Patient Information Forum

For Professionals Working in Consumer Health Information

Communicating risk: know your numbers

September 2015

There can be many ways to present the same type of data. Are you using the best method to communicate your information? You don't need to be a mathematician – a few simple tips can make your information instantly easier to understand.

Natural frequencies

One of the best ways to make statistics more meaningful is to use natural frequencies rather than percentages. This is because people often find percentages a hard concept to understand.[1,2] So, rather than saying "Drug X reduces symptoms for 10% of people", you could say "Drug X reduces symptoms for 1 in 10 people".

It's also important to make your numbers easy to understand. Obscure proportions, like "8 out of 27" are hard to picture. Try to either stick to using multiples of 10 as the denominator (3 in 10, 45 in 100 etc.); or alternatively saying "1 out of… " to make numbers more relevant.[3]

How?

For the obscure proportion example above (8 out of 27), this is equivalent to 30% (8/27 x100). This could be expressed as "30 in 100 people", or "3 in 10 people". You could also describe this as "just under 1 in 3 people" (27/8 =3.4).

Finally, if you're comparing figures between groups, make sure they have the same denominator.[3,4] So, don't say 1 out of 6 for one group and 1 out of 8 for another – it's hard to tell quickly which one is larger. Instead, convert both figures so they use the same denominator.

How?

The most simple way to compare two fractions with different denominators is to convert both to percentages, and then use numbers out of 100.

- 1/6 x 100 = 16.7%, or 17 out of 100 people
- 1/8 x 100 = 12.5%, or 13 out of 100 people

Absolute risk describes the chance of an event happening over a specific time.

Relative risk describes how two risks compare; or in other words, how much more or less likely a particular event is in one group compared with another.

Risk reductions describe how these risks are reduced by a particular intervention.

The differences between these are best described using an example. Imagine that you read a study on a new drug, which finds the risk of having a heart attack or stroke is 10% in people who didn't have the treatment, compared with 5% in people who took the drug for 3 years.

This can be described as:

- An absolute risk reduction of 5% (10% minus 5%) – also sometimes referred to as 5 percentage points: "The number of people who had a heart attack or stroke after taking the drug dropped by 5 in 100".
- A relative risk reduction of 50% (5% divided by 10%): "The drug reduced the risk of heart attack or stroke by 50%".

Which would you find easiest to understand and which would you find more persuasive?

Relative risks tend to be misleading, by making any changes look bigger than they actually are.[1] They're often quoted in media stories as they add 'shock value'. However, if presented on its own, the relative risk doesn't actually tell you anything meaningful. You need to know what your baseline is to understand how it relates to you.

So – for the example above, someone who has a very small risk of heart attack to begin with will benefit much less from the drug than someone who has a high risk of heart attack.

- For someone with a low baseline risk of 1 in 100, a 50% relative risk reduction would mean their risk is now 0.5 in 100 (an absolute reduction of 0.5 percentage points).
- For someone with a high baseline risk of 80 in 100, a 50% relative risk reduction would mean their risk is now 40 in 100 (an absolute reduction of 40 percentage points).

You can see that in each example, the relative risk stayed exactly the same, whereas there is a huge difference in the absolute risk reductions.

When presented on their own, absolute risk reductions generally give readers a more accurate understanding of risk than relative risk reductions.[1,5] There are sometimes occasions when it may be useful to include the relative risk – for example if you're trying to emphasise the effect of a particular intervention. But if included, it should always be in association with absolute or baseline figures.[5] Including the baseline figures has been shown to significantly improve readers' estimate or interpretation of risk.[5]

Explaining uncertainty

Estimations of risk are just that – an estimate. Even with the most perfectly designed study, the results are always influenced by the play of chance.[6]

This is where confidence intervals come in. Confidence intervals are a measure of how sure we can be about the estimates obtained from a study. They present a range of values, in which we can be fairly certain the true answer lies. The wider the confidence interval, the more uncertain we are. In most studies, results are expressed in terms of a 95% confidence interval (95% CI). This means we can be 95% certain that the true answer will lie within that range.[6]

So, if a study tells us a drug works for 25% of people and the 95% confidence interval is 23–26%, the results are very precise and we can feel more confident that the true proportion of people who will benefit is close to 25%. If the confidence interval is 12–48% though, there's much more uncertainty around the results and it's questionable how useful they are.

On top of this, in the 'real world', patients who take the drug may be very different from those in the study setting, and this may affect how well it works. So even the confidence interval does not fully express our uncertainty.

How?

So, how to communicate uncertainty? As we know, more information isn't always a good thing – aim to keep it as simple as possible.

For the example above, in which a drug worked in 25% of people and had a 95% confidence interval of 12–48%, you could explain this as follows:

- "Results from the study suggest that the drug works in 25 in 100 people. The results weren't very precise though – between 12 and 48 in 100 people may benefit from the drug."

If you don't need to discuss study results in depth in your information, it may be enough to be aware of how to interpret and convey this information. If the confidence intervals are very wide, should you be quoting those results at all? If there's a narrower range, you may simply want to add in suggestion of uncertainty in your content by using terms such as "Around", "Approximately" or "About". For example:

- "Around 25 in 100 people may benefit from this drug".

PIF Toolkit: risk checklist

www.pifonline.org.uk/toolkit

PiF Toolkit key step	Covered here
Be cautious using verbal descriptors of risk. If used, ensure these are accompanied by statistical information.	
Use absolute risk rather than relative risk.	✓
Use natural numbers rather than percentages.	✓
Consider using both positive and negative framing for risk.	
Communicate uncertainty of data; explain the effect confidence intervals have on data.	✓
Consider using a mix of numerical and pictorial formats to communicate risk.	
Make risks relevant. Consider using examples as a comparator.	

References

1. Akl EA, Oxman AD, Herrin J, et al. Using alternative statistical formats for presenting risks and risk reductions. Cochrane Database of Systematic Reviews 2011, Issue 3. Art. No.: CD006776. DOI: 10.1002/14651858.CD006776.pub2.
2. Fagerlin A, Zikmund-Fisher BJ, Ubel PA (2011). Helping patients decide: ten steps to better risk communication. J Natl Cancer Inst. 103(19):1436–43. doi: 10.1093/jnci/djr318 jnci.oxfordjournals.org/content/103/19/1436.long.
3. Stewart FH, Shields WC, and Hwang AC (2004). Presenting health risks honestly: mifepristone, a case in point. Contraception (69):177–8. https://arhp.org/uploadDocs/journaleditorialmar2004.pdf.
4. Royal College of Obstetricians and Gynaecologists (2008). Presenting information on risk. www.rcog.org.uk/globalassets/documents/guidelines/clinical-governance-advice/cga7-15072010.pdf.
5. Berry DC, Knapp P, Raynor T (2006). Expressing medicine side effects: assessing the effectiveness of absolute risk, relative risk, and number needed to harm, and the provision of baseline risk information. Patient Educ Couns;63(1-2):89–96.
6. Irwig L, Irwig J, Trevena L, Sweet M (2008). Smart Health Choices: Making Sense of Health Advice. London: Hammersmith Press. www.ncbi.nlm.nih.gov/books/NBK63638/.

About the author and contributors

This fact sheet was written and produced for PiF by Pippa Coulter. Pippa is a specialist in the production of consumer health content, with 15 years of experience in medical publishing and communications. She has extensive experience in producing high-quality, reliable and evidence-based health content for consumers. Pippa currently manages the health content library at Bupa. View Pippa's profile on Linkedin.

The factsheet was kindly reviewed by David Spiegelhalter, Winton Professor for the Public Understanding of Risk in the Statistical Laboratory, Centre for Mathematical Sciences, University of Cambridge.

Hannah Bridges, HB Healthcare Comms, edited the factsheet.

About PiF

PiF is a non-profit organisations working to improve the quality and accessibility of health information for patients and public across the UK. Our work involves: delivering resources and events for information producers; influencing to raise the profile of health information; and bringing together those interested in the field of health information via the PiF network. You can find out more at www.pifonline.org.uk .