

Simulation exercises as vehicles to address risk and uncertainty in chemical preparedness

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Aim

- 1) To elucidate important concepts regarding risk in the context of chemical preparedness
- 2) To describe a simulation exercise testing the emergency preparedness and response to an EU-wide cross-border threat to health
- 3) To spread light on some of the processes of expert judgement in light of uncertainty

Introduction – Societies and risk (Slovic, 1997)

- Our societies have expended great effort to make life safer and healthier.
- However many in the public have become more, rather than less, concerned about risk.
- These individuals see themselves as exposed to more serious risks than were faced by people in the past, and they believe that this situation is getting worse rather than better.

Technological Stigma - Robin Gregory

- Chemical technologies (except for medicines) have been stigmatized by being perceived as entailing unnaturally great risks (Gregory et al., 1995).
- Gregory et al refer to the term – **Technological stigma**

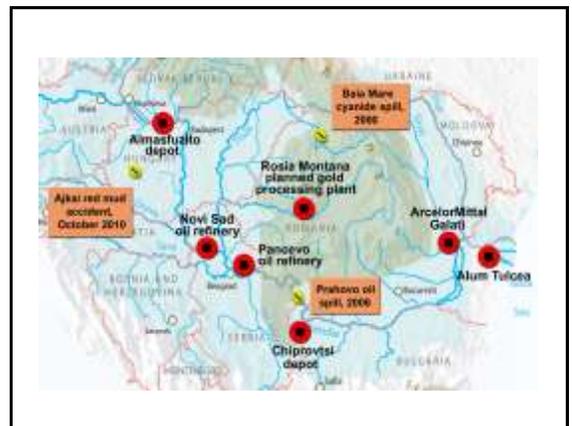


Toxic Chemical Agents

- Over 60 million chemical agents assigned CAS numbers
- 160,014 commercially available chemicals
- Around 500 new chemicals introduced each year
- 5000 chemicals have reliable medical toxicology information for acute and chronic exposure.

2,3,7,8 – Tetrachlorobenzodioxin (1976)





Buncefield Oil Depot Explosion (2010)



Buncefield Oil Depot Explosion



Concepts of Risk

Paul Slovic (b.1938)



Risk – Paul Slovic

- People's sense of risk has little to do with mathematical probability.

Risk

- Level of risk associated with an activity, technology or disease judged to be extreme and unacceptable if the hazard:
 - is new or unfamiliar.
 - is perceived as increasing and unbounded.
 - is invisible and uncontrollable.
 - evokes feelings of dread.
 - has fatal outcomes.
 - is seen as not adequately understood by experts.

The Public and the Experts –Slovic

- Paul Slovic on peculiarities of human judgement.
- Mr & Mrs Citizen easily swayed by
 - Trivial details
 - Inadequately sensitive to differences between low and negligibly low probabilities
- Experts show many of the same biases in attenuated form

The Public and the Expert – Slovic

- Slovic argues that the public has a richer conception of risks than experts do.
- He states that when experts and the public disagree on their priorities: *“Each side must respect the insights and intelligence of the other”*
- Slovic desires to wrest sole control of risk policy from experts challenging the foundation of their expertise, the idea that risk is objective

Slovic

- *«“Risk” does not exist “out there”, independent of our minds and culture, waiting to be measured. Human beings have invented the concept of “risk” to help them understand and cope with the dangers and uncertainties of life. Although these dangers are real, there is no such thing as “real risk” and “objective risk”»*

9 ways of expressing mortality risk associated with the release of toxic material in the air

Deaths per million people in the population
 Deaths per million people within x miles of the source of exposure
 Deaths per unit of concentration
 Deaths per facility
 Deaths per ton of air toxic released
 Deaths per ton of air toxic absorbed by people
 Deaths per ton of chemical produced
 Deaths per million dollars of product produced
 Loss of life expectancy associated with exposure to the hazard

Slovic –

No such thing as objective risk

- Evaluation of risk depends on the choice of measure
- Choice may have been guided by a preference for one outcome over another
- Concludes that defining risk is thus an exercise in power

Cass Sunstein (b. 1954)



Kahneman and Tversky



Richard Thaler



Sunstein

- Disagrees sharply with Slovic
- Defends the role of experts as a bulwark against “populist” excesses
- Poor regulation is wasteful of lives and money both of which can be measured
- Risk Regulation should be guided by rational weighting of costs and benefits
 - Number of lives saved (or life-years saved)
 - Cost to the economy

Sunstein

- Has faith in the objectivity achieved by science, expertise and careful deliberation
- Biased reactions to risks are an important source of erratic and misplaced priorities in public policy.

Sunstein

- Lawmakers and regulators may be overly responsive to irrational concerns of citizens because of
 - Political senisitivity
 - Prone to same biases as other citizens

Sunstein and Kuran – availability cascade

- Mechanism through which biases flow into policy – the availability cascade
- In the social context, “all heuristics are equal but availability is more equal than the others”.
- The importance of an idea is judged by the fluency (and emotional charge) with which it comes to mind.

Availability cascade

- Self-sustaining chain of events
- Starting from media reports of a relatively minor event and lead up to public panic and large-scale government action
- Amplified by “availability entrepreneurs”
- Scientists who try to dampen the fear attract little attention, most of it hostile.
- Issue becomes politically important – guided by public sentiment.

Availability cascade

- Terrorists are the most significant practitioners of inducing availability cascades
- In most cases the number of casualties from terror attacks is very small relative to other causes of deaths
- Gruesome images endlessly repeated in the media cause everyone to be on edge
- Difficult to reason oneself into a state of complete calm.

Sunstein versus Slovic

- Sunstein seeks mechanisms that insulate decision makers from public pressures letting the allocation of resources be determined by impartial experts who have a broad view of all risks and resources
- Slovic points out that insulating the experts will produce policies and measures that the public will reject

Kahneman

- Irrational fears and availability cascades do influence public policy in the domain of risk
- Widespread fear even if unreasonable should not be ignored by policy makers.
- Rational or not fear is painful and debilitating.
- Policy makers should protect the public NOT just from real dangers but also from fear.





Public Health England

FOI

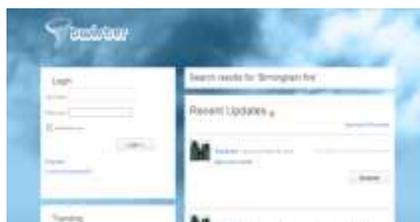
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Prevention and promoting the public's health

Exercise Quicksilver Plus

Information sources

- Injests
- News bulletins
- Media Website
- Social media



Final note

EXPERT JUDGEMENT

- Decision-makers**
- Judging reliability of information sources
 - Judging the situation in light of expert advice being given
 - local
 - international
- Deciding**
- whether to attend to patients on board the ship
 - whether to bring down from the ship all those who had fallen ill and treat them within a designated area on land
 - whether to evacuate the entire ship
 - how much of the healthcare workforce to shift from their everyday duties to focus on the cruise-liner event
 - whether to engage higher levels of authority

- Communicators**
- Judging reliability of information sources
- Deciding**
- on what kind of information to communicate (which has to be correct information but in a way that it allays anxiety)
 - how frequent
 - whom to address
 - general public
 - journalists
 - Parl. Secretary for Health
 - what format
 - press release
 - telephone
 - email

UNCERTAINTY

In conclusion

- Simulation exercises of emergency threats
 - Place decision-makers in a position to take decisions promptly
 - Place experts in a position to appraise information quickly and issue expert advice to decision-makers
 - Uncertainty and missing pieces of information are the rule of the day, but more so in emergency situations

Conclusion

- We should all strive to work together to design risk policies combining the experts' knowledge with the public's emotions and intuitions

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