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Q9+ Ten Years Examining Risk Communication

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ABSTRACT

This paper addresses risk communication, its purpose from a Q9 point of view, and ways that risk communication can be improved and contribute to better decisions and actions. Risk communication and its purpose are defined in ICH Q9. Despite the simplicity of concepts, risk communication has proven to be difficult. Categories of problems in the risk communication process are identified. These include technical problems, semantic problems, and effectiveness problems. Since risk decisions are based on the adequacy of risk communication, it behooves us to minimize problems and improve risk communications as much as possible. A table of comparative risk concepts and messages for application in risk communication is presented. An extensive listing and discussion of ideas for application to more effective risk communication is provided.

Risk communication is an important component of quality risk management as described in the ICH Q9. It has not received as much consideration as the other parts of Q9. Risk communication must be made more effective – our risk decisions depend on the quality of our communication. Better risk communication will result in better decisions ultimately contributing to patients receiving medicinal products with the high levels of quality, safety, and purity that they deserve.

INTRODUCTION

In the ten years since the ICH Q9 Guideline (1) was published, much has been discussed and written about risk assessment, risk evaluation, and risk reduction as used in the area of pharmaceutical and biotech manufacturing and quality. For example, ways to establish rating scales, the limitations of brainstorming, and risk treatment strategies are now much more familiar to new practitioners, managers, and regulators alike. One topic that has not received as much attention as those listed above is risk communication. This is in contrast to the extensive research and writing on risk communication to patients and users of FDA-regulated products of which some of the results can apply to QRM.

In this paper, we will look at risk communication, its purpose from a Q9 point of view, and ways that risk communication can be improved and contribute to better decisions and actions.

DEFINITION

Q9 defines risk communication as: *The sharing of information about risk and risk management between the decision maker and other stakeholders* (p. 8), and provides a limited description of what risk communication includes

“The output/result of the quality risk management process should be appropriately communicated and documented… Communications might include those among interested parties; e.g., regulators and industry, industry and the patient, within a company, industry or regulatory authority, etc. The included information might relate to the existence, nature, form, probability, severity, acceptability, control, treatment, detectability or other aspects of risks to quality. Communication need not be carried out for each and every risk acceptance. Between the industry and regulatory authorities, communication concerning quality risk management decisions might be effected through existing channels as specified in regulations and guidances.” (p. 5)

According to Q9, the purpose of risk communication is to:

> "Provide guidance on the principles and some of the tools of quality risk management that can enable more effective and consistent risk based decisions, both by regulators and industry, regarding the quality of drug substances and drug (medicinal) products across the product lifecycle." (p.1)

More broadly, risk communication serves to share information, change beliefs (i.e., the mental model or picture one has of how a system is organized or works), and change behavior (2). When the risk communication has had an impact, it can be seen directly (in changed behavior) or indirectly (changed beliefs that later may cause a change in attitude or behavior).

One can see that decision making, that is determining the appropriate actions to take in a given situation, is at the foundation of QRM. Risk communication, then, serves as an ongoing way of providing the information to those internal and external decision makers and stakeholders who have a legitimate interest in the situation and the decisions made concerning it.

THE COMMUNICATION MODEL

The classic, simplest model of communication consists of the following:

(a) Sender who originates the message

(b) Transmitter that encodes the message into a signal so that it can be passed on

(c) Channel or medium for the message's transmission

(d) Receiver that accepts the transmission and converts it back into the message, and

(e) Destination that is the recipient of the message (3).

Anyone who has played the party game "telephone" has seen how a message can get distorted as it moves from the sender to receiver, often because a rather complex message is initiated-- the message is transmitted in a whisper and given without repetition so any noise can interfere with what is being said; a perfect formula for chaos and, at least in the game, many laughs. In any type of serious communication—communicating risks in our case—we don't want chaos, confusion, or laughs: we want there to be true fidelity between the message that is given and the message that is received.

Shannon and Weaver identified another component of communication that is unwanted: noise (3). Shannon worked for Bell Telephone Laboratories and was particularly interested in the role of telephones in communication, so these researchers' attention was placed on factors that could introduce noise into the transmission and affect understanding and results.

Communication Problems

There are three categories of problems that Shannon and Weaver identified in the communication process. These are:

- Technical problems – the accuracy transmitting the signal between the transmitter and the receiver
- Semantic problems – issues in the interpretation of the information by the receiver compared again the sender's intended meaning
- Effectiveness problems – the success of the intended result of the information that has the desired outcome or result

In terms of risk communication, there can be technical problems if a report is garbled or if color codes are not apparent on a heat map, but it is more likely that semantic and effectiveness problems will be more significant. Semantic problems, for example, could be the receiver misinterpreting a vague term like "low risk" or "high likelihood of occurrence." An effectiveness problem might be a decision manager who is not persuaded by the communicated message to take appropriate risk-reducing actions.

In the case below, the real-life impact of a problematic communication can be seen.

AN EXAMPLE OF A LESS-THAN-EFFECTIVE RISK COMMUNICATION

In October 2015, print and electronic media ran headlines such as:

- *UN health body says bacon, sausages and ham among most carcinogenic substances along with cigarettes, alcohol, asbestos and arsenic* (4)
- *Experts attack claims that bacon is 'as big a cancer threat as smoking'* 5)
- *Bad Day For Bacon: Processed Meats Cause Cancer, WHO Says* (6)
- *Bacon Causes Cancer, But Don't Worry About It'* (7)

One newspaper quoted a woman selling sausages in Frankfurt, Germany as saying: "It's total nonsense. If it were true, every German would have already died of wurst, using the German word for sausage" (8).

The cause of this media excitement was a report entitled, *Carcinogenicity of consumption of red and processed meat* (9). A press release summarizing the report from the World Health Organization (WHO) said, "Processed meat was classified as *carcinogenic to humans* (Group 1), based on *sufficient evidence* in humans that the consumption of processed meat causes colorectal cancer" (emphasis in original, 10). An accompanying question-and-answer document provided more information:

Q. Does it mean that consumption of processed meat is as carcinogenic as tobacco smoking and asbestos?

A. No, processed meat has been classified in the same category as causes of cancer such as tobacco smoking and asbestos (IARC Group 1, carcinogenic to humans), but this does NOT mean that they are all equally dangerous. The IARC classifications describe the strength of the scientific evidence about an agent being a cause of cancer, rather than assessing the level of risk." (11)

Despite the detail provided by WHO, those writing the headlines, if not the more detailed news reports, demonstrated semantic problems. For example, some writers conflated hazard (i.e. the source of harm) and risk (i.e. the combination of likelihood of occurrence and impact). Others failed to differentiate between absolute risk and relative risk. Readers of these news reports (the destination or recipients of the transmission) may also have experienced semantic problems if they did not understand the difference between absolute (i.e. the observed or calculated risk of developing a disease) and relative risk (i.e. the ratio of the chance of a disease developing among members of a population exposed to a factor compared with a similar population not exposed to the factor). (12). Searching different media sources, one could eventually find a reporter who put the information into a more meaningful explanation and context.

"The scientific evidence linking both processed meat and tobacco to certain types of cancer is strong. In that sense, both are carcinogens. But smoking increases your relative risk of lung cancer by 2,500 percent; eating two slices of bacon a day increases your relative risk for colorectal cancer by 18 percent. Given the frequency of colorectal cancer, that means your risk of getting colorectal cancer over your life goes from about 5 percent to 6 percent…" (13).

This case also displays an effectiveness problem that Shannon and Weaver described. The headlines and most news stories did not provide a clear answer to the "So what?" question. Specifically, how was the receiver to use the information? What decisions are to be made? What actions should be taken? Should one reduce the amount of cured meat and bacon at breakfast? Or, should all cured meats and bacon be totally avoided?

In examining risk communication to patients, researchers have looked at the risk message that is being conveyed and how the patient uses that information (14). Table 1 provides a summary of this along with how that risk message could be used by decision makers. The originator of the risk communication needs to be clear as to what outcome is intended by the recipient of the risk message. For example, is it simply to be aware of a potential issue (i.e., if you eat lots of bacon every day of your life, don't be surprised if you get colorectal cancer!). Or is it to provide the recipient information that they can use in making a data-driven decision about the risk (i.e., "if you eat two pieces of bacon every day, you will increase your lifetime risk of developing colorectal cancer from 5 in 100 to 6 in 100").

RISK CONCEPT	RISK MESSAGE (EXAMPLE)	PURPOSE OF MESSAGE
Possibility	It could happen / it might not happen.	Awareness, avoid surprise
Relative possibility	It is more likely to happen.	Recognize best option
Comparative possibility	This is more likely to happen than that.	Recognize best option
Categorical possibility	There is a high chance of this happening.	Motivate to act
Relative probability	This risk is higher by this much (e.g., 50%).	Recognize best option
Absolute probability	The risk is this (e.g., 10%).	Motivate to act
Comparative probability	The risk is 20% if I do X; it is 80% if I do Z.	Make magnitude dependent decisions on options
Incremental probability	The risk will increase by 25% if I do this.	Make magnitude dependent decisions on options

TABLE 1. RISK CONCEPTS AND MESSAGES (BASED ON ZIKMUND-FISHER, 14

MAKING DECISIONS CONCERNING RISKS

Decisions about risks are ideally supposed to be made rationally, according to a methodical, logical process such as with "risk-based decision making" (15). Yet, as seen in economic decisions, including those that involve economic risks, humans often "misbehave" and do not follow predicted theory (16). Decision makers – including experts – use intuition as well as more in-depth analysis techniques which have been shown to be affected by cognitive fallacies and biases (17). See Ramnarine for a more complete discussion of biases (18).

Those making decisions regarding risks, including risk-team members estimating hazard likelihood and impacts, need to be aware of these factors and take steps so as to reduce their impact on decision results (17).

IDEAS FOR MORE EFFECTIVE RISK COMMUNICATION

To reduce the noise that can interfere with a risk communication and to improve the understanding and effectiveness of the risk message, there are practices that can improve the risk communication process. These include the following:

- **Acknowledge uncertainty**. There is often a significant amount of uncertainty surrounding a quality risk assessment. For example, the process and/or product may be new or only a few lots of an active pharmaceutical ingredient have been made in the recent past. Typically, such uncertainty occurs in the estimation of likelihood of occurrence rather than in the identification and severity ranking of impacts. It is recognized that the more uncertainty that there is in an assessment, the more risk that is present. In other words, since we don't know for sure, the risk estimate could be higher or lower; to be conservative and to hedge one's estimates, risks are usually rated higher.

Using ranges or identifying what factors have uncertainty attached to them can be useful. Visual representations may be helpful as well, for example, something similar to how weather maps show cones of probability for how a hurricane may travel over time. Additionally, having a 10-point scale for rating likelihood, impact, or detectability implies that there is more known, i.e., there is more certainty, than when using a three- or five-point scale. (Note – the anchoring-and-adjustment cognitive fallacy and optimism bias should also be considered when providing a numerical range.) Regardless of the risk scale used, any sources of uncertainty that might affect risk communication should be noted.

- **Assess, not justify, a risk.** It is relatively easy to read through a risk assessment and realize the intent was not to perform a fact-based inquiry of the risks, but rather, to justify a decision, often one that had already been made. In these cases, the outcomes do not withstand regulatory scrutiny; confirmation bias and expectation bias are quite apparent. When QRM is properly executed, there should be alignment between the risk question that is initially asked, the risk assessment performed, and the risk treatment that is put in place. Telling the "risk story" properly and in context is the responsibility of the risk message originator.

- **Provide a context to support understanding.** In some situations where the technology, process, product, or risks are not commonly seen, it can be helpful to include background information in the risk communication. This could be an attachment with a flow chart, a narrative, or pictures of the equipment involved. Doing this is more than just a "nice to have"; research has shown that the more knowledge and understanding a person has about a system and its risks, the more willing they are to accept higher levels of risks (19). Additionally, providing a documented rationale for why items were rated as a particular level of risk can be very helpful, particularly when the risk reports are examined when team members are no longer available (or able) to explain how rating decisions were made.

Supplying additional information is consistent with knowledge management — what ICH Q10 (20) identifies as one of the two "enablers" of a modern system (quality risk management being the other enabler). This in turn is aligned with "process understanding," an important contributor to product quality and process control, discussed in ICH Q8 (21) and Q11 (22).

- **Transparency and trust.** One of the most important elements in risk assessment and risk management is the credibility – the trustworthiness and competence, as perceived by the stakeholders – of those involved. If the stakeholders do not have confidence in those conducting, managing, or sponsoring the activities, the stakeholders may demand higher levels of control or decide to accept only the lowest levels of risk. Conversely, if there is trust, the stakeholders may be willing to accept more risk. Open, honest, two-way communication between all the stakeholders is essential when working to assess and manage risks. Trust

and credibility is key in when communicating with stakeholders and particularly with regulatory agencies (23). When the industry was starting to formally use QRM, some firms were reluctant to completely disclose their risks, preferring to give agency representatives only a short, two-page summary of the risk assessment. More recently, however, firms have become more comfortable sharing complete risk assessment documentation; regulatory agencies are more persistent in asking for full documentation. They have also become more knowledgeable on what a firm does in a QRM exercise.

- **Rating scales and terminology.** In a risk documentation package it is very important to communicate the rating scales that were used in making determinations on likelihood of occurrence, severity of impact, and detectability. Scales with simple likelihood categories like “low”, “medium”, and “high” provide very little meaning as everyone can interpret them differently. Scales that reflect the use of the equipment or real-life experiences and that have some level of quantification are much more beneficial. For example, assuming that 20 lots of product were made a year and a five-year period was assumed, categories could then be such as very infrequently (0-10 events per 100 lots), somewhat frequently (11-25 events per 100 lots), and very frequently (>26 events per 100 lots). (This topic is explored in more detail by Waldron; 24)

- **Provide information that supports credibility.** In communicating a QRM activity, that had been performed, identifying those participating as members of the QRM is standard practice. Including a sentence that describes their expertise, for example, “Chris Smith, B.S., M.E. – Process engineer with 10 years experience in formulation development” provides additional credibility for the team, its members, and its results.

- **Communicate the big picture.** Communicating (including documenting) specific risk management activities is critical but it is also important for decision makers and some key stakeholders to understand the broader risk environment. Risk registries and graphical heat maps can be useful tools in this effort allowing a firm’s management to track and trend efforts to reduce risks. (In some regions, regulatory authorities often ask to see a firm’s risk registry of quality risks.)

- **Consistency.** Research done on how patients making treatment decisions evaluate numbers have shown that there is not a clear advantage to expressing quantitative data in the form of percentages (i.e., 10% of units) over frequency (i.e., 10 in 100 units) though at least some authors suggest the use of frequency (25). Whatever format is used should be done consistently. Also, keeping denominators the same (e.g., 100 units) allows for easier comparability.

- **Provide ongoing communications**. Monitoring and periodically reviewing the completed QRM activity is a requirement (1); it is a way to determine if the assumptions made during the process are still valid and if any external factors might have an impact on the decisions that were made. Communicating to decision makers and stakeholders information that results from the monitoring and periodic review can be simple and yet important way of keep decision makers and other key stakeholders current on the state of specific risks.

CONCLUSIONS

Risk communication is an important component of quality risk management as described in the ICH Q9 guideline but it has not received as much consideration as the other parts of Q9. Risk communication can be made more effective by considering research from other fields that has identified flaws in how people make decisions as well as ways to minimize the deficiencies and improve communications and the quality of subsequent decisions. The result will be better risk communication and better decisions that will contribute to patients receiving medicinal products with the high levels of quality, safety, and purity that they deserve.

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