

Original**Food Poisoning Incidents in Workplaces in Japan from 2004 to 2015**Ryoichi Inaba¹⁾ and Atsushi Hioki¹⁾²⁾¹⁾Department of Occupational Health, Gifu University Graduate School of Medicine²⁾Clinical Division, Matsunami General Hospital

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Abstract

The objective of this study was to examine food poisoning incidents at workplaces in Japan between 2004 and 2015. Information on food poisoning incidents was collected mainly from the national food poisoning statistics along with other sources.

The numbers of food poisoning incidents during the 12-year period were confirmed as follows: 246 occurred in workplace cafeterias, 37 in workplace dormitories, and 88 from delivered lunches. Some workers were also included in the incidents involving hospital meals, school lunches, school events, and welfare facility meals. Norovirus was the most frequent causative agent for food poisoning among all food service facilities. The proportion of norovirus increased in 2010–2015 as compared with that in 2004–2009. These results suggest that it is necessary for workplaces to select a meal provider that performs thorough hygienic control, and to prepare for outbreaks of food poisoning and infectious diseases. The crude incidences of food poisoning were higher in workplace cafeterias and dormitories, and the proportion of incidents caused by *Clostridium perfringens* was relatively high in workplace dormitories, for hospital meals, and in workplace cafeterias. Thus, we concluded that in order to prevent food poisoning, it is useful to share information about incidents in facilities with similar environments.

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—Key words—

workplace, food service facility, food poisoning

Introduction

The annual number of food poisoning incidents during the last 20 years in Japan decreased from a peak of 3,010 in 1998 to 931, 976, and 1,202 in 2013, 2014 and 2015, respectively. Nevertheless, approximately 20,000 people were still affected annually by food poisoning in these three years¹⁾. Outbreaks of food poisoning in workplaces can have detrimental effects on the continuation of business activities^{2,3)}. Preventive measures against secondary infections are needed when the causative agent of the food poisoning is contagious^{4–6)}. Outbreaks of food poisoning in workplaces are caused mainly by the food supply facility or the lunch supplier, with the former including schools and hospitals.

The national food poisoning statistics¹⁾ provide insufficient information regarding facilities responsible for food poisoning in workplaces because not all food supply facilities in workplaces were set up by that company. In other words, facilities that are set up by another provider are categorized as “restaurants”, similar to general restaurants located in public. The responsible facilities in cases of delivered lunches are categorized as “caterers” without discrimination of the delivery destination, but these lunches are often delivered from restaurants. Moreover, categories such as “schools,” “hospitals” and “welfare facilities” represent the number of poisoned cases occurring chiefly among customers, not among workers.

In this study, we collected information on food poisoning cases in workplaces primarily based on the above-mentioned national statistics¹⁾ and by adding data from other sources such as published articles, case re-

Table 1 Numerical information relating to food poisoning in workplaces according to the national statistics

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Number of food service facilities*													
Workplace	11,812	11,263	10,967	10,799	10,629	10,565	10,291	9,973	9,995	9,854	9,578	9,328	125,054
Hospital	9,764	9,507	9,519	9,561	9,456	9,230	9,024	8,830	8,792	8,818	8,692	8,595	109,788
School	19,127	18,851	18,867	19,077	18,830	18,507	18,617	18,004	18,174	18,044	17,977	17,828	221,903
Dormitory	2,857	2,726	2,630	2,605	2,567	2,454	2,358	2,337	2,259	2,156	2,085	2,047	29,081
Welfare facility	36,757	37,604	38,773	39,532	40,385	40,637	41,089	40,861	42,394	43,317	43,673	44,348	489,370
Feeding center for general consumers	532	523	494	511	494	492	451	468	475	480	468	444	5,832
Number of approved facilities for restaurant businesses*													
Restaurant	819,022	806,767	807,786	806,990	793,261	782,120	775,377	760,560	763,157	760,863	760,649	753,853	9,390,405
Caterer and lunch box store	83,842	82,819	83,023	83,193	82,368	82,294	82,113	80,507	82,038	82,462	82,903	82,473	990,035
Hotel and Japanese inn	65,926	63,680	62,256	60,821	59,009	57,275	55,580	52,821	52,157	50,724	49,110	47,753	677,112
Number of food poisoning incidents by responsible facilities identified**													
Total incidents	1,666	1,545	1,491	1,289	1,369	1,048	1,254	1,062	1,100	931	976	1,202	14,933
Food service facility in workplace	19	18	19	12	10	23	12	12	13	14	8	11	171
Dormitory in workplace	6	1	3	3	9	3	5	1	1	1	0	0	33
Food service facility in welfare facility	31	17	19	12	24	13	17	18	15	25	24	27	242
School food service facility	5	6	7	6	7	3	0	3	2	6	1	1	47
School dormitory	5	7	9	2	3	3	4	5	6	1	3	3	51
Hospital food service facility	11	8	15	8	2	6	6	2	3	5	5	7	78
Caterer	48	56	79	69	62	25	54	45	45	37	35	53	608
Restaurant	462	534	612	582	634	562	662	640	614	549	590	742	7,183

*Report on public health administration and services by Ministry of Health, Labour and Welfare

**Statistics of food poisoning by Ministry of Health, Labour and Welfare

ports and websites.

Methods

First, we listed all recorded food poisoning cases between 2004 and 2015 from the food poisoning statistics¹⁾. In these statistics, the responsible facilities for food poisoning are roughly categorized into home, workplace, school, hospital, hotel, restaurant, food-store, food-manufacturer, caterer, natural environment, and others. Food supply facilities in the workplace, or workplace cafeterias, are included in the subcategory of “food service facilities in the workplace” under the category of “workplace.”

Additional information regarding food poisoning was surveyed from PubMed, Ichushi-Web⁷⁾, the Infectious Agents Surveillance Report⁸⁾, the Database of Health Crisis Management⁹⁾, prefectural government websites¹⁰⁻¹²⁾ and other websites, using the terms “food poisoning” and “workplace cafeteria,” “worker,” “employee,” “workplace” or “company” in English and Japanese. Incidents in schools were also available from the Japan Sport Council’s website¹³⁾. Patients poisoned at a banquet or while eating with friends or co-workers were not included in this study.

Work-related food poisoning can be approved as an occupational accident under some circumstances. Thus, we surveyed the statistics on occupational accidents by food poisoning recorded in national public offices¹⁴⁾, local public offices¹⁵⁾ and other sources¹⁶⁾.

The number of food service facilities attached to a workplace, hospital, school, or welfare facility, and the number of approved restaurant business facilities were obtained from the Report on Public Health Administration and Services¹⁷⁾.

The statistical significance of differences in the proportions of the investigated variables was assessed by the Pearson’s chi-squared test using Microsoft Office Excel 2007 SP3 (Microsoft, Seattle, WA, USA).

Results

According to the food poisoning statistics, the numbers of food poisoning incidents in workplace cafeterias and dormitories during the 12 years between 2004 and 2015 were 171 and 33, respectively (Table 1). The number of incidents at school dormitories in this period was 51. The rough estimates of the incidence of food poi-

Table 2 Accumulated numbers of food poisoning incidents and patients in workplaces according to the responsible facilities

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Number of food poisoning incidents by responsible facilities identified													
Workplace cafeterias	25	29	27	21	12	27	15	28	17	15	16	14	246
Workplace dormitories	6	2	3	3	10	3	6	1	2	1	0	0	37
Lunch boxes delivered to workplaces	6	11	19	6	4	5	11	5	7	7	2	5	88
Lunch boxes of unknown delivery destination	72	83	116	111	103	61	93	64	78	78	65	81	1,005
Hospital meals	11	10	15	9	3	6	6	2	4	6	4	7	83
School meals	7	5	6	6	4	4	1	5	6	4	3	3	54
School events	18	30	29	18	23	13	22	14	18	13	10	12	220
Welfare facilities	33	20	19	16	25	17	19	18	22	25	24	28	266
Number of food poisoned patients by responsible facilities identified													
Workplace cafeterias	1,504	1,783	1,233	502	562	1,285	841	1,185	493	825	625	536	11,374
Workplace dormitories	63	25	53	33	373	22	90	13	19	12	0	0	703
Lunch boxes delivered to workplaces	707	2,477	3,406	595	122	95	1,746	1,126	3,872	258	88	1,489	15,981
Lunch boxes of unknown delivery destination	3,194	5,139	8,765	8,203	5,454	3,176	7,031	2,610	4,189	4,987	3,326	3,736	59,810
Hospital meals	660	362	598	365	84	211	137	74	107	306	149	253	3,306
School meals	776	588	1,607	1,565	926	620	138	2,080	960	372	1,591	445	11,668
School events	898	1,253	890	971	1,200	519	741	335	812	379	379	419	8,796
Welfare facilities	1,438	727	732	955	717	368	575	554	789	801	649	716	9,021

soning calculated from the number of facilities and food poisoning incidents was 1.37 per 1,000 facilities ($p < 0.001$ vs. others) in workplace cafeterias, 2.89 ($p < 0.001$) in dormitories (including both workplace and school dormitories), 0.71 ($p > 0.05$) in hospital food service facilities, 0.21 ($p < 0.001$) in school food service facilities, 0.61 ($p < 0.001$) for meals from caterers, and 0.76 ($p < 0.001$) in restaurants, compared to 0.74 in total.

By adding the acquired information in this study, the total number of food poisoning incidents occurring in workplace cafeterias and dormitories during the 12 years reached 246 and 37, respectively (Table 2), including 81 and 4 cases, respectively, occurring in facilities that were operated by restaurant business providers. Twelve incidents that occurred at cafeterias for hospital staffs were also included. The mean number and percentage of food poisoning cases at workplace cafeterias were 45.6 (standard deviation, 58.5; 95% confidence interval, 38.1 to 53.2) and 42.2%, respectively. In one case where a food service provider had undertaken 13 workplace cafeterias, the number of food poisoning patients amounted to 580.

The number of food poisoning incidents in workplaces caused by delivered lunches during the 12 years was 88, including 20 incidents occurring when the lunches were provided for a meeting. The destination was unknown in another 1,005 cases of delivered lunch-related food poisonings. Lunch boxes are often delivered from one provider to many workplaces; for example, in one major incident, 2,035 workers in 551 workplaces developed food poisoning¹⁸.

In the incidents occurring from school lunches, other school events (including school dormitories), hospital meals, and welfare facility meals, the poisoned people were not workers, but rather students, patients, and users. However, in some hospitals and welfare facilities, prepared foods for patients and users were also served to the staff members.

In terms of the food poisoning causative agents, the proportion of norovirus as the causative agent was the highest, at 50.3%, followed by 10.5% for *Salmonella* species, 8.1% for *Staphylococcus aureus*, and 7.2% for *Clostridium perfringens*. The proportion of norovirus increased in 2010–2015 in comparison with that in 2004–2009 ($p < 0.001$) (Fig. 1). The percentage of the food poisoning causative agents being diarrheagenic *Escherichia coli*, *Bacillus cereus*, and *Salmonella* species and *Clostridium perfringens* were relatively high at workplace cafeterias in 2010–2015, at workplace dormitories in 2004–2009, and at hospitals in 2004–2009, respectively, while norovirus and histamine were high at schools; *Campylobacter jejuni*/*C. coli* were high at school events, including school dormitories; and histamine at welfare facilities.

Regarding the month of occurrence, the frequency of food poisoning was higher in January and December and lower in April and May (Fig. 2). The frequency according to the responsible facilities was higher in January for workplace cafeterias, in February for workplace dormitories, in January and December for delivered

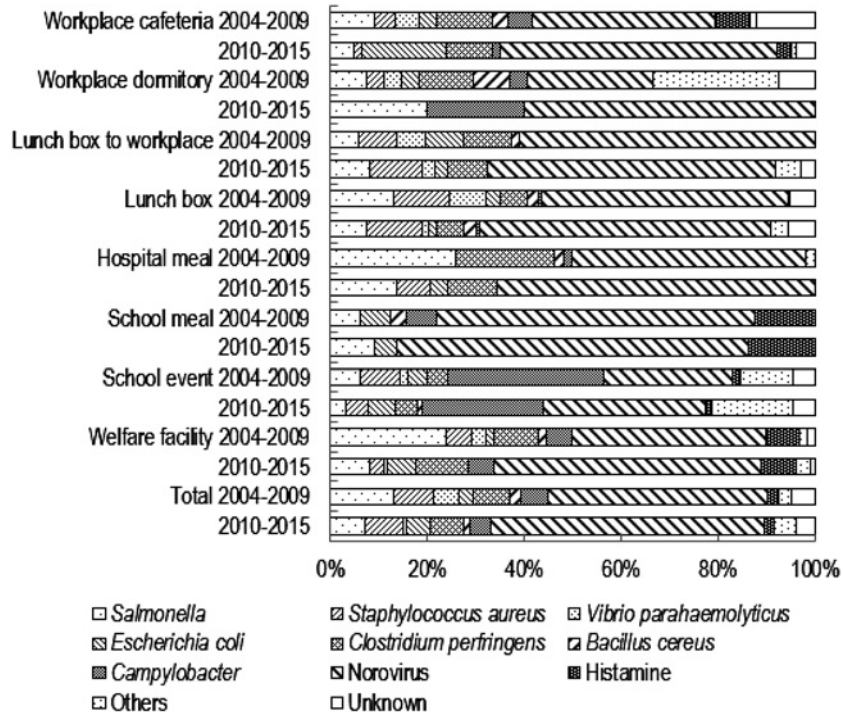


Fig. 1 Number of food poisoning incidents in workplaces according to the causative agents and responsible facilities

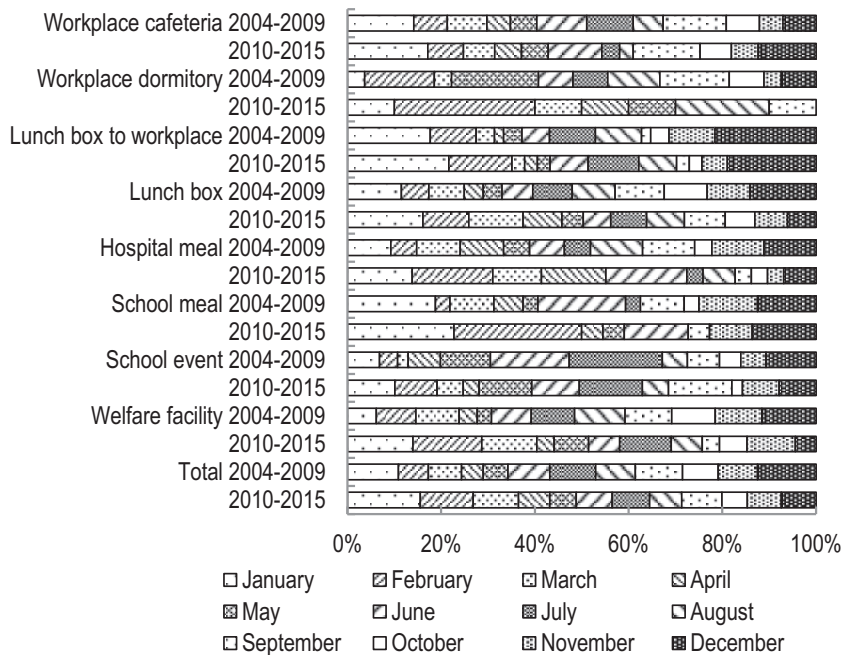


Fig. 2 Number of food poisoning incidents in workplaces according to the month and responsible facilities

lunches to workplaces, in January for school lunches, and in July for school events. In contrast, incidences were lower in July and August for school lunches.

The category “food poisoning” was not included in either the industrial accident statistics or government employees’ accident compensation statistics. The numbers of food poisoning cases approved as an accident in local government workers between the 2008 and 2014 fiscal years were as follows: 36 police officers in fiscal year 2008; one cook in fiscal year 2009; one fire defense personnel and two child welfare officers in fiscal year

2012; one fire defense personnel in fiscal year 2013; and one child welfare officer in fiscal year 2014.

Discussion

There is currently no accurate information on food poisoning cases in workplaces in Japan. Here, we collected data regarding food poisoning cases from existing information. However, the ratios of actual cases according to the different workplaces and sources of food remain unknown. For example, there are likely more cases that occurred in workplaces but were categorized into “restaurants” or “caterers.” In addition, there may be many cases in which it was not possible to determine whether the symptoms were due to food poisoning or infection from infected person, but were nonetheless determined to be caused by infection. Using this limited information, we tried to analyze the trends of food poisoning in the workplace.

Norovirus was found to be the most frequent causative agent of food poisoning. Prevention of norovirus-mediated food poisoning is difficult, because asymptomatic carriers can cause food poisoning¹⁹. Even in terms of the incidents with school lunches, where the incidence of food poisoning was the lowest, the ratio of norovirus was the highest. Thus, we consider it difficult to avoid food poisoning caused by supplied food, such as norovirus-contaminated bread, as well as histamine-generated food, and it is consequently necessary to carefully check the food providers used. Further, preventive measures against secondary infection by all workers are necessary when food poisoning by norovirus or diarrheagenic *E. coli* occurs. The incidents of food poisoning tended to be higher in workplace cafeterias and dormitories. In the workplace dormitories, the frequency of the causative agent being *Bacillus cereus* was relatively high in 2004–2009. Moreover, it should also be noted that special caution must be taken regarding the period of time between cooking and consumption and the preservation methods of food. This is especially true for hospital meals, workplace dormitories, and welfare facilities, in which the incident ratio of *Clostridium perfringens* tended to be high. In addition, the ratio of diarrheagenic *E. coli* tended to be higher in workplace meals. This finding was largely due to one outbreak in 13 workplace cafeterias operated by the same company²⁰. Based on these findings, for the prevention of food poisoning, we consider it useful to share information about incidents among the same functional facilities such as workplace cafeterias, hospital food services, and dormitories.

The number of workers who had received accident compensation was low during the study period. It is not known whether this is due to the number of applications or the rate of approval being low, and we speculate that one potential reason may be that food providers and food-related businesses use food poisoning insurance against poisoned patients.

In Japan, the Ministry of Labour announced their recommendation on the prevention of infection to workplaces with food supply facilities when facing a nationwide outbreak of enterohemorrhagic *E. coli* (O157) infection in 1996^{21,22}. The hygienic control manual for large-scale cooking facilities²² was later revised following an outbreak of norovirus infection and food poisoning. In some cases, the municipal government informs workers regarding food poisoning²³. However, food providers, other than those of school lunches and public services, have to pursue profits. Accordingly, almost no disruption to business operations caused by food poisoning were identified in the present investigation², and, in response to outbreaks of food poisoning, a corporation²⁴ and hospitals^{4,25} reported having taken risk management measures.

In conclusion, it is important to select a food provider that promotes food sanitation management as well as to develop a business continuity plan³ in case of food poisoning and infectious diseases occur in the workplace.

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全国の事業場における 2004～2015 年の食中毒事件発生状況

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—キーワード—

事業場, 給食施設, 食中毒

事業場での食中毒の集団発生は, 施設内(寮を含む)の給食施設や仕出し・給食弁当が原因で起こりうる。国の食中毒統計では, 施設内にある給食施設の一部が一般の飲食店としてカウントされているなど, 事業場における食中毒事件の発生状況が十分に把握できない。今回, 国内の事業場における 2004 年から 2015 年の 12 年間の食中毒発生状況について, 国の食中毒統計をもとに, 文献や行政およびマスメディアの公表資料から情報を追加し, 職場での食中毒発生状況について分析を行った。

収集できた 12 年間の食中毒事件数は, 従業員食堂での発生 246 件, 従業員寮 37 件, 事業場への仕出し・給食弁当によるもの 88 件であった。このほかの仕出し弁当による 1,005 件では, 配達先に事業場が含まれているか特定できなかった。病院給食, 学校給食, 学校行事(寄宿舍・寮を含む)および福祉施設給食での食中毒では, 利用者が主体であったが, 一部, 職員が含まれていた。

食中毒の原因物質としては, すべての種類の給食施設においてノロウイルスの占める割合が最も高かった。ノロウイルスの割合は 2004～2009 年より 2010～2015 年の方が高かった。ノロウイルスによる食中毒は予防が困難であり, 二次感染も起こりうることから, 委託等に際しては食品衛生管理が徹底された給食業者を選択すること, および食中毒や感染症の集団発生に備えることが必要であると考えた。食中毒発生率の概数は従業員食堂および寮で高かった。従業員寮, 病院給食, 従業員食堂ではウェルシュ菌の割合が高い傾向がみられた。食中毒発生率の低い学校給食においては, 納入された食材に起因するノロウイルス食中毒やヒスタミン食中毒の割合が高かった。事業場内での食中毒予防に資するため, 環境の類似した施設間で発生状況について共有することが有用であると考えた。

利益相反: 利益相反基準に該当無し

(日職災医誌, 66: 75—81, 2018)