

## A B S T R A C T

A local public health agency is expected to respond to a wide spectrum of health concerns, the management of which usually requires effective communication of information, and dialogue with concerned communities. Local health departments have not always found this to be a smooth process. This paper begins by reviewing the public's construction and perception of risk, and examines the changing popular view of the health agency with respect to trust and credibility. The health agency's role and responsibilities in the area of risk communication are addressed in the form of a checklist drawn from a wide range of field-tested sources.

## A B R É G É

On s'attend à ce qu'un service local de santé publique réponde à un vaste éventail de questions de santé dont la gestion exige une communication efficace de l'information et un dialogue avec les collectivités concernées. Cela ne se déroule pas toujours sans heurt pour les services de santé locaux. L'article commence par un examen de l'interprétation et de la perception des risques par le public, puis se penche sur l'évolution de la réputation générale des services de santé aux chapitres de la fiabilité et de la crédibilité. Le rôle et les responsabilités des services de santé en matière de sensibilisation aux risques y sont abordés sous la forme d'un aide-mémoire, compilé à partir d'une gamme étendue de sources vérifiées dans la pratique.

# The Perception and Communication of Risk: A Guide for the Local Health Agency

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The ability to communicate effectively about risks is emerging as a high priority for local official health agencies. Communities increasingly demand full access to information and decision-making, while at the same time, public trust in traditional institutions is at a very low level.<sup>1</sup> This paper offers an overview of current understanding about how people perceive risk, and continues with a checklist for communicating risk-related information. Readings are available from the author for those wishing more information.

### How do people perceive risk?

Ask an industrial chemist, or an engineer in charge of a waste incinerator how people see risk, and their responses will often include adjectives such as "irrational" or "emotional". Technical people and regulators frequently have difficulty understanding why citizens react with hostility to nuclear power plants and waste disposal facilities, where projections of risk are relatively small, while disregarding threats to health or safety such as smoking, drinking, or dangerous sports, demonstrated to be hundreds or thousands of times more dangerous. Society's attention and resources are seen as being misdirected toward the trivial, while relatively "safe" technologies and facilities are being opposed needlessly.<sup>2</sup>

The field of risk perception draws heavily from cognitive psychology,<sup>3-5</sup> well beyond the size constraints of this paper. However, an important observation in addressing the

apparent discrepancy cited above is that "non-experts" consistently and predictably differ from "experts" in the way that they identify and assess risks. Some of the key findings since 1969<sup>6</sup> include:

1. People have difficulty understanding probabilistic data, and risks involving very small and very large numbers.<sup>7,8</sup>
2. People tend to react to uncertainty with greater risk-avoidance behaviour. But probabilities can only be expressed in terms of uncertainty, and when presented with statements in this form, people often will demand to be told exactly what will take place, with "zero risk" becoming the objective.
3. People employ numerous heuristics or personal rules-of-thumb to assist them in assessing risk, for example whether the risk is imposed, memorable, "dreaded", known to science, controllable, etc.<sup>9,10</sup> Although these factors seldom appear in formal risk assessments, they form the basis for the layperson's concept of risk and judgements thereon. Sandman et al. have dubbed them "outrage factors" to distinguish them from an expert's construct of "hazard".<sup>11</sup> Slovic and others have displayed graphically the degree to which people assess a wide range of risks such as "nuclear energy", "toxic waste", or "handguns" in terms of these factors.<sup>12-14</sup> The results remain surprisingly consistent, and are largely independent of class, gender, age, political ideology, or location.
4. People often use health, safety, or environmental risks as a surrogate for political, economic, or social issues. Fischhoff<sup>15</sup> has observed that:

" . . . few controversies are only about the size of those risks. Indeed, in many cases, the risks prove to be a side

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issue, upon which are hung disagreements about the size and distribution of benefits, or about the allocation of political power in a society.”

5. The informal knowledge lay people have about technology is probably underestimated.<sup>16</sup> The literature suggests that the layperson’s construction of risk is more complex than that of the usual technical expert, not less.<sup>2,10,11,17</sup>
6. A particularly useful explanation of the discrepancy between lay and expert construction of risk has been proposed by Sandman and co-workers,<sup>9,13</sup> who see the issue as one of definition rather than ignorance. They re-classify the expert’s concept of risk as “hazard” (i.e., probability  $\times$  magnitude), while the layperson, they argue, judges risk almost exclusively in terms of the “outrage” factors. When ranked, these terms are poorly correlated ( $r=0.2$ ) accounting for only 4% of the total variation between them.<sup>11</sup>

The implications for risk communication are clear: increasing the volume of the message, or even repeating it, will not effectively overcome the risk-perception gap between the expert and the layperson. Community concerns – especially outrage factors – must be addressed at every stage.

#### How do the public see the health agency?

Communities are frequently frustrated by governments that are apparently unresponsive to local concerns. News media and popular fiction enhance public awareness of damage, death, and disaster where official assurances have hitherto been reassuring.<sup>18</sup> Frewer et al.<sup>1</sup> found that in the United Kingdom, members of parliament and government ministries rank only slightly more trustworthy as information sources about health risks than tabloid gossip newspapers. Most-trusted sources were university scientists, medical doctors and consumer organizations. Covello<sup>19</sup> had previously found similar results in the USA, but reported that local health departments still command a relatively high degree of credibility and trust.

Sandman et al.<sup>9</sup> have concluded:

“The most important finding remains . . . agency behaviour, and the agency-community relationship – have a substantial impact on the public’s percep-

tion of risk . . . more impact than the objective seriousness of the risk, and far more impact than any technical explanation of the risk.”

#### The health agency’s role in risk communication

Most crises arise without warning or time to prepare practised responses: e.g., a neighbourhood contaminated with PCBs from burning plastics, portable classrooms containing *Stachybotrys* mycotoxins, or cases of meningococcal meningitis at a school. Although the “technical” threats are different, the public’s reaction in each case will predictably share many characteristics, allowing the agency to partly plan its communications in advance.

Too many organizations in both public and private sectors still rely upon an outdated model of communication in which a source (usually the agency) transmits its message through a medium (pamphlet, verbal presentation, TV announcement) to the receiver (resident). Such simplistic one-way systems do not permit the community to ask their own questions or express their own information needs, and this alone can increase the outrage and decrease the community’s trust of the agency.

A community that perceives a facility as a threat, can easily delay, and often completely prevent its completion. A large landfill facility in Ontario was delayed 20 years, exceeding the expected life of the site.<sup>20</sup> Similarly, a biohazard level-4 laboratory, although ready to open, has been prevented from operating as such by local residents who had not been informed that such a facility was planned.<sup>21</sup>

### A RISK COMMUNICATION CHECKLIST

#### 1. Who should we tell?

Tell all segments of the community the same information, but tell the people most at risk first. The risk will burden them unfairly in any case, and they should not be the last to find that they had been exposed, especially if the agency had known two weeks before – an example of the “double indignity” of poor risk communication.

#### 2. What should we tell them?

In a crisis setting, people will want answers to questions such as:

- “What has happened?”
- “What will the health effects be for me and my family?”
- “Can anything be done right now to lessen the risk?”

They should have access to all the useful information available, so tell them what is known, and just as important, what is not yet known. This means clearly explaining the extent to which the information may be uncertain, unreliable, or incomplete. When no information is released (“no comment at this time”), or the response is obscured by unnecessary technical language, a risk information vacuum<sup>22</sup> is created, into which will rush imagination, rumour, falsehood, and exaggeration to disrupt decision-making over the longer term.

#### 3. What if the information is incomplete?

If a contamination event is suspected, but not completely certain, the temptation is to delay warning the public until the evidence is irrefutable: “What if it turns out to be false?” the agency reasons, “we do not want to scare them unnecessarily.” It is also true that the results have had no chance for peer-review, and damage may ensue to corporate interests. But does this justify endangering the public’s health? Analysis of case studies shows that reversing a false alarm is much easier than trying to explain why the people were not warned when the threat was quite likely to be real.<sup>23,24</sup> In 1993, more than 400,000 people in Milwaukee, Wisconsin were affected by cryptosporidiosis, 4,000 were hospitalized, and 100 deaths were attributed to the organism.<sup>25</sup> The health department had delayed the release of information (including a “boil-water” order), despite evidence that the outbreak was water-borne. By the time the order was given, five weeks after the outbreak began, some of the victims claimed they would have employed effective preventive measures had they been informed. As a result, the health agency has suffered long-term damage to its credibility and public trust.

Information withheld pending confirmation appears to a nervous community to

be a cover-up. It is always safest to tell what is known. However, should the source or validity of the information be in doubt, the agency should explain that there are doubts, and promise to release all further information as and when it is received. If the concern turns out to be justified, the community will acknowledge that it had been advised at the earliest possible time; if unfounded, any damage is usually quickly reversible. Either way, exercising the "precautionary principle" protects both the public's safety and the agency's credibility.

#### 4. When should we tell them?

Tell them as soon as the agency knows, and before a local television station breaks the story on the evening news. If the agency is not first with the information, and is not seen to take the initiative in dealing with the problem, much time may be wasted in damage control: correcting errors, half-truths, misunderstandings, and especially in explaining why they delayed telling the public. In the 1999 Belgian poultry products recall, the Belgian government allegedly knew of the dioxin contamination in these foods approximately one month before the press discovered and released the news. This was the biggest health scandal in the EU since the BSE-vCJD link was admitted by the UK Ministry of Agriculture, Fisheries and Food in March 1996 (itself another example of unforgivably delayed communication).

#### 5. How should we tell them?

A technical report, complete with measurements in parts per billion and cancer risk probabilities of  $2.4 \times 10^{-6}$ , may have a negative effect upon citizens who are waiting for signs of empathy: "Is there any compassion there for what we feel?"; "Could this be the cause of my husband's cancer?"; "Is anyone really listening to our concerns?" The natural reaction of an engineer or scientist when faced with public challenge and dissent is to confirm the objective details, not abandon it in favour of subjective feelings and anecdotes. But to the community, perception equals reality; if they perceive a risk, then their concerns about that risk must be acknowledged and addressed.

Detailed technical terminology of the analyst, epidemiologist or engineer at a public forum may actually increase alienation. Careless use of "not significant" may be inflammatory; the expert intends it to mean "not statistically significant", whereas the citizen hears her genuine concern declared petty and trivial. Similarly, in the risk assessment context, "conservative estimate" may be a risk of cancer death as much as 10,000 times higher than any realistic prediction due to compounded safety factors.<sup>26</sup> But the layperson may infer this to mean an estimate lower than that which might be realistically expected.<sup>27,28</sup>

For non-scholarly persons, very large numbers, very small numbers, and exponentials (such as " $1 \times 10^{-6}$ ") are difficult to comprehend,<sup>29</sup> and every effort should be made to rehearse explaining these concepts in understandable terms.

#### 6. Who should deliver the information?

The right person for this position must have audience acceptability (are they technically credible, responsive, and believable?), and organizational acceptability (what is their skill at media relations, public speaking, and listening?).<sup>30</sup> This person should ideally have had training and experience in this type of communication, but if not, they should have been involved from the earliest possible date, reviewing the content, process, and approach. Involvement of experienced communicators can be especially valuable in dealing with the electronic media. Both the spokesperson and the format of the message must be appropriate for the experience and preparation of the audience.

#### 7. How important is the partnership with the community?

Partnerships are essential for stabilizing a concerned community. Information and certain decision-making powers need to be shared by the agency and the community. Neighbours of an industrial facility might be invited to join an advisory committee, or decide on monitoring protocol and action if specifications are not met. While power-sharing is difficult to initiate, the benefits are transparency of process, and useful contact between the experts and the

community stakeholders. The involvement must be genuine; superficial presence or tokenism can have the opposite effect.<sup>31</sup>

#### SUMMARY

Risk communication includes conveying technical information in terms most people can understand, clarifying how reliable or complete it is, and delivering this information quickly, with genuine concern for people's feelings. But effective risk management often requires partnership with public stakeholders, addressing their anxieties and concerns, and their need for input. Innumerable case studies have shown that the public scrutinizes the behaviour, the performance, and the process of the agency more closely than they do the risk estimates and other factual content in the messages themselves.

#### REFERENCES

1. Frewer LJ, Howard C, Hedderly D, Shepherd R. What determines trust in information about food-related risks? Underlying psychological constructs. *Risk Analysis* 1996;16(4):473-86.
2. Hance BJ, Chess C, Sandman P. *Improving Dialogue With Communities: A Risk Communication Manual for Government*. New Brunswick, NJ: New Jersey Dept. of Environmental Protection, 1988;1.
3. Tversky A, Kahneman D. Judgement under uncertainty: Heuristics and biases. *Science* 1974;185:1124-31.
4. Kahneman D, Tversky A. Prospect theory: An analysis of decision under risk. *Econometrica* 1979;47:263-91.
5. Geuter G, Stevens AL (Eds.). *Mental Models*. Hillsdale, NJ: Lawrence Erlbaum Associates, 1983.
6. Starr C. Social benefit versus technological risk. *Science* 1969;163:1232-38.
7. Tversky A, Kahneman D. The framing of decisions and the psychology of choice. *Science* 1981;211:453-58.
8. Sjöberg L. Strength of belief and risk. *Policy Sciences* 1979;11:39-57.
9. Sandman PM, Miller P. Outrage and Technical Detail: The Impact of Agency Behavior on Community Risk Perception. Division of Science and Research, New Jersey Department of Environmental Protection, 1991.
10. Slovic P. Perceptions of risk: Reflections on the psychometric paradigm. In: Krinsky S, Golding D (Eds.), *Social Theories of Risk*. Westport, CN: Praeger, 1992;117-52.
11. Sandman PM. Risk communication: Facing public outrage. *EPA Journal* November 1987;21-22.
12. Lichtenstein S, Slovic P, Fischhoff B, et al. Judged frequency of lethal events. *Journal of Experimental Psychology: Human Learning and Memory* 1978;4:551-81.
13. Slovic P, Fischhoff B, Lichtenstein S. Characterizing perceived risk. In: Kates RW, Hohenemser C, Kasperson JX (Eds.), *Perilous Progress: Managing the Hazards of Technology*. Boulder, CO: Westview Press, 1992; 91-125.

# COMING EVENTS ACTIVITÉS À VENIR

14. Morgan G, Fischhoff B, Bostrom A, et al. Communicating risk to the public. *Environmental Science Technology* 1992;26(11):2048-56.
15. Fischhoff B. Risk: A Guide to Controversy. In: National Research Council. *Improving Risk Communication*. Washington, DC: National Academy Press, 1989;211-98.
16. Wynne B. May the sheep safely graze? In: Lash S, Szerszynski B, Wynne B. *Risk, Environment, and Modernity*. Thousand Oaks, CA: Sage Publications, 1996;59.
17. Burger EJ. Health as a surrogate for the environment. *Daedalus* 1990;114(4):133-53.
18. Covello VT. Informing people about risks from chemicals, radiation, and other toxic substances: A review of obstacles to public understanding and effective risk communication. In: Leiss W (Ed.), *Prospects and Problems in Risk Communication*. University of Waterloo Press, 1989;7-9.
19. Covello VT. *Risk Perception and Communication: Tools and Techniques for Communicating Risk Information*. [Proceedings of Workshop] "Environmental Risk: Unpacking the Black Box." McMaster University, Ontario, November 1995.
20. Sly T. Risk Perception in the Sensitized Community. [Doctoral Thesis] University of Teesside (UK) 1997;81-82.
21. Public meeting, Etobicoke, June 1996. Videotape recording courtesy of Rogers Cable-systems Ltd, Toronto.
22. Powell D, Leiss W. *Mad Cows and Mothers' Milk*. Montreal, McGill-Queen's Press, 1997;31-34.
23. Rhodes R. *Deadly Feasts*. New York: Simon & Schuster, 1997.
24. Picard A. *The Gift of Death: Confronting Canada's Tainted Blood Tragedy*. Toronto: Harper Collins, 1997.
25. Griffin RJ, Dunwoody S, Zabala F. Public reliance on risk communication channels in the wake of a cryptosporidium outbreak. *Risk Analysis* 1998;18(4):367-75.
26. Keenan RE, Finlet BL, Price PS. Exposure assessment: Then, now, and quantum leaps into the future. *Risk Analysis* 1994;14(3):225-30.
27. For an excellent review of the semantic problems in risk communication, see Jardine CG, and Hrudehy SE, Mixed messages in risk communication. *Risk Analysis* 1997;17(4):489-98.
28. Covello VT. Informing people about risks from chemicals, radiation, and other toxic substances: A review of obstacles to public understanding and effective risk communication. In: Leiss W (Ed.), *Prospects and Problems in Risk Communication*. University of Waterloo Press, 1989;2-3.
29. National Research Council. *Improving Risk Communication*. Washington, DC, 1989; 129-31.
30. Lundgren R, McMakin A. *Risk Communication* (2<sup>nd</sup> ed.) Columbus, Ohio: Battelle Press, 1998.
31. Fischhoff B. Risk perception and communication unplugged: Twenty years of progress. *Risk Analysis* 1995;15(2):137-46.

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Pour être publiés dans le prochain numéro, les avis doivent parvenir à la rédaction avant le 15 mai 2000 et être valables à compter du 30 juin 2000. Les avis reçus après le 15 mai 2000 seront insérés si le temps et l'espace le permettent.

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