DRAMS Journal Club

Hi,

Thanks for signing up to present at Journal Club. This document contains (hopefully) all the information you will need for putting together your presentation.

Hopefully, DRAMS will have put you in touch with the clinician who has agreed to supervise your session. If this has not been done, or you are having trouble contacting the clinician, please email DRAMS and we will sort this out. Once you have made contact, you should both agree on the paper you will present and hopefully discuss some key areas.

Once the paper has been decided, it would be great if either of you could email the title, author etc to drams so we can put a link up on the site.

Below are some checklists to help you analyse the paper. Hopefully, they will be helpful in producing your presentation.

The presentation should be around 10 minutes long (and be about 8-12 slides long). Below is a loose framework which you might want to work by:

1. Introduce the paper
    a. Try and outline the question it is looking to ask and why that might be important (also why you have chosen the paper)
    b. Go on to describe how the paper answered the question (do not go into whether this was the right/wrong way at this point)
    c. Describe the results briefly and any conclusions made
2. Analysis
    a. Using the checklist, go through each section (Title/author; abstract/intro; methods; results; discussion) and highlight any strengths/weaknesses of the study (in general- a Yes is a strength; a No a weakness)
    b. Highlight if and why answering the question asked by the study is important to clinical practice/medical research
    c. Try and think of what needs to be done next (or how things could be done differently)
3. Discussion
    a. Are there any questions you had after reading the paper? (***you don't need to answer these now- in fact, it might be good to save them to be discussed at the session)***
    b. In terms of clinical practice (or in general), does the paper raise any issues?
4. Conclude by summarising (as always)

If you have any questions or problems, please don't hesitate to get in touch.

DRAMS Journal Club & Critical Appraisal

This is a very brief overview of how you might analyse medical papers. The idea is to decide whether or not the authors did the appropriate research and have drawn the right conclusions. As simple as this sounds, some articles do particularly well at hiding their flaws. Hopefully this guide will give you some tips to try and identify the good from the bad.

Clinical Trials

- **Start at the VERY beginning**
  - Look at the **title**- immediately you might be able to tell whether this study could be sensible or not.
  - Look at the **authors**- and, in particular, where they work/who employs them and whether they have declared any ***conflicts of interest*** — No conflict of interest? Y/N/Unsure
    - Why?- because there has even been research on research. Who funds a study often affects the results of a study (even if the methods look identical from independent research)
  - The **abstract** can be helpful ONLY in identifying the question behind the research and what kind of study is going on. Methods, results and conclusions should really be more thoroughly examined for errors
    - Is the paper a ***randomised control trial?*** If not, what kind of study is it? — Y/N
- Now begin to look at the **introduction**
  - Does the paper present a clear question to answer? i.e. can you identify — Y/N
    - **P**atient/Population group
    - **I**ntervention
    - **C**omparison intervention (placebo/current tx)
    - **O**utcome to be measured
  - *(Does the title of the paper reflect the question being asked?)* — *Y/N*
  - *Is there a clear reason for asking the question? (e.g. will it save lives)* — *Y/N*
    - *Was this reason known before the study or a chance finding discovered as part of 'data dredging'?* — *Y/N*
  - *Has this question been asked before?*[1] — *Y/N*
- **Methods**- probably the ***most important bit in determining how reliable the paper is***
  - Is the study population useful? (i.e. does the study look at a variety of people rather than males >90 with a mole on their left buttock?!) — Y/N
    - If there have been exclusions, why?
    - Likewise, check for dropout rates and final numbers.
  - Has the treatment allocation been completely randomised? — Y/N
  - Has the assignment of treatments been blinded to
    - Patient — Y/N

[1] This may be found in the intro, discussion or it may not be stated at all (and require some of your own background reading). Bear in mind that other studies may have their own faults. If the studies disagree, you may want to try and find out why. If they concur, you also might want to find out why.

        - Practitioner Y/N
        - Family/carer/other Y/N
    - Has this been done in such a way that no-one has the means to check the treatment allocation? (i.e. protected system rather than an open system) Y/N
    - Is the only difference between treatment groups the treatments? (e.g. no epidemiological/health differences) Y/N
    - Aside from treatment, were both groups treated equally? Y/N
    - Are the outcomes measurable in an objective, standard, valid, reliable way? Y/N
    - Have patients been analysed in the groups to which they were randomly allocated?[2] Y/N
- **Results**- often the most difficult part to truly analyse because of confusion over the statistics/analysis
    - Has the paper reported statistically significant result(s)? (usually $p<0.05$ or 95% Confidence intervals)
        - *If so, try and work out what the result actually means in practice.*
        - *Do you think that the analysis/format used was correct for this study? (this can be difficult if you're not a statistician, but some details about different ones are given below)*
- The **discussion**
    - Are the conclusions of the study an accurate representation of the results? Y/N
    - Have the authors recognised any limitations to the study? Y/N
    - Have the authors done their utmost to reduce the effect of bias? Y/N
    - Do the authors make any suggestions for further research or recommend any changes in practice? Y/N
        - Do you think they are right? Y/N
        - Do you think that these are the correct recommendations? Y/N
        - Will this directly affect your (or your institution's) practice? Y/N

[2] In some studies, patients in the treatment group may end up switching to control (and vice versa) due to side-effects, contra-indications, refusal of treatment etc. Perhaps counter-intuitively, RCTs should analyse these patients as if they were on their initially allocated treatment (termed intention-to-treat analysis). The reason why this makes a study *more* instead of less reliable is thus: once you start excluding/swapping patients around, the results have been shown to be more easily influenced.

Scientific Literature (Wet-Lab based)

Lab-based research articles can be particularly hard to critically evaluate, even to lab professors, without at least a background knowledge of the field of interest. However, there are still a few basic questions that you should ask of the papers which can help.

Look at the authors and declarations of conflict of interest/funding sources. Could there be an issue here?

Again, start at the very beginning with the **Title/Abstract**

- Is this a study on ***cells, tissues, animals (whether worms, flies, rodents, mammals, primates), or humans?***
- Is this research of basic physiology, pathology/disease mechanisms, drug trials etc?
- Is the study asking a clear question? (NB this may also be found in the introduction) Y/N
    - *Again, why are they asking this question? Has it been asked previously? What new evidence is expected to be gained?*
    - Is there a clear hypothesis? Y/N
    - Are there clear aims/objectives? Y/N

In the **methods** section…

- Has the study included all possible control arms of the experiment? (there can often be several controls) Y/N
- *Read over the methods.* Is this the best way of answering the question? Y/N
    - *Will there be any part of the answer missing? Can you think of any flaws?*
- Has the study used multiple experiments/methods? What is the purpose of each and are they connected such to help answer the question?

The **results** section

- For each individual experiment, can you identify the raw data? Y/N
    - If not, would there be a way of extrapolating the raw data from what is given? Y/N
        - *Do you suspect that any data is being hidden?*
- What analysis has been done? Does this show any significant data? Y/N
    - *In reality, what does this mean? Try and describe it in layman's terms if you can*
    - Do you think that this was the correct analysis? Y/N

Unlike clinical trials, the **discussion** section can often be the most crucial part of the paper to analyse

- What have been the main conclusions drawn by the authors? Do these fit with the results? Do they relate with the initial question asked in the introduction? Y/N
- Have the authors identified any designs flaws/limitations of the study? Y/N
- Have the authors recommended any next steps/future research? Y/N
- Are the results/conclusions of this study following on from previous research? Y/N
    - If so, does this study support/contradict other studies? Y/N
- ***Why is this research important?*** *Can you see the clinical relevance? If so, what is it? If not, think about why?*

Meta-analysis/Systematic review

These papers are the most important in evidence based medicine, and theoretically should be of the highest quality. Analysing these papers is therefore also important.

Again, look for any conflict of interests, funding sources etc that may affect the result. Y/N

Unlike studies, these may have a different layout, but essentially should have the same structure. In the **introduction**…

- Can you identify a clearly defined research question? (use PICO as for clinical trial) Y/N
    - *Why is this important? What is the current evidence/opinion on this topic?*
    - *Will it have an impact on your institution/ your clinical practice?*
    - *Has this question been asked before?*

In the **methods section…**

- Have at least 2 people been involved in study selection and data extraction? Y/N
- Has a comprehensive literature search been carried out? Y/N
    - Have at least 2 major databases been searched e.g. Pubmed Central, EMBASE, MEDLINE? Y/N
    - Have the key words and MESH terms been cited? Y/N
    - Has the search strategy been cited? Y/N
    - Was personal contact with experts saught? Y/N
- Have the authors detailed if or how they limited their review by publication type? Y/N
    - Did they use objective criteria? E.g. a scoring system, language filter, date filter, etc. Y/N
    - Have the authors provided a list of included *and* excluded studies? NB this may be in the references section Y/N
        - Have they detailed the characteristics of included studies? i.e. patient population details, treatment details, duration, etc Y/N
        - The scientific quality of the included studies is assessed and documented?[3] Y/N
            - Was this done so appropriately? Y/N
            - *(Are there any warnings by the authors to interpret findings with caution due to poor quality studies?* Y/N
- Were the appropriate methods used to combine the individual study findings? Y/N
    - Studies should be assessed for homogeneity using the appropriate test (usually Chi-squared test for homogeneity). Have the authors tested for homogeneity? Y/N
    - If heterogeneity exists, have the authors used a random effects model and/or have they described why it is clinically relevant to combine the studies? Y/N
- Has publication bias been assessed? Y/N
    - Have the authors actually described doing this (this may be in the form of a statistical test (e.g. Egger's test, Hedges-Olken) and/or may be in the form of a funnel-plot graph or other)? Y/N
    - *If there are less than 10 included studies, generally publication bias cannot be accurately assessed.*

Finally, what do the results mean?

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[3] This is particularly important as a systematic review analysing bad data will produce bad data. Therefore, each included study should be assessed for quality by the author and this should be detailed in the paper. This may be as simple as stating HIGH/LOW, and can most easily be done using scoring systems e.g 'Jadad score' (see appendix), or by analysing for bias.

- Are the conclusions made by the authors the same ones you would have made? Y/N
- Will this have an effect on your/your institutions clinical practice? Y/N
- Have the authors answered the initial question? Y/N
- What do they recommend?

Appendix 1- Which Stastistic???

This will NOT go into detail about how the statistics works but will just give a framework for what statistic should be chosen. All should give an estimate of significance (e.g. p-value). ***NB Note that, particularly in clinical trials and systematic reviews/metaanalyses, it is more likely that the results will be analysed and presented using Relative risk/Absolute risk/Odds ratio and Confidence Intervals (see appendix 2).***

Statistical Analysis	Independent Variables		Dependent Variables		Control Variables	Question anwered by the statistic
	# of IVs	Data type	# of DVs	Date type		
Chi-square	1	categorical	1	categorical	0	Do differences exist between groups?
t-Test	1	dichotomous	1	continuous	0	Do differences exist between 2 groups on one DV?
ANOVA	1+	categorical	1	continuous	0	Do differences exist between 2 or more groups on one DV?
ANCOVA	1+	categorical	1	continuous	1+	Do differences exist between 2 or more groups after controlling for control variables on one DV?
MANOVA	1+	categorical	2+	continuous	0	Do differences exist between 2 or more groups on multiple DVs?
MANCOVA	1+	categorical	2+	continuous	1+	Do differences exist between 2 or more groups after controlling for control variables on multiple DVs?
Correlation	1	Dichotomous or continuous	1	continuous	0	How strongly and in what direction (i.e. +ve/-ve) are the IV and DV related?
Multiple regression	2+	Dichotomous or continuous	1	continuous	0	How much variance in the DV is accounted for by linear combination of the IVs? Also, how strongly related to the DV is the beta coefficient for each IV?
Path analysis	2+	continuous	1+	continuous	0	What are the direct and indirect effects of predictor variables on the DV?
Logistic regression	1+	Categorical or continuous	1	dichotomous	0	What is the odds probability of the DV occurring as the values of the IV change?

NB a more comprehensive guide to 'which test' can be found here (http://www.ats.ucla.edu/stat/mult_pkg/whatstat/***) – in case you have a study which uses more complex tests.***

Statistics Decision Tree

Research Question	Number and type of DV	Number and type of IV	Covariates	Test	Goal of Analysis
Group differences	nominal or higher	1 nominal or higher		chi square	determine if difference between croups
	continuous	1 dichotomous		*t*-test	determine significance of mean group differences
		1 categorical		one-way anova	
			1+	one-way ancova	
		2+ categorical		factorial anova	
			1+	factorial ancova	
	2+ continuous	1 categorical		one-way manova	create linear combo of Dvs to maximize mean group differences
			1+	one-way mancova	
		2+ categorical		factorial manova	
			1+	factorial mancova	
Degree of relationship	continuous	1 continuous		bivariate correlation	determine relationship/ prediction
		2+ continuous		multiple regression	linear combination to predict the DV
	1+ continuous	2+ continuous		path analysis	estimate causal relations among variables
Prediction of group membership	dichotomous	2+ nominal or higher		logistic regression	create linear combo of IVs of the log odds of being in one group

Taken from http://www.sfu.ca/~ber1/iat802/pdfs/When%20to%20use%20what%20test.pdf on 17/08/13.

Appendix 2- How results are presented?

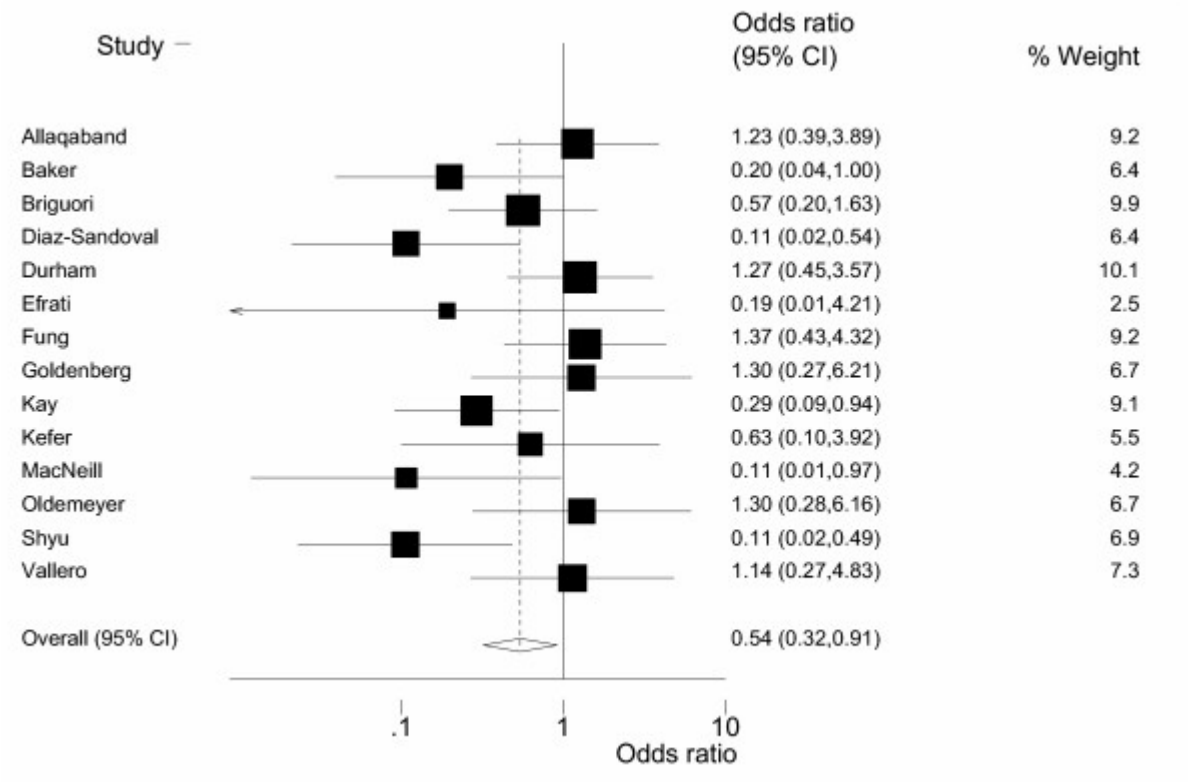
Most studies will have one categorical (yes/no) independent variable (e.g. treatment) and one categorical dependent variable (e.g. cardiac event). In these cases the results can be expressed in a number of ways:

<table>
<tr><td>What is the measure?</td><td>What does it mean?</td></tr>
<tr><td>Relative Risk (RR) = risk of the outcome in the treatment group / risk of the outcome in the control group.</td><td>The relative risk tells us how many times more likely it is that an event will occur in the treatment group relative to the control group. An RR of 1 means that there is no difference between the two groups thus, the treatment had no effect. An RR < 1 means that the treatment decreases the risk of the outcome. An RR > 1 means that the treatment increased the risk of the outcome.</td></tr>
<tr><td>$$RR = \frac{P(outcome|treatment)}{P(outcome|no\ treatment)} = \frac{A/(A+B)}{C/(C+D)}$$</td><td>e.g. if the results were
<table><tr><td rowspan="2">Treatment</td><td colspan="2">Outcome</td><td rowspan="2">Total</td></tr><tr><td>Yes</td><td>No</td></tr><tr><td>Yes</td><td>350</td><td>410</td><td>760</td></tr><tr><td>No</td><td>386</td><td>366</td><td>752</td></tr><tr><td>Total</td><td>736</td><td>776</td><td>1512</td></tr></table>Then the relative risk would be
$$RR = \frac{350/760}{386/752} = 0.90$$</td></tr>
<tr><td colspan="2">NB the Odds ratio is an equivalent measure; only it is a calculation based on odds rather than probability (i.e. P/1-P)
$$OR = \frac{\frac{P(outcome|treatment)}{1-P(outcome|treatment)}}{\frac{P(outcome|no\ treatment)}{1-P(outcome|no\ treatment)}}$$
Which in the above example would be
$$\frac{\frac{350/760}{1-(350-760)}}{\frac{386/752}{1-(\frac{386}{752})}} = 0.81$$</td></tr>
<tr><td>Absolute Risk Reduction (ARR) = risk of the outcome in the control group - risk of the outcome in the treatment group. This is also known as the absolute risk</td><td>The absolute risk reduction tells us the absolute difference in the rates of events between the two groups and gives an indication of the baseline risk and treatment effect. An ARR of 0 means that there</td></tr>
</table>

difference.	is no difference between the two groups thus, the treatment had no effect.
In our example, the ARR = (386/752) – (350/760) = 0.05 or 5%	The absolute benefit of treatment is a 5% reduction in the death rate.
Relative Risk Reduction (RRR) = absolute risk reduction / risk of the outcome in the control group. An alternative way to calculate the RRR is to subtract the RR from 1 (eg. RRR = 1 - RR)	The relative risk reduction is the complement of the RR and is probably the most commonly reported measure of treatment effects. It tells us the reduction in the rate of the outcome in the treatment group relative to that in the control group.
In our example, the RRR = 0.05/(386/752) = 0.10 or 10% Or RRR = 1 – 0.90 = 0.10 or 10%	The treatment reduced the risk of death by 10% relative to that occurring in the control group.
Number Needed to Treat (NNT) = inverse of the ARR and is calculated as 1 / ARR.	The number needed to treat represents the number of patients we need to treat with the experimental therapy in order to prevent 1 bad outcome and incorporates the duration of treatment. Clinical significance can be determined to some extent by looking at the NNTs, but also by weighing the NNTs against any harms or adverse effects (NNHs) of therapy.
In our example, the NNT = 1/ 0.05 = 20	We would need to treat 20 people for 2 years in order to prevent 1 death.
Confidence Intervals are extremely important as they describe the confidence with which we can reject or accept the null hypothesis (which in this case would be treatment is better than no treatment). There are several ways of calculating CIs, which can be very complicated. Most use computers to calculate them (I have done so using this link http://www.cebm.net/?o=1040 for ARR and http://www.hutchon.net/ConfidOR.htm for OR).	In our example: ARR (CI95%)= 0.053 (0.002-0.103) OR (CI95%)= 0.80 (0.66-0.99) **Note that if you are using Absolute figures, the CI indicates no significance (i.e. reject the hypothesis) if they cross 0. If using odds figures, the CI indicates no significance if they cross 1.**

The Forest Plot (for metaanalyses)

This is the traditional way of displaying results of a meta-analysis. Each study is given a weight (the size of the square) using more calculations (not important for us but, for interest, they may be things like Mantel-Haenszel weighting) and the confidence intervals are shown. All the confidence intervals should overlap (at least a bit) those of all the other studies- this represents homogeneity. Finally, the diamond at the bottom represents the pooled odds ratio of the studies and the overall result.



Taken from http://www.pmean.com/05/ForestPlots.html on 17/08/13

Jadad Score

Item	Maximum Point	Description	Example
Randomisation	2	1 point if randomisation is mentioned	'The patients were randomly assigned into two groups.'
		1 additional point if the method of randomisation is appropriate	'The randomisation was accomplished using a computer-generated random number list, coin toss or well-shuffled enveloped.'
Blinding	2	1 point if blinding is mentioned	'The trial was conducted in a double-blind fashion.'
		1 additional point if the method of blinding	Use of identical tablets or injectables, identical

		is appropriate	vials. Use of tables with similar looks but different tastes.
		Deduct 1 point if the method of blinding is inappropriate (i.e. minimum 0)	Incomplete masking
An account of all patients	1	The fate of **all** patients in the trial is known. If there are no/missing data, the reason is stated.	'There were 40 patients randomised but the data from 1 patient in the treatment group and 2 in the control were eliminated because of a break in protocol.'