

Administrative Control of Food Handlers and Places Dispensing Food and Drinks

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THE administrative control of food handlers and places dispensing food and drinks is one of the most difficult problems in the field of public health. The subject has been receiving much attention from public health officials during the past few years, and considerable data concerning the problem have appeared in the literature. The purpose of this article is to review the subject briefly and to describe recent activities of the Hartford Board of Health in this field.

Food handlers play a rôle of some importance in maintaining the health of the community. This group includes housewives and servants in private homes, as well as food handlers in public and semi-public places. The housewife may not be the cause of an extensive outbreak of disease, but she may cause illness among her own family and guests by failure to observe proper precautions in storing, preparing, and serving food. It is the responsibility of health officials to instruct food handlers concerning the danger of food-borne diseases and their prevention. It is also important that consumers know what is expected of food handlers in the way of personal hygiene and other preventive measures.

The germs of many communicable diseases may be present in the human nose, mouth, throat, genitourinary and gastrointestinal tracts, and leave the body with excretions from these parts. In this way diseases may be spread by case or carrier, either directly or indirectly. If the illness is spread by one with symptoms, it is usually easy to find the source of infection. If spread by carrier, it is more difficult. It is well known that the following diseases, as well as others, may be spread by contaminated food:

Amebiasis	Poliomyelitis
Diphtheria	Scarlet fever
Dysentery, bacillary	Streptococcus sore throat
Food poisoning	Tuberculosis
Paratyphoid fever	Typhoid fever

These and many other diseases, including those listed below, may also be spread indirectly by contamination of dishes and other utensils, or directly from food handlers to customers:

Chickenpox	Pneumonia, broncho
Conjunctivitis, infectious	Pneumonia, lobar
Encephalitis, epidemic	Smallpox
Influenza	Syphilis (rarely)
Measles	Common cold
Meningococcus meningitis	Vincent's angina
Mumps	Whooping cough

Personal cleanliness is one of the

fundamental principles of food handling. Proper washing of the hands after using the toilet, after contamination from coughing or sneezing, and before beginning to prepare or serve food is of the utmost importance. The hands may become contaminated with discharges from the nose, mouth, throat, genitourinary and gastrointestinal tracts, and may be a menace to the public. If the hands are to be washed thoroughly, hot running water, soap, nail brush, and ample time are necessary. They should be dried on individual towels. The finger nails should be neatly trimmed and free from dirt at all times.

It has been shown that the routine examination of food handlers by supervisory authorities has had but little effect upon the incidence of disease. Compulsory laws, involving a large expenditure of money and frequently giving a false sense of security, would not seem to be justified. A number of cities which formerly issued health certificates to food handlers have discontinued doing so. From the standpoint of public health administration, experience indicates that the spread of such diseases as typhoid fever, syphilis, and tuberculosis can be controlled more satisfactorily and economically by investigating all cases and contacts in the community and bringing the sources of infection under control, than by routine examination of food handlers. However, a periodic health examination by a physician is highly desirable for the individual, and the Hartford Board of Health advises that it be done on a voluntary basis.

Many foods at room temperature serve as excellent media for the growth of certain disease producing germs. Great care must be taken in the preparation, storage, and dispensing of such foods. Before serving they should be heated to such a degree as will kill pathogenic bacteria. Food that is not intended for immediate consumption

should be placed under refrigeration. Many cases of illness result each year from the improper preparation and storage of cream filled pastry, meats, and other foods.

All foods should be given individual service. Serving forks, tongs, spoons, and other implements should be used to handle such foods as cake, candy, bread, and lump sugar. Persons preparing salads, sandwiches, and foods to be eaten unheated, should take the maximum precautions to prevent touching the ingredients with their hands.

Glasses, dishes, silverware, and other utensils in which food is prepared, stored, or served should be cleansed, disinfected and properly protected from contamination until used again. This protects the next person from germs which may have been left by the food handler, or by the customer who previously used the utensil.

LABORATORY STUDIES AND LEGISLATION

A laboratory study of drinking glasses from places dispensing food and drinks in Hartford was begun in the autumn of 1934 and continued through the summer of 1935.¹ The purpose of the project was to determine the efficiency of disinfection of glasses, dishes, and other eating utensils. One glass was examined from each of 200 drug stores, 232 taverns, and 198 restaurants—or a total of 630. The tavern glasses were examined during the winter and spring, and those from the restaurants and soda fountains during the autumn of 1934 and summer of 1935.

At the time the study was begun a review of the literature² revealed no accepted standard laboratory methods for such work, hence the results may not be comparable with similar studies elsewhere. It was necessary to develop a technic which would be relatively simple, and yet would give a representative bacteriological picture of conditions. At first only total plate counts were made

from supposedly clean glasses. As the study progressed, it was decided to determine the type of organism on the glass rim, and the bacteriological content of the entire glass.

The cultures were made in the establishments by a representative of the Board of Health. A definite amount of sterile water and a swab were provided for each glass. The water was placed in the glass and worked around in such a way as to wash down the bacteria, and then returned to the original bottle. The swab was rubbed around the rim of a second glass, approximately 1 inch from the top inside and outside, and returned to its tube. They were then brought to the laboratory and cultures were made within 1 hour. Agar plates were made from the glass washings and incubated for 36 hours. The swab was placed in a tube of sterile bouillon and allowed to incubate over night. It was found that this period of incubation was the most satisfactory for preventing over-growth by spore formers. In the morning the swab was removed from the tube, direct smears were made, and it was then discarded. The smears were stained by the Gram method. Blood agar and Endo plates were made from the broth tubes. After 24 hours' incubation these plates were examined macroscopically for hemolytic or coliform colonies.

A second bacteriological survey of glasses was begun in the autumn of 1935 and continued through the summer of 1936. In this study the rim of one glass from each of 690 estab-

lishments was cultured. By this time a routine laboratory technic had been developed. The laboratory technician taking the cultures was provided with 10 c.c. of sterile water in a test tube and a sterile dry swab wrapped in paper. Just before taking the culture, the swab was moistened in the water and rubbed on the rim of the glass, inside and out. The swab was returned to the tube of sterile water and brought to the laboratory. Before making the culture, the swab was shaken vigorously in the sterile water. This was continued until the cotton was nearly loosened from the swab. A measured portion of the water was used for a plate count, and a broth culture was made from the swab. A smear was made from the broth culture, stained by the Gram method, and examined for type of organism. Colonies on the agar plates were counted and the count was adjusted after figuring the dilution. A summary and comparison of the bacteriological findings of the two surveys will be found in Tables I, II, and III.

The results of the laboratory studies indicated that many places in Hartford were not adequately disinfecting eating utensils. A large percentage of glasses examined were found to be contaminated with bacteria commonly found in the human upper respiratory and gastrointestinal tracts. It was shown that rinse water of 130°F., as required by Board of Health regulation, would not properly disinfect eating utensils.

A careful survey of disinfecting agents and methods was made. It was con-

TABLE I
Plate Counts from 630 Drinking Glasses, 1934-1935

<i>Colonies</i>	<i>Restaurants</i>	<i>Drug Stores</i>	<i>Taverns</i>	<i>Total</i>
0- 100	47	24	17	88
100- 1,000	41	42	24	107
1,000-100,000	86	103	146	335
Over 100,000	24	31	45	100
Total	198	200	232	630

TABLE II
Bacteria Cultures from 630 Glass Rims, 1934-1935

Organism	Restaurants Positive		Drug Stores Positive		Taverns Positive	
	Number	Per cent	Number	Per cent	Number	Per cent
Streptococci	12	6.1	8	4.0	77*	33.2
Staphylococci	40	20.2	56	28.0	73†	31.5
Pneumococci	3	1.5	0	0.0	23	9.9
Coliform	15	7.6	57	28.5	87	37.5

* Hemolytic streptococcus 3

† Hemolytic staphylococcus aureus 6

TABLE III
Bacteria Cultures from Glass Rims

Organism	630 Examinations 1934-1935 Positive		630 Examinations 1935-1936 Positive	
	Number	Per cent	Number	Per cent
Streptococci	97	15.4	99	14.3
Staphylococci	169	26.8	148	21.4
Coliform	159	25.2	127	18.4

cluded that from the administrative point disinfection by hot water would be the simplest to supervise. The efficiency of certain chemical agents in disinfection was granted, but their supervision would not be practical in Hartford. Bacteriological studies were made to determine the minimum temperature and time needed for adequate disinfection. The new regulation was adopted on August 19, 1936, and became effective October 1, 1936.

Regulations Concerning the Cleansing of Glasses, Dishes, Silverware, and Other Utensils Used at Places Dispensing Food and Drink

a. All glasses, dishes, silverware, and other utensils used at places dispensing food or drink shall be washed after each service until clean to the sight and touch in warm water (110°-120° F.), containing soap or alkali cleanser.

b. After cleansing, all glasses, dishes, silverware, and other utensils, shall be placed in wire cages and subjected by immersion for at least 5 minutes to the bactericidal action of water heated to a minimum of 170° F.

c. Upon removal from the hot water, glasses, dishes, silverware, and other utensils shall be

stored in such a manner as not to become contaminated before being used.

d. Other equally effective methods of bactericidal action by heat, hot water, or steam will be approved.

e. When paper receptacles, ice cream cones, or other single service utensils are used for serving food or drink, they must be kept in a sanitary manner, protected from dust, flies, and other contamination.

A new regulation concerning the serving of food and drinks was also passed and an Inspection and Score Card System adopted.

Regulation Concerning the Serving of Food and Drink

a. Places manufacturing, preparing, and serving food and drink shall require all food handlers to wash their hands thoroughly with soap and water after using the toilet.

b. Places serving food and drink shall take the maximum precautions to prevent contamination of food and drink by hands of waiters and customers.

c. All food and drink shall be given individual service.

d. Places dispensing food and drink shall display the license and score card in such place as is plainly visible to the public, and is approved by the Board of Health.

TABLE IV
Bacteriological Examination of Glasses

Organism	1934-1935	1935-1936	1937-1938
	614	690	2,794
	Examinations	Examinations	Examinations
	Per cent	Per cent	Per cent
	Positive	Positive	Positive
Streptococci	15.3	14.3	0.3
Staphylococci	26.0	21.4	9.73
Coliform	25.3	18.4	4.76
No growth or spore formers	33.4	45.0	85.01

After sufficient time had been allowed for installation of equipment, and for instruction of proprietors and food handlers as to the necessity of adequate disinfection of utensils and observance of personal hygiene, a third survey was made. This included a plate count from the rim of glasses and a culture for the type of organism from all places dispensing food and drinks in the city. No attempt was made to classify streptococci or staphylococci as to hemolysis, and the Gram-negative bacilli were all classified as coliform organisms. The results are compared in Table IV with the studies made previous to the enforcement of the new regulations.

filled the requirements of the new regulations. Two difficulties presented themselves. Manufacturers did not make the type of equipment suitable for the smaller places, and the plumbing in many establishments, even with new equipment, was not capable of maintaining water at the desired temperature. Representatives of equipment companies, sanitary engineers, and plumbers conferred with representatives of the Board of Health. Apparatus was designed, and laboratory studies were made to determine whether it would disinfect eating utensils.

The Board of Health licenses 623 places to dispense food and drinks in Hartford. All have installed approved disinfecting equipment. The types of apparatus may be divided into 5 groups: (a) tanks with dish trays; (b) sinks with dish trays; (c) hot air disinfectors; (d) mechanical dish washers; (e) paper utensils. Most of the smaller places have installed the simple tank type. Many fountains have sinks with trays. The heat for the first two types is generated by gas, and the temperature regulated either by thermostat or thermometer. The hot air disinfecter was designed by a local company. Laboratory tests have shown that utensils are disinfected by this type of apparatus when exposed to 250°F. for 15 minutes. The larger establishments have mechanical dish washing. Table VI summarizes certain data concerning disinfecting equipment in use in Hartford.

TABLE V
Bacteriological Examination of Glasses

Colonies	1934-1935	1937-1938
	542	934
	Examinations	Examinations
	Per cent	Per cent
	Positive	Positive
0	10.32	30.94
1- 100	5.53	21.73
100- 500	9.42	8.99
500- 1,000	8.51	5.36
1,000- 5,000	22.14	9.85
5,000-10,000	9.77	4.07
10,000-50,000	20.29	4.39
Over 50,000	14.02	14.67
Total	100.00	100.00

DISINFECTING EQUIPMENT

Less than 10 per cent of places dispensing food and drinks in Hartford had equipment and plumbing which ful-

TABLE VI
Data Pertaining to Disinfection

Type Equipment	Number Places	Disinfecting Space Average Cubic Inches		Heated by	
		Per Place	Per Customer	Gas *	Electricity
Tank with Trays	308	4,400	22.5	299	9
Sink with Trays	169	4,762	25.2	156	13
Hot Air	47	4,852	19.3	16	31
Mechanical	62	5,070	8.7	59	3
Paper Utensils	37	0	0	0	0
Totals and averages	623	4,771	18.9	530	56

* Includes 15 disinfectors heated with coal and 5 heated with oil.

INSPECTION AND EDUCATION

The Inspection and Score Card is a valuable aid to the Board of Health Educational Program. It was patterned from Figure 64 of *Recording of Local Health Work*, by Walker and Randolph.³ Their form was simplified and adapted to our local needs. It is required to be posted where it will be visible, and may be inspected by customers. A leather holder is provided by the Board of Health, and a duplicate Score Card is filed in the Board of Health office. The establishment is scored monthly. This does not mean that it is inspected only once each month as frequently it may be necessary to make several visits. Four points are allowed for each item. When practical, the place is scored by a different inspector each month.

The representative of the Board of Health makes the inspection in the presence of the manager and other employees. It is an educational visit. Each item is inspected carefully and criticisms and suggestions are made. If violations are found, a note is made on the back of the Score Card and a reasonable length of time is given for necessary corrections. The Score Card is proving a stimulus to establishments to improve the standard of their service. It gives the Board of Health an opportunity to educate food handlers in

the best methods of food handling and personal hygiene. The Score Card is also very helpful to the inspector. It provides him with a standard inspection procedure and a monthly record of each establishment for comparison.

DISCUSSION

It is impossible to estimate the amount of disease spread by food handlers and eating utensils. Lynch and Cumming⁴ made extensive studies of dish washing in several army stations. These investigators found that the influenza rate was much higher among men using dishes washed in the line, than among those who ate at the tables and whose dishes were washed in water of higher temperature. "In an epidemiological study of 66,076 troops it was shown that there was an influenza rate of 51.1 per 1,000 troops among those who had the advantage of collective washing of utensils, while among those who washed their own mess gear in warm water, the rate was 252 per 1,000."⁵ They concluded⁴ that if mess kit dish water is responsible for explosive outbreaks in the army, perhaps, common dish water in public eating places likewise is responsible for the spread of certain diseases.

Cumming⁶ sent questionnaires to public institutions in the United States. The 370 institutions replying formed

MONTHLY SCORE SHEET FOR PLACES DISPENSING FOOD AND DRINK IN HARTFORD

(PROPERTY OF THE HARTFORD BOARD OF HEALTH)

Firm Name		Address											
Owner or Proprietor		Nature of Business											
Date		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Buildings	Arrangement	...	...	...	...	...	...	...	...	...	...	...	...
	Floor	...	...	...	...	...	...	...	...	...	...	...	...
	Walls and ceilings	...	...	...	...	...	...	...	...	...	...	...	...
	Light and ventilation	...	...	...	...	...	...	...	...	...	...	...	...
	Screening	...	...	...	...	...	...	...	...	...	...	...	...
	Toilets	...	...	...	...	...	...	...	...	...	...	...	...
Utensils	Handwashing facilities	...	...	...	...	...	...	...	...	...	...	...	...
	Kitchen	...	...	...	...	...	...	...	...	...	...	...	...
	Dishes	...	...	...	...	...	...	...	...	...	...	...	...
	Silverware	...	...	...	...	...	...	...	...	...	...	...	...
	Mechanical equipment	...	...	...	...	...	...	...	...	...	...	...	...
	Dishwashing equipment *	...	...	...	...	...	...	...	...	...	...	...	...
Refrigeration	Sink and drainboard	...	...	...	...	...	...	...	...	...	...	...	...
	Tables and counters	...	...	...	...	...	...	...	...	...	...	...	...
	Ice box	...	...	...	...	...	...	...	...	...	...	...	...
Food storage	Water cooler	...	...	...	...	...	...	...	...	...	...	...	...
	Meat	...	...	...	...	...	...	...	...	...	...	...	...
Food service	Milk	...	...	...	...	...	...	...	...	...	...	...	...
	Other supplies	...	...	...	...	...	...	...	...	...	...	...	...
	Food service	...	...	...	...	...	...	...	...	...	...	...	...
Waste and garbage receptacles		...	...	...	...	...	...	...	...	...	...	...	...
Flies and vermin		...	...	...	...	...	...	...	...	...	...	...	...
Employees	Health certificates	...	...	...	...	...	...	...	...	...	...	...	...
	Washable outer garments	...	...	...	...	...	...	...	...	...	...	...	...
	General cleanliness	...	...	...	...	...	...	...	...	...	...	...	...
Total score		...	...	...	...	...	...	...	...	...	...	...	...
Employees	Male, number	...	...	...	...	...	...	...	...	...	...	...	...
	Female, number	...	...	...	...	...	...	...	...	...	...	...	...
Inspector's initials		...	...	...	...	...	...	...	...	...	...	...	...

* To maintain temperature of water at minimum of 170° F. Score based on rating of 4 points per item.

the basis for the report. These came from every state in the Union and from many different types of institutions. As a result he concluded that the major avenue of infection was through interchange of contaminated eating utensils. He found that the pneumonia mortality rate was higher in institutions than in the army or civil life, due perhaps to larger messing groups and lack of sanitary dish washing.

Cumming and Yongue⁷ stated that there were sound reasons for believing the sanitation of eating and drinking utensils is an important factor in disease control. They found that only 60 per cent of the contamination was removed by the washing process, but when the

hand or machine method was consistently carried out, there was 99 per cent reduction in bacteria.

In 1924 the city of Dayton, Ohio, began a study⁸ designed "to give greater protection to the eating out public." The investigators through a program of inspection, instruction, and laboratory examination have worked out a system of ratings which are published monthly in the bulletin of the Health Department.

That this method has been effective is shown by the fact that in 1925 only 28 per cent of the restaurants received the Class A or excellent rating, whereas 92.5 per cent received the Class A rating in 1933.

Laboratory studies (Tables I, II, and III) have shown that a high percentage of drinking glasses used in places dispensing food and drinks in Hartford were contaminated with bacteria from the upper respiratory and gastrointestinal tracts. The same condition was undoubtedly true of other eating utensils. A study made after the installation of disinfecting apparatus (Table IV) demonstrated a marked improvement in the bacteriological findings. The percentage of glasses adequately disinfected increased from 33.4 per cent and 45.9 per cent in the first two studies to 85 per cent in the last survey. This was too great a difference to be due to chance, and it seems fair to conclude that it was due to the program which included new legislation, the installation of disinfecting equipment, and mass education.

The Board of Health program to improve the sanitary condition of places dispensing food and drinks in Hartford has been received with enthusiasm by the public. The proprietors and employees of establishments have been coöperative. The policy has been one of education rather than police force. Food handlers are being instructed in the correct principles of personal hygiene and the best methods of preparation, storing, and dispensing of foods. The public is being taught to demand modern and approved methods of food sanitation. This is being accomplished through the press, radio, lectures, literature, demonstrations, and personal contact by trained personnel. The problem is a difficult one, and only a beginning has been made. Years of conscientious effort will be required to accomplish the maximum results.

CONCLUSIONS

1. Laboratory examinations have shown that a large percentage of drinking glasses used at places dispensing food and drinks in Hartford were not adequately disinfected. They were frequently found to be contaminated with bacteria from the human upper respiratory and gastrointestinal tracts.
2. Only a small percentage of places dispensing food and drinks in the city had equipment and plumbing capable of disinfecting eating utensils as required by the new Board of Health regulations.
3. Laboratory examination of glasses following the installation of apparatus capable of disinfecting eating utensils showed a marked improvement in dish washing sanitation.
4. The Inspection and Score Card adopted by the Board of Health has proved to be a valuable administrative aid as well as a stimulus to the proprietors of eating establishments to raise the standard of their service.
5. Legislation, and disinfection of equipment are of little value unless followed by an educational program for the instruction of both food handlers and the public in the correct principles of food handling.

REFERENCES

1. Botsford, C. P., M.D., Health Officer Emeritus, Hartford, Conn. Unpublished Data, 1934-1935.
2. The Public Health Committee of the Cup and Container Institute, 30 Rockefeller Plaza, New York, N. Y. *Techniques for the Bacteriological Examination of Glasses*.
3. Walker and Randolph, *Recording of Local Health Work*, pp. 216, Figure 64.
4. Lynch, Charles, M.D., and Cumming, James G., M.D., Dr.P.H., The Distribution of Influenza by Indirect Contact—Hands and Eating Utensils. *A.J.P.H.*, 9, 1:25-38, 1919.
5. Cumming, James G., M.D., Dr.P.H., and Yongue, N. E. Eating Utensil Sanitation. *A.J.P.H.*, 26, 3:237-244 (Mar.), 1936.
6. Cumming, James G., M.D., Dr.P.H. Influenza-Pneumonia as Influenced by Dish Washing in Three Hundred and Seventy Institutions. *A.J.P.H.*, 9, 11:849 (Nov.), 1919; 10, 7:556 (July), 1920.
7. Cumming, James G., M.D., Dr.P.H., and Yongue, N. E. A Standard Technique for the Bacteriological Examination of Eating Utensils. *Mil. Surgeon*, 80, 6:411-417 (June), 1937.
8. Our Method of Protecting Health Through Cleanliness Rating of Eating and Drinking Utensils. *Bull. Div. of Health, Dayton, Ohio*, Mar. 1, 1936.
9. *Memorandum on the Cleansing and Bactericidal Treatment of Glasses, Dishes, etc.*, U. S. Public Health Service—Office of Milk Investigations.