Developing effective risk communication

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Overview

1. Need for effective risk communications
2. Features of effective risk communications
3. Examples of existing risk communications
4. The mental models approach to developing effective risk communications
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Need for risk communication

• Risk communication can help lay people to
  – Respond to acute situations and their aftermath
  – Participate in policy making

• Risk communication can help experts to
  – Provide practical information
  – Obtain informed consent
  – Maintain public trust and morale
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Effective risk communications

- Help people to understand the risk and to reduce it
- Are based on a systematic expert model
  - Reflect interdisciplinary scientific literature
- Are based on formative research with members of the intended audience
  - Use wording that lay people understand
  - Address decision-relevant gaps and misconceptions
  - Give behaviorally realistic advice
Existing risk communications

• Are often not evaluated
• Are often ineffective, if they are evaluated
• Often lack the features of effective communications
  – Use wording lay people don’t understand
  – Present basic facts, but don’t fix gaps and misconceptions
  – Fail to give behaviorally realistic advice
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Example: Wording

SHELTER IN PLACE
Example: Not fixing knowledge gaps
Example: Not fixing knowledge gaps

This special UV light shows where the bacteria that can cause food poisoning could lurk on hands.
Example: No behavioral strategy
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Mental Models Approach

1. Normative: What should people know?
   - Interdisciplinary literature review and expert panel
   - Create expert model

2. Descriptive: What do people already know?
   - Conduct qualitative interviews and quantitative surveys
   - Identify relevant wording and decision contexts
   - Create lay model

3. Prescriptive: What do people still need to know?
   - Comparison of expert model and lay model
   - Identify knowledge gaps and misconceptions
   - Iterative message development

4. Evaluation: Does the risk communication work?
   - Randomized controlled trial, comparing risk communication to control group
Example: Pandemic influenza

Problem:

- Not enough data to judge likelihood of occurrence, or effectiveness of interventions

1. Normative:

   - Model of risk with behavioral interventions (e.g., hand washing, social distancing, barrier methods)
   - Estimates of model parameters

2. Descriptive: In progress

3. Prescriptive: In progress
What is the probability that H5N1 will **become an efficient human-to-human transmitter** (capable of being propagated through at least two epidemiological generations of affected humans) sometime during the next 3 years?

Median = 15%
Example: Drinking-water-borne Cryptosporidium

Problem

- Reduce risk of outbreak

1. Normative:

- Risk model to track occurrence and evolution of outbreak, including contaminant delivery and detection, water treatment efficiency, timing of interventions, compliance with boil water notices
Day Utility Becomes Aware of Contamination & Issues Boil Water Alert

- normal consumer compliance
- nearly complete consumer compliance

Cumulative Percent Morbidity

Epidemic averted

Days to repair
- 1
- 7
- 10
- 14
- 1-10
Problem:
  – Reduce risk of outbreak

1. Normative:
  – Risk model to track occurrence and evolution of outbreak, including contaminant delivery and detection, water treatment efficiency, timing of interventions, compliance with boil water notices

2. Descriptive:
  – Little to no knowledge in general population
  – Useless knowledge in vulnerable populations

3. Prescriptive:
  – Abandon reliance on current warning system
  – Provide protective resources for immunocompromised

Example:
Drinking-water-borne Cryptosporidium
Example:
Carbon Capture and Storage

Problem:
- Inform public acceptance judgments

1. Normative:
- CCS may help to reduce carbon dioxide emissions

2. Descriptive:
- Interviewees had little to no knowledge about CCS
- They preferred to discuss CCS relative to other low-carbon technologies as part of a low-carbon energy portfolio
Public perceptions of CCS

- Survey respondents ranked CCS below other low-carbon options.
- However, they had limited information about these options.

Example:
Carbon Capture and Storage

Problem:
- Inform public acceptance judgments

1. Normative:
- CCS may help to reduce carbon dioxide emissions

2. Descriptive:
- Interviewees had little to no knowledge about CCS
- They preferred to discuss CCS relative to other low-carbon technologies as part of a low-carbon energy portfolio

3. Prescriptive: In progress
- Provide more realistic information about costs and benefits of portfolios including CCS vs. alternative portfolios (which may make CCS look better)
Communication materials

Wind Power

How it Works: Unlike the old windmills that ground grain and pumped water in Holland, or the metal windmills that pumped water for cattle in the American West, modern windmills are large (often more than 100 feet high). The machines have blades designed like wings of airplanes. Wind turns the blades of the turbine, which are connected to a generator to make electricity.

Carbon Dioxide (CO₂) Capture

How it Works: Ordinarily, when coal is burned, CO₂ is released to the atmosphere. However, equipment may be added to plants that captures CO₂ instead of letting it escape. Once captured, the CO₂ gas is made into a liquid form and carried by pipeline to a place where it can be permanently disposed in suitable rock formations more than half a mile underground. If the location is chosen correctly, the CO₂ will stay trapped in the underground rocks. The CO₂ can be monitored to make sure it stays in place. After a few decades, the CO₂ will dissolve in the water in the rocks. Over thousands of years, it may change into minerals.

- 10 technologies presented on 9 mini-sheets
- Multi-attribute qualitative information presented
- Readability at low grade level: Flesch-Kincaid score is 7.7
Energy portfolio ranking study

• Participants sampled from the community
  – hs education
  – no science or technical background

• Procedure
  – Study materials at home
  – Conduct initial individual ranking
  – Group discussion jury-like groups of 6-8 people
  – Conduct group ranking
  – Conduct individual ranking
  – Exit survey
Public acceptance of CCS may be increased with

- Broader public understanding of
  - Costs and risks of CCS and alternatives to reduce CO$_2$

- Better risk communication
  - Open and respectful of the public’s concerns
Conclusion

• Effective risk communications
  – help people to make informed decisions
  – Are not developed by one expert but require extensive input from experts and lay people

• Their effectiveness is shown in randomized controlled trials, comparing the risk communication to controls
Relevant references


