

1 **General Interest Article**

2 **Exploring the Role of Dietitians in the Delivery of Food Safety Information**

3 Victoria J. Gould,^{1*} Ellen W. Evans,² Elizabeth C. Redmond,² Ingela M. Marklinder,³

4 Jennifer J. Quinlan⁴ and Sanja Ilic⁵

5 ^{1*}Dept. of Healthcare and Food, Cardiff School of Sport and Health Science, Cardiff Metropolitan
6 University, Western Avenue, Llandaff, Cardiff, Wales CF5 2YB

7 ²ZERO2FIVE Food Industry Centre, Cardiff Metropolitan University, Western Ave., Llandaff,
8 Cardiff, Wales CF5 2YB

9 ³Dept. of Food Studies, Nutrition and Dietetics, Uppsala University, P.O. 560, SE-752 22, Uppsala,
10 Sweden

11 ⁴Dept. of Nutrition Sciences, Drexel University, 3141 Chestnut St., Philadelphia PA 19104, USA

12 ⁵ Dept. of Food Science and Technology, The Ohio State University, Columbus, Ohio 43210, USA

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14 **SUMMARY**

15 Individuals with compromised-immunity have an increased risk of foodborne disease. There's a
16 need for such individuals to be made aware of risk reducing food safety practices to reduce the
17 potential risk of foodborne disease in this population. Dietitians are regulated by law to assess,
18 diagnose and treat dietary/nutritional problems, working with individuals and indirectly, through
19 training/education of other health professionals. Identification of individuals who are at risk of
20 foodborne illness by dietitians is key to effective provision of any amount of food safety information
21 to vulnerable patients. Food safety advice provided by dietitians for appropriate individuals could
22 form part of their dietetic management, and research has found that the public have named dietitians
23 as health professionals they trust to provide food safety advice. However, gaps in food safety
24 knowledge of registered dietitians are apparent, despite inclusion of food safety training in the
25 undergraduate dietetic curriculum. The aim of this paper is to explore the potential role dietitians play
26 in delivery of food safety information and consider this from an international perspective, as well as
27 determining potential opportunities to enable dietitians to deliver clinically applicable food safety
28 information to consumers in order to help reduce their risk of foodborne disease.

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35 **OVERVIEW**

36 **Importance of domestic food safety for consumers at an increased risk of foodborne disease**

37 Foodborne diseases are a public health concern worldwide. A report by the World Health
38 Organization on the global burden of foodborne disease estimated that foodborne hazards cause 600
39 million cases of foodborne illness and 420,000 deaths globally (48). Consumers that are most ‘at-risk’
40 for foodborne disease and subsequent death are older adults, pregnant women, immune-compromised
41 individuals, and children younger than age five (48). This in part is due to increased susceptibility of
42 infection from a lower number of organisms (30) which could be caused by disease or medications
43 which compromise the immune system (23). Risk of infection from listeriosis especially, is higher in
44 those with comprised immunity (38). Malnutrition, prevalent in many different population groups, has
45 also been shown to be a factor which increases the risk of diarrheal diseases (29). Ensuring the
46 microbiological safety of food, is therefore particularly important for at-risk populations and other
47 susceptible consumers as consequences can be severe (30). Internationally, there is a responsibility
48 upon institution foodservice operations such as hospitals and long-term care facilities that serve food
49 to at-risk populations to implement either mandatory or voluntary food safety principles (32) such as
50 Hazard Analysis Critical Control Point (HACCP) principles (46).

51 Although food safety control measures are in place throughout the food supply chain to ensure
52 food safety, the final responsibility is that of the consumer in the domestic setting. Consequently,
53 there is a need to minimize the risk of vulnerable consumers from consuming potentially unsafe food
54 products in the domestic environment. Through all food handling steps, including shopping,
55 transportation to the home, domestic storage, preparation, cooking and consumption in the home,
56 consumers are required to implement risk reducing food-safety practices to ensure food safety (43).
57 The domestic kitchen is a multi-factorial contributor to foodborne disease (44). Cross-contamination,
58 insufficient heat treatment of foods, inadequate refrigerated storage, inadequate hand decontamination
59 practices and improper cleaning of food contact surfaces are internationally recognized factors most
60 commonly associated with foodborne disease (20, 41). Consequently, there is a need for consumers to
61 ensure personal and domestic hygiene practices, separation of raw foods from ready-to-eat (RTE)
62 produce, heat treatment, refrigeration temperatures, adhere to use by dates and select safe food and

63 drink (47). To enable this, consumers, including vulnerable individuals and their caregivers need to be
64 provided with tailored, appropriate food safety information and informed of food safety risks to
65 enable them to implement risk reducing food safety practices (37). Furthermore, for identified
66 vulnerable consumers, information detailing higher-risk foods to be avoided and lower-risk
67 alternatives should be provided (31).

68 **The provision of food safety information for consumers**

69 A need for targeted food safety information for vulnerable consumers has been identified (33),
70 and the provision of targeted food safety advice to these groups may reduce the impact of subsequent
71 infections (24). For example, appropriate food safety education for cancer patients, may prevent
72 further cases of foodborne infections (39). However, a review of food-related patient information
73 resources available in the UK (17), has established that many resources fail to highlight the
74 importance of food safety for patients during chemotherapy treatment; considerable information gaps
75 exist in food-related information sources, particularly in relation to listeriosis prevention practices.
76 Overall, existing information has been determined to be inconsistent, with significant variations
77 between resources (17). There is a need for food safety education specifically intended for vulnerable
78 patient groups and consideration is required as to how and when this might be best placed. If
79 vulnerable consumers were able to receive adequate food safety information from adequately trained,
80 credible healthcare professionals such as dietitians, this could emphasize the importance of food
81 safety.

82 **Trusted sources of food safety information**

83 Trust is an important factor for individuals when receiving information upon which they may
84 change their attitudes or behaviors, (45) as information provided by a credible source may be more
85 likely to influence the public (19). Research has found that the professionals' level of knowledge in
86 itself does not lead to trust, but that trusted sources are instead seen to be characterized by positive
87 attributes such as accountability (21). A large European study found that the effectiveness of food
88 safety information was largely dependent upon the source and its perceived reliability (34), trust in the

89 information provider is an important factor for consumers when evaluating sources of food safety
90 information (34, 45).

91 In Europe and the US, healthcare professionals, such as doctors and dietitians, are seen as the
92 most trusted sources of food safety information by consumers (42, 45). Several qualitative studies
93 have found that consumers prefer healthcare providers such as dietitians as their information source
94 for food safety information (3, 26). Indeed, verbal communication from healthcare professionals
95 including dietitians is a preferred method of food safety advice delivery by transplant patients (13)
96 and have been frequently mentioned as credible sources who should provide food safety advice to at-
97 risk consumers such as those living with HIV (26), individuals living with cancer (36) and people
98 receiving chemotherapy treatment (17).

99 **What is a dietitian?**

100 The title ‘dietitian’ is protected, meaning that dietitians are the only qualified healthcare
101 professionals that are regulated by law to assess, diagnose and treat dietary and nutritional problems
102 and are governed by an ethical code of conduct, performance standards and ethics (5, 8). In 2004, the
103 International Confederation of Dietetic Association (ICDA), in consultation with member associations
104 representing dietetics around the world (27), such as the Health and Care Professions Council (HCPC)
105 in the UK, and the Academy of Nutrition and Dietetics in the US, agreed upon an international
106 definition for a dietitian: “*The dietitian applies the science of nutrition to the feeding and education of*
107 *groups of people and individuals in health and disease. The scope of dietetic practice is such that*
108 *dietitians may work in a variety of settings and have a variety of work functions*” (4). Regulations for
109 the title of dietitian mean that the dietetic practitioner accepts the obligation to promote high standards
110 of professional practice and to protect the public and the profession by upholding them. This includes
111 engaging with continuing professional educational requirements to maintain registration (2, 19).

112 All registered dietitians (RDs) in the US are also by default nutritionists, but it is important to
113 note that not all nutritionists are RDs, additional training is required for this title (9). In the UK and
114 some other European countries, it is possible to train as either a nutritionist, or a dietitian, but again to
115 obtain the title of dietitian a student must have trained on an accredited program and shown

116 competency in certain areas of clinical practice before qualifying, either by the completion of clinical
117 placements or internship (25). Internationally, it is accepted that dietitians will have received a
118 minimum level of a bachelor degree and a period of supervised professional practice of at least 500
119 hours which meets the international competency standards for dietitians (27).

120 In the UK, the profession is regulated by the HCPC, which works with the UK professional body,
121 the British Dietetic Association (BDA) to promote the profession, represent its members, develop
122 curriculum frameworks, deliver post-registration education, training and continuing professional
123 development (25). Membership to the BDA is open to anyone working in nutrition and dietetics, diet
124 or food; including trained dietitians, researchers, educators and students (6). Similarly, in the US, The
125 American Dietetic Association (ADA) works together with the credentialing agency, the Commission
126 on Dietetic Registration (CDR) to maintain appropriate curriculum frameworks, education and
127 training (14). In Sweden, the Dietisternas Riksförbund (the Swedish Association of Clinical
128 Dietitians), works to protect the professional interests of members and ensures high standard of
129 dietetic training and research (16). It is difficult to accurately quantify the number of registered
130 dietitians globally, but it is a growing profession. The ICDA states they represent over 200,000
131 Dietitians-Nutritionists worldwide (28), there are currently 9,556 RDs in the UK (25), in Sweden,
132 there are 1,611 RDs (16) and in the US, 67,000 members of the ADA most of which are RDs (2).

133 **What do dietitians do?**

134 Dietitians are trained to become skilled at advising individuals make diet related behavior changes
135 to improve health and prevent disease. The ADA states that as a profession, dietitians are committed
136 to helping the public have a healthy lifestyle focusing on five critical health areas facing all
137 Americans: Obesity and overweight, with special emphasis on children, healthy aging, having a safe,
138 sustainable and nutritious food supply, nutrigenetics and nutrigenomics, integrative medicine,
139 including supplements and alternative medicine (2). Dietitians use the science of nutrition to devise
140 eating plans for patients to treat medical conditions. They promote good health by helping to facilitate
141 a positive change in food choices (25).

142 It is an important part of the dietetics curriculum recognized by both the BDA and the ACEND
143 that all graduates learn appropriate communication and behavior change skills, with the BDA stating
144 that all trainee dietitians should graduate with critical, integrated and applied knowledge of
145 communication and educational methods (4). This curriculum ensures that dietitians are not only
146 principle nutrition information providers but also have the skills to influence behavior change in
147 patients and also to educate and train groups of individuals be these patient groups or other health
148 professionals. Dietitians are reportedly trained to assess individuals with differing social and
149 environmental influences and provide appropriate nutritional intervention. Research has found that
150 diverse strategies are required for the provision of effective food safety information due to the
151 differing needs of groups of clients each with their own social and environmental influences and food
152 preparation practices (11). In the complex area of behavior change, which can be influenced by a
153 multitude of internal and external factors, dietitians have an important role in supporting patients to
154 change diet-related behavior (13) which involves using effective communication skills and a variety
155 of supportive approaches in order to empower people to improve their health.

156 **Food safety in the dietetic curriculum**

157 Given that food needs to be safe and nutritious to maximize food-related health and wellbeing;
158 food safety is part of the curriculum designed for the training of RDs. The Accreditation Council for
159 Education in Nutrition and Dietetics (ACEND) in the US states that upon completion of a dietetic
160 training program graduates should be able to “*Describe safety principles related to food, personnel*
161 *and consumers*” (1). This specifically relates to food safety in foodservice, meaning most of the food
162 safety training for dietitians in the US and international programs which use the US curriculum, has
163 been focused on development of HACCP plans managerial control of food safety in foodservice
164 operations. In the UK, the Curriculum Framework for the pre-registration education and training of
165 dietitians is set by the BDA to ensure university nutrition and dietetics programs satisfy the HCPC
166 Standards of Proficiency for Dietitians (4). This framework states that graduate dietitians “*must have*
167 *applied knowledge of food safety legislation and practice to manage and evaluate the service of safe*
168 *food as well as a broad knowledge of structure and function of common microbes which cause*

169 *infection and disease*” (4), although this has less emphasis on foodservice application, prominence is
170 given to legislation and microbiology. The way food safety is presented as part of dietetic training is
171 essential, indeed, Medeiros and Buffer consider the idea that associating food safety with medical
172 nutrition therapy would encourage younger dietitians to address the topic with their patients (35). The
173 provision of food safety education alongside dietetic therapy, for example, rather than as lectures in
174 microbiology, might provide more context for learning and fit with the holistic, patient centered
175 therapy which is being promoted as best care.

176 The inclusion of food safety in dietetic curriculum frameworks indicates awareness by
177 international regulatory bodies that dietitians need to be able to provide correct food safety
178 information. To limited research has been undertaken to determine how and when food safety
179 education is provided during a dietitian’s training, whether it is sufficient and if this training then
180 enables dietitians to learn how to identify vulnerable individuals and confidently provide bespoke
181 food safety information and advice. Current exploration of dietetic food safety training delivery is
182 needed to determine whether clinically applicable skills are taught as opposed to provision of
183 scientific knowledge. Although clear curriculum requirements for the training of dietitians have been
184 set by the relevant bodies, there is a need for an international comparison of dietetic-curriculum
185 requirements, furthermore, little is currently known as to how institutions internationally choose to
186 interpret and deliver such requirements. This is likely to mean that food safety training and education
187 of dietitians may be variable, even when delivering against the same curriculum.

188 **Professional development and continuing education of dietitians**

189 Both the BDA and ADA recognize that the role of the dietitian is continually changing, and
190 recommend that the education and training of practitioners should prepare individuals for diversity of
191 practice and ensure they are adaptable to change in order to develop new and extended roles (4).
192 Given the ever changing field, continuing education and professional development is essential for
193 RDs. As all RDs have a commitment to their ongoing education, and may wish to increase their
194 confidence by improving their knowledge. It may be necessary to consider updating RDs food safety
195 training via continuing professional development/education courses. It is unclear if food safety related

196 continuing professional development/education courses are currently available to RDs. Specifically
197 tailored courses could work well to enable RDs to identify at-risk patients and deliver targeted and
198 relevant food safety information. The ADA states that dietitians should have a commitment to
199 ongoing continuing education regarding food and water safety (22), and both the ADA and BDA
200 require the dietitian to continue their professional educational in order maintain registration
201 supporting this further training (7). As indicated in Figure 1, although there are opportunities to
202 facilitate food safety education for dietetic students, training and education of RDs in practices is also
203 an important area that must not be overlooked.

204 **Opportunities for food safety information provision by dietitians**

205 When considering that the key part of a dietitians training and role is to assess nutritional status of
206 a patient, it follows that the role of the dietitian should include the provision of food safety advice to
207 vulnerable patients (1, 4). This would ensure a patient's dietary needs are being more widely
208 considered, fitting with the movement towards a more patient centered approach to healthcare and
209 information provision (12, 15). This approach encourages health professionals to work in a more
210 holistic way, identifying individual patient needs of which food safety education/behavior change
211 may be one. Working as part of a wider multi-disciplinary team dietitians also have scope to
212 indirectly inform consumers regarding food safety by training of other health professionals and/or
213 development of resources. Although dietitians are in positions to be able provide effective food safety
214 information and advice to appropriate patient groups, much more research is needed to establish their
215 level of knowledge, attitudes towards safety and how they identify vulnerable consumers and provide
216 information. As illustrated in Fig. 1, there is a need to consider the potential routes dietitians may
217 facilitate delivery of food safety information delivery or cascade training to communicate food safety
218 risks and risk reducing food safety practices to decrease the risk of foodborne illness among
219 vulnerable patient populations.

220 It is clear that dietitians are in a prime position to reach some of the most vulnerable consumers
221 either directly or indirectly to have an impact on their risk reducing food practices during food
222 handling, storage and consumption in and outside of the home. Despite this, a lack of adequate food

223 safety knowledge among nutrition students and gaps in RDs knowledge (35, 40) have been identified
224 and RDs are only occasionally providing food safety advice to vulnerable consumers (10, 12),
225 dietitians are more likely to provide food safety advice when immune compromised patients also have
226 a medical condition that increased their risk of foodborne infections (10). As there is currently only
227 limited evidence available about RDs' beliefs and attitudes towards their role in providing safe food
228 handling education, it is not clear if dietitians believe it is their role to provide food safety advice (10).
229 Further exploration of the potential barriers that may prevent RDs from providing food safety
230 information and advice and how confidence can be improved in this area requires further research.

231 A symposium on teaching food safety to dietitians at the IAFP European symposium on food
232 safety in 2018 identified the need for collaborative research into developing efficient methods to work
233 with dietitians to facilitate the delivery of food safety information, the symposium resulted in an
234 international network of like-minded academics that aspire to integrate dietetics students in effective
235 food safety education and ensure appropriate professional development and continuing education
236 courses to empower dietitians to inform and enable patients to implement food safety practices and
237 reduce the risk of foodborne illness (18).

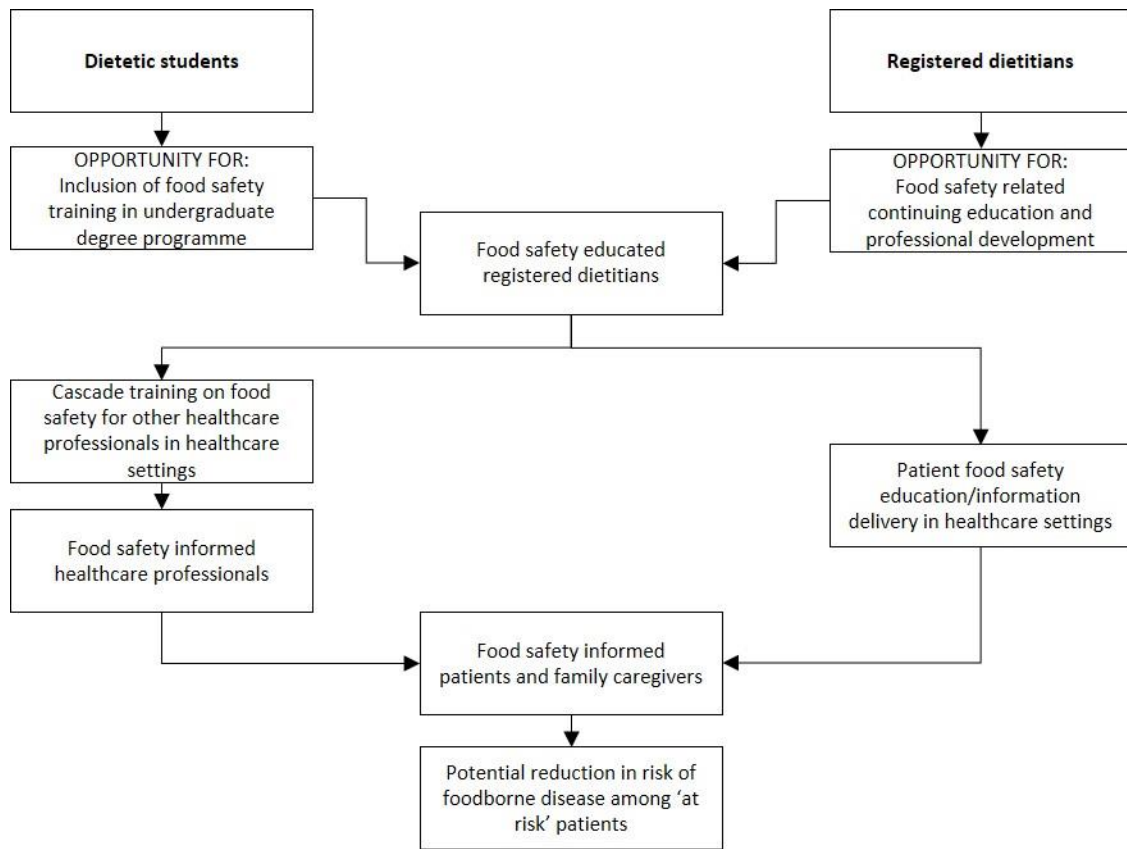
238 **Conclusions.** Dietitians are well placed to be an important resource for food safety information
239 and advice, whether that be directly or indirectly for vulnerable populations. The delivery of clinically
240 applicable food safety advice by adequately trained dietitians may increase awareness amongst
241 vulnerable populations about their susceptibility to foodborne disease and enable them to implement
242 risk reducing food safety practices. Available research is limited, but it indicates that (i) there are gaps
243 in RDs' knowledge of food safety which necessitate further exploration, (ii) there is a lack of
244 consensus about the interpretation of the dietetic curriculum requirements in institutions that deliver
245 accredited dietetic training, (iii) there is a need to better understand trainee dietitians' food safety
246 knowledge, training experiences and attitudes towards the delivery of food safety information; and
247 (iv) there is a need to explore the availability of food safety related continuing education courses for
248 RDs. As a group of dietitians, microbiologists and food safety educators, we have identified an
249 opportunity to work as an international network of dietetic food safety educators to enhance this
250 research area and explore the need to interpret the dietetic curriculum in a way that shifts the

251 emphasis from dietitians having knowledge of food microbiology and food safety legislation to
252 dietitians having clinically applicable skills to identify and deliver bespoke food safety advice and
253 information to at-risk patients to increase awareness of food safety risks and enable risk reducing food
254 safety practices.
255

256 **FIGURE LEGENDS**

257 **FIGURE 1. Opportunities to increase food safety awareness of dietitians and potential**
258 **routes to deliver food safety information to at-risk consumers.**

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270 **REFERENCES**

- 271 1. Accreditation Council for Education in Nutrition and Dietetics. 2018. ACEND
272 accreditation standards for nutrition and dietetics didactic programs (DPD). Available at:
273 <http://www.eatrightpro.org/~media/eatrightpro%20files/acend/about%20program%20accreditation/accreditation%20standards/2017standardsfordpdprograms.ashx>. Accessed 5th
274 November 2018.
275
- 276 2. American Dietetic Association. 2018. Description of the American dietetic association.
277 Available at: <https://www.diet.com/g/american-dietetic-association>. Accessed 5th November
278 2018.
- 279 3. Athearn, P., P. Kendall, V. V. Hillers, M. Schroeder, V. Bergmann, G. Chen, and L.
280 Medeiros. 2004. Awareness and acceptance of current food safety recommendations during
281 pregnancy. *Matern. Child Health J.* 8:149-162.
- 282 4. British Dietetic Association. 2013. A curriculum framework for the pre-registration
283 education and training of dietitians. Available at:
284 <https://www.bda.uk.com/training/practice/preregcurriculum>. Accessed 5th November 2018.
- 285 5. British Dietetic Association. 2014. Dietitian, nutritionist, nutritional therapist or diet
286 expert? A comprehensive guide to roles and functions. Available at:
287 https://www.bda.uk.com/publications/dietitian_nutritionist.pdf. Accessed 12th October 2018.
- 288 6. British Dietetic Association. 2017. About the BDA. Available at:
289 https://www.bda.uk.com/about/about_bda/home. Accessed 12th October 2018.
- 290 7. British Dietetic Association. 2017. Continuing professional development. Available at:
291 <https://www.bda.uk.com/training/cpd/home>. Accessed 14th December 2018.
- 292 8. British Dietetic Association. 2017. What does a dietitian do? Available at:
293 <https://www.bda.uk.com/improvinghealth/yourhealth/dietitians>. Accessed 5th November
294 2018.
- 295 9. Bruening, M., A. Z. Udarbe, E. Yakes Jimenez, P. Stell Crowley, D. C. Fredericks, and
296 L. A. Edwards Hall. 2015. Academy of nutrition and dietetics: standards of practice and
297 standards of professional performance for registered dietitian nutritionists (competent,
298 proficient, and expert) in public health and community nutrition. *J. Acad. Nutr. Diet.* 115:1699-
299 1709.e39.
- 300 10. Buffer, J., P. Kendall, L. Medeiros, M. Schroeder, and J. Sofos. 2013. Nurses and
301 dietitians differ in food safety information provided to highly susceptible clients. *J. Nutr. Educ.*
302 *Behav.* 45:102-108.
- 303 11. Campbell, M. E., C. E. Gardner, J. J. Dwyer, S. M. Isaacs, P. D. Krueger, and J. Y.
304 Ying. 1998. Effectiveness of public health interventions in food safety: a systematic review.
305 *Can. J. Publ. Health.* 89:197 - 202.
- 306 12. Casagrande, G., J. LeJeune, M. A. Belury, and L. C. Medeiros. 2011. Registered
307 dietitian's personal beliefs and characteristics predict their teaching or intention to teach fresh
308 vegetable food safety. *Appetite.* 56:469-475.

- 309 13. Chen, G., P. A. Kendall, V. N. Hillers, and L. C. Medeiros. 2010. Qualitative studies
310 of the food safety knowledge and perceptions of transplant patients. *J. Food Prot.* 73:327-35.
- 311 14. Commission on Dietetic Registration. 2018. About CDR. Available at:
312 <https://www.cdrnet.org/about>. Accessed 5th November 2018.
- 313 15. Department of Health. 2004. Choosing health. Making healthy choices easier -
314 Executive summary. Available at:
315 <http://www.nhshistory.net/choosing%20health%20summary.pdf>. Accessed 5th November
316 2018.
- 317 16. Dietisternas Riksförbund. 2018. DRF – Swedish association of clinical dietitians.
318 Available at: <http://drf.nu/about-drf/>. Accessed 14th December 2018.
- 319 17. Evans, E., and E. Redmond. 2017. An assessment of food safety information provision
320 for UK chemotherapy patients to reduce the risk of foodborne infection. *Publ. Health.* 153:25-
321 35.
- 322 18. Evans, E. W., V. J. Gould, J. J. Quinlan, S. Ilic, and I. M. Marklinder. 2018. Teaching
323 food safety to dietitians: toward an international network. IAFP European symposium on food
324 safety. Stockholm, Sweden. 25-27 April 2018. Available at:
325 <https://www.foodprotection.org/upl/downloads/meeting/archive/5b6370d98ee1f513d2e65.pdf>
326 . Accessed 5th November 2018.
- 327 19. Food and Agriculture Organization, and World Health Organization. 1999. The
328 application of risk communication to food standards and safety matters. Report of a Joint
329 FAO/WHO Expert Consultation. Rome, 2-6 February 1998. *FAO Food Nutr. Pap.* 70:1-42.
- 330 20. Food and Drug Administration. 2000. Report of the FDA retail food program database
331 of foodborne illness risk factors. FDA retail food program steering committee. Available at:
332 <http://www.perishablepundit.com/docs/fda-foodborneillnesses.pdf>. Accessed 4th August
333 2017.
- 334 21. Frewer, L. J., C. Howard, D. Hedderley, and R. Shepherd. 1996. What determines trust
335 in information about food-related risks? Underlying psychological constructs. *Risk Anal.*
336 16:473-486.
- 337 22. Gerald, B. L., and J. E. Perkin. 2003. Position of the American dietetic association:
338 food and water safety. *J. Am. Diet. Assoc.* 103:1203-18.
- 339 23. Gerba, C. P., J. B. Rose, and C. N. Haas. 1996. Sensitive populations: who is at the
340 greatest risk? *Int. J. Food Microbiol.* 30:113-123.
- 341 24. Gillespie, I. A., J. McLauchlin, C. L. Little, C. Penman, P. Mook, K. Grant, and S. J.
342 O'Brien. 2009. Disease presentation in relation to infection foci for non-pregnancy-associated
343 human listeriosis in England and Wales, 2001 to 2007. *J. Clin. Microbiol.* 47:3301-3307.
- 344 25. Health & Care Professions Council. 2016. Dietitians. Available at: [https://www.hcpc-
345 uk.org/aboutregistration/professions/index.asp?id=5#profDetails](https://www.hcpc-uk.org/aboutregistration/professions/index.asp?id=5#profDetails). Accessed 12th October
346 2018.

- 347 26. Hoffman, E. W., V. Bergmann, J. A. Shultz, P. Kendall, L. C. Medeiros, and V. N.
348 Hillers. 2005. Application of a five-step message development model for food safety education
349 materials targeting people with HIV/AIDS. *J. Am Diet. Assoc.* 105:1597-1604.
- 350 27. International Confederation of Dietetic Associations. 2017. International standards for
351 dietitians-nutritionists. Available at:
352 <https://www.internationaldietetics.org/Downloads/International-Definition-of-Dietitian.aspx>.
353 Accessed 5th November 2018.
- 354 28. International Confederation of Dietetic Associations. 2018. About ICDA. Available at:
355 <https://www.internationaldietetics.org/About-ICDA.aspx>. Accessed 13th December 2018.
- 356 29. King, J. C., R. E. Black, M. P. Doyle, K. L. Fritsche, B. H. Halbrook, O. A. Levander,
357 S. N. Meydani, W. A. Walker, and C. E. Woteki. 2000. Foodborne illnesses and nutritional
358 status: a statement from an American society for nutritional sciences working group. *J. Nutr.*
359 130:2613-2617.
- 360 30. Lund, B. M. 2014. Microbiological food safety and a low-microbial diet to protect
361 vulnerable people. *Foodborne Pathog. Dis.* 11:413-424.
- 362 31. Lund, B. M. 2015. Microbiological food safety for vulnerable people. *Int. J. Environ.*
363 *Res. Publ. Health.* 12:10117–10132.
- 364 32. Lund, B. M. 2019. Provision of microbiologically safe food for vulnerable people in
365 hospitals, care homes and in the community. *Food Contr.* 96:535-547.
- 366 33. Lund, B. M., and S. O'Brien. 2011. The occurrence and prevention of foodborne disease
367 in vulnerable people. *Foodborne Pathog. Dis.* 8:961 - 973.
- 368 34. Mazzocchi, M., A. Lobb, W. Bruce Traill, and A. Cavicchi. 2008. Food scares and trust:
369 A European study. *J. Agric. Econ.* 59:2-24.
- 370 35. Medeiros, L. C., and J. Buffer. 2012. Current food safety knowledge of registered
371 dietitians. *Food Prot. Trends.* 32:688 - 696.
- 372 36. Medeiros, L. C., G. Chen, V. N. Hillers, and P. A. Kendall. 2008. Discovery and
373 development of educational strategies to encourage safe food handling behaviors in cancer
374 patients. *J. Food Prot.* 71:1666-72.
- 375 37. Medeiros, L. C., G. Chen, P. Kendall, and V. N. Hillers. 2004. Food safety issues for
376 cancer and organ transplant patients. *Nutr. Clin. Care.* 7:141 - 148.
- 377 38. Meier, J., and L. Lopez. 2001. Listeriosis: an emerging food-borne disease. *Clin Lab*
378 *Sci.* 14:187-192.
- 379 39. Mook, P., S. J. O'Brien, and I. A. Gillespie. 2011. Concurrent conditions and human
380 listeriosis, England, 1999–2009. *Emerg. Infect. Dis.* 17:38-43.
- 381 40. Muhammad, I., C. N. Azizah, and S. I. Yunita. 2018. Evaluating nutrition students'
382 knowledge of food safety in Indonesia: multi-strata comparison review. *Pak. J. Nutr.* 17:666-
383 670.

384 41. Public Health England. 2015. PHE gastrointestinal infections data. Summary of eFOSS
385 data, 2013. Available at:
386 [https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/426019/eFOSS](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/426019/eFOSS_surveillance_tables_for_Web.pdf)
387 [S_surveillance_tables_for_Web.pdf](https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/426019/eFOSS_surveillance_tables_for_Web.pdf). Accessed 6th July 2015.

388 42. Redmond, E., C. Griffith, and S. King. 2005, Evaluation of consumer food safety
389 education initiatives in the UK and determination of effective strategies for food safety risk
390 communication. Food Standards Agency Research Project B20003. Food Research and
391 Consultancy Unit, University of Wales Institute Cardiff. Accessed 5th November 2018.

392 43. SafeFood. 2012. Food behaviours. Volume 1: Food safety on the island of Ireland.
393 Available at:
394 [http://www.safefood.eu/SafeFood/media/SafeFoodLibrary/Documents/Publications/Research](http://www.safefood.eu/SafeFood/media/SafeFoodLibrary/Documents/Publications/Research%20Reports/Volume-1-Final.pdf)
395 [%20Reports/Volume-1-Final.pdf](http://www.safefood.eu/SafeFood/media/SafeFoodLibrary/Documents/Publications/Research%20Reports/Volume-1-Final.pdf). Accessed 12th April 2017.

396 44. Scott, E. 2003. Food safety and foodborne disease in the 21st century. *Can. J. Infect.*
397 *Dis.* 14:277-280.

398 45. Shepherd, J. D., and S. H. Saghaian. 2008. Consumer response to and trust of
399 information about food-safety events in the chicken and beef markets in Kentucky. *J. Food*
400 *Distribution Res.* 39:123-129.

401 46. U.S. Department of Health and Human Services, Food and Drug Administration, and
402 Center for Food Safety and Applied Nutrition. 2006. Managing food safety: a regulator's
403 manual for applying HACCP principles to risk based retail and food service inspections and
404 evaluating voluntary food safety management systems. OMB control no. 0910-0578. Available
405 at: <https://www.fda.gov/downloads/Food/GuidanceRegulation/UCM078159.pdf>. Accessed
406 13th December 2018.

407 47. World Health Organization. 2006. Five keys to safer food manual. Available at:
408 http://apps.who.int/iris/bitstream/10665/43546/1/9789241594639_eng.pdf?ua=1 Accessed 6th
409 September 2017.

410 48. World Health Organization. 2015. WHO estimates of the global burden of foodborne
411 diseases. foodborne disease burden epidemiology reference group 2007-2015. Available at:
412 http://www.who.int/foodsafety/areas_work/foodborne-diseases/ferg/en/. Accessed 5th
413 November 2018.

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