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Background document:

**Current Practices and Challenges of
Risk Communication in Canada**

**Prepared for: Workshop on Improving the Public Communication of
Chemical-Related Health Risks**

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1. Introduction

The public often receives multiple messages about the existence, nature, magnitude, and acceptability of chemical-related health risks. These messages can range from concerns about existing or emerging risks, to scientific risk assessments, and the legal and institutional arrangements used to manage the assessed risks. Chemical-related risks must therefore be effectively discussed with the public, so as to help clarify any ambiguity individuals may have regarding the potential chemical health risk at hand and support informed decision-making.

Risk communication is an integral part of the risk assessment and risk management processes. The fundamental goal of risk communication is to provide meaningful, relevant, and accurate information in clear and understandable terms, and targeted to a specific audience. It serves to inform the public of potential risks so that appropriate and timely actions can be taken to mitigate or prevent adverse health consequences. As such, tools and guidance on the accurate and informative communication of risks can assist policy makers, and diverse public professionals to foster better-informed societal responses to risk, or emerging risk situations.

The objective of this workshop is to identify best practices and other considerations that would assist policy makers, and diverse public professionals, to improve the practice of risk communication in Canada so as to build public understanding of: (i) chemical-related health risks; and (ii) the ways in which these risks can be appropriately addressed. To accomplish this, it is important that all key individuals involved in the risk communication process have a general understanding of the present practices and challenges of communicating risk in Canada. Important concepts and strategies currently used in risk communication are discussed in the background document, accompanied by various discussion points to consider.

2. Risk communication: current practices

2.1 Who is responsible for risk communication in Canada?

The communication processes model proposed by Leiss and Krewski (1989) sought to build upon previous risk communication models, to provide a more complete and dynamic representation of risk communication (**Figure 1**). The idea underlying this concept is that risk communication is a process that essentially involves the interplay of two social domains, called the ‘expert sphere’ and the ‘public sphere’. This interaction is constrained both by the nature of the risk and by the conventional institutional channels that direct the flow of information and opinion in contemporary society.

On the ‘expert side’ (**Figure 1**), we must recognize that hazard identification and risk estimation are matters requiring considerable technical knowledge, including measurements and analyses employing highly sophisticated methodologies. The probabilistic dimension of risk necessarily entails the use of technical language for its description. In addition, insurance coverage and legal liability mean that non-scientific but nonetheless highly professional expertise also will be called upon in the assessment of risks and their consequences.

On the ‘public side’, the citizenry as a whole through political decision-making processes, including the electoral support of politicians and parties with certain stances

on risk management, makes the final determination of risk acceptability. Most decisions will still be made by public and private-sector officials, acting with the advice of experts in a great variety of forums. However, in a democratic society, the parameters within which the discretionary authority of these officials may be exercised at any time will be set by the general character of risk acceptance and risk perception in society as a whole, and by relevant economic, social, and political factors. The state of societal risk perception and risk acceptance must be factored into risk management decision making; if risk managers do not do so, they themselves run the risk of igniting bitter public controversy and possibly the reversal of their decisions.

The model highlights the tension between the expert and public spheres, and assumes that all participants have an identifiable set of interests that bear upon their involvement and that play a part in the outcome of risk communications processes.

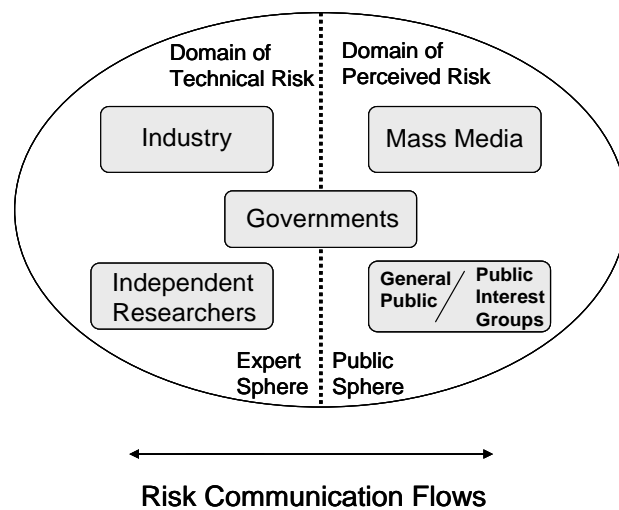


Figure 1. Schematic illustrating the communication processes model. Risk communication flows between the ‘Expert sphere’ and the ‘Public sphere’, and assumes that all groups that participate in risk communication have a specific agenda that drives their involvement in the process. These special interests are taken into consideration and can heavily influence the outcome of the risk communication process (Leiss and Krewski, 1989).

Discussion points

- Are any key groups not represented in this model? If so, would they belong in the expert sphere, the public sphere, or both spheres?
- What is lacking in the current process regarding interaction between groups that have a role in communicating risk information to Canadians?
- How could this model be improved or updated?

2.2 Who is best positioned to credibly communicate chemical-related risks with the Canadian public?

It is imperative that risk communicators make a good first impression on their audience. The reaction of individuals to risk messages depends on the confidence they

have in risk communicators. Providing people with information and facts regarding the chemical risk is not sufficient to build trust or sustain the confidence of the public (OECD, 2002). If the source of the risk message does not demonstrate integrity and credibility, members of the public may instinctively develop a negative perception of this individual or of the organization they represent, which in turn may influence the public's perception of the risk being discussed.

Establishing trust is extremely important in risk communication. The key factors that may influence whether members of the general public trust risk communicators include: caring and empathy; dedication and commitment; competence and expertise; and honesty and openness (Slovic, 1999). However, if the individual is unable to convey empathy towards the audience, the other three groups of qualities will not likely sway the negative public opinion that has been formed about this individual or organization. "People want to know that you care before they care what you know."¹

In the domain of risk communication, it has been observed that citizen advisory groups, health professionals, safety professionals, scientists, and educators have high to medium trust compared to other stakeholders (Krewski et al., 2006). Higher trust levels or credibility enable an individual or an organization to effectively communicate risk to stakeholders. A source with lower credibility assumes the credibility of the source with the highest credibility that agrees with its position on an issue. For this reason, it is important for risk communicators to align themselves with individuals that have equal or higher credibility in the eyes of the public if they want to ensure that the risk message is well received and understood.

Discussion points

- What other individuals or groups may be considered by the public to have high to medium credibility?

2.3 How do experts review, explain, or communicate risk issues?

Risk communication entails a dialogue between government, non-governmental and non-profit organizations, industry, and academics with the public on current risk issues. To ensure good communication with other stakeholders, it is recommended that risk communicators conduct the three following actions: 1) identify and understand the stakeholders involved, 2) understand the risk perception of stakeholders, and 3) develop and communicate risk messages.

2.3.1 Identify and understand the stakeholders

Risk communicators should appreciate the importance of understanding and characterizing his/her target audience. Different stakeholders can have very different needs, concerns, and agendas regarding risk issues, which can change depending on the situation. Risk messages should therefore be designed with the target audience in mind, to ensure the interests and priorities of the various stakeholders are addressed.

¹Ronald Brecher and Trevor Diggins. Health Canada training program *Communicating health risk information to stakeholders*. February 23, 2006. Ottawa, ON.

Every stakeholder involved in risk communication, including the risk communicator, has important roles and responsibilities to fulfill. The roles and responsibilities of stakeholders frequently involved in risk communication are discussed in **Table 1**, as well as a brief explanation of how or why risk messages may be different depending on the stakeholder (FAO, 1998).

Discussion points

- Are any key stakeholders missing from the list in Table 1? If so, what are their roles?

2.3.2 Understand the risk perception of stakeholders

To effectively convey risk information to stakeholders, the risk communicator must first attempt to identify what determinants or pre-conceived factors may inherently influence decisions made by individuals regarding the management of a risk. Risk is pervasive in our society, and cannot be totally eliminated despite an often-expressed public desire for “zero risk”. The concept of acceptable risk is dependent on an individual’s perception of the risk, as well as available scientific information. Risk is not solely a scientific issue; it is perceived differently depending on the values and beliefs of the person, on some well-understood characteristics of the hazard (e.g., familiarity, severity, controllability), and on the societal situation (Miller and Soloman, 2003).

The most cited source for risk information by the public is the mass media (Krewski et al., 2006). Although journalists are responsible of reporting risks in context (Griffiths, 2003), some can seek to bring a problem to the attention of the public and can sensationalize risks in their coverage, which tends to install fear about risk issues into the minds of individuals. Since individuals generally react to risk emotionally (Sandman, 2008) and believe what they hear and read in the media, they can begin to live in a constant state of anxiety regarding risks and their perception of risks can become reality.

When people are experiencing intense feelings, their perceptions or mental models (i.e., an internal conception for how something works in the real world; Granger Morgan et al., 2002) of risk can differ immensely from those of experts. The disparity between the mental model of experts and non-experts regarding a risk, which is often related to the two different levels of knowledge about the subject matter, can diminish the efficacy of risk communication (Granger Morgan et al., 2002).

Psychological and social factors can have considerable influence on risk judgments, and are unique to various societies and cultures (**Table 2**; Krewski et al., 1995). Gender, age, geographical region, ethnicity, religion, level of education, and socio-economic status are all factors that can also affect risk perception. For example, females perceive risk higher than men, older people higher than younger people, and less educated people higher than educated people (Krewski et al., 1995; Krewski et al., 2006). Understanding how all of these factors can impact an individual’s perception and acceptability of risk improves the ability of risk managers to develop strategies to effectively communicate risks to the public (Bier, 2001); this is essential since the public’s views are considered when selecting appropriate risk management strategies.

Table 1: A description of the roles and responsibilities of stakeholders frequently involved in risk communication.*

| Stakeholders | Description |
|------------------------------------|--|
| Governments | Governments must manage public health risks and communicate information about risks to citizens. Decision-makers within governments are required to communicate with stakeholders on the development of scientific and technical analyses, and to involve the public and other interested parties in the risk analysis and risk communication processes. In addition, it is the government's responsibility to provide risk information to the public in a consistent and transparent manner. |
| Industry | Industry leaders are responsible for the production of safe and quality products for its consumers. Therefore, it is a corporate responsibility to communicate information regarding risks to the affected consumers in a timely manner. Industry is a major source of information for risk assessments, and the participation of this stakeholder in the risk management process is critical for successful decision-making. The interests and concerns of industry regarding risk issues are usually of financial and legal nature; therefore risk communicators should include information on these issues in their risk messages. |
| Public | The participation of the public in the analysis of risk is viewed as an essential element of a successful public health program. Early participation ensures the risk analysis process addresses public concerns and results in improved public understanding of the risk assessment and of how decisions are made. The public has a responsibility to raise their concerns and opinions to risk managers, so that these issues are considered in the decision-making process. Public representatives and consumer organizations can also work with governments and industry to ensure that risk messages addressed to the public are appropriately formulated and delivered. |
| Academia and research institutions | Members of the academic and research community may play an important role in risk analysis by contributing their technical and scientific expertise. They are often asked by the media to comment on government decisions regarding risks. Scientific or technical experts can serve as independent sources of information in the risk communication process. |
| Media | The media plays a critical role in risk communication, which depends on the risk issue, the context, and the type of media involved. The media can transmit, create, or interpret a risk message. It is thus important to involve the media in all aspects of the risk communication process and to ensure that the risk messages they are provided are clear and comprehensive. |
| NGOs | Public interest groups or non-governmental organizations (NGOs) play an important role in raising public awareness of potential sources of health and environmental risk, and in providing practical information to parents/families – directly and/or via key intermediaries such as service providers and the media – about how to reduce or avoid potentially harmful chemical exposures. Staff of NGOs may include professionals with extensive scientific, medical or public health education, among other areas of expertise, thus NGOs may operate in both the “expert” and “public” domains of the risk communication paradigm described in section 2.1 above. Many NGOs aim to promote public health and well-being by increasing awareness of potential sources of risk, fostering citizen action, and advocating for protective policies and regulations. NGOs are effective at getting understandable information into the hands of the general public, and are thus a key player in risk communication. |

*Based on (FAO, 1998).

Table 2: Factors that can affect risk perception*

| Factors | Examples |
|----------------|--|
| Psychological | vulnerability, anger, lack of trust, grief, denial, fear, anxiety, depression, isolation, frustration, guilt |
| Social | economic issues, costs associated with the risk issue, conflicts between different groups within the community, jurisdictional issues, relocation of the community |
| Other | gender, age, geographical region, ethnicity, religion, level of education |

*Adapted from Krewski et al., 1995.

With respect to public understanding of risk, Slovic (1986) states that an individual's perceptions of risk is often inaccurate, risk information may frighten and frustrate the public, strong public beliefs are hard to modify, and public views are easily manipulated by risk presentation format. Therefore, when communicating risk information to the public, one should demonstrate consideration, acknowledgement, and understanding of the audience's concerns by:

- taking people's concerns seriously but not personally when responding to outrage
- not minimizing individuals' experiences or apprehensions concerning the risk issue
- listening actively to the audience and remaining calm
- not trying to "win" the argument
- letting the audience voice their opinions
- speaking clearly and with compassion; being honest, frank, and open with the audience.
- if pertinent, acknowledging lack of trust, communicating the steps being taken to prevent the loss of trust, and asking the audience how trust can be regained (Hance et al., 1988)

Risk perception is a very powerful factor that affects risk management. The perception, values, and feelings of individuals regarding chemical and health related risks are factors that are as important as numerical or factual scientific data. Risk communicators should recognize the limitations of public consultations and overcome them to ensure that appropriate risk management decisions are made.

Discussion points

- What are examples of other factors that can affect the risk perception of individuals?
- How else can risk communicators demonstrate consideration, acknowledgement, and understanding of the audience's concerns?

2.3.3 Develop and communicate the risk message

In addition to considering risk perception and the type of stakeholders involved in risk management, there are several other factors to contemplate when developing an effective risk message. One of the first things to do before undertaking a risk communication effort is to think through the what, who, and why regarding the communication of risk assessment results. Identifying the most important problem(s) to be overcome by the risk message will help decide how to design the message and what information should be included (Bier, 2001 and references therein).

The wording in risk messages must be chosen very carefully. Words that may be clear to risk professionals in terms of scientific and technical meaning can signify something very different to the public. Jardine and Hruddy (1997) indicate that the use of terms such as “significant versus non-significant”, “negative versus positive results”, “population versus individual risk”, “relative versus absolute risk”, or “association versus causation” in risk messages can lead to confusion and even opposite interpretation of the message by the target audience.

Several terms expressed with numbers also need to be clearly conveyed in risk communication, such as: concentrations (e.g., in parts per million or billion); probabilities (the likelihood of the event); and quantities (e.g., tons of chemical released, volume of toxic effluent released into an aquatic environment). The most difficult terms to present and explain are risk and probability. Probability of occurrence can be presented in risk communication messages verbally, numerically, or graphically. Bier (2001) reviewed the literature and reported that the correspondence between a verbal and numerical presentation of probabilistic information is very variable. Guidance on how to translate numerical probabilities into lay language does not exist; therefore risk managers must be very careful in choosing their words when explaining such concepts to stakeholders. Below is a list of strategies and techniques that can help managers effectively communicate risk issues.

- use clear and simple language and avoid using jargon and technical or scientific terms.
- do not present numbers that are complicated to understand for non-experts (e.g., avoid using ratios or exponents such as 10^{-6}).
- emphasize actions that the public can take in the risk message, as well as where to get further information (i.e., practical advice is given to the public).
- do not express your opinion.
- avoid risk comparisons (e.g., as risky as flying), or use commonly understood comparisons.
- explain uncertainties and data gaps associated with the risk issue clearly and concisely.
- discuss the positive/benefits when giving information on nature of risk to an audience.
- do not mention probabilities, as members of the general public typically don't understand this concept and are more likely to relate to information on outcomes (e.g., ~2300 die of this disease/year).

If the purpose of the risk message is to efficiently communicate risk orally to stakeholders, there are several points that risk communicators can bear in mind when speaking before an audience. The following is a list of strategies and techniques that should be considered when communicating with stakeholders in person:

- develop lay explanations for technical terms before public meetings.
- speak slowly and repeat important points at least three times.
- do not talk down to the audience.
- present messages in visually interesting ways (graphics, good examples, pictures).
- use personal experience, examples, and anecdotes to make technical data seem less complex.
- give the media a statement that they can quote to avoid being misquoted.

The format of the risk message will depend on the purpose for which the message is developed. A risk message that is designed to promote awareness to the public (one-way communication) would be designed very differently than a communication message that is developed when a decision on the course of action must be made and communication with the public is necessary (two-way communication). **Table 3** lists examples of risk message formats used to communicate risk in different circumstances.

Table 3: Examples of various types of risk messages.*

| Reason the risk message was developed | Type of risk message |
|--|---|
| Risk Notification | dear health professional letter, health advisories, drug and biological products labels, signage, and packaging |
| Risk Information | news releases, web sites, publications, media interviews speaking engagements, conferences and workshops |
| Risk Awareness | social marketing programs, public education programs, mass media communications, pamphlets |
| Risk Management | oral communications, public hearings, discussion/working groups, one-on-one conversations, interviews |

*Based on Health Canada, 2005 and Krimshy, 2007.

There are many ways of presenting information in risk messages. Appropriate choices can range from verbal, written, qualitative and quantitative means. The command and cajole approach can also be used in risk messages. Johnson et al. (1988) used qualitative (verbal) and quantitative (both verbal and numerical) formats along with the command (what reader should do) and cajole (what reader may want to consider in reaching a decision) approaches in designing risk messages for a study on the risks of radon in homes. Whereas the command-qualitative approach increased learning, the quantitative booklets led to greater consistency between the perceived and objective risk. The cajole-qualitative approach had a positive effect on the likelihood of the individual making an appropriate recommendation to their neighbor. This study demonstrated that the preferred format for presenting risk information varies with the purpose of the risk communication effort – to educate or promote awareness, to affect risk perceptions or to

motivate people to take appropriate actions. It is therefore important to remember the purpose of the risk message, and to test its appropriateness and efficacy once developed by having it peer reviewed by a third party, undertaking pilot testing before it is used on target audiences, and/or evaluating the communication of the message with focus groups, surveys or questionnaires.

Discussion points

- Who should be involved in developing/communicating the risk message? Who shouldn't be and why?
- Are there other reasons why a risk message may be developed?
- If so, what are some examples of the types of risk messages that could be developed?
- What other strategies or techniques can be used to present risk information orally?

3. Role of key intermediaries

Intermediaries play a critical role in communicating risk to the public because they are often the first or only people with whom citizens discuss certain risk issues. Intermediaries such as teachers, day care workers, nurses etc. are very similar to stakeholders in that they communicate risk to individuals; however they sometimes do not possess the information, education and/or training regarding the communication of specific risk issues. The lack of knowledge or experience of some intermediaries in communicating risks with their clients must be mitigated as this can negatively affect the safety of the public. As one of many possible examples of the role of key intermediaries in risk communication, a brief summary of the challenges that medical professionals face in providing risk information to the public and strategies on how risk communication may be improved are provided below.

3.1 Physicians and other health care providers

Risk and uncertainty is a fundamental part of the health care profession, and is a subject that medical practitioners and providers face every day. Professionals working in health care are in direct contact with the public and often interact with patients or clients on a one-on-one basis. It is their responsibility to convey new and existing information on health-related risks to patients, in the most comprehensible and effective manner possible. Although risks in health care are usually much higher, uncertain, and complex than for other professions, very few medical professionals have training in risk communication (Paling, 2003).

The development of more original and efficient methods to inform and educate physicians and other health care providers on the safety of drugs or chemicals and biological products could help improve the communication of health risks to the public. It is believed that many practicing physicians lack the time to actively seek out new drug safety information if it is not directly sent to them. "Dear Health Professional" letters are frequently sent to medical doctors but are considered a relatively ineffective method of communicating risk information to physicians (Cranston, 2005). Some physicians choose to consult with other physicians on current data related to product safety, which is an ineffective approach if both physicians do not have the latest risk information. In addition, some health care providers including physicians may not know where to look

for health risk information, or may be unaware of the possible risks of certain products (e.g., day care operators regarding toys contaminated with harmful chemicals).

Appendix 1 gives examples of where individuals could find quality information on risk communication and chemical risk issues.

Another issue with health risk communication is that some individuals or organizations advise the public to seek health information on chemical exposure from their physician. As intermediaries, physicians must consequently be prepared to answer questions about the risks of exposure to environmental hazards such as toxic chemicals. However, chemical toxicity outcomes are likely unfamiliar to medical doctors, as these usually involve involuntary exposure and much uncertainty regarding the probability of an adverse outcome (Miller and Soloman, 2003). Providing physicians with the education and training in environmental health is therefore essential if the public is to be well informed on chemical risks.

Discussion points

- Physicians and health care workers are examples of key intermediaries. Are there other examples of individuals or groups that play a similar role in communicating risk to the public?
- How can risk managers improve risk communication messages or strategies to better target key intermediaries?

4. Situating science and scientists in a policy and societal context

4.1 Lack of interaction between scientists and policy makers

The main goal of risk communication is for stakeholders to exchange information about the existence, nature, severity, and acceptability of risks and to collectively decide on ways of mitigating these risks (Myres and Gidda, 2004). One way of improving risk communication could be to draw emphasis on the importance of open communication between academic specialists and policy-makers. Increased communication between these groups could help advance the accurate development of science-based regulations and limits for a chemical risk. Knowledge transfer can be facilitated by knowledge brokers, which are intermediaries between scientists and policy makers that help bring science contents to policy makers and policy contents to scientists (Choi et al., 2009).

Although this strategy to improve the risk communication process is reasonable in theory, scientists and policy makers can have varying ideas and perceptions of what consist of acceptable risks, and of how the outcome may affect the safety of the public. For example, some policy-makers may seek a definitive answer from scientists about whether or not a chemical risk is acceptable, in an effort to decide on mitigating actions or to assuage the public in a timely manner. The reality is that the science is often not advanced enough to accurately predict the outcome of an adverse event related to a chemical risk, and some scientists would rather err on the side of caution and use the precautionary principle if there is a reasonable doubt concerning exposure to a chemical.

The public and policy-makers also favor the precautionary principle in some cases, but in other cases scientists need to explain the meaning of the risk assessment results and how the quantitative assessment was conducted to policy-makers, to help them understand that deciding if exposure to a chemical is an acceptable risk is not black

or white. Risk assessment is a tool that scientists use to estimate the level of risk associated with a chemical hazard, and it comes with a certain level of uncertainty. On the other hand, policy makers need to educate scientists on the challenges involved in making decisions at the regulatory level and on the process of translating scientific data into policy.

Discussion points

- **Are there other reasons why it may be difficult for policy makers and academics to work together and communicate during the risk management process?**

4.2 Council of Canadian Academies

The Council of Canadian Academies (CCA) is a non-profit organization whose main objective is to offer a credible way of building public confidence in the policy and regulatory decisions that are being made in Canada – by assuring the public that decisions made were based on accepted and independently reviewed scientific knowledge and data. The CCA establishes panels of specialists to conduct independent, expert assessments of critical scientific matters that are related to important public policy issues. Scientific assessments are conducted for the provincial and federal governments, various foundations, NGOs, and the commercial sector and are widely distributed to the public (CCA, 2009).

The CCA is an organization that helps translate science into policy in a reliable and transparent way. The National Academies of Science (NAS) is a similar group that has been successful in the U.S., advising the federal government and public on critical national issues related to science, technology, engineering, and health. The CCA and similar groups could be of great assistance to risk communicators in Canada, by changing negative perceptions that citizens may have of people involved in the risk management process and assisting risk communicators in decision-making process.

Discussion points

- What would be a specific role of CCA or similar organizations in the risk communication process?
- Are there similar organizations in Canada that could help bridge the gap between science and policy making credibly and transparently, thus helping improve knowledge transfer and risk communication?

5. Options and alternative approaches to enhance risk communication in Canada

5.1 Third party support

As discussed in section 2.3.2, the public's confidence in some groups and individuals is lower (e.g., certain politicians or industries) than for others because some citizens believe that they are not trust worthy or reliable sources of information (Krewski et al., 2006). Third party support is therefore used by these and similar groups of individuals to communicate to other stakeholders the level of potential risk resulting from chemical exposure. The benefit of third party assistance in risk communication is that it

increases the credibility of the risk assessment results and subsequent management decisions that are suggested in the eyes of the public.

Third party support frequently consists of the concurrence of risk management decisions via publication results found in peer-reviewed scientific or medical journals. However, in high-stakes risk controversies, it is suggested that stakeholders recruit the support of a non-biased, independent, and credible mediator to engage the public in long-term dialogues regarding the management of the chemical risk (Leiss, 2001). An example of a third party organization is the Council of Canadian Academies (refer to section 4.2).

Discussion points

- What are other examples of third parties that can assist risk communicators?

5.2 Training of physicians

Given that risk communication is an integral part of practicing physicians' day to day activities, doctors should have adequate training on how to convey health related risks to patients. Unfortunately, teaching medical students how to discuss risk issues with patients has received little attention in undergraduate medical curriculum. Exercises such as role playing consultations between patient and doctor help students develop the skills of listening, presenting ideas, decision making, and working as part of a team – attributes that are essential in becoming a good risk communicator (Sedgwick and Hall, 2003).

One way to improve health communication could be to encourage physicians that have never received appropriate training in risk communication to take a training course. Research has shown that consultations with doctors that have training in the use of decision aids were more focused, and resulted in a greater perception of decisions actually being made (Thornton et al., 2003). It has been shown that when patients consult with their doctors, good quality information and graphics help explain risks associated with medical conditions and treatment options (Thornton, 2003). If doctors learn strategies that help patients understand risk, it could strengthen their relationship and help alleviate the stress of individuals awaiting a medical diagnosis (Paling, 2003).

5.3 Media training

The news media is the central source of information on health and risk issues for the general public (Krewski, 2006). With this in mind, it is important that decision-makers communicating risk to the public get proper training on how to effectively communicate with the media, to ensure that the transmitted message is accurate. If individuals communicating risk do not have formal training in communication (e.g., consultants, medical experts) they have a responsibility to become effective spokespersons on behalf of their organization.

The mass media has dramatically changed in the past decade. It is no longer necessary to rely on the general media to transmit a specific risk message to the public. Many individuals now depend on the Internet as their main source of general information. Therefore, media training for risk communicators should not only include information on how to speak to reporters at press conferences, during one on one interviews, or on the

telephone, but also on how to communicate with the mass media via the Internet (e.g., message boards, through the organization's website, online news sites etc.).

Stakeholders need to understand how they can use the Internet as a forum for information dissemination, and therefore should receive training on effective electronic risk messaging. If specific information on chemical risks needs to be communicated to the public, stakeholders can post information via the organization's website. Links to fact sheets for the media can be posted directly on an organization's home page and the organization could then post and control the risk messages that are received by the media quickly and effectively. Updated risk information can be posted frequently, keeping the media updated with current news on important risk information.

Media training should also help risk communicators judge which type of risk message is most appropriate to communicate different levels of risks (e.g., fact sheet on the public health website for the swine flu outbreak because the information changes frequently). This type of training is generally important because it would help ensure that the risk information transmitted to the mass media by stakeholders is accurate and clear.

Discussion points

- Are there other strategies or concepts that can be addressed by media training, to help risk communicators convey risk messages clearly and efficiently to the public and media?

5.4 Training of journalists and reporters

The recent transformation of mass media has resulted in a shortage of specialized reporters able to efficiently cover science stories. As a result, many general assignment reporters must act as scientific journalists. The Science Media Centre of Canada (SMCC) plans to train the media on how to improve their scientific journalism skills, and will help general assignment reporters deliver more accurate, informative, and insightful scientific stories. The SMCC is still in the development phase in Canada, but is modeled after successful centres that are currently in operation in the United Kingdom, Australia, and New Zealand. Examples of services that will be available at SMCC include responding rapidly to reporters on breaking news, providing key contacts and access to reliable information, and arranging media briefings with top experts on demand. The idea is that the SMCC can help improve the science-based risk communication process because reporters will be better equipped to convey risk information to the general public (SMCC, 2009).

Discussion points

- Are there organizations or programs in Canada similar to the SMCC that could facilitate training of members of the media?
- What would be the potential role of such a centre in Canada?
- What are the possible advantages and/or drawbacks of having such a centre in Canada?

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Appendix 1: Quality information on risk communication and chemical risk issues

Although the media is not always the most accurate source of health and risk information that is currently available, the general public mainly relies on the news for an update on current issues (Krewski et al., 2006). Quality sources of up-to-date health and risk information include: 1) peer-reviewed journals and academia, and 2) reputable organizations.

1) Peer-reviewed journals and academia

Peer-reviewed journals are among the most reliable sources of scientific and technical information available. Stakeholders can obtain a copy of publications from most academic libraries for a nominal fee. There also exist numerous databases (e.g., Pubmed, Medline, Toxline, EmBase) that can be accessed online by stakeholders and used to download articles on risk communication, chemical risks and similar topics for free. However, many journals require individuals to purchase contributions, some of which charge extravagant fees.

The 11 most productive authors and 9 most relevant journals publishing articles on environmental and technological risk communication between 1988 and 2000 are indicated in **Table 4**. Gurabardhi et al. (2004) systematically retrieved and analyzed 349 articles published on risk communication, and their study indicates an increase in the number of papers published with time and by academics from various fields of research. Now more than ever, stakeholders have a wealth of knowledge on hazardous chemicals and the most efficient risk communication strategies, and should therefore take advantage of the resources that are available to them to devise good chemical risk communication practices.

2) Reputable organizations

Although the quality of information provided in peer-reviewed journals is often very high, manuscripts often take months even years to get published. On the other hand, Internet websites of reputable organizations may be better sources of breaking or daily information on chemical risk issues. The Internet now enables stakeholders such as international, governmental, and non-governmental organizations to report information on chemical risks in real time. Internet websites often provide the public with up-to-date information in the form of fact sheets located directly on the organization's homepage, or in the form of drop down menus that are easily accessible on the site. In addition, several organizations post reports on chemical risk assessments or similar pertinent information in a format that is accessible to the public (e.g., PDF). Please refer to **Table 5** for examples of websites from reputable organizations that often report information on risk communication and/or chemical risks.

Discussion points

- **What is considered a “reputable” organization or website?**
- **Are there other ways or places to obtain quality information on chemical risk issues and risk communication?**

Table 4: Most productive authors and most relevant journals publishing articles on environmental and technological risk communication in 1988-2000.*

| Authors | | | | Journals ^a | | |
|---------------|------------------------|-----------------|--------------|---|------------------------|------------------------|
| Name | Articles in sample (n) | As first author | Times cited | Name | Articles in sample (n) | Average # of Citations |
| Slovic, P. | 11 | 3 | 254 | Risk Analysis | 42 | 12.4 |
| Fischhoff, B. | 10 | 3 | 118 | American Journal of Industrial Medicine | 15 | 3.2 |
| Frewer, L. | 7 | 5 | 35 | J. of Hazardous Materials | 12 | 2.2 |
| Petts, J. | 6 | 6 | 27 | Radiation Protection Dosimetry | 8 | 2.3 |
| Bord, R. | 4 | 3 | 39 | Health Physics | 7 | 2.0 |
| Covello, V. | 4 | 1 | 41 | J. of Occupational and Environmental Medicine | 6 | 1.3 |
| Gutteling, J. | 4 | 1 | 9 | Environmental Health Perspectives | 5 | 2.6 |
| Howard, C. | 4 | 0 | 29 | Human and Ecological Risk Assessment | 5 | 0.2 |
| McCallum, D. | 4 | 1 | 40 | Environmental Science and Technology | 4 | 3.0 |
| O'Connor, R. | 4 | 1 | 39 | | | |
| Renn, O. | 4 | 2 | 31 | | | |
| Column total | 62 | 26 | 662 | Column Total | 104 | 6.3 |
| Total sample | 349 | 62 | 1 315 | Total sample | 349 | 3.8 |
| | 18% | 42% | 50% | | 30% | |

* Adapted from Gurabardhi et al., 2004.

^a Of the 349 articles examined, 30% were published in the 9 journals listed above.

Table 5: Examples of credible websites from reputable organizations that report information on risk communication and/or chemical risks.

| Organization (Acronym) | Headquarters Secretariat | Website | Objectives |
|---|--|----------------------------------|--|
| United Nations Environmental Program (UNEP) | Nairobi, Kenya | unep.org | To promote chemical safety and provide countries with access to information on toxic chemicals. UNEP is a prime leader in the UN system for international activities related to the efficient management of chemicals. |
| World Health Organization (WHO) | Geneva, Switzerland | who.int | To ensure physical and mental health for all. To establish international standards for food, biological, chemical, and pharmaceutical products and promote health research, generate and communicate new health info. etc. |
| Pan-American Health Organization (PAHO) | Washington, DC | new.paho.org | The aim of PAHO is similar to WHO: Physical and mental health for all. Priorities include nutrition, safe water, sanitation, disease control etc. PAHO offers training in environmental and public health. |
| International Program on Chemical Safety | Geneva, Switzerland | who.int/pcs | Mandate includes evaluations of chemical risks, risk assessment methods, and international co-operation in emergency situations. |
| Organization for Economic Co-operation and Development (OECD) | Paris, France | www.oecd.org | OECD has a large amount of information on several topics to help governments foster prosperity and fight poverty through economic growth and financial stability. It helps ensure the environmental implications of economic and social development are taken into account. |
| International Life Sciences Institute (ILSI) | Washington, DC | ilsa.org | To advance the understanding of scientific issues related to nutrition, food safety, toxicology, risk assessment, and the environment with the help of international scientists from academia, government, and industry. |
| Health Canada (HC) | Ottawa, ON | hc-sc.gc.ca | HC conducts scientific research and public consultations to help people meet their health care needs. HC works to prevent and reduce risks to individual health and the overall environment. It communicates information on disease prevention to protect the public from avoidable risks. |
| Harvard Centre for Risk Analysis | Boston, MA (Harvard University) | www.hcra.harvard.edu/ | To conduct novel research, educate on risk assessment and related disciplines, and encourage public discourse about risk topics. |
| The R. Samuel McLaughlin Centre for population health risk assessment | Ottawa, ON (University of Ottawa) | emcom.ca | The centre aims to identify potential population health risks by using the best available methods in health risk science. Emcom is an internet-based information resource that provides current info. on endocrine disrupting substances. |
| Risk Sciences and Public Policy Institute | Baltimore, MD (Johns Hopkins University) | jhsph.edu/RiskSciences/index.htm | To protect public health through education, service, and research in risk and policy – activities which improve the base and methods for risk assessment and enhance risk management process. |