

Advice to authors preparing manuscripts on patient risk or treatment benefit

Risk has been defined as a danger or peril as perceived by an individual. In clinical medicine, risk is used to express the likelihood of a negative or harmful effect on the patient. Risk can be expressed in several ways such as an absolute risk (AR), relative risk (RR), odds ratio (OR) and hazard ratio (HR). Similar measures can also be used to evaluate the benefit of new treatments. In clinical trials, one or more of these measures are often reported. However, which one of these measures is most appropriate, given the nature of the data and the study design?

In clinical research, results are often presented as categorical or binary (yes/no) outcomes. One of the most commonly used methods for analysing binary data is the 2 x 2 contingency table (see Table 1). From this 2 x 2 table, the RR and OR, as well as other measures of risk or benefit, can be calculated (see Table 2). However, the design of the study, method of analysis and overall sample size dictate which measure should be estimated. As an illustration, RR cannot be obtained directly from a case-control study because such an approach is designed to estimate the OR. Similarly, logistic regression analysis, which is one of the commonly used statistical methods seen in medical literature, also generates an OR. Reviewers of medical literature may assume that the OR is a measure of the overall risk in a given population.

In some circumstances when the event in question is rare, i.e. <10%, the OR can be used as an approximation for the RR for the overall population. However, with more common events, the OR must be adjusted in order to approximate the RR [1].

When conducting patient care research, pharmacy practitioners must ensure that the results of a study are reported in a format that reports the outcomes correctly. For a more detailed review of the methods of interpreting and reporting risk or patient benefit, investigators interested in submitting articles to this journal are directed to some excellent reviews [2-4]. As an aid to authors, some key points that should be considered before submitting an article on patient risk or benefit are detailed as follows:

Table 1: The standard 2 x 2 contingency table

Treatment	Outcome		
	Event at evaluation	No event at evaluation	Total
Experimental group	cell ₁₁ = a	cell ₂₁ = b	n = a + b
Control group	cell ₁₂ = c	cell ₂₂ = d	m = c + d
R: a + c; s = b + d; N = a + b + c + d			

Table 2: Common outcomes reported in clinical trials or epidemiological studies

Outcome	Definition	Expression
Disease recurrence	Number of patients who have redeveloped the disease at a given point in time, after a period of being disease free	Exp group = a Control group = c
Risk of recurrence	Proportion of patients who have disease recurrence divided by the number under investigation. Usually expressed as a percentage	Exp group = a/n Control group = c/n
Relative risk	The risk of recurrence in the experimental group divided by the risk of recurrence in the control group. Usually expressed as a percentage	[(a/n)/(c/n)]
Relative risk reduction	1-RR	1-[(a/n)/(c/n)]
Absolute risk reduction (ARR)	The risk of recurrence in the experimental group minus the risk of recurrence in the control group	(a/n) - (c/n)
Number needed to treat	The number of patients that have to be treated by the new intervention in order to avoid one additional clinical event. In this case, a disease recurrence. Expressed as the reciprocal of the absolute risk reduction (ARR ⁻¹)	[(a/n) - (c/n)] ⁻¹
Odds ratio	The odds of an event occurring in the experimental group divided by the odds of an event occurring in the control group	(a x d)/(c x b)
Hazard ratio	The instantaneous relative risk of an event per unit time for an individual in the experimental compared with an individual in the control group, given that both individuals have survived to time t	Ln [h(t)/h ₀ (t)] = b ₁ x ₁ + b _k x _k
Exp group: experimental group		

- All clinical outcomes of patient risk or benefit should have been based on a pre-planned statistical analysis. The statistical analysis should be well described in the methods section. Investigators are encouraged to consult a statistician during the design phase of the study and for data analysis.
- The paper should report all original event (or success) rates, which will allow for independent calculation of measures of risk or benefit.
- For studies evaluating prevention or treatment, the primary results should be presented as both an AR and RR.
- If the paper reports patient benefit, the number needed to treat should also be calculated (see Table 2).
- If the paper estimates ORs, the statistical models must be well described in the methods section.
- If ORs have been estimated and the event is common (i.e. >10% event rate), the OR should not be used interchangeably with RR. To estimate RR, the OR must be adjusted appropriately [4].
- All outcomes of risk or benefit should also be supported with measures of precision (e.g. 95% confidence intervals).
- Potential bias in the outcomes measures must be accounted for in the study design or the method of analysis. Furthermore, all potential biases should be addressed in the discussion section of the paper.

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