



Hôpital St-Boniface Hospital

# Clinical Trial Research News

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*This newsletter is published on a quarterly basis and is an information source for anyone interested in Clinical Research. Please contact Terry (237-2226) if you would like to be added to / deleted from our mailing list.*

## Statistics and Medical Research

### Odds Ratios and Relative Risk

In the last few decades odds ratios (OR) and relative risk (RR) have become much more widely used and reported in medical studies. Odds ratios and relative risk are two means of communicating to clinicians the effects of treatment interventions in clinical studies. They are extensively used in many fields of medical and social science research, epidemiology, survey research and clinical trials. Odds ratios and relative risk are important as descriptive statistics for a number of reasons:

- They provide an estimate (with confidence intervals) of the relationship between two binary (e.g. "yes" or "no") measures.
- They allow the researcher to examine the effects of other variables on the relationship using logistic regression, thus extending the analysis beyond the two binary variables.

As a general rule, in medical research the odds ratio is preferred for retrospective and case-control studies while relative risk is used in randomized controlled trials and cohort studies.

Both odds ratios and relative risk compare the likelihood of an event occurring between two groups. Basically they provide a measure of effect size, describing the strength of association or degree of non-independence between two binary variables. The odds ratio is the ratio of the odds of a binary event occurring in one group to the odds of it occurring in another group (e.g. experimental and control groups). Relative risk, also called the risk ratio, is the ratio of the probability of a binary event occurring in one group compared to another group. While the odds ratio compares the relative odds of an event in each group, relative risk compares the probability of an event in each group.

### Example Calculation

We can use a common study design frequently employed in medical research to illustrate how odds ratios and relative risk are calculated. Suppose we measure the occurrence of an adverse event (such as a treatment side effect) in both an experimental and control group, each containing 100 subjects, and obtain the following data:

### Adverse Event

<u>Treatment group</u>	yes	no	Total
Experimental	a = 4	b = 96	a + b = 100
Control	c = 28	d = 72	c + d = 100
Total	a + c = 32	b + d = 168	200

From the above data we can calculate a number of indexes:

Experimental Event Rate =  $a/a + b = 4/100 = .040$  or 4%

Control Event Rate =  $c/c + d = 28/100 = .280$  or 28%

Experimental Event Odds =  $a/b = 4/96 = .042$  or 4.2%

Control Event Odds =  $c/d = 28/72 = .389$  or 38.9%

Odds Ratio (OR) =  $(a/b)/(c/d) = .042/.389 = .108$

Relative Risk (RR) =  $(a/a + b)/(c/c + d) = .040/.280 = .143$

Relative Risk Reduction (RRR) =  $1 - RR = 1 - .143 = .857$  or 85.7%

The calculations show that odds are not the same as risks, which are based on probabilities. The odds of a patient in a given group having an adverse event is calculated by dividing the number of patients who have the event by the number of patients who do not. The risk of a patient in a given group having an adverse event is computed by dividing the number of patients having the event by the total number of patients in that group. For instance, in the example the odds of a control patient having an adverse event is 38.9% while the risk is 28%. These differences are then reflected in the respective values of the OR and RR indexes.

Both the OR and RR index must be greater than or equal to zero. If OR and RR = 1 then there is no difference in adverse events between the two groups. If the index > 1 then the event is more likely to occur in Group A than Group B. If the index is < 1 then the event is less likely to occur in group A than Group B. In the example above both the OR and RR are < 1 indicating that the adverse event is more common in the control group than the experimental group.

### Advantages and Disadvantages of Odds Ratios and Relative Risk

Both odds ratios and relative risk have strengths and weaknesses which must be considered carefully when deciding which index to report in a study:

- The OR is symmetrically consistent whether the outcome event is expressed as a positive outcome (e.g. survival) or a negative outcome (e.g. death). The same is not true of the RR which is asymmetric. The RR for dying may be unrelated to the RR for surviving, complicating the clinical interpretation and conclusion.
- The mathematical properties of ORs make their clinical application more difficult than RR. ORs are more difficult to interpret and communicate to patients as they are not as intuitively understandable as the concept of RR. For example, if a new medication has been shown to have a 10% rate of negative side effects, compared to a 20% rate for a standard treatment, then most patients can comprehend that the side effect risk for the new medication expressed as a RR is one-half that of the conventional treatment. ORs do not have the same commonsense meaning.
- RR cannot be computed in certain research designs, particularly case-control studies. However, ORs can be accurately estimated in case-control studies even when an adverse event is relatively rare.
- In fields where adverse events are quite common, the OR tends to overestimate both the likely benefits and harm of treatment. When the prevalence of adverse events is moderate to high, RRs are a more valid indicator of the possible benefits and harm of treatment.
- Many statisticians and researchers argue that Relative Risk Reduction ( $1 - RR$ ) is the preferred index of presentation of clinical results, especially when the control event is relatively high (e.g. >40%).
- RRs are easier to use than ORs when calculating the number of patients that would need to be treated to prevent one additional adverse event – a calculation that is very useful in the assessment of clinical trials.

## References

Bland, J. & Altman, D. "The odds ratio." *British Medical Journal*, 2000, 320, 1468-70.

Cummings, P. "The relative merits of risk ratios and odds ratios." *Archives of Pediatric and Adolescent Medicine*, 2009, 163, 438-45.

Sackett, D., Deeks, J. & Altman, D. "Down with odds ratios!" *Evidence-Based Medicine*, 1996, 1, 164-6.

Articles are authored by OCR statistical consultant Doug Staley. Doug teaches statistics at the School of Medical Rehabilitation, University of Manitoba and has conducted medical research at SBGH for more than 25 years. Readers are welcome to submit questions or suggest topics of interest. Doug can be contacted through the OCR or by email: [dstaley@mts.net](mailto:dstaley@mts.net)

## Visitors on Business Form – REMINDER

Please note that the Office of Clinical Research "Frequently Asked Questions" Webpage has been updated as follows;

### Are representatives from the sponsor (i.e. Drug Companies) & their monitors required to sign a "Visitors on Business" form?

According to recommendations made by the WRHA PHIA Committee in January 2010, representatives from a sponsoring company who will be reviewing medical records for clinical research monitoring and auditing purposes, are required to sign a "Visitors on Business" form. The original form is to be kept in the Investigators research files and a copy given to sponsor's representative if requested. For a copy of the form please click on the link "[Visitors on Business Form](#)".

Website Link to more "FAQs"

<http://www.sbr.ca/content/blogcategory/91/136/#faq48>

## Research Review Committee at St. Boniface General Hospital

### Deadlines for RRC Submission

March 31, 2010

April 28, 2010

May 26, 2010

### Meeting Date

April 7, 2010

May 5, 2010

June 2, 2010

### **NO MEETING IN JULY**

**Submissions to the RRC must be received in N1004 by 11:00 AM on the deadline date.**

Contact the **RRC** at **235-3623** with any questions you may have regarding your RRC submission. Please always refer to the Office of Clinical Research and RRC web site for the most recent submission forms and updates.

<http://www.sbr.ca/content/blogcategory/87/132/>

## The Biomedical (BREB) / Health Research Ethics Board (HREB) Submissions

### Deadline for REB Submissions

April 12, 2010

May 17, 2010

June 14, 2010

### Meeting date

April 26, 2010

May 31, 2010

June 28, 2010

### **NO MEETING IN JULY**

Contact **Ethics** at **789-3255** with any questions you may have regarding your REB submission. Please always refer to the Research Ethics Board web site for the most recent submission forms and updates.

<http://www.umanitoba.ca/faculties/medicine/research/ethics/index.html>

## **Education and Training Events**

### **Life Science Association of Manitoba (LSAM) – Training Events**

Through an industry led steering committee, LSAM offers a variety of courses and training resources so that companies can effectively train their employees to meet their current needs. LSAM has offered 1141 courses and trained more than 11,700 individuals since 1994. To view a list of scheduled training events please visit their training website:

[www.lsam.ca/calendar.cfm](http://www.lsam.ca/calendar.cfm)

### **SDRI Annual Clinical Research Workshop - Saskatoon, SK – April 29 to 30, 2010**

The SDRI Annual Clinical Research Workshop & Symposium will be held in Marquis Hall, University of Saskatchewan, on April 29-30. This year's program features:

- Nine expert speakers from across North America
- Ten sessions covering a wide range of clinical research topics, including budgets, good clinical practice, ethical dilemmas and more
- Two interactive workshops
- Excellent opportunities to meet and learn from others in the field

More Information is available at:

[www.usask.ca/sdri/events.shtml](http://www.usask.ca/sdri/events.shtml)

### **International Clinical Trials Day – St. Boniface Hospital Research – Thursday, May 20, 2010 – 9AM to Noon**

St. Boniface Hospital Research will be hosting a half day of presentations on a variety of Clinical Trial and Research topics. There is no charge for this event but you are encouraged to register to guarantee your spot.

**Please see attached poster for a list of speakers.**

To register contact Terry Sawicz-Hanesiak at 237-2226 or [tsawicz@sbgh.mb.ca](mailto:tsawicz@sbgh.mb.ca)

### **MAGI's Clinical Research Conference 2010 East – Boston, MA – May 23-26, 2010**

Operations - Regulatory - Contracts – Budgets.....More Information Available at:

<http://www.magiworld.org/events/2010E/>

### **Fall 2010 – Clinical Research 3 Part Lecture Series**

Dates to be announced in the next newsletter.

**HAPPY EASTER!**