

Short Communication**FDA Food Code recommendations: how do popular US baking shows measure up?**Valerie Cadoret¹, Sarah A. MacLean², Corey H. Basch¹, and Stefanie D. Grimando¹¹ Department of Public Health, William Paterson University, Wayne, NJ 07470, USA² Department of Epidemiology, at Mailman School of Public Health, at Columbia University, New York, NY 10032, USA**Abstract**

The purpose of this study was to determine if popular US baking shows follow the FDA Food Code recommendations and critical food safety principles. This cross-sectional study examined a convenience sample of 75 episodes from three popular baking shows. The three shows were about competitively baking cupcakes, competitively baking cakes, and baking in a popular local bakery. Twenty-five episodes from each show were viewed. Coding involved tallying how many times 17 FDA Food Code recommendations were or were not followed. On each show, bare hands frequently came in contact with ready-to-eat food. On a per-hour basis, this occurred 80, 155, and 176 times on shows 1-3, respectively. Hands were washed before cooking three times on the three shows and never for the recommended 20 seconds. On each show, many people touched food while wearing jewelry other than a plain wedding band, for an average of at least 7 people per hour on each show. Shows 1-3 had high rates of long-haired bakers not wearing hair restraints (11.14, 6.57, and 14.06 per hour, respectively). Shows 1 and 2 had high rates of running among the bakers (22.29 and 10.57 instances per hour, respectively). These popular baking shows do not demonstrate proper food safety techniques put forth by the FDA and do not contribute the reduction of foodborne illnesses through proper food handling.

History

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television***Correspondence**cadoretv@gmail.com

+1-973-720-2603

1. Introduction

The Centers for Disease Control and Prevention (CDC) estimates that there are 9.4 million illnesses, 55,961 hospitalizations, and 1,351 deaths annually due to 31 foodborne agents (CDC, 2016). While everyone is at risk for foodborne illnesses, young children, the elderly, those with weakened immune systems, and pregnant women are most at risk (Barkley et al., 2016). Many individuals fall ill from the food they prepare at home (Byrd-Bredbenner et al., 2013; Scott, 2003) as they do not have the proper food safety knowledge to protect themselves from foodborne pathogens. Roughly 79% of Americans report washing their hands with soap and water, and 71% regularly wash cutting boards with soap and water or bleach when cooking and consuming foods (IFICF, 2011). Improper cleaning of cutting boards and knives may be linked to 14% of all foodborne illnesses (Kennedy et al., 2005).

The International Food Information Council Foundation reported in 2011 that 22% of Americans retrieved their food safety information from cooking shows or hosts and that 17% of Americans trust the food safety information these shows deliver (IFICF, 2011). In fact, more Americans (55%) trust media sources for food safety information than trust government officials or public agencies (33%) (IFICF, 2011). Given these statistics, cooking shows are an important platform for conveying food safety techniques. The purpose of this study was to determine if popular US baking shows are following the Food and Drug Administration (FDA) Food Code recommendations. The Food Code recommendations aim to avert foodborne illnesses by avoiding the most critical hazards in food safety (USDHHS, 2013). To our knowledge, this is the first study examining demonstrations of critical food safety principles on baking shows.

2. Methods

The study had a cross-sectional design. The coding sheet used in this study was designed based on of the most recent (2013) FDA Food Code (USDHHS, 2013). This study observed 17 FDA Food Code recommendations. Coding involved tallying how many times the FDA Food Code recommendations were or were not followed.

The convenience sample consisted 75 episodes from three popular US baking shows, 25 episodes per show. The three shows were about competitively baking cupcakes (show 1), competitively baking cakes (show 2), and baking in a popular local bakery (show 3). Episodes of show 1 and show 2 were one hour in length and episodes of show 3 were thirty minutes. The shows were viewed on Netflix, Xfinity on Demand, the website of the aforementioned network, and YouTube. Coding of the shows was completed by Valerie Cadorett and Stefanie D. Grimando and took place from September through December 2016. The coming attractions at the beginning of each episode were excluded.

Table 1 lists observations of critical food safety principles and the applicable FDA Food Code recommendation. We used SPSS (version 23) to perform all statistical tests. We compared the three shows using one-way Analysis of Variance (ANOVA) tests. These analyses were based on the mean number of per-hour FDA Food Code observations across the 25 episodes of each of the three shows. This study was considered exempted from review by the Institutional Review Board (IRB) at William Paterson University.

3. Results

The first six shows were viewed together by Valerie Cadorett and Stefanie D. Grimando to establish intra-rater reliability, which demonstrated 93% agreement. The total viewing times for shows 1-3 were 17.5, 17.5, and 8.75 hours, respectively.

Hands were washed before cooking only three times and never for 20 seconds. On each show, bare hands frequently came in contact with ready-to-eat foods and this occurred 80.06, 155.20, and 176.00 times per-hour on shows 1-3, respectively. On each show, someone touched a bare exposed body part and then touched food at least 5 times per hour. On show 2, there was a

significantly greater rate (2.29 per hour) of people wiping their hands on themselves and then not washing their hands ($p=0.002$). On each show, there were many people touching food while wearing jewelry other than a plain wedding band, for an average of at least 7 people per hour on each show. All three shows had a high rate of long-haired bakers not wearing hair restraints, and this occurred 11.14, 6.57, and 14.06 times per hour on shows 1-3, respectively.

Food on display was never protected from contamination, and chemical sanitizer was never seen. On both shows 1 and 2, wiping cloths were frequently used to clean hands and then used to wipe food-contact surfaces (2.57 and 2.97 per hour, respectively). Shows 1 and 2 had high rates of running among the bakers (22.29 and 10.57 instances per hour, respectively). Shelled eggs were used significantly ($p<0.001$) more frequently in show 1 (3.49 per hour) and show 2 (3.77 per hour). Cakes were only observed being served undercooked on show 1 (0.17 per hour) and show 2 (0.34 per hour). Tasting of products was more frequent ($p<0.001$) on show 1 (3.49 per hour) and show 2 (5.66 per hour). The rate of eating over open food was significantly ($p<0.001$) lower on show 3 (1.71 per hour) than on show 1 (7.54 per hour) or show 2 (5.89 per hour).

4. Discussion

Hand washing among food employees is one of the best ways to reduce the chance of contaminating food with pathogens (Ali, Verril, & Zhang, 2014). This study showed that bakers rarely washed their hands before engaging in cooking and often touched ready-to-eat foods with bare hands. To prevent norovirus and other foodborne illness, it is important to wash hands and avoid bare hand contact with ready-to-eat foods (Barkley et al., 2016). The high rate of touching ready-to-eat foods with bare hands can be attributed to adding on decorations, such as fondant, sprinkles, and fine details.

Many bakers wore nail polish, artificial nails, and jewelry on their hands and wrists, but rarely wore gloves while working with food. Nails and chips of polish can fall into food products (Todd et al., 2010). Wearing finger rings increases the number of bacteria on one's hands; even after scrubbing, there are more

Table 1 Frequency of observations related to the FDA Food Code

Food Code	Observations	All	Show 1		Show 2		Show 3		p*
			Competitive	Cupcake Baking	Competitive	Cake Baking	Popular	Local Bakery	
	Number of times...	Total	Total	Per hour	Total	Per hour	Total	Per hour	
2-301.12(A)	...hands washed for 20 seconds	0	0	0.00	0	0.00	0	0.00	1.000
2-301.14	...hands washed before cooking	3	2	0.11	1	0.06	0	0.00	0.363
2-301.14(A)	...fingers licked then hands not washed	13	8	0.46	4	0.23	1	0.11	0.206
	...food touched after touching hair, face, nose, or other exposed body part	269	92	5.26	124	7.09	53	6.06	0.453
2-301.14(I)	...wiped hands on self then did not wash hands	60	14	0.80	40	2.29	6	0.69	0.002
2-302.11(B)	...different people wore fingernail polish without gloves when touching food	167	46	2.63	76	4.34	45	5.14	0.018
	...different people wore artificial fingernails without gloves when touching food	18	3	0.17	14	0.80	1	0.11	0.761
	...people wearing fingernail polish wore gloves when touching food	22	17	0.97	5	0.29	0	0.00	0.002
	...people wearing artificial nails wore gloves when touching food	7	2	0.11	5	0.29	0	0.00	0.365
2-303.11	...different people had jewelry on arms/hands other than plain wedding band when touching food	358	123	7.03	150	8.57	85	9.71	0.134
2-401.11(A)	...there was eating/tasting over open exposed food	250	132	7.54	103	5.89	15	1.71	<0.001
2-402.11(A)	...different long haired bakers did not wear hair restraints	433	195	11.14	115	6.57	123	14.06	<0.001
	...hair goes in or hangs over exposed food	220	44	2.51	101	5.77	75	8.57	0.001
3-301.11(B)	...bare hands contacted exposed ready-to-eat-foods	5657	1401	80.06	2716	155.2	1540	176.0	<0.001
3-304.14(A)(2)	...wiping cloths used to clean hands then used to wipe food-contact surfaces	104	45	2.57	52	2.97	7	0.80	0.004
3-304.14(B)(1)	...there was chemical sanitizer solution in a bucket on tableware	0	0	0.00	0	0.00	0	0.00	1.000
3-306.11	...food on display protected from contamination	0	0	0.00	0	0.00	0	0.00	1.000
3-401.11(A)(2)	...cake served undercooked	9	3	0.17	6	0.34	0	0.00	0.032
	...judges knowingly consumed raw cakes	11	5	0.29	6	0.34	0	0.00	0.036
	...there was eating/tasting of products such as raw batters or icings	161	61	3.49	99	5.66	1	0.11	<0.001
	...shelled eggs used	128	61	3.49	66	3.77	1	0.11	<0.001
4-101.17(B)(1)	...knives stored in wooden block	50	25	1.43	25	1.43	0	0.00	<0.001
	...wooden cutting board used	311	289	16.51	10	0.57	12	1.37	<0.001
	...wooden utensil used	228	143	8.17	48	2.74	37	4.23	<0.001
4-702.11	...food-contact surfaces sanitized before contact with food	1	1	0.06	0	0.00	0	0.00	0.373
4-903.11(A)(2)	...clean utensils not stored handle up in a jar when exposed to contamination	188	99	5.66	87	4.97	2	0.23	<0.001
4-903.11(B)(2)	...there was a person running	575	390	22.29	185	10.57	0	0.00	<0.001

*One-way ANOVA of mean observations per hour

bacteria under the rings than on adjacent skin (Kelsall et al., 2006).

Researchers observed a high presence of wooden cookware. Although the FDA states it is acceptable to use wooden cookware, it recommends using it sparingly as it can become pitted and hard to clean when used to cut moist foods (USDHHS, 2013). In all three shows, the bakers were under significant pressure to perform under strict time constraints. Running among the bakers could be an illustration of rushing, which could contribute to the high prevalence of not following the FDA Food Code recommendations.

The number of FDA Food Code recommendations, which were or were not followed among the three shows could differ due to characteristic differences between the shows. Bakers on show 1 and show 2 were competing for money and the title of being the best cupcake or cake baker. Show 3 was more focused on the story of the lead baker while show 1 and show 2 were

more focused on baking. This could explain why the FDA Food Code was followed less often on shows 1 and 2. Bakers in show 3 were sitting most of the time, while the bakers in shows 1 and 2 were standing most of the time. This could explain why running was higher in shows 1 and 2.

Despite the novel contribution of this paper, there are limitations. This study is cross-sectional by design, and therefore cannot be generalized. The use of a convenience sample is further limiting. Additionally, the FDA Food Code is US-based and this study focused on only three US baking shows. However, these shows are popular, widely viewed, and many episodes were included. These shows are also watched internationally.

5. Conclusion

Many individuals become sick from the food they prepare at home. Cooking shows are an opportunity to educated viewers of essential food safety techniques and have the power to assist in the reduction of

foodborne illness. However, these baking shows are not demonstrating proper food safety techniques put forth by the FDA and are not contributing to the United States© goals of reducing foodborne illnesses through proper food safety handling (USDHHS, 2018). Future research should look at the extent to which viewers are modeling the behaviors of television cooks and if poor food handling practices in baking shows are occurring in different areas of the world.

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