 50 control restaurants for which duration of inspection was available, the mean duration was 45.8 minutes for cases and 43.0 minutes for controls (mean difference among 27 matched pairs = 5.17 minutes; 95% confidence interval = -5.23, 15.58).⁵

Univariate analysis of individual violations (Table 1) showed that case restaurants were 3 times as likely as controls to be cited for vermin (the presence of insects or insect fragments). The only other variable associated with outbreaks was larger seating capacity (≥ 50

seats). Both variables independently predicted outbreaks in conditional logistic regression analysis (Table 1).

Discussion

The results of this study suggest that restaurant inspections in Miami–Dade County do not reliably identify restaurants that are at increased risk of outbreaks of food-borne illness. Although critical violations are the focus of the inspections, only 1 of 12 critical violations, evidence of vermin, was associated with outbreaks in this study. Forty-five percent of the case restaurants had no critical violations cited in the inspection report preceding the outbreak.

The Seattle–King County study found an association between outbreaks and (1) a restaurant’s overall inspection rating, (2) the presence of any critical violations, (3) the presence of any of 3 individual violations, including food protection practices, and (4) duration of inspection, with restaurants that subsequently had outbreaks taking longer to inspect.²

The differences in the 2 studies’ findings may reflect differences in checklist formats or in the way inspections were conducted.

Seattle–King County, for example, assigns a varying number of points (up to 5) for each checklist item, and the study included case and control restaurants’ mean overall scores in its evaluation; Miami–Dade County does not. The 2 studies also were conducted almost a decade apart. Since 1988, Hazard Analysis and Critical Control Point (HACCP) guidelines have been incorporated into the Food and Drug Administration’s Food Code and widely adopted by the food industry.⁷ Whereas restaurant inspections are a snapshot of conditions at a particular time, HACCP systems combine control of hazardous food processes with continuous monitoring to identify and correct dangerous conditions. Consequently, inspection forms and critical violations that were relevant in a previous decade may no longer adequately reflect the causes of restaurant-associated food-borne outbreaks. Today, other factors—such as the adequacy of food safety training and the types of food prepared⁸—may be most relevant to outbreak prevention. Some states, for example, are moving to vary the frequency of inspections as a factor of the restaurant’s size and the perceived risk of the menu items.⁹

Larger regional or national studies done with standard protocols and data collection forms are needed to adequately assess the use-

fulness of restaurant inspections as currently practiced.¹⁰ In addition, since new food safety initiatives are likely to stimulate more changes in the food and restaurant industries, regulatory agencies need to periodically evaluate restaurant inspection practices to maintain their relevance. □

Contributors

M. A. Cruz planned the study and assisted in the analysis of the data and the writing of the paper. D. J. Katz analyzed the data, interpreted the results, and wrote the paper. J. A. Suarez assisted in the design of the study and the collection of the data and contributed extensively to the final revisions of the paper.

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