Improved Inspection Scheduling for Foodservice Establishments

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(Received for publication August 27, 1979)

ABSTRACT

Theoretical and experimental considerations indicate that overall sanitation scores for a community's foodservice establishments would improve if the frequency of sanitation inspections were made to vary according to perceived risks attributable to sanitation deficiencies.

Sanitarians inspect and issue sanitation scores to foodservice establishments to promote sanitation and prevent foodborne illness. Usually the establishments are inspected the same number of times per year. There is increasing theoretical and experimental evidence that providing different inspection frequencies for establishments with different risks of sanitation deficiencies would more effectively reduce demerit points per establishment for a given total number of inspections within a jurisdiction.

Sanitation is, at least in part, a culture-dependent concept. Disease-provoking and "unclean" conditions are both reflected negatively in measurements of sanitation. Attempts to quantify combinations of such conditions will involve subjective judgments as to their relative importance under a variety of situations. Under these circumstances, a major challenge to administrators remains the lack of a good operational definition of sanitation. The parameters currently used to measure it and the way such parameters are combined into an aggregate sanitation rating, lead to too tenuous a connection between sanitation ratings and the risk of illness and uncleanliness.

Nevertheless, we make the assumption that sanitation ratings (or demerit-point sanitation scales), as currently used, at least roughly correlate with the public health and uncleanliness risks determined by sanitarians. Thus if a change in sanitation scheduling yields higher sanitation scores (i.e., fewer demerit points), then we assume that sanitation has improved, on the average.

FACTORS INFLUENCING SANITATION

There are many factors that influence the sanitation (and the sanitation score) of a foodservice establishment at any point in time. We do not know what all these factors are, nor how they interrelate; but we can assume that for various establishments different factors have various levels of importance in the sanitation score assigned during periodic inspections. We believe that a reasonable case can be made that in spite of imperfect understanding of establishment characteristics, variable inspection schedules can be structured which improve overall sanitation levels in a jurisdiction. To illustrate this point, suppose that factors influencing sanitation level at a point in time include (but are not limited to): (a) physical nature of the establishment (e.g., liquor store with no in-house food preparation, restaurant with "from scratch" food preparation, etc.) (b) nature of the food sold by the establishment (e.g., prepackaged food heated in a microwave oven, griddle cooking, etc.), (c) management and employee attitudes toward sanitation (e.g., cleanliness is good for business, uncleanliness won't be noticed, etc.), (d) management and employee expectation regarding next sanitation inspection (e.g., an inspection is imminent, etc.) and (e) historical sanitation scores received (e.g., always high, etc.).

Establishments that are strong with regard to (c) and (e) or have minimal food handling are likely to remain sanitary even if their inspection frequency is reduced from current levels and the establishment personnel are aware of such reduction. On the other hand, the sanitation of establishments that are weak in (c) and (e) might be greatly improved if the frequency of inspections is increased, thus affecting (d) and possibly (e). That is, establishments that have been historically "good" are probably "good" for reasons other than the threat of inspections. Conversely, personnel in establishments that have been historically "poor" may have low self-motivation or capability to maintain high standards, and the expectation of more frequent inspections could be a strong factor for sanitation improvement.

NUMBER OF INSPECTIONS

No absolute number of inspections can be recommended for establishments with high or low sanitation levels. Minimum inspection frequencies, or the average inspection frequencies for all the establishments, must be determined in part on the basis of the public's willingness to pay for the assumed benefits accruing
from inspections. However, if different establishments benefit from inspections to a different degree, then different inspection schedules seem appropriate.

The clustering of establishments by sanitation types has been studied recently by several investigators (1,4,5). Kaplan and EI-Ahraf (4) showed that clustering based on physical characteristics alone (i.e., establishment type) may yield dramatic differences in rate of reported food-poisoning outbreaks.

Table 1 is a reworking of the data presented in Bader et al. (1). They randomly selected matched experimental and control food establishments. The control group was inspected the usual four times per year. The experimental group was inspected once with additional visits only subsequent to complaints from the public in accordance with health department policy. The Table shows that natural clusters of establishments that have historically good scores suffered less of a decline in scores during the experiment than establishments with historically lower scores, when the inspection frequency for both was reduced.

**TABLE 1. Historical demerit points and net increase in demerit points induced by experimentally reduced inspection frequency.**

<table>
<thead>
<tr>
<th>Establishment type</th>
<th>Historical demerit points before reduced inspections</th>
<th>Demerit points under reduced inspections</th>
<th>Net increase in demerit points under reduced inspections</th>
</tr>
</thead>
<tbody>
<tr>
<td>School</td>
<td>3.6</td>
<td>6.8</td>
<td>3.2</td>
</tr>
<tr>
<td>Simple menu (small)</td>
<td>5.8</td>
<td>9.4</td>
<td>3.6</td>
</tr>
<tr>
<td>Drive-in</td>
<td>7.2</td>
<td>12.1</td>
<td>4.9</td>
</tr>
<tr>
<td>Complex menu (small)</td>
<td>8.6</td>
<td>17.4</td>
<td>8.8</td>
</tr>
<tr>
<td>Large</td>
<td>9.9</td>
<td>17.4</td>
<td>7.5</td>
</tr>
<tr>
<td>Oriental</td>
<td>10.6</td>
<td>25.2</td>
<td>14.6</td>
</tr>
</tbody>
</table>

*From: Bader et al. (1).*

Furthermore, in a 6-month study, Zaki et al. (5) clustered establishments by sanitation scores and noted that establishments with historically high scores generally maintained them even under reduced inspection schedules, whereas establishments with historically low scores appeared to require more frequent inspections to maintain or improve their scores.

Our intuitive argument that establishment characteristics that affect sanitation can be used to institute variable inspection schedules to increase sanitation scores in a jurisdiction is complemented by the following simple mathematical illustration.

Suppose an inspector must divide a total of 10-day-long inspection visits between two restaurants. On any given day when there is no inspection, restaurant A is estimated (by some method) to have a 0.02 probability of causing foodborne illness. Similarly, restaurant B has a 0.04 probability. On a day when either restaurant is inspected, the probability for that restaurant drops to 0.0. If the inspector carries out x inspections at restaurant A and y inspections at restaurant B, where x + y = 10, he will have prevented (on the average) 0.02x (0.04y) illnesses. Thus, if he uses an inspection schedule with x = y = 5, he will have prevented an average of 0.3 illness. However, if he inspects restaurant A zero times and restaurant B ten times, on the average he will have prevented 0.4 illness, which is a 33% improvement.

Naturally, our example is too simplistic to be directly implemented. It suggests an extreme solution, and the original premise of a *constant* rate of outbreaks per day regardless of inspection frequency is probably unrealistic. However, it is not unreasonable to assume that if establishments can be identified and clustered according to their expected rate of undesirable occurrences (as reflected in historical sanitation scores), then an adjustment of inspection schedules so that "riskier" establishments are inspected more frequently relative to less "riskier" establishments will result in more efficient use of inspection manpower.

A basic economic principle for resource allocation (2, p. 383) is: "**Optimal allocation of an input.** If an input i can be used in producing both commodities x and y, then the marginal social product of i in the manufacture of x must equal the marginal social product of i in the manufacture of y." An alternative statement of this principle is (2, p. 386): "If resources are to be allocated optimally between any two outputs x and y, then the ratio of the marginal social utility of x (MSU_x) to the marginal social cost of x (MSC_x) must equal the corresponding ratio for commodity y; i.e., we must have MSU_x/MSC_x = MSU_y/MSC_y. (Here, marginal cost of x may be interpreted to mean the quantity of resources needed to produce an additional unit of x, etc.)."

In our case, the input is food service establishment inspections (or the cost of those inspections) and the social product is, for example, number of outbreaks of food poisoning prevented. The above economic principle may not apply if there are constraints on the use of resources, such as requirements for at least a minimum annual number of inspections per establishment. Also, we do not possess a sophisticated model for measuring the marginal effect of an additional inspection (or expenditure of an inspection dollar) on the social product. However, in searching for a solution that is an improvement over a constant inspection frequency regardless of expected benefits, one can see that is reasonable to infer that inspection frequency should be somewhat proportional to presumed potential changes in sanitation risk and inversely proportional to inspection costs.

A practical test of clustering by sanitation score was made in Arlington County, Virginia (3). In general, the lower the historical sanitation score of an establishment, the more frequently it was inspected and vice-versa. The result was a continuous and substantial increase in average sanitation scores, in spite of reduced manpower levels.

In the mathematical sense of the word, "optimal"
Public participation at the Food Labeling Hearings exerted a significant impact on the Agency's food labeling policies — and it is important that consumers know this. This is the final stage of good communication and effective public participation. As soon as the proposed food labeling regulation is published in the Federal Register, the Office of Consumer Affairs plans to send the proposal to all of the consumers who testified at the hearings or sent written comments to the Agency. Approximately 10,000 consumers will receive the food labeling proposal.

IN CONCLUSION

Regardless of whether it is the industry, health professionals or consumers, the ultimate goal of any group that interacts with FDA is to have its particular point of view reflected in Agency policy or final regulations. Heretofore consumers have not consistently expressed their views to FDA during the decisionmaking process. As a result, the Agency did not have access to consumer views when attempting to resolve an issue or establish a certain regulatory policy. When such a situation occurs, the courtroom usually becomes the first rather than the last forum for discussing differences and considering alternative approaches to a problem. One of the benefits of public participation is that diversity and controversy are actively sought and openly addressed at the early stages of the decisionmaking process.

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inspection schedules cannot be derived. Too much is unknown or unmeasurable about establishment characteristics and sanitation. However, our arguments strongly support the case that substantial improvements can be made by changing the current widespread practice of constant inspection frequencies. By incrementally varying inspection frequencies in proportion to sanitation deficiencies (and in inverse proportion to inspection costs if the differences are significant enough to warrant it), observing subsequent changes in sanitation scores, and again varying the inspection frequencies, a superior inspection schedule can be successively approached.

REFERENCES