SURG238: PRACTICAL INTRODUCTION TO CLINICAL RESEARCH

Welcome to Week 4!

Agenda

1. Intro to statistics: Dr. Lakshika Tennakoon
2. P values
3. Odds ratios

P values: don’t pay attention (too much)

P values and hypothesis testing: watch the language

Our eyes are drawn to “P values”

What is P value?

- Assuming A and B are the same, probability of getting a result=/more extreme than observed

P value ≤ alpha= “our results are significant”?

- NO

P values: don't pay attention (too much)

Viewpoint

April 10, 2018

The Proposal to Lower *P* Value Thresholds to .005

John P. A. Ioannidis, MD, DSc[1]

Author Affiliations | Article Information

JAMA. 2018;319(14):1429-1430. doi:10.1001/jama.2018.1536

P values are misinterpreted, overtrusted, and misused. The language of the ASA statement enables the dissection of these 3 problems. Multiple misinterpretations of *P* values exist, but the most common one is that they represent the "probability that the studied hypothesis is true."[3] A *P* value of .02 (2%) is wrongly considered to mean that the null hypothesis (eg, the drug is as effective as placebo) is 2% likely to be true and the alternative (eg, the drug is more effective than placebo) is 98% likely to be correct. Overtrust ensues when it is forgotten that "proper inference requires full reporting and transparency."[3] Better-looking (smaller) *P* values alone do not guarantee full reporting and transparency. In fact, smaller *P* values may hint to selective reporting and nontransparency. The most common misuse of the *P* value is to make "scientific conclusions and business or policy decisions" based on "whether a *P* value passes a specific threshold" even though "a *P* value, or statistical significance, does not measure the size of an effect or the importance of a result," and "by itself, a *P* value does not provide a good measure of evidence."[3]

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“P <0.05”

- There is no actual cutoff for being “statistically significant”

- “statistically significant”= failure to reject the null. This is NOT accepting the null
  - No evidence that difference in groups was the same. NOT that groups were different

- Small p value does NOT mean large effect size
  - i.e. “Difference in mean systolic blood pressure (group 1: 140 vs group 2: 142) <0.001
  - 3 factors affect p value: effect size, sample size, spread of data

https://www.tandfonline.com/doi/full/10.1080/00031305.2016.1154108

P values and testing multiple outcomes

If testing multiple outcomes, need to adjust alpha ***a priori***

- If you look for enough comparisons between two groups, you WILL find a difference…simply by chance

- Bonferroni correction: alpha/n

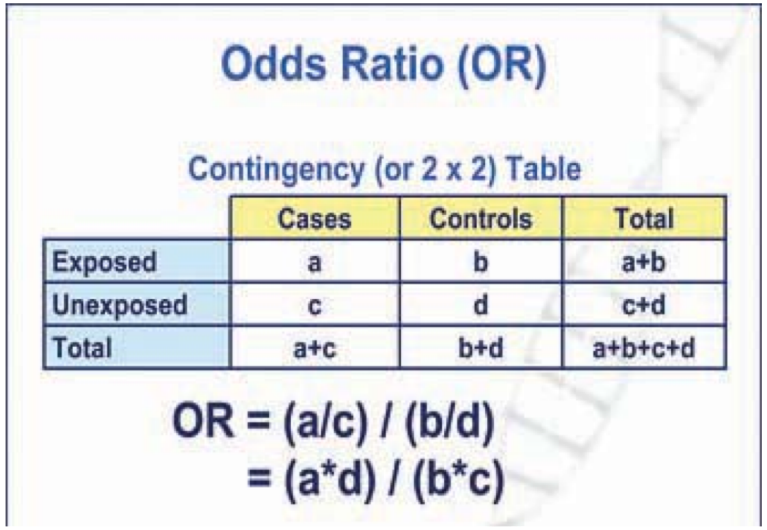
- i.e. looking at 5 outcomes. For statistical significance, instead of $p<0.05$, will be $p<0.01$. Again, don't rely on threshold itself

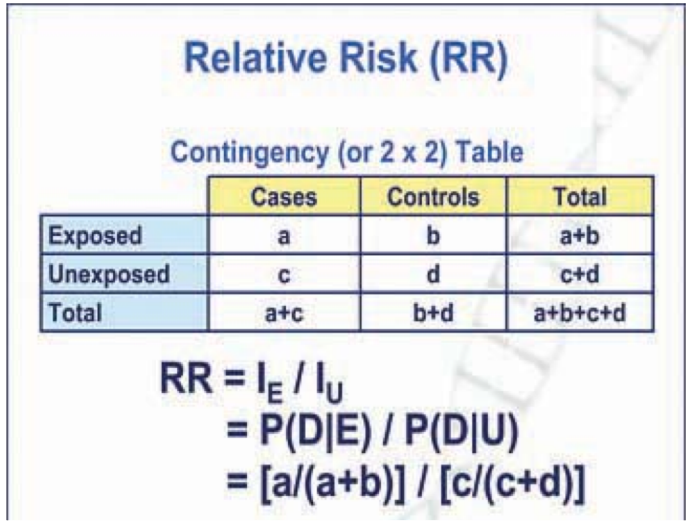
P values and Table 1

Not meaningful (personal opinion)

Misleading if populations have large sample sizes: report SMD instead

Odds ratio: what are they?





OR are not intuitive

- “your odds of death increase by 5%” is NOT “risk of death"

Why odds ratios?

- Output of logistic regressions (just exponentiate the coefficients)
- Case control studies…no choice

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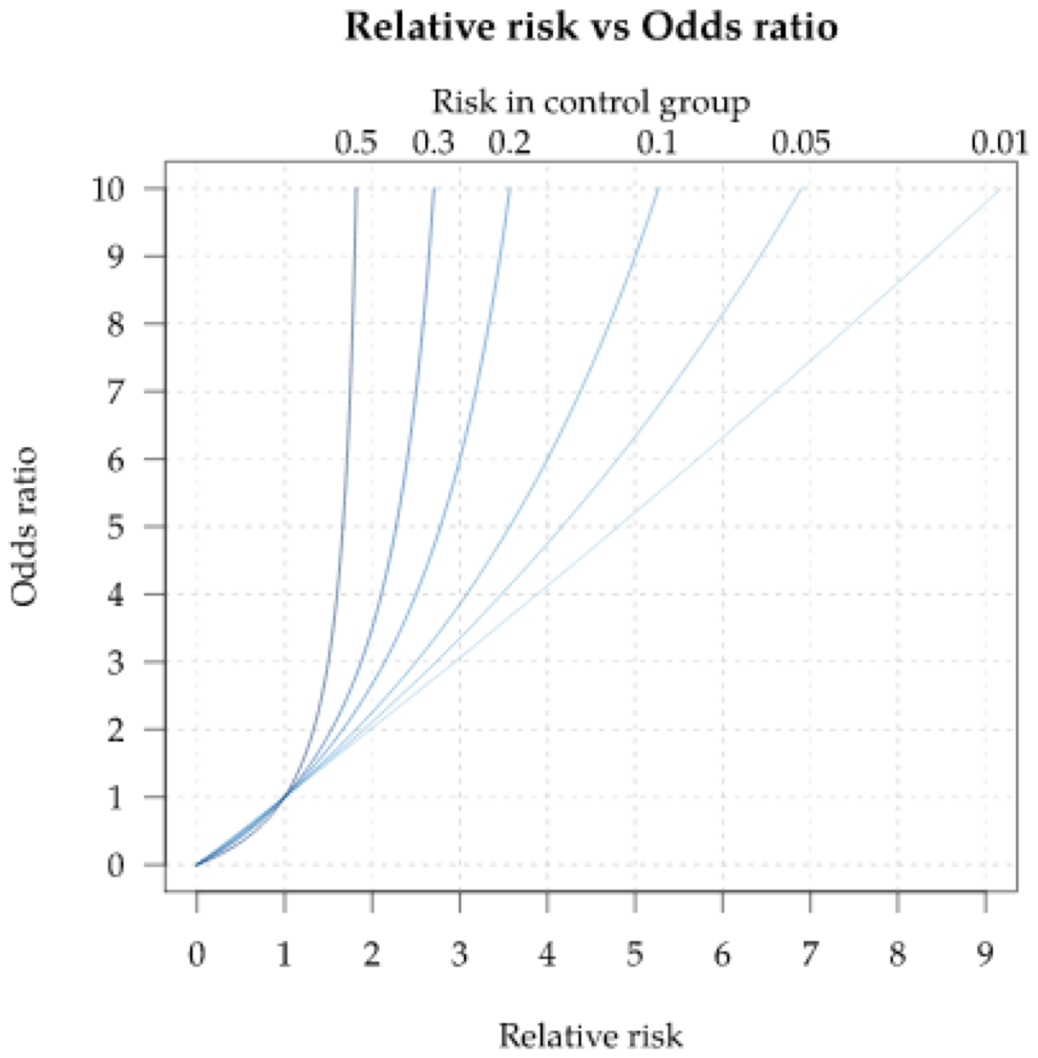
Odds Ratios are dramatic



OR are always farther from the null than RR
- OR paint “more dramatic” picture of differences

Can interpret OR as RR if rare disease assumption is met (risk in control group <10%)

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Look at the confidence intervals!

95% CI is NOT (95% probability true value is in this range),

95% CI is: after hypothetical repeats of experiments using the data, 95% of the time, true value will be within this range