Current Status of Food Poisoning Control

LEON BUCHBINDER, Ph.D.

CONTROL of food poisoning disease, which is primarily of bacterial origin, is not an outstanding achievement of public health in this country. The Deputy Surgeon General of the Public Health Service noted in 1959 that "progress in foodborne disease control is probably not keeping pace with progress in other fields of public health" (*1*).

Although reporting of outbreaks to the Public Health Service by the States is admittedly incomplete, 236 outbreaks, affecting 9,925 persons, which were caused by foods other than milk and milk products were reported in 1958, according to Dauer and Davids (*2*). Compared with the number of outbreaks shown previously in similar reports, the number in 1958 indicated no downward trend. Dauer and Davids noted that there is no convincing evidence that staphylococcal food poisoning and foodborne *Salmonella* infections are becoming less frequent.

Actually, the real extent of preventable foodborne illness is unknown because of inadequate reporting (*3*), but students of the problem indicate that the annual incidence is high. One investigator estimates the occurrence of 60,000 to 90,000 cases of foodborne illness per year (*4*), while another believes there may be several hundred thousand (*5*). The California State Department of Public Health in 1957 indicated that for that State alone there may be about 100,000 cases annually (*6*). Therefore, an assumption that there may be from one-half to 1 million cases in the Nation per year does not seem unreasonable. It is indeed fortunate that the occurrence of a case of bacterial food poisoning requires, in addition to a susceptible person, the conjunction of three separate but interdependent factors: a micro-organism capable of causing food poisoning, a food capable of supporting its growth, and a combination of temperature and time permitting its growth.

This report presents some reasons for the unsatisfactory status of the control of food poisoning in comparison with sanitary control programs for fluid milk and potable water. These have been regarded as among our most successful public health endeavors.

Sanitary Control

The most significant factors in the control of water, milk, and foodborne diseases relate in some way to the matter and manner of sanitary control. These include, among others, the character and unity or diversity of products controlled, and the nature and extent of processing operations and their amenability to physical check by health agencies.

Because milk and water are liquids, disease-producing bacteria in them can be effectively eliminated by sanitary processing. Water, which is subjected to a number of successive procedures which tend to free it of any existing pathogens and prevent the ingress of additional ones, is finally chlorinated for further assurance. Likewise milk, although it is treated from barn to bottle in a manner designed to prevent the entrance and growth of micro-organisms, is subjected finally to pasteurization, which destroys most pathogens. Virtually closed processing systems can be and are used for both water and milk to avoid contamination from any source, particularly from the processor himself. On the other hand, the processing of those foods which may cause food poisoning

Dr. Buchbinder is assistant director, bureau of laboratories, New York City Department of Health.

is quite different. There is usually no terminal sterilization. Although many foods receive germicidal heat treatment, incidental to the cooking process, the effect is frequently vitiated because of the manner in which food is handled during or after processing. Furthermore, since most foods which are likely to cause poisoning are in a solid state, unlike milk and water, it is technically very difficult to prepare them in closed systems.

Food sanitation is also greatly complicated by the multiplicity of food products and preparative processes used. This complexity is still further compounded by the fact that foods, unlike milk and water, are prepared in a multitude of establishments. Food in each such place is exposed to contact with one, several, or many food handlers. Finally, many food handlers are unskilled and from the lower economic and social strata. They are thus unaware of and indifferent to sanitary techniques.

The great number of persons and places concerned makes it physically difficult and sometimes impossible for a health agency to exercise satisfactory control. The magnitude of this numbers problem can be illustrated by comparing statistics on the extent of food-processing operations with those for milk- and water-processing operations in New York City, which has a population of about 8 million persons. There is practically only one water system, which is municipally operated, and some 30-odd milk pasteurization plants. The effectiveness of control of these centralized operations is attested to by the fact that for almost 30 years, no recognizable milkborne or waterborne illness has occurred, with the exception of one small localized outbreak of shigellosis in 1959 which, presumptively, was believed to be waterborne.

On the other hand, New York City has about 22,500 restaurants, 400 retail and wholesale bakeries making custard products, 5,000 establishments licensed for retail food processing, some of which are stores selling appetizers, delicatessens, catering establishments, fish processors, and pork sausage manufacturers, and 100 wholesale food-processing establishments which prepare ready-to-eat, take-home foods. There are also about 1½ to 2 million dwelling units in which food is prepared for consumption. The magnitude of this potential control task is almost of Herculean proportion. This is one possible explanation for lack of evidence of a decline in food poisoning in this city.

Decline of Certain Pathogens

Milk and water control have been aided, to a degree which cannot be exactly determined, by a gradually decreasing prevalence of some important diseases, such as typhoid and paratyphoid fever, bacillary dysentery, diphtheria, and streptococcal infections. This decline, which has resulted in less grist for the sanitary control mill, came about not only because of attrition produced by sanitary control measures themselves but also because of evolutionary processes which reduced the virulence of some of the pertinent micro-organisms, as well as other control procedures such as immunization, chemotherapy, and antibiotic therapy. Food control has been similarly affected but to a lesser degree. Thus the diseases with the highest fatalities, such as typhoid fever, botulism, and streptococcal infections, have declined to a low level. Most likely, however, these diseases have never been the major agents of foodborne disease. There is no evidence, on the other hand, that the bacteria mainly responsible for food poisoning are less prevalent or less virulent today than they were in the recent past. These include the staphylococci, enterococci, *Salmonella* species, and *Clostridium welchii.*

Public and Professional Apathy

Another very important factor in the early and continuing success of milk and water programs was good citizen support, as well as support of the press and medical circles. Originally, this support stemmed mainly from the nature of the diseases for which milk and water served as vehicles. Illness frequently was accompanied by high mortality and was well publicized. When mortality was not significant, illness often was severe enough and of sufficient duration to require medical attention. Another not unimportant factor was that infants and young children were affected by milkborne disease. Because of the public's awareness of the health hazards associated with the consumption of milk and water, it was not too difficult to get support for control measures.

The food control story is quite different. Most food poisoning today is usually relatively mild, and most often, the affected person is not seen by a physician. Deaths are very rare. Even extensive outbreaks, which are much less frequent than single cases or small outbreaks of food poisoning, arouse little furor when publicized. Usually adults are affected, and no scare headlines "about the danger to our children" are seen.

The public has been long accustomed to occasional mild and even more severe gastrointestinal symptoms. The expression "It was probably due to something I ate" is frequently uttered as an incident-closing, fatalistic remark on a par with the statement that a treated cold ends in a fortnight whereas an untreated one lasts 2 weeks. People, as a whole, do not seem to know that food poisoning is a preventable disease as well as one with a sizable annual incidence. This unawareness and apathy neither stimulate appraisal of existing control programs nor encourage formulation of new ones.

The lack of concern when an outbreak occurs is also shared by physicians, notably those associated with large feeding operations. For example, very recently in New York City, where food poisoning is a reportable disease, there were two instances of unreported outbreaks, one in a very large industrial feeding operation, the other in a large institution. Only after second outbreaks had occurred shortly after the first ones did apprehension lead to a report. The second outbreaks would probably not have taken place if the first occurrence had been revealed. This failure to report, whether due to a desire to avoid publicity, suits for personal injury, or impairment of personnel relations, or due to unenlightenment or simple neglect, is another instance of the necessity for an effective educational program.

Technology and Laboratory Standards

Public interest in milk and water control encouraged continued research and the development of improved engineering procedures and technical advances by industry. Very importantly, it also led to the development of standard methods for testing these substances in the laboratory and, finally, to absolute laboratory standards, particularly bacteriological, by which nationwide uniformity was attained. The efforts of the American Public Health Association in sponsoring standard methods for milk and water analysis and of the Federal Government in establishing standards, both qualitative and quantitative, for use in interstate commerce, were great stimulants in these endeavors.

Despite the absence of local consumer interest in the food problem, there has fortunately been a carryover of technical knowledge from milk control into this area. Equipment of proper sanitary design is available and in fairly widespread use. The Public Health Service ordinance for restaurant food service and the efforts of the National Sanitation Foundation have been helpful.

Laboratory control of food preparation and processing, however, is still in a relatively elementary stage of development. The American Public Health Association issued its first volume on bacteriological testing of foods as late as 1958. This, however, is not a standard methods volume. There are no standard methods and consequently no universally accepted absolute standards of bacterial quality. Each laboratory decides which tests it will perform and how they will be carried out. Confusion reigns. In any event, although standards of bacterial quality are a useful adjunct to food protection, the main factor continues to be sanitary practice.

Health Agency Attitude

Present morbidity statistics, inadequate as they may be, indicate that a measure of control of foodborne illness has been attained. While statistics of reporting States and cities reveal no great decrease in morbidity, they may also be interpreted as indicating no increase. This plateau, which may be regarded as being too high, reflects the fact that a great deal of money and effort is spent on food control activities. Why then is not the achievement greater? Apart from intrinsic difficulties already noted, one obstacle is the attitude of some public health administrators. There is a common notion, fostered by the success of milk and water control programs, that all major bacterio-

logical problems relating to ingested substances have been solved. The main task is assumed completed, with only a holding operation or at most some mopping up remaining. This may or may not be true for milk and water control, but it is certainly not so for food control. Such a negative attitude, which is also fostered by competition from many new projects demanding the administrator's attention, neither leads to the best use of the food control dollar nor improves the morale of food control personnel.

It should be noted, however, that some administrators who believe that the food control budget is in balance with the total budget still recognize the need for more effective control. There is no convincing evidence that the problem is fundamentally financial, certainly not for well-established local units whose administrators presumably would be genuinely interested in the development of more effective techniques as well as increased support by both the food industry and the public. A new look at the problem by health agencies is overdue.

Recommendations

If the premise is accepted that achievement in food control leaves much to be desired, what can be done to improve the situation? There are few if any pat solutions. The most obvious approach is that of individual and joint reappraisal. Proper questions must be asked. Appropriate answers will be reached after study and discussion.

Some questions indicated by this review may now be asked, and in some cases possible answers suggested. Obviously, health agencies must be concerned with fuller detection and better reporting of cases and outbreaks. This depends to a great extent on public cooperation which in turn depends on public education. It is startling to realize that secondary school education on food control in the home is practically nonexistent. The preparation and institution of such a program could be a great challenge to the joint efforts not only of the food sanitarian and health educator but also to the school educator.

Education of the food handler and the supervisor of food handling and, perhaps more importantly, the administrator and physician associated with food service must be restudied in connection with self-inspection activities, and paramountly, active supervision by the health agency.

The largest expenditure in food control is for the service of the food sanitarian. Is he so oriented in his work as to be most effective? Is he too concerned with the minutiae of operations and the sanitation of the physical plant and not enough with the end product, the food offered for sale? Should there be more objective appraisal of operations, including, perhaps, laboratory tests of the condition of equipment and food rather than concentration on the almost infinite number of impedimenta of restaurants? Should the sanitarian be concerned with all foods or only those that can produce food poisoning? Should a moratorium be placed on esthetics of food handling until some inroads are made on the important problem of food poisoning control? If the answer to some of these questions is yes, retraining of the sanitarian is indicated.

How much effort should be devoted to improving processing equipment? For example, should the design of closed-system equipment be encouraged or promoted? This is equipment, modeled after that used in milk pasteurization, with built-in facilities for refrigeration and terminal sterilization. It could be used for certain food products in sizable processing or feeding operations. The ever-expanding use of ready-to-eat foods, which tends to increase the centralization of processing facilities, offers this new opportunity for as well as new challenge to control.

A major advancement toward proper sanitary design of restaurants was achieved in New York City recently by the promulgation of a new health code requiring prior approval of plans for the physical plant of new restaurants. Such a procedure might also be considered for new food-processing plants.

The unorganized state of laboratory control demands the joint efforts of authorities in this field to standardize procedures. It is likely that the greatest value of the laboratory lies not in the investigation of outbreaks that have occurred, but in controlling critical foods on a routine preventive basis.

It is to be hoped that, eventually, standard procedures as well as standards of bacterial quality of food will be developed similar to those effected many years ago in other fields of environmental control. Isolated attempts to establish bacterial standards for certain foods indicate that a more widespread application of such a procedure could be successful. For example, standards for bivalve molluscs have served as guides to quality; standards for frozen precooked dinners, promulgated by the armed services, have been effective; and standards for fresh crabmeat, promulgated by New York City, created a small sanitary revolution in the crabmeat industry.

There have been few if any efforts to promote public health research in food control on a continuous and coordinated basis. On the whole, the limited progress has resulted from individual research carried out in government agencies at all levels, in universities, and in industry. If there is to be a new era in food control, it presumably will be stimulated by a concerted, nationwide research effort. As part of such a program, among the first steps might be the formation of a national study committee. The committee might be charged first with determining the status of food control, then with establishing broad national goals for research and development, and finally with suggesting means for implementing these goals.

Summary

The apparent lack of progress of food poisoning control programs in the United States is indicated by a fairly constant number of outbreaks and cases reported annually. In comparison, milk and water control programs have been successful. Most likely the magnitude of the problem is not realized, and many more cases of foodborne disease occur than are reported.

Probably the most important difficulty in sanitary control relates to the nature of food-processing and food-serving operations. As a rule, terminal sterilization of foods cannot be or is not performed. Likewise, closed-processing systems have not or cannot be used. As a result, food which is frequently not entirely freed of contamination is also subjected to recontamination. Also, food-preparation operations include numerous food products and processes and many locations with thousands of employees, a great number of whom are potential sources of food infection. The application of close physical control of food preparation, so successfully applied in the sanitation of milk and water supplies, demands greater manpower resources than are available.

Unlike the decline in prevalence of some of the bacteria responsible for milk and water illnesses, there is no such evidence for the causative organisms of food poisoning.

Although the sanitary design of equipment for milk and water control has greatly benefited technological development in food control, important fundamental problems remain unsolved. The use of bacteriological testing of foods is not yet universally supported by the food industry and the public. There is no consensus as to the value of or necessity for bacteriological tests, which tests should be used, or which, if any, quantitative standards should be applied.

The stimulus of public demand for more adequate food-protection services is largely lacking. This reflects a negative public attitude caused by the fact that food poisoning is usually relatively mild or, if severe, frequently of short duration; a fatalistic attitude induced by unawareness of its preventable nature; and unenlightenment as to the extent of its occurrence.

A significant intangible obstacle to improving the status of foodborne disease is the complacency of some administrators because they know a control program exists and they believe that the problem of control of ingested substances of all kinds has practically been solved. They feel no urgency to reevaluate their agencies' food control programs in the light of available knowledge. Fortunately, this is not a universal administrative attitude since some administrators recognize the need for greater achievement and would welcome the development of more effective procedures as well as better support by the public and the food industry.

Research in food control has been fragmentary. Hope for real progress lies in the development of a national program relying heavily on the fruits of coordinated research. The for-

mation of a national study committee is suggested.

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