HOW TO HELP REPORTERS TELL THE TRUTH

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Abstract: Reporters and the public are confused by constantly conflicting "they says" on every controversial or unsettled subject. How can you in science and statistics help the media – or the public – understand and convey the facts, or the best "facts" you can muster? *Tell them candidly about both the strengths and weaknesses of your evidence, your statistics and studies.* Tell them about (1) the certainty of uncertainty – how all you can tell them is the best estimate at the moment; (2) how we all must use probability to decide on action in the face of uncertainty; (3) the importance of the power of large numbers to lend belief; (4) the danger of bias, or other unaccounted for explanations; (5) the ubiquity of variation from study to study; and (6) the fact of a hierarchy of studies, from the least to the most believable. Tell them that one study rarely proves anything, that there is commonly a variety of studies with varying results, and we must look for a consensus of studies, and the best, least biased informers. The reason to do it this way? Candor builds credibility!

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1. INTRODUCTION

The world of journalists is a world of sources – medical scientists, physicians, biologists, statisticians, and "spokespersons" for everyone imaginable – all telling us things and often saying, "Believe this." Yet we know it can't all be believed.

When it comes to any health or risk or environmental issue, for example, one scientist or environmentalist typically says the nuclear plant or toxic waste dump will cause so many cases of cancer. Another scientist or environmentalist or industry spokesperson denies it. One doctor reports a "promising" new treatment, and another doctor says, "No, it doesn't work."

To the journalist and the public, this is all part of a whole world of conflicting claims and assertions about politics, budgets, the economy, education, welfare and the many risks of modern life. These risks range from pollutants, chemicals, "bad" diets, exposure (good or bad? beneficial or dangerous?) to all the vitamins, minerals, herbs and supplements we're told to swallow.

So what can we believe? What's worth reporting? And most importantly to us all, What's worth doing something about?

2. STATISTICAL THINKING

I happened to write a little book – *NEWS & NUMBERS – A guide to Reporting Statistical Claims and Controversies in Health and Other Fields* – to try to help reporters and editors and news directors deal with all the conflicting claims and assertions we hear. It has now gone through several printings and come into use at a number of journalism schools. It has been recommended to physicians, scientists and even statisticians for a simple way of seeking truth or some approximation of truth, a way to help both the public and the media understand what science is saying, or should be saying.

I think this shows a wide interest among journalists and scientists alike in helping the public learn to separate the truth from the trash, or the probable truth from the probable trash. I believe it shows that you in science can become effective allies in using some of the principles and explanations of NEWS & NUMBERS. These principles are not just mine, but those of good scientists and statisticians. These principles can be extremely useful when we are called on to explain why different experts say different things or, so often, say one thing today and another tomorrow.

I believe that six principles pretty much sum up what the media and the public need to know about statistical thinking:

- the certainty of uncertainty
- the use of probability.
- the power of large numbers
- the danger of bias
- the ubiquity of variation, and
- the hierarchy of studies.

I believe that by your imparting these principles, we – the media and the public – can go a long way toward judging the claims and statistics that are thrown at us.

3. THE CERTAINTY OF UNCERTAINTY

The first thing we must learn is that *all science is uncertain* or uncertain to a degree. Nature is complex and research is difficult, and almost all anyone can say about the behavior of atoms or people is that there is a strong probability that such-and-such is true, and we may know more later. Dr. Arnold Relman, long-time editor of the *New England Journal of Medicine* once told me, "All we are publishing are progress reports" and "we may do better tomorrow."

This can tell us why things so often seem settled one way today and another tomorrow and why so much is debated whether it is the effects of global warming, a pesticide or a medical treatment. It tells us why people – and certainly our editors and news directors – so often ask, "Why *do* they say one thing today and another tomorrow?"

It is important to tell the public about uncertainty or a degree of uncertainty and why it exists if we are to combat the wide public distrust and skepticism that exists today with people saying, "You tell us one thing today and another tomorrow. We can't believe anything!"

4. THE USE OF PROBABILITY

You in science, and we in the media, must also say that uncertainty need not impede vital action if we understand and use the other principles such as the use of probability.

Science uses probability to live with uncertainty. And the laws of probability and chance tell us to expect some unusual, even impossible sounding events, including many alarming "clusters" of cancers or birth defects that have no discernable cause but nature's coin tossing.

5. THE POWER OF LARGE NUMBERS

We can then tell why we look for studies and conclusions that are based on the *power of large numbers.* And why we should be skeptical and questioning – not entirely disbelieving for there are exceptions – about studies that have only a handful of cases. And why proof of anything requires more than anecdotes, however striking.

Too, we should be wary of assertions with no cases or not enough cases, like the frequently heard statement from a defender of something or other that "there is no proof… there is no evidence…. There is no conclusive evidence." etc. Usually there is no conclusive evidence because there haven't been any good studies.

When it comes to numbers, our lessons should also include something about statistical strength or odds, how the greater the odds against some association being a matter of chance, the greater its strength or believability. If a pollutant seems to be causing a 10% increase in risk above background, that may or may not be a meaningful increase or decrease. But if the risk associated with the pollutant is several times greater than that without, then the odds are strong that something is happening.

6. THE DANGER OF BIAS

Next there is the fact that many people who make claims ignore other possible influences, which bias their result. So we have to learn to ask, "Are there any other possible explanations for what you saying, or influences that you may be ignoring?"

As John Bailar has maintained, "Bias dominates randomness almost everywhere." He continued, "… epidemiologists … have spent much effort in recent years on two areas critical to statistical analysis. One is understanding the nature of confounding and the effects of efforts to reduce its influence. The other is developing a taxonomy of bias. This taxonomy has some very important, big, practical implications." "One thing we should do in the academic setting is focus far more than at present on inference in the face of bias." (Bailar, 1995)

7. THE UBIQUITY OF VARIATION

A common pitfall of science is that everything that is measured or studied varies from study to study or from measurement to measurement. It is important to tell people that no two studies of exactly the same thing have exactly the same result, often the results vary widely and this is expected. We want to see studies repeated and repeated before putting down our chips.

8. THE HIERARCHY OF STUDIES

Finally, there is the hierarchy of studies. All studies are not equal. When someone tells us, "I've done a study," we should ask, "What kind?", "How confident can you be in the results?", "Were any flaws possible?" An honest researcher will always admit flaws or other possibilities; a snake-oil seller will volunteer none.

All this principle tells us, or will tell us, if you help teach it to us, is that one study rarely proves anything. There are typically several different studies with differing, often conflicting, results. We must therefore seek out the most credible evidence, the most likely probabilities. We must look for a consensus among the best studies and among the best, most neutral, observers: those who remain scientists rather than salespeople.

9. REPORTING BIAS

News reporting today is actually vastly better than the reporting of a few generations ago. But we have a long way to go.

Of the reporting of health and medicine, some years ago (tongue only partly in cheek), I said there are only two kinds of medical and environmental stories: New Hope and No Hope. New Hope and No Hope get on Page One and the Evening News. The stuff in between these two often gets ignored or buried.

Reporters like to run for Page One or the Evening News. So there is a lot of exaggeration and hype and

often slighting the whole truth, or so often mixed truth, about the so-called medical "wonders" that fill the news. Take kidney dialysis, a wonder for many but a failure for many. Heart pacemakers maintain lives but can also fail or get infected. Genetic engineering has produced thousands of wonderful words but no wonders so far when it comes to demonstrated cures. AIDS drugs are keeping many patients alive, but are a bitter story, or too expensive, for many.

Oh, you may say, the terrible, exaggerating press.

But who tells us this stuff? It's often the scientists and doctors who do the work and get carried away.

Sometimes the reporting bias is source bias – not reporter bias. Sometimes a more thoughtful, a more objective source might have helped produce a better story. In particular many news stories simply fail to include some numbers that any of us would want for intelligent decision-making.

10. ANSWERING UNANSWERED QUESTIONS

A sharp magazine editor once told me, "Don't leave any unanswered questions," by which he did not mean every conceivable question, but the questions that would readily arise in people's minds.

Well in the *New England Journal of Medicine* (Gaziano, 1993), researchers once wrote that "One to three drinks" a day may help to protect against heart attacks. They defined a drink as 13.2 grams of alcohol on average. But with whiskey, wine and beer all at various "proofs" or alcohol content, neither the article nor an accompanying editorial nor any news reports I read or saw told how much daily booze, wine or beer somebody like me should consume to drink no more than the prescribed grams. A drinker could stay within the three-glass limit yet swallow far more alcohol than was advocated by pouring hard liquor instead of beer.

Today, medical reports are widely scanned by TV and print reporters, by the public and by the highly non-statistical physicians, bless them. I believe editors should take into account the fact that, intentionally or not, they are now reporting to the public. And to patients. This should mean including – it need only be very brief – the context that the reporters, the public and the physicians need. It means answering unanswered questions.

11. MISSED EXPLANATIONS

Sometimes, of course, a reporter does not read an article quite carefully enough and misses a relevant explanation.

On the CBS Evening News of Nov. 13, 1996, CBS' Dr. Bob Arnot, reported on a study of Gulf War Veterans and the so-called Gulf War Syndrome. He said that not only do the soldiers have no more illnesses than soldiers who did not serve in the Gulf, but "In fact they are healthier than most Americans." This of course ignores what epidemiologists know as the "Healthy Worker Effect," where people on jobs are naturally healthier on the average than other persons since they are able to work.

The article in the *New England Journal of Medicine* reporting the study (Kang and Bullman, 1996) said: "In both groups of veterans [e.g., the Gulf War vets and the controls] mortality rates were significantly lower overall than those in the general population. The authors said this might be attributed to a "Healthy Soldier Effect," similar to the Healthy Worker effect, but the news reports I saw or read missed this explanation.

12. REPORTING ON RISK

Although often quoted, risks are still easily misunderstood. There is very little understanding among the public, and among many journalists, of the difference between a rate and a proportion. or even between a rate and a mere number. The airline passenger death rate has been headed downward almost year by year, with few exceptions. But stories about crashes or deaths often make it seem that airline travel is getting more dangerous. But increasing numbers of crashes or deaths have two explanations: increasing risk or an increasing population – more people flying on more flights. By not mentioning the latter (more people on more flights), the former (more dangerous) is given an unearned credibility.

A January 13, 19988 headline in *The Washington Post* said, "Airline Accident Rate is the highest in 13 Years." But the story merely reported death and crash totals – not rates at all. A correction had to be printed pointing out that "the number of accidents per 100,000 departures had been declining…"

Help the public and the media understand that rate has to mean so many per so many per unit of time. Help the media, help the public understand the importance of looking at the right denominator when assessing rates or risks. But don't assume that everyone you talk to remembers what the "denominator" is. Maybe say, "the right population."

Here is a glaring example. The *Wilmington (Del.) News Journal* on Oct. 10, 1994 splashed a dramatic headline atop Page One: "Cradle of Sorrow – 19901: code for 'dangerous to infants'". This '19901' is the ZIP code for Dover, Delaware. And this '19901' ZIP code had the state's highest infant mortality rate, higher than in any of the state's high poverty, high teenage pregnancy areas. The story said, "Why .. is not easily

explained." But the *News Journal* soon learned why. The Dover hospital, where these deaths occurred, is the only hospital in something like a 40-mile area. It draws many childbirths from outside Dover. Hence the large numbers in one zip code. The mortality rate was obtained by dividing the infant deaths in the ZIP code by the population in just that ZIP code. But this population wasn't the relevant population. A case of a wrong denominator.

Speaking of risk, I think the public has been, and continues to be, ill served by the bare use of the word "safe." Again and again, we have been told that some new technology, some new prescription drug is "safe" only to learn otherwise for some people and sometimes for many. When the Food and Drug Administration or Environmental Protection Agency or some other entity describes something as "safe," it is almost never completely so. Where we sometimes must accept some risk, I think we should say "safe" means "relatively safe" and try to indicate, in the best numbers and rates we can muster, the degree of safety or risk –the risk of adverse events. We might create some short-term disadvantage, but gain in long-term public confidence in official pronouncements.

When you tell us about an increase in exposure or risk in terms of "relative risk," don't neglect to tell us the actual numbers of people affected or potentially affected. And when you just tell us the numbers of people affected, try to add the relative risk – the odds – for us, the public. We need both the risks and the expected number of cases to make personal decisions.

13. CONCLUSION

All the things I have been describing are the kinds of things you can help the public and journalists understand. In a thousand difficult situations – risks, apparent risks, research results, new solutions – you, as well as we who do the reporting, must not pretend that there are answers inscribed in stone. There is, rather, the certainty of uncertainty, the necessity to rely on probabilities and the rest of the rules that make a so-called fact worth considering.

This advice, this admission of sometime uncertainty flies in the face of the usual recipe for convincing the public, or Congress, that some action, or appropriation, is necessary. This admission of uncertainty defies the usual formulas: "Here are the facts and woe, oh woe, if you do not accept them"… "This technology is safe. We tested it!"… "There are only 2.3 chances in a zillion that this rocket will blow up on the pad."

A wise person once said, "If you would have public confidence, confide in the public." Any other course may work temporarily, then backfire, just as so many "certainties" and "assurances" to the public have backfired and created so much of today's skepticism and plain cynicism about all science.

Please help us! Help us the media and us the public come as close as we can to knowing and facing the truth.

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