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Review

# Food Risk Communication in the Case of Microbial Contamination

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**Abstract**

The aim of this short paper is to present the state of the art in the area of unique communication environment when foodborne illness due to contamination with food appears. These situations request a very specific behavior and reaction of the food supply chain managers towards consumers. Risk Perception Model and Good Practices for Risk Communication seeks for solutions which should not be restricted to negative messages and warnings but should include positive 'educational messages'. It is very important to respect all good practices in food supply chains/nets which are in function. Regarding information channels, we should use all available, but tailor the information to bring proper information, awareness and action to the audience.

**Keywords:** foodborn illnesses; food supply managers; risk perception model; information channels

**Резюме**

Целта на този обзор е да представи настоящото състояние на изследванията в областта на уникалната комуникационна среда, когато се появяват хранителни заболявания, дължащи се на замърсяване с храна. Тези ситуации изискват много специфично поведение и реакция от страна на мениджърите на веригата за доставка на храни към потребителите. Моделът за възприемане на риска и добрите практики за комуникация с риска се стремят към решения, които не трябва да се ограничават до отрицателни послания и предупреждения, а трябва да включват положителни «образователни послания». Много важно е да се спазват всички добри практики във веригите, които предлагат храни. По отношение на информационните канали трябва да използваме всички налични, но да приспособяваме информацията, за да я поднесем на аудиторията в подходяща форма, с необходимата коректност.

## Introduction

A foodborne illness event creates a unique communication environment, as foodborne illness is both a risk to the individuals not infected and a crisis to those experiencing symptoms – this is what shapes perceptions of risk. Consumer perceptions of risk are essential (Hyer and Covello, 2007). A food incident which can cause foodborne illness is where concerns about actual or suspected threats to the safety or quality of food start and this is where intervention is required to protect consumers. Taylor and others (2012) pointed out that safety and quality associated with the production, marketing and consumption of food, together with overall levels of trust in the food supply chain, are increasing in importance in our society. Incidents are clustered in two categories: the one happening in the food net, like contamination of food or animal feed in processing, distribution, retail and catering, resulting in action to withdraw the food from sale or recall it from the public, or the one resulting from environmental pollution incident, like fire, chemical spills or radiation. Respecting the consequences, they deserve equal attention. Food quality and food safety have become a hot topic in mass media. Consumers have become increasingly concerned and demanding about the quality and safety of food they are eating. The increased demand for safer food has re-

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sulted in the development and introduction of quality management systems, which are used to control the quality and safety of products like standards and good practices (Raspor *et al.,* 2013). Food safety requirements with changes in food supply chains, social, health and demographic situations, lifestyle and environmental conditions have led to significant efforts in the development of quality management system (QMS) in agribusiness and food industry worldwide. Because quality systems differ in several aspects, they are combined or integrated to assure more aspects of food quality. Quality is divided into aspects of product safety, product quality and total quality, which embrace products safety and quality (Raspor and Jevšnik, 2008). Despite significant investment, the incidence of food borne diseases still increases. Food-borne diseases caused by microbiological hazards are a public health problem in Europe and worldwide. Mishandling of food plays a significant role in the occurrence of foodborne illness, which affects almost 1 in 10 people globally who become ill every year from eating contaminated food, and 420 000 die as a result (WHO, 2015). According to the last official report from the European Food Safety Authority (EFSA), a total of 43.3% of reported foodborne outbreaks (with convincing evidence) in Europe have been traced to food eaten in professional food service settings (EFSA and ECDC, 2016). Among professional settings, catering establishments represent the major share.

Food and health professionals, government officials, industry representatives, and others who communicate with consumers about risks may struggle to understand why people make the decisions they do (Jevšnik *et al*., 2008). The communicator can become frustrated when the consumer does not read or listen carefully to understand potential risks, or does not seek out additional information in order to make informed decisions. In daily life, consumers do not see and think about risk in the same way that experts think about it (Witte, 1992). Consumers start to think when something starts going the wrong way, for that reason it is very important to keep them alert for contamination episodes. Ma (2016) emphasized that efforts to protect public health and reduce foodborne illness outbreaks will not be fully effective unless the resulting information is communicated to consumers. Improved food safety communication can not only help consumers in making safer food choices and thus reduce the instances of outbreaks, but can also provide motivation for businesses (e.g. restaurants) to strengthen their food safety controls. In fact, studies have shown that informing consumers about food safety will influence their behaviors (Choi *et al*., 2011; Porucznik and Royal DeLegge, 2013), and communicating food safety information with consumers, such as publishing restaurant inspection scores, helps to improve food safety controls (Almanza *et al*., 2002; Jin and Leslie, 2002).

Regarding current information channels on food safety, it is passed on to the consumers via different media like, newspapers, magazines, radio, TV, internet tools/Youtube, Facebook, Twitter and other social media messages. Never before had we had so many channels open for information flow. The fast development of electronic communications is also taking over in the area of food safety communication. The rise of the Internet, portable digital electronic communication devices, and social media are profoundly changing the way people communicate. Communicating risks has become a core ingredient in the regulatory functions of government, interest group advocacy, public health, and corporate relations. The channels of risk communication have grown in complexity along with the development and expansion of the Internet and the birth of personalized blogging. The paper of Krimsky (2007) concludes that the Internet, as illustrated by the Google search engine, has created more opportunities for citizen learning and expanded the breadth and channels of risk communication, while also providing new opportunities for stakeholders to influence the message. Since democratization of information does not necessarily create greater concordance between the cultural and technical assessment of risk, we have to be especially careful about adopting relevant communication tools. Ma (2016) established that the Internet was consumers' preferred media choice for food safety communication. Among Internet-based platforms, websites were most preferred. Media, information, and source characteristics interact in influencing consumers' experience with the websites and later communication outcome. It is very important to maintain or improve information quality while offering media functionalities that reduce users' efforts in information seeking.

Hazard – something that can go wrong; Probability – likelihood of it happening; Consequences– implications of hazard; Value – subjective evaluation of the relative importance of what might be lost (Raspor and Jevšnik, 2016). We have to deal with two faces of the same issue.

Based on our attitudes to this important issue,

we can analyze how the conceptual approach has been changing in this fast developing area. In particular, we are aware of the extreme importance of legislation and the advent of good practices, where HACCP is a dominant scheme for food safety assurance on global level (Raspor *et al*., 2012). Even more, if we link it to the growing industrial production and processing of food and globalization trends in food supply nets, we face shifts also on the communication side, not just because hardware and software have changed. Taking into account such development, risk communication has also been developing historically. For clarity, we could cluster this development in 4 phases. Phase 1 (1975-1985): emphasis on comparative risk estimates, "arrogance of technical expertise". Phase 2 (1985-1995): emphasis on successful communications, practices from modern marketing, limited success due to lack of trust. Phase 3 (1995-2005): emphasis on social context, trust through commitment. Phase 4 (2005-now): emphasis on comprehensive approach involving new communication means on global scale.

This paper presents state of the art in the area of unique communication environment when foodborne illness starts due to consumption of contaminated food and requests a very specific behavior and reaction of managers of food supply chains towards consumers.

**Methodology**

The methods of research are based on various search engines of a selection of key words and their combinations. We applied searching platforms, like ScienceDirect: (http://www.sciencedirect.com/) PubMed http://www.ncbi.nlm.nih.gov/pubmed and http://scholar.google.com/ in preselected sets of key terms relevant to this study. Then the articles were analyzed for the purpose of this paper.

**Results and Discussion**

Three characteristics distinguish a crisis from an unpleasant occurrence: surprise, threat, short response time (Herman, 1963; Ulmer *et al*., 2009).

Based on these characteristics, a foodborne illness outbreak is a crisis since individuals expect that the food they have purchased will be safe and are surprised when it is not. The presence of microbial contaminants in the food has the potential to cause an array of issues from discomfort to death, which indicates *threat* of serious illness and if not addressed and contained, contaminated food could be widely distributed and consumed due to short response time which is connected to characteristics of microbial growth.

Taking into account the current practice of risk communication, it is essential and relevant to consider four elements (Table 1). Ma (2016) in her study showed three information and source characteristics – trustworthiness, timeliness, and accuracy, along with three platform features – search ability, interactivity, and enhanced usability (including visuals and links) were most important when users formed their perceptions (self, response, process, and information efficacies) towards the website and the information communicated. This shows that while the communication channel is important in determining communication outcomes, information quality also plays a central role (Ma, 2016).

The source of information (Table 2) is very

**Table 1:** Four elements in risk communication practices

| |
|---|
| • The message (information) |
| • The source (origination point of message) |
| • The channel (path) |
| • The receiver (termination point) |

**Table 2:** Most common sources of food safety related information in last decades

| |
|---|
| • Research level |
| • Education level |
| • Public Organizations Responsible for Food Safety level |
| • Consumer organizations level |
| • Food business operators level |

important, however, it is not always well structured and expressed. In the current practice, we mostly face various sources of information and they approach the issue from their own perspective, which is frequently overloaded with characteristics specific to the source. Ma (2016) discovered that consumers commonly identify the websites for information through the use of search engines. This highlights the need for government and health agencies that are interested in communicating food safety information to the public to do their best to get "found". Overall, good practices include adding more relevant keywords, providing timely updates, and incorporating links from other trustworthy sources.

Consumers filter the risk information based mostly on their experience that affects what they hear, how they process and come to understand the information, what they conclude, how they react upon being informed and finally how they actually act (Table 3). For the average consumer, risk is highly subjective and the wording is not always well understood (Ambrožič *et al*., 2010). Consumer behavior and attitudes towards food safety show that the levels of understanding, motivation and trust need to be further cultivated. It has been shown that the present maintenance of food safety in the food chain can easily break down because of different kind of barriers or simple misunderstanding (Raspor and Jevšnik, 2016). The maintenance of information quality along with better media functionalities could improve communication outcomes (Ma, 2016).

In a foodborne illness event (Wilcock *et al*., 2004), if an individual does not receive risk messages early enough, the individual will be unable to protect him or herself from potential harm. Thus, risk messages should be distributed through a variety of formats and channels in order to reach the greatest number of affected publics. Ma (2016) pointed out that individuals only perceive a risk if a foodborne illness outbreak is personally relevant to them. This implies that more localized and

**Table 3:** The most common communication problems in current practice

| |
|---|
| • The information is not what the audience wants to hear |
| • The information is poorly presented |
| • The information is improper |
| • The information is not understood |
| • The information comes from the wrong source |
| • The information is sent via the wrong channel to reach target audience |

**Table 4:** The conceptual characteristics of the process of sensemaking process followed after crisis commence (Weick, 1995)

| |
|---|
| 1. It has to be grounded in identity construction- Identity and identification is central |
| 2. It has to be retrospective- Retrospection provides the opportunity for sensemaking |
| 3. It has to be enactive of sensible environments- People enact the environments they face in dialogues and narratives |
| 4. It is an interaction and interactive process- Sensemaking is a social activity in which plausible stories are preserved retained or shared |
| 5. Sensemaking is an ongoing process- The basic idea of sensemaking is that reality is an ongoing accomplishment that emerges from efforts to create order and make retrospective sense of what occurs- so individuals simultaneously shape and react to the environments they face |
| 6. Focused on and by extracted cues- People extract cues from the context to help themselves decide on what information is relevant and what explanations are acceptable |
| 7. Driven by plausibility rather than accuracy- People favor plausibility over accuracy in accounts of events and contexts |

timely (e.g. real-time) updates may be needed in communicating about foodborne illness outbreaks. As such, health departments may be uniquely positioned to be the center for communications of foodborne illness outbreaks as they are, in general, more aware of local events and have more specific information for consumers.

It is difficult to cope with all the novelties and innovations since it is not always clear what is actually new and what is merely an improvement of existing techniques or protocols. The compilations of different authors or authorities around the world are attempting to solve this issue. However, such information can provide a reference for processors worldwide searching for better ways to improve food safety in their plants. The new technologies have to bring significant improvements into the safety of food. Increased public and industry awareness of the new technologies being used could further promote their use, by small and very small plants in particular, towards improving the safety of food products. The new technologies listed should be viewed as information of the current state of the art (Raspor and Jevšnik, 2009).

Risk communication rises to the challenge of bridging the expert analysis of the risk equation on one side and public reaction and action on the other.

However, many researchers and practitioners in this area in the past wanted to make sense of an incident. The process of sense making sensemaking as seen by Weick (1995) outlines 7 propertie,s which were in the last century additionally extended and cemented but conceptually preserved the basic outline (Table 4).

When we go further with analyses of cases which happened in the last decades, we could identify many phases within every crisis. It is interesting that some of them only had a few phases, some more. In conceptual thinking, we should have seven steps which might overlap when necessary to be used as a relevant tool (Table 5).

During each phase in this scheme, we need relevant tools and procedures. In current practices, there are many Risk and warning message models which may address hazards in food supply chain. The most typical in the food supply chain is HACCP. However, there are currently many practices around the globe to communicate risks to the pub-

**Table 5:** Seven phases along the food borne crisis

| |
|---|
| 1. Admonishment; |
| 2. Risk Assessment; |
| 3. Response; |
| 4. Management; |
| 5. Resolution; |
| 6. Recovery; |
| 7. Alert for the next event |

**Table 6:** The elements of Good Practices for Risk Communication adopted from Sellnow *et al*. (2009)

| |
|---|
| 1. Infuse Risk Communication into Policy Decisions; |
| 2. Treat Risk Communication as a Process; |
| 3. Account for the Uncertainty Inherent in Risk; |
| 4. Design Risk Messages to be Culturally Sensitive; |
| 5. Acknowledge Diverse Levels of Risk Tolerance; |
| 6. Involve the Public in Dialogue about Risk; |
| 7. Present Risk Messages with Honesty; |
| 8. Meet Risk Perception Needs by Remaining Open and Accessible to the Public; |
| 9. Collaborate and Coordinate About Risk with Credible Information Sources; |
| 10. Do not delay decisions |

lic. Each of actual practices is specifically designed to address specific risk or threat and specific cluster of people. Each of them has some specificities, since it is tailor-made for the purpose. Good Practices for Risk Communication (Sellnow *at al*., 2009) as stated gives a sufficient platform for acting in such circumstances (Table 6).

There are a number of functions that a risk communication program and Good Practices for Risk Communication might seek to fulfill. One of the most needed element is adequate communication language. If we leave aside the problem of translation of important food terms from one language to another, we still have to admit that there are three languages communicating food/health risk in current communication practices: professional, public and language which started to be used by communicators in the name of the one who is addressing this issue to the general public. Two of them (professional, public) are well articulated. The one which is commencing in the current communication space by risk communicators needs further support from the professional side but also from the side of particular national language to adopt and integrate many newly coined "scientific terms" to publicly understandable level. Ma (2016) showed three information and source characteristics – trustworthiness, timeliness, and accuracy, along with three platform features – search ability, interactivity, and enhanced usability (including visuals and links) were most important when users form their perceptions (self, response, process, and information efficacies) towards the website and the information communicated. This shows that while the communication channel is important in determining communication outcomes (Ma, 2016), information quality also plays a central role. Consequently, we have to take professional and public language in proper perspective, and we have to implement also developments in food supply nets into clear vocabulary used in mass communication of risks when needed. The *Risk Communicator* profession entering into practice shall be dressed up with all relevant skills for highly professional work (Table 7).

Additionally, the audience plays an important role. It includes consumers who will encompass both old and young as well as food and nutrition enthusiasts, shareholders, organized groups, businesses, special needs consumers (mothers, sick, etc.), hospitals and nursing homes, politicians, policy makers and so on. Ma (2016) established that the risk is perceived only when it is personally relevant. This implies that more localized and timely (e.g. real-time) updates may be necessary in communicating about foodborne illness outbreaks. As such, health departments may be uniquely positioned to communicate foodborne illness outbreak information, as they are generally more involved and aware of local outbreaks. Entities interested in communicating food safety information may consider working with local health departments in the attempt to improve the communication outcome (Ma, 2016).

Understanding Risk Perception is not always easy and it can be easily interpreted in the wrong direction. To avoid such situation, one can help with descriptive analysis (Table 8).

Crisis communication is marked by three distinct phases: pre-crisis, acute crisis and post-crisis (Coombs, 2007). The pre-crisis stage is marked with messages intended to mitigate harm and encourage preparation for the crisis. Communication

**Table 7:** The impact of language style and format when communicating indicated risk in public

| **Less Risky** | **More Risky** |
|---|---|
| • Individual Control | • Controlled by Others |
| • Voluntary | • Involuntary |
| • Familiar | • Unfamiliar |
| • Low Dread | • High Dread |
| • Affects Everybody | • Affects Children |
| • Naturally Occurring | • Human Origin |
| • Little Media Attention | • High Media Attention |
| • Understood | • Not Understood |
| • High Trust | • Low Trust |
| • Consequences Limited/Known | • Catastrophic Consequences |
| • Benefits Understood | • Benefits Unclear |
| • Alternatives Available | • No Alternatives |

**Table 8:** Descriptive element to allocate particular case in less and more risky cluster of food event

| Relevance of the issue | The message from Professional | Interface - Risk Communicator | The message from Media to Public |
|---|---|---|---|
| Perception Position | Scientific | ? | Intuitive |
| | Probabilistic | ? | Yes/No |
| View point | Acceptable Risk | ? | Safety concerns |
| Awareness | Case specific | ? | Generalization |
| Point of interest | Comparative Risk | ? | Discrete Events |
| Affection scale | Average population impact | ? | Personal individual Consequences |
| Emotional issues | A death is a death | ? | Suffering issues |

**Table 9:** Five stage model for responding in situations of high concern and/or low trust

| |
|---|
| 1. Active listening and emphatic responses |
| 2. Provide short clear statements of findings - your main point |
| 3. Provide 1-2 facts to support main point |
| 4. Repeat the statement/main point |
| 5. Next steps/follow-up by provider and patient |

**Table 10:** Major Rules of Risk Communication (based on Covello and Allen, 1988)

| |
|---|
| 1. Accept and involve public as a legitimate partner<br>Your goal is to produce an informed public, not to defuse public concerns or replace actions. |
| 2. Plan carefully and evaluate your performance<br>Different goals, audiences, and media require different actions. |
| 3. Listen to the public's specific concerns<br>People often care more about trust, credibility, competence, fairness, and empathy than about statistics and details. |
| 4. Be honest, frank and open<br>Trust and credibility are difficult to obtain; once lost they are almost impossible to regain. |
| 5. Coordinate and collaborate with other credible sources<br>Conflicts and disagreements among organizations make communication with the public much more difficult. |
| 6. Meet the needs of the media<br>The media are usually more interested in politics than risk, simplicity than complexity danger than safety. |
| 7. Speak clearly and with compassion<br>Never let your efforts prevent your acknowledging the tragedy of an illness, injury, or death. People can understand risk information, but they may still not agree with you; some people will not be satisfied. |

in the acute phase of a crisis involves disseminating, instructing and adjusting information to help individuals cope with the crisis event. Finally, post-crisis communication provides an opportunity for communication after activities have returned to normal, specifically providing an opportunity to explain organizational learning and renewal (e.g., what led to the contamination, what is being done to ensure that another contamination will not occur, and information about their turned safety of the contaminated product) (Table 9).

Risk Perception Model and Good Practices for Risk Communication (Table 10) seeks for solutions which should not be restricted to negative messages and warnings but should include positive 'educational messages' (Jevšnik *et al.*, 2008a; Raspor, 2008). Due to fast spreading of information and rumor mills this is not so trivial to achieve in current world. However, the basic rules as designed by the U.S. Environmental Protection Agency are still fit for the purpose.

Results showed that consumers demonstrated judgments of `optimistic bias" and the `illusion of control', as well as notions of perceived invulnerability to food poisoning from self-prepared foods (Ovca *et al*., 2014; Ovca *et al*., 2016). Statistical associations between perceptions of personal risk, control and responsibility and risk and control attributed to `other people' have been identified. The results of Ma (2016) study indicated that providing high-quality information (information that is accurate, up-to-date, and trustworthy) should still be the priority in communicating foodborne illness outbreak information. When information quality is maintained, Internet-based platforms offer great potential to broaden food safety communication and protect public health. These findings may have negative implications for the effectiveness of consumer food safety education initiatives. It is suggested that consideration of such judgments and associations during the development of future consumer food safety risk communication strategies may increase their effectiveness also at home (Redmond and Griffith, 2004; Jevšnik *et al*., 2011; Raspor *et al*., 2013).

## Conclusion

Ma (2016) pointed out that traditionally, food safety information has been communicated through push media that are passive in message delivery, such as TV and newspapers. In fact, the most common outlets for food safety information have been newspapers, television, and radio (Almanza *et al*., 2003). Food safety communication in the sense stressed by Ma (2016) is similar to marketing communication; if you want consumers to use the information, it is important to make it easy for them to find such information – and one way to achieve this is to draw consumers' attention to the most important and relevant part of information.

It is necessary to respect all good practices in the food supply chains/ nets (Raspor and Jevšnik, 2016) or at least major Rules of Risk Communication as specified in this paper. A fundamental concept of risk communication is that people experiencing stress typically have difficulty hearing, understanding, and remembering information. A central issue of risk communication is that people's perceptions of the magnitude of risk are influenced by many factors, some of which are very diffused and hard to define. Sandman (1989) pointed out that there is low correlation between the technical seriousness of a risk (for example, how many people die from the risk) and its cultural seriousness (for example, how many people get upset by the risk and how badly it upsets them). So when we are in a situation to address people we have to perform this in an honest and open way, telling them what can be done to cause as little damage as possible.

Assessing all interactions within food supply chains, we see that many contact points do not have the attention they would deserve. This complexity opens a question: shall we really discuss the future of food safety management in a food chain? This implies that we accept linearity as a key principle in current food systems. We know from daily practice that this is not the case (Raspor and Jevšnik, 2016). Thus, we shall start to redesign our approach and thinking, and we shall start to think about food supply networks where Risk communication is expressed and well promoted. Only such holistic approach will build an efficient system and mutual trust between food suppliers and food consumers.

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