

The Precautionary Principle and Protection of Children's Health

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Main points

- Precaution is about how do we make better, more preventive decisions under complexity and uncertainty – a compass not a hammer
- Need a flexible approach to precaution that adapts precaution as an guiding approach – for known and complex risks
- A goal is moving from a reactive to a proactive approach to hazards/risks – solutions-based
- A precautionary framework can be a strong driver for innovation in science, policy, and technology
- Precaution is a challenge to develop new tools to characterize and prevent complex risks

Problem – Children's Development at Risk from Environmental Contaminants

- Children as a susceptible sub-population
- Increases in childhood illnesses and behavioral disorders
- Laboratory evidence of environmental links
- Evidence from epidemiologic studies, case reports, and case studies
- Known human exposures
- Well-known risks and emerging more complex ones
- Preventable risks

Children as a susceptible sub-population

- Windows of vulnerability due to rapid growth and development
- Age related differences in absorption, metabolism, detoxification and excretion
- Longer period of exposure
- Greater exposures
 - Eat and drink more per kg body weight
 - Closer to the ground – hand to mouth
 - Dietary exposures
- Many of today's impacts affect future more – interdependence of ecology and health
- Society values protecting children

Increases in childhood chronic illnesses

- Asthma rate inc. by 160% over 15 yrs.
- 17% of US children suffer from one or more learning, behavioral or developmental disorders
- 8000 children under 15 are diagnosed with cancer each year. 21% increase in incidence over 20 year period.
- Millions still suffer from consequences of poor sanitation and access to water; infectious disease, etc.
- Known links between certain exposures and illness: PCBs, lead, mercury pesticides, solvents

Poor and minority children at greater risk

- Exposures from:
 - Housing
 - Proximity to polluting facilities
 - Poor water quality/access and sanitation
- Additional magnifiers due to poor nutrition, stress, poor schools – cumulative risks

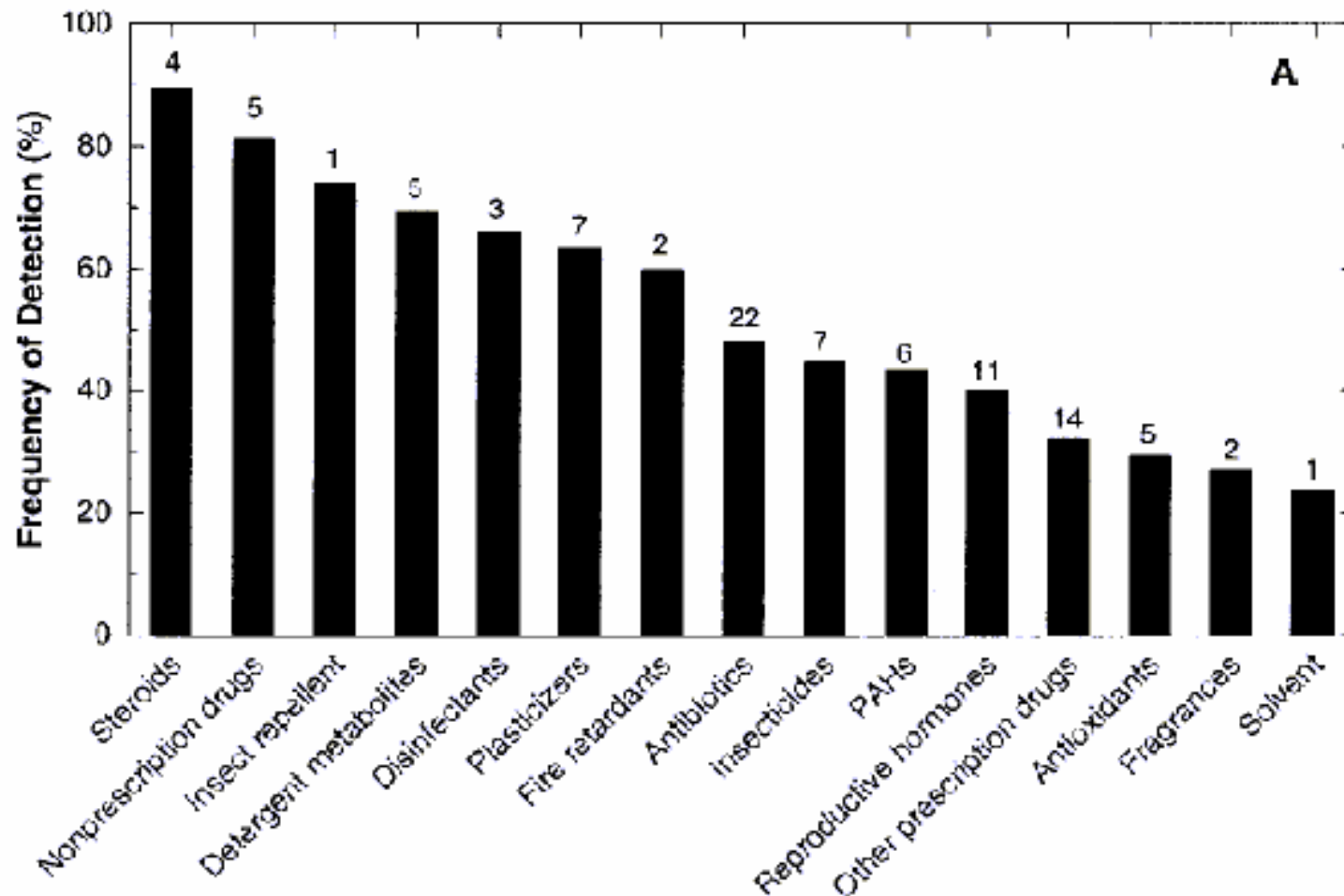
Problem – Limitations in the science used to study causes of disease

- Lack of interdisciplinary approaches to find patterns in the evidence
- Difficulties in following populations
- Cumulative and interactive exposures/effects
- Low-dose impacts/windows of vulnerability/susceptible populations
- Lack of explicitness about uncertainties – what is known, not known, can be known, suspected
- Traditional scientific approaches often lead to “no problem”

The problem of uncertainty

- As we know, there are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know. But there are also unknown unknowns -- the ones we don't know we don't know
 - Donald Rumsfeld (2002)

USGS Surveillance on Pharmaceuticals and Personal Care Products in the Environment



“Unrecognized risks are still risks;
uncertain risks are still risks; and
denied risks are still risks”

-- John Cairns, Jr.

Opportunities for committing “type III” errors –
Right Answer Wrong Question.

Limitations of Conventional Scientific Methods

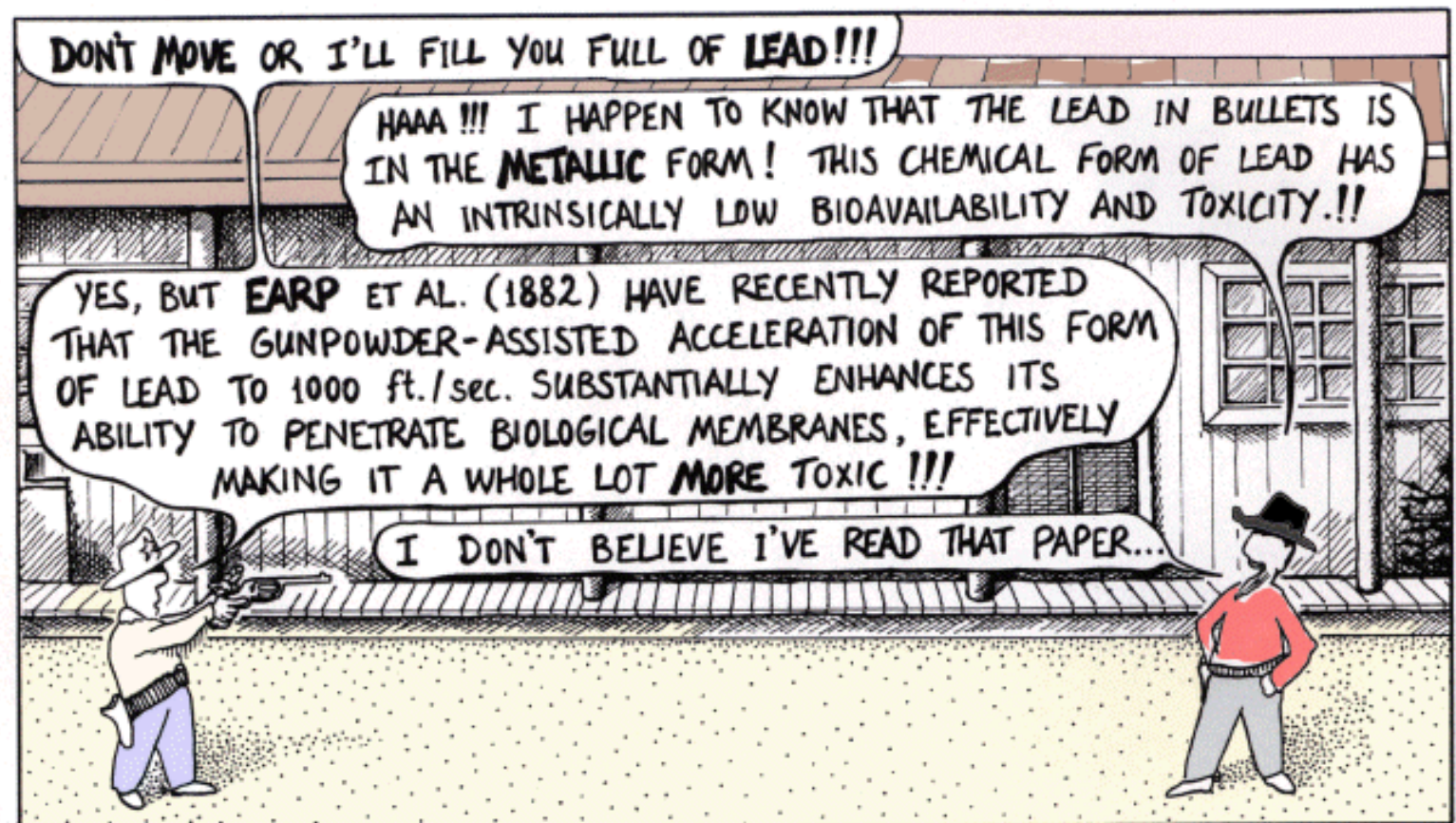
- Ways in which the conduct of science can hinder precautionary policies:
 - Limited hypothesis formulation
 - Setting type I and type II error rates
 - Compartmentalization of disciplines
 - Separation of qualitative and quantitative work
 - Narrow definition/exploration of uncertainty
- Assume things are not connected – formulate hypotheses in a way that is feasible to answer with time and resources – refine our understanding of existing problems;

Problem – Science and Policy

- Many environmental risks considered safe by default (chemicals, nanotechnology, etc.)
- To take action then must demonstrate harm on a case by case basis
- Reactive focus- exposures are inevitable and there is some definable “acceptable” level of exposure that can be quantified through expert “objective” science

Problem – Science and Policy

- Risk assessment and application in policy generally expensive, slow and highly dependent on assumptions
- A process open to creation of uncertainty – years spent debating the nuances of a particular risk
 - “Hormesis” the latest point of debate
- While study goes on the default is no problem
- Focus on characterizing and quantifying problems
 - U.S. Federal budget for ‘green chemistry’ = to cost of a single 2 year cancer study for a single chemical in rodents



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Sir Bradford Hill (1965)

- “All scientific work is incomplete – whether it be observational or experimental. All scientific work is liable to be upset or modified by advancing knowledge. *That does not confer upon us a freedom to ignore the knowledge we already have, or to postpone the action that it appears to demand at a given time.*”

The costs of not taking action on preventable risks

- Costs to health and the economy
 - Lead – approx \$48 billion in lost productivity per year in US
 - Asbestos
 - CFCs
- Bankruptcy – at least 70 companies bankrupt due to asbestos
- Preventable costs of environmentally related childhood illness in MA from \$1.1 bn/yr to \$1.6 (direct costs plus lost future income).
- Bias towards short term costs of compliance versus uncertain long term costs to health

History of Precaution

- Long history in public and environmental and occupational health policy in the U.S.
 - John Snow and the Broad Street Pump
 - German Vorsorgeprinzip
 - International treaties
 - European Union
 - Wingspread Conference
- All definitions have 3 elements: If uncertainty & credible evidence of risks, then take precautionary measures.

International Statements on the Precautionary Principle

- Second North Sea Declaration. In order to protect the North Sea from possibly damaging effects of the most dangerous substances...a precautionary approach is addressed which may require action to control inputs of such substances even before a causal link has been established by absolutely clear scientific evidence.
- Bergen Declaration on Sustainable Development. In order to achieve sustainable development, policies must be based on the precautionary principle. Environmental measures must anticipate, prevent, and attack the causes of environmental degradation. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The Rio Declaration on Environment and Development. In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Wingspread Statement on the Precautionary Principle

- “When an activity raises threats of harm to the environment or human health, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically.”
- Key components of the principle include:
 - taking action to prevent harm in the face of scientific uncertainty,
 - placing burdens on proponents of an activity,
 - seeking out safer alternatives to potentially harmful activities, including stopping the activity; and
 - democratic participation in decision-making regarding science and technology.

Vision and principles for Precaution

- The right to a healthy and life sustaining environment – protecting the vulnerable
- Acting on credible early warnings, even though the risk is not completely understood
- Identifying, creating and choosing the safest feasible alternatives – reorienting questions
- Responsibility on proponents
- Expanding the range of participants in risk decisions
- Rethinking the science use to inform policy

Vision and principles for Precaution

- Acting on credible early warnings
- Assessing and choosing the safest feasible alternatives to meet our needs
 - Focus on solutions/preventability, not just how bad problems are – not just bans
- Responsibility on proponents
- Expanding the range of participants in risk decisions
- Rethinking the science used in policy

Expanding those involved can improve decisions under uncertainty

- These are public decisions that involve uncertainty and contested values
- Helps ensure that the right questions are asked about problems
- Lay citizens bring a perspective and experience to the decision-making process that is not bounded by disciplinary expertise
- Lay judgments reflect a sensitivity to values and common sense
- Increases the legitimacy, quality, and accountability of decision-making processes.

Precaution and science

- Precaution is not anti-science or just risk management. Best available science should inform policy
- It demands more rigorous and transparent science to characterize risks, identify opportunities for prevention and make clear gaps in understanding.
- The role of science is to inform policy – we don't need perfect information, but enough to decide when we know enough to act and what to do.
- Call for more science.

Appropriate Science – A new vision of science for policy

- Methods/approaches chosen to fit the nature and complexity of the problem - flexibility
- Quantitative and qualitative data respected equally
- Risk assessment not separated from alternatives assessment (solutions)
- Use of interdisciplinary approaches to the extent feasible considering cumulative effects, susceptible sub-populations.
- More comprehensive uncertainty characterization and improved communication/consultation
- Look at whole of evidence including accumulated knowledge and judgment
- Systems for continuous monitoring to avoid unintended consequences and identify early warnings

Steps in approach for applying precaution

- Determine whether risk merits a more thorough review
- Broadly define problem
- Consider and examine all relevant evidence on exposure, hazard and risk – considering variability, direct and indirect effects
- Comprehensively examine uncertainty
- Examine a wide range of options to reduce risks and their pros/cons
- Determine an appropriate course of action using a wide range of policy tools
- Institute post-implementation follow-up

The important goal – when do we know enough to act?

- A “moving target” – no single recipe
- Consider when and how to act in context of:
 - Available knowledge
 - Scientific “suspicion”/accumulated understanding
 - Complexity/magnitude/severity/uncertainty/reversibility
 - Technical/economic feasibility
 - Availability of prevention options
 - Public values/risk aversion
 - Responsibility to protect health and ecosystems

Goals of precautionary actions

- Continuously reduce and if possible remove exposures to potentially harmful conditions
- Win-win, cost-effective and multi-risk reduction
- Create conditions for sustainability - proactive
- Improve production processes and activities
- Establish public health goals
- Provide information and education for empowerment and accountability
- Integration into the research agenda
- Minimize unintended consequences (consider existing risks)

Tools for applying precaution

- Clean production and pollution prevention
- Environmental/Health Impact Statements
- Integrated pest management
- Financial responsibility/producer responsibility
- Goal setting for environmental health
- Research, technical support and other incentives for innovation in technologies and activities

Example: Toxics Use Reduction

- Goal: 50% reduction in toxic waste through TUR
- Not to look for a “safe” level of emissions but for ways to reduce waste and chemical use.
- Quantify materials use and understand how and why a chemical is being used. Understand costs of chemical use.
- Examine alternatives.
- Measure progress and re-evaluate periodically.
- Results: 1990-1997 57% reduction in waste; 33% reduction in use; 80% reduction in emissions while saving \$15 million – excluding environmental/health benefits.

Example: Forward Looking Precaution – Goal Setting

- Common in Public Health
- Goals for reducing exposures; reduction in hazardous substances; reductions in incidence of disease; establishment of “red flag” activities; establishment of activities that might lead to harm
- European chemicals policies: phase outs of the most harmful chemicals and those that are unstudied; rapid assessment
- Establishment of environmental quality goals with backcasting processes.
- Research into alternative technologies

Conclusions

- Precautionary policies recognize the limits of science and policy under uncertainty and complexity
- Precaution should be considered a continuous approach to guide better, more health protective decisions under uncertainty.
- The most robust decisions involve a diverse range of tools, options, stakeholders, and an ability to build on knowledge – the whole of the evidence. But precaution not a guarantor against mistakes.
- The best environmental policies will be informed by the best available science, but will also be guided by a principle of erring on the side of caution
- Go beyond border of diagnosis to solutions. Need to increase resources for research and development of safer alternatives to problem materials and activities
- Ultimate goal is to prevent disease and degradation and restore health.

