A Patient-Centred Approach to Develop a Food Safety Intervention to Reduce Chemotherapy Patients' Risk of Foodborne Illness

Ellen W. Evans* & Elizabeth C. Redmond
ZERO2FIVE Food Industry Centre, Cardiff Metropolitan University, Wales, United Kingdom.
*Corresponding author: elevans@cardiffmet.ac.uk

Introduction

Chemotherapy patients have an increased risk of foodborne illnesses due to immunosuppression[1]. Cancer patients are reported to have a five-fold increased risk for development of listeriosis[2].

To minimise the risk of foodborne illness it is important that cancer patients consume foods prepared and cooked at home according to food safety recommendations and avoid risk associated food products[3].

It is suggested that limited food safety information is available to chemotherapy patients in the UK and data on their food safety knowledge, practices and perceptions are lacking[4].

Purpose

The aim of the project was to design, develop and evaluate a targeted food safety intervention strategy using a consumer orientated research approach.

Methods

Phase 1 – Online food-related patient information resources (*n*=45) were obtained from 35 of 154 National Health Service (NHS) chemotherapy providers in England, Scotland and Wales, the Department of Health and three of 184 identified UK cancer charities. Resources were reviewed for the inclusion of food safety information using a content analysis approach.

Phase 2 – In-depth interviews (*n*=15) were conducted with patients and family caregivers to establish the food related experiences of patients during treatment.

Phase 3 – Self-complete questionnaires (paper-based and online) were completed (*n*=172) by chemotherapy patients (70%) and family-caregivers (30%) to determine the knowledge, attitudes and self-reported practices.

Phase 4 – Focus groups were conducted with chemotherapy patients and family-caregivers (*n*=20) to elicit information regarding preferred formats for future food safety information and establish the target audience's perceived need for food safety education to inform Phase 5.

Phase 5 – A series of food safety interventions tailored specifically for targeting patients and family-caregivers were produced to promote safe food handing/storage behaviours. An evaluation of the resources with patients and family-caregivers (*n*=17) was conducted.

Phase 6 – A pre and post intervention test-retest self-complete questionnaire with patients and family-caregivers (*n*=15) was used to determine the acceptability and the potential effectiveness of the intervention on knowledge and attitudes.

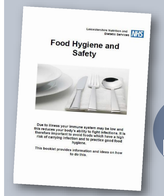
References & Acknowledgments

1. Gerba CP, Rose JB and Haas CN. Sensitive populations: who is at the greatest risk? *International Journal of Food Microbiology*. 1996; 30: 113-23.
2. Mook P, O'Brien S and Gillespie I. Concurrent Conditions and Human Listeriosis, England, 1999–2009. *Emerging Infectious Diseases*. 2011; 17: 28 - 43.
3. Medeiros LC, Chen G, Kendall P and Hillers VN. Food safety issues for cancer and organ transplant patients. *Nutrition in Clinical Care*. 2004; 7: 141 - 8.
4. Medeiros LC, Chen G, Hillers VN and Kendall PA. Discovery and Development of Educational Strategies To Encourage Safe Food Handling Behaviors in Cancer Patients. *J Food Prot*. 2008; 71: 1666-72.

- The food safety research team wish to acknowledge the personal chemotherapy experiences of Prof. Louise Fielding (1968 – 2013) who recognised the need for food safety information during chemotherapy treatment.
- Ethical approval was granted by the Cardiff School of Health Sciences Research and Ethics Committee. Project reference number: 0001-SREC-2014(01).
- This project received funding from a Tenovus Cancer Care Innovation Grant (TIG2014-30).

Results

Phase 1: Review of food safety information for chemotherapy patients



The majority (64%) of resources referred to the increased risk of infection during chemotherapy and 67% included one or more food safety practice (range: 1 – 43, mean: 13, possible maximum: 57)

Hand hygiene was the most frequently included aspect of food safety. Although 49% of sources, referred to washing hands before preparing food, only 20% recommended the use of soap and hot/warm water.

Less than half (44%) included risk-associated foods to be avoided raw/undercooked eggs, meat/poultry) and only 22% included safer alternatives.

Reference to listeriosis risk reducing behaviours were lacking:
- 7% recommended that ready-to-eat foods should be consumed within two days of opening
- 22% included recommended refrigeration temperature
- 33% referred to adhering to 'use by' dates

Cumulatively, considerable gaps exist and information varied greatly between sources.

Phase 2: Food related experiences of patients and caregivers

During the interviews, food provision was determined to be an important role for caregivers:

"Not being able to help her suffering, her pain, and there was nothing I could do, it was a very strange feeling. The good outcome was, I found out where the kitchen was! Not only where the kitchen was, what happened in there. I grew into it, and thoroughly enjoyed it. It made me feel less useless, useful then. An active role with her eating at home, her healthcare I left to the professionals. To provide food to maintain, it gave me a role."

"Peter", caregiver for his wife during her chemotherapy treatment.

Although many were aware of the increased risk of infection during chemotherapy and the need for infection control, the perceived risk of foodborne illness was often underestimated:

"I knew there was increased risk of picking up infections so I was especially careful about hand washing after being in public space. But I didn't think particularly about a risk of food poisoning."

"Jack", received chemotherapy for prostate cancer.

Physical, mental and social changes were also determined to impact on food procurement, cooking and eating habits during treatment, which included anorexia, nausea, dusgeusia, indecisiveness and depression.

Phase 3: Food safety awareness of patients and caregivers

Although many reported awareness of key food safety practices, self-reported practices indicate that malpractices may be implemented:

- 65% did not own a refrigerator thermometer
- 72% defrosted meat at room temperature
- 74% do not use a meat thermometer
- 25% fail to adhere to 'use by' dates
- 45% not aware of any risk associated food products

Figure 1. Recall of health related information received during chemotherapy (*n*=130)

The majority (61%) reported being more concerned about diet and nutrition than food safety during treatment. Furthermore, significantly ($p<0.05$) greater proportions (67 – 69%) recalled receiving information on healthy eating and keeping active than food safety (49%) during chemotherapy treatment (Figure 1).

Phase 4: Design and development of a food safety intervention

To enable a sense of 'control' for food safety, risk-reducing behaviours not only needed to be recommended, but why they are important needed to be addressed:

"It's ok being told what's good, what's bad, but, when they don't tell you why, you can't relate to it."

"Barbara" received chemotherapy for breast cancer.

During the focus groups, it was established that the use of some images may prevent some patients and/or family-caregivers engaging with the intervention:

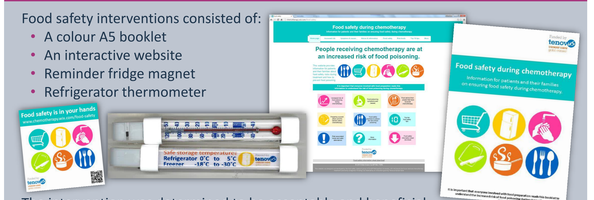
"I dislike pictures of people, 'cos you subconsciously try and relate to the picture, the demographic of people going through cancer may be the older generation, so I feel like a minority sometimes, left out."

"Janet" received chemotherapy for breast cancer.

The focus group established that a multi-resource intervention including paper-based and web-based information along with in-home reminders was desired by patients and family-caregivers to be administered in a pre-chemotherapy meeting.

Phase 5: Evaluation of the food safety intervention

Food safety interventions consisted of:
- A colour A5 booklet
- An interactive website
- Reminder fridge magnet
- Refrigerator thermometer



The intervention was determined to be acceptable and beneficial:
- 100% believed the intervention increased their food safety knowledge
- 100% believed the intervention would inform patients and caregivers of the risks associated with food poisoning and aid how to reduce associated risks.
- 95% thought intervention would reduce food poisoning among patients.

"This appears a comprehensive, informative and clear guide for patients and relatives which hopefully will be widely available."

"George", caregiver for his wife.

"Easy to access and thorough information given to help chemo patients."

"Pam", received chemotherapy.

"It appears user friendly, has appropriate use of colours, not too clinical or medical looking."

"Colin", received chemotherapy.

Phase 6: Potential effectiveness of the food safety intervention

Perceptions of risk, control and responsibility increased post-intervention (Table 1).

Table 1. Median of pre and post intervention perceptions of risk, control and responsibility (*n*=15)

Perceptions of:	Pre-intervention	Post-intervention	Wilcoxon Signed Rank Test
Risk *(1: very high – 10: very low)*	8.0	9.0	Z= 2.623, p<0.05, r= -0.7
Control *(1: total – 10: none)*	1.5	4.0	p>0.05
Responsibility *(1: none – 10: total)*	8.0	10.0	Z= -2.827, p<0.005, r= -0.7

Food safety attitudinal scores were statistically more positive with large effect (z=-2.580, p<0.01, r=0.67) post-intervention (Mean=82) than pre-intervention (Mean=92). Knowledge of key food safety practices also improved post-intervention (see Table 2).

Table 2. Pre and post intervention knowledge of key food safety practices (*n*=15)

Knowledge of:	Pre-intervention	Post-intervention	Chi-square goodness-of-fit
Recommended refrigeration temperature	67%	93%	X^2 (1, n=15) = 4.8, p<0.05
Thermometer use when cooking	27%	93%	X^2 (1, n=15) = 34.0, p<0.001
Core cooking temperature	40%	73%	X^2 (1, n=15) = 6.9, p<0.01
Anti-bacterial soap to wash hands	87%	100%	*
Use by date indicating food safety	75%	100%	*

**Chi-square test cannot be performed as only one variable was generated*

The intervention was effective in increasing the knowledge and improving attitudes of patient and family-caregivers' regarding food safety during chemotherapy.

Significance of study

Cumulatively, using a data driven patient-centred approach, completion of this study has established that:
- Food safety information for patients and family-caregivers is lacking and variable between sources
- The risk of food poisoning was often underestimated by patients and family-caregivers
- Although many patients and caregivers indicated food safety awareness, malpractices were reported
- Food safety information needs to be engaging and needs to enable a sense of 'control'

Consequently, this study has designed, developed and evaluated a specifically tailored food safety strategy to target chemotherapy patients and family caregivers that may help to increase the implementation of risk-reducing food safety behaviours.

The strategy was determined to be acceptable, beneficial and effective among patients and family-caregivers which may assist in reducing the risk of foodborne illness during chemotherapy treatment.

ISQua®
Food Industry Centre
Cardiff Metropolitan University
ZERO2FIVE
Canolfan Diwydiant Bwyd
Prifysgol Metropolitan Caerdydd
Funded by tenovus cancer care gofal canser