Do not throw the baby out with the bath water: a guide for using non-significant results in practice

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Abstract
Acting on results that are not statistically significant is challenging for clinicians. Such results are often interpreted as evidence of lack of association or as useless evidence. We provide a framework for interpreting and applying non-significant results at the point of care using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) approach.

It is well known that p values are misused, misunderstood and miscommunicated. Much has been written about misleading conclusions based on p values and data dredging; and how this contributes to publication bias and misleading conclusions. However, there is minimal guidance for clinicians interested in practicing evidence-based medicine on how to actually implement results that are not statistically significant in patient care. Many scientific publications have cautioned about the limitations of p values and provided the correct definition and interpretation of them, but a practical guide is needed. To merely tell practitioners that p value is non-significant results can sometimes be clinically useful and help in decision-making.

Rate certainty in the evidence
The GRADE approach uses eight different domains to rate the certainty in evidence (also called quality of evidence); however, since this discussion is about statistically non-significant results, we focus on the domain of imprecision.
GRADE advises decision-makers to ignore p values and instead determine whether their decision would change across the CI of the absolute effect.

In this scenario, if we consider a neonatal death rate of 2 per 1000 to be trivial, then our decision would be the same whether the true effect was 0/1000 or 2/1000. In this case, evidence would be precise and warrants sufficient certainty to make a decision. If we consider a neonatal death rate of 2/1000 to be unacceptable, then this evidence is imprecise and we have very low certainty about making a decision. The second layer of

Using non-significant results in practice

1. From a relative risk:
   \[ (1 - \text{relative risk}) \times \text{CER} \]
2. From an OR:
   \[ \frac{\text{CER} \times \text{OR} \times \text{CER}}{1 - \text{CER} + \text{OR} \times \text{CER}} \]

*Also called risk difference or absolute risk reduction.

CER is the control event rate.
decision-making involves a fully contextualised approach that incorporates other outcomes. For example, some women may consider the increase in neonatal death to be acceptable if they knew that a trial of labour is associated with lower risk of maternal thromboembolic complications.

**Use shared decision-making principles and tools**

The second principle of evidence-based medicine dictates that evidence alone is insufficient for decision-making. One should also consider patients’ values and preferences. In the example discussed so far, clinicians should ask women how they value each outcome. Women who fear (are more averse to) any fetal loss even if the risk was very low may opt for a caesarean delivery. Women who place higher values on preventing maternal perioperative complications, prefer a natural birth experience and short postdelivery recovery period may opt for a trial of labour considering that the risk of fetal loss is very low.

Clinicians presenting these options should convey the uncertainty in evidence to patients. Shared decision-making processes and tools, such as decision aids, are paramount to facilitate the discussion and convey probabilities using natural frequencies (which are more understandable) and depictions. Such tools have been associated with lower decisional conflict, lower chances of regret and increased likelihood that patients will make decisions consistent with their own values.3 9

**Discussion and conclusion**

Text mining studies have demonstrated that the use of p values has substantially increased from 1990 to 2014.1 Therefore, this issue will continue to be a challenge for evidence-based practitioners. Statistically non-significant results can be clinically useful and may help with making clinical decisions. Avoiding harm was presented here as an example. Evidence-based healthcare practice hinges on using the best available evidence; if that evidence was statistically non-significant, we have a compelling rationale to use it.

Bayesian approaches may be a better alternative that hypothesis testing for inference because they involve the calculation of the probability of parameters given the data (as opposed to the frequentist approach; which computes the probability of the data given the parameters). Therefore, Bayesian approaches can directly provide the posterior odds of the null hypothesis against the alternative hypotheses (eg, 4:1 being true).10 These odds may be more intuitive to decision-makers than the p value which is commonly misinterpreted as ‘the probability of the null hypothesis being true’.

In this methodological proposal, we provide a framework for interpreting and applying non-significant results that incorporates statistics, evidence-based medicine and shared decision-making perspectives.

**Contributors**

MHM and MCT conceived the idea of this guide and wrote the initial draft. FZ and MT revised the manuscript and contributed to the discussion.

**Competing interests**

None declared.

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**References**