Learning Outcomes

By the end of this session you will:

◦ Understand the meaning of “Evidence Based Medicine”
◦ Understand the nature and content of the Cochrane Library
◦ Be able to navigate around a systematic review
◦ Understand what Critical Appraisal is
◦ Be aware of some of the different types of research
◦ Understand the key features of quantitative research
◦ Be able to interpret basic statistics within a research paper
◦ Gain experience in critically appraising a research paper
What is evidence based practice?

Evidence-based practice is the integration of

- individual clinical expertise with the
- best available external clinical evidence from systematic research and
- patient’s values and expectations
Evidence-Based Practice

“The conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”

www.cebm.net
Centre for Evidence-based Medicine
Why do we need to critically appraise?

- “It usually comes as a surprise to students to learn that some (the purists would say 99% of) published articles belong in the bin and should not be used to inform practice” (Greenhalgh 2001)
- Find that 1% - save time and avoid information overload

Why does evidence from research fail to get into practice?

- 75% cannot understand the statistics
- 70% cannot critically appraise a research paper

HOW A DAILY DOSE OF DARK CHOCOLATE CAN CURE STRESS

By Laura Clout

IT can cut the risk of heart disease, reduce blood pressure and boost power - and now it is claimed to be the ultimate stress-buster.

As well as being good to your body, chocolate can help melt away even the most exhausted of stress. Research revealed yesterday.

Not just any old chocolate, though. A study suggests the more finely chopped, the better. And you mustn't eat too much.

Up to 10 squares or 40 grams a day can reduce levels of stress hormones during times of high anxiety, researchers said. It also helps to rebalance other stress-related chemicals in the body.

The study adds to the growing reputation of plain chocolate as the latest superfood, with growing evidence that it contains flavonoids, which fight inflammation and protect against harmful molecules which accumulate in the body and to reduce the risk of heart disease and cancer.

Chocolate has been linked to protecting against skin and bowel cancer, lowering blood pressure and helping to prevent premature births.

A small bar of dark chocolate a day helps keep stress at bay, say researchers.

It cuts levels of stress hormones and rebalances other chemicals in the body during times of high anxiety, a study found.

A group of men and women ate 20g of dark chocolate - roughly half a small bar - morning and evening and scientists monitored their stress hormones.

The high hormone levels in those under the most pressure fell after just two weeks of chocolate therapy, the Journal of Proteomics Research reports.

Researcher Burin Kechhar, who works for Nestle, said the study by Dutch and Swiss scientists provides strong evidence that a daily consumption of 40g is sufficient to modify the metabolism of healthy volunteers.

He added that stress reduction has long-term health benefits.

Other recent research has shown that just a 57g chunk of dark chocolate a day can make you less anxious, but also...
Chocolate good... says choc maker
(from NHS Choices)

The study was published in the peer-reviewed Journal of Proteome Research.

- Although the researchers refer to their study as “randomised”, there does not appear to be any control group, so it is unclear exactly what they mean by this term.

- The trial involved a small sample of 30 people. The effects of chocolate were assessed in even smaller subgroups of people with different anxiety traits.

- All the people in this study were healthy young adults, not overweight or obese, did not drink excessively or smoke, did not have conditions such as diabetes. These results cannot be applied to people who are older, unwell or have less healthy lifestyles.

- While the researchers observed changes in metabolism or stress hormones, it is not definite that chocolate consumption was responsible for this. For example, being part of a trial situation and removing participants from everyday life may have caused this effect. Additionally, other measures that may have played a role in the metabolic changes, such as diet and physical activity, were not reported.

- A follow-up period of 14 days is far too short to make any conclusions about how long-term daily consumption may affect stress, mental health, cardiovascular health or weight gain. The researchers themselves do not state that dark chocolate has any of these effects.

- As the trial was conducted by the food manufacturer and confectioner Nestlé, the researchers may have had a vested interest in promoting the positive results of their trial.
Exercise

Read the Feng Shui example
Discuss with the person next to you:

- Would you say that this research study provided conclusive evidence that feng shui is effective?

- If your answer to question 1 is NO or DON’T KNOW how would you improve the design of the study?
Cochrane Reviews are now the “gold standard” for systematic reviews in such key publications as *The Lancet*, *New England Journal of Medicine*, *British Medical Journal*, and the *Journal of the American Medical Association* and routinely appear there as well as in specialised medical journals for various specialty areas.
Quantitative OR Qualitative?

- Collection of numerical data in order to describe, explain, predict, and/or control phenomena of interest.

- A body of research techniques which seeks insights through loosely structured, mainly verbal data rather than measurements. Analysis is interpretative, subjective, impressionistic and diagnostic.

<table>
<thead>
<tr>
<th>Social Theory</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methods</td>
<td>Experiment, survey</td>
<td>Observation, Interview</td>
</tr>
<tr>
<td>Question</td>
<td>How many X’s?</td>
<td>What is X?</td>
</tr>
<tr>
<td>Sampling Method</td>
<td>Statistical</td>
<td>Theoretical</td>
</tr>
<tr>
<td>Strength</td>
<td>Reliability</td>
<td>Validity</td>
</tr>
</tbody>
</table>
Different types of research

- **Systematic Reviews/ Meta-analysis**
  
  - A literature review focused on a single question which tries to identify, appraise, select and synthesize all high quality research relevant to that question.
  
  - Combines results of several RCTs or other types of evidence
  
  - Systematic reviews follow a clear sequence of steps:
    - Defining an appropriate question
    - Searching the literature – published and unpublished, English & non-English
    - Assessing the studies – involves 2 independent reviewers
    - Combining the results & producing a “bottom-line”
    - Placing the findings into context

  - Advantages
    - Limits bias
    - Good quality evidence
    - Added power by synthesising individual study results
Different types of research
- Experimental

- Randomised Controlled Trials (RCTs)
  - Randomly assign individuals to an intervention group or a control group in order to measure the effectiveness of an intervention.
  - May involve “blinding” of researchers and participants.
  - Gold standard for treatment evaluations.
  - However, some studies are not suitable for RCTs.

- Types:
  - Superiority
  - Equivalence
  - Non Inferiority
Different types of research
-Observational

**Cohort Studies**
- A non-experimental study design
- Follows a group of people (a cohort), and then looks at how events differ among people within the group.
- Follow up period can be years or decades
- Prospective cohort studies (which track participants forward in time) are more reliable than retrospective cohort studies

**Case-control Study**
- Examines a group of people who have experienced an event (usually an adverse event) and a group of people who have not experienced the same event, and looks at what risk factors both groups have been exposed to
- Retrospective, therefore prone to recall bias, but quick & involve small numbers
- Primary method of studying new or unusual outcomes.
Different types of research - Observational

- **Case-Series** (also known as a clinical series)
  - Analysis of series of people with a disease or condition given similar treatment or examines their medical records for exposure and outcome.
  - Can be retrospective or prospective, or consecutive or non-consecutive
  - There is no comparison group

- **Case-Study**
  - A detailed analysis of a person with a particular disease or condition, noting characteristics of condition.
  - Often used to call attention to new diseases or diseases entering new populations
  - Not statistically significant

Exercise: Look at the list of abstracts you’ve been given. Identify what type of research each is.
Cochrane: the gold standard for systematic reviews

The Cochrane Library is considered to be...
“the best single source of reliable information on the effects of healthcare interventions”

- An International organisation
  - 12 Cochrane centres world wide
  - UK Cochrane Centre based in Oxford

- Divided into Cochrane Review Groups
  - Each concentrating on a specific area of healthcare
    - e.g. Back group, childhood cancer group, epilepsy group, incontinence group
Cochrane consists of…

- The Cochrane Database of Systematic Reviews
  - *(Cochrane Reviews)*
  - *Complete reviews and Protocols (reviews in preparation)*
- The Database of Abstracts of Reviews of Effects
  - *(DARE) (Other Reviews)*
  - *Produced by the Centre for Reviews and Dissemination*
  - *Abstracts of world-wide systematic reviews*
  - *Many cover topics not yet covered by Cochrane*
- The Cochrane Central Register of Controlled Trials
  - *(Clinical Trials)*

- The Cochrane Methodology Register
  *(Methods Studies)*
- The Health Technology Assessment Database
  *(Technology Assessments)*
- NHS Economic Evaluation Database
  *(Economic Evaluations)*
What is a Cochrane Systematic Review?

✓ Identifies an intervention for a specific disease or other problem in health care, and determines whether or not this intervention works.

✓ Adhere to a strict design in order to make them more comprehensive, thus minimising the chance of bias, and ensuring reliability.

✓ Contain all known references to trials on a particular intervention and a comprehensive summary of the available evidence.
What is a Cochrane Protocol?

- the plan or set of steps to be followed in a study
- should describe the rationale for the review, the objectives and the methods that will be used to locate, select, and critically appraise studies, and to collect and analyse data from the included studies
Systematic Reviews & Protocols Process

Cochrane Review Group

Members include:
- Trial Search Coordinators
- Hand-Searchers, Clinicians,
- Librarians and
- Statisticians

Register title

Prepare protocol
(3 months to one year)

Prepare review
(one to five years)

The Cochrane Library
updated monthly
(Changing to continuous in June 2013)
The Review Layout

[Review]
Stretching to prevent or reduce muscle soreness after exercise
PDF (Size 278K)

Abstract
Plain language summary
Background
Objectives
Criteria for considering studies for this review
Search methods for identification of studies
Methods of the review
Description of studies
Methodological quality
Results

Authors' conclusions
Potential conflict of interest
Acknowledgements
Characteristics of included studies
Characteristics of excluded studies
Additional tables
Analyses
Sources of support
Cover sheet
References
Submit Feedback
Export Citation
Figures (full size)
Tables
Other Versions

All reviews have the same headings and follow the same format and layout
When to use Cochrane...

- To find....what works, what doesn’t work i.e. the evidence...
- Will an intervention be effective in a particular condition?
- Is treatment A better than treatment B?
- What is an effective intervention to achieve outcome Z?

Cochrane will not find information on...

- General health care, i.e. new drugs
- Statistics
- Cause, prognosis, epidemiology or risk factors for an illness
- Guidelines
- Current research (except systematic reviews or controlled trials)
Sign up and have the option of saving your searches.

Basic search box
Click Advanced Search for more options

Click here for Subject Heading/MeSH searching

Drop down menu for searching different fields

Add search to search manager to enable you to combine searches using AND, OR, NOT
Clinical Scenario

- You are a GP. An elderly lady visits you wanting advice. She is about to visit her grandchildren in Australia and some of her friends have suggested she wear compression stockings for the flight. She’s never heard of these before and doesn’t know what they are supposed to do. She has no major health problems. What advice would you give her?
Searching exercise

Clinical question
- In passengers on long haul flights, does wearing elastic compression stockings, compared to not wearing elastic stockings, prevent DVT?

- **P** (population/problem) = passengers on long haul flights
- **I** (Intervention) = wearing elastic compression stockings
- **C** (comparison/control) = no elastic stockings
- **O** (Outcome) = DVT
Plan your Search

- Use PICO to formulate your search question
- Think of alternative keywords
- Use a combination of keywords and MeSH (thesaurus / subject headings)

P = Patient or population
I = Intervention
C = Comparison
O = Outcome
**MeSH Medical Subject Headings**

**MeSH terms in Cochrane:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cochrane Reviews:</td>
<td>Fully indexed, except for Reviews first published in recent issues</td>
</tr>
<tr>
<td>Cochrane Protocols:</td>
<td>No MeSH indexing</td>
</tr>
<tr>
<td>Clinical Trials:</td>
<td>Only reviews taken from Medline</td>
</tr>
<tr>
<td>Other reviews:</td>
<td>Fully indexed</td>
</tr>
<tr>
<td>Technology assessments:</td>
<td>Fully indexed</td>
</tr>
<tr>
<td>Economic Evaluations:</td>
<td>Fully indexed</td>
</tr>
</tbody>
</table>

**Search tips**

- **Plurals / American spelling = automatic**
  - i.e. Foot will find feet
  - Randomise will find randomize

- **Wildcard / truncation**
  - Can be used at beginning, middle or end
  - i.e. *natal, h*ematology, arter*

- **Combining Results**
  - Use #
  - i.e. #1 and #2

**Punctuation**

Avoid hyphens, apostrophes

Use **wildcard** instead:

- e.g. body-weight = “body* weight”
- post-natal = “post* natal”
- Parkinson’s = parkinson*
Click on number to see results
Although there is a systematic review which answers our question, for the purposes of this exercise we will look at a related RCT which first appeared in the Lancet in 2001:

**Frequency and prevention of symptomless deep-vein thrombosis in long-haul flights: a randomised trial.**
Scurr JH, Machin SJ, Bailey-King S, Mackie IJ, McDonald S, Smith PD
Year: 2001
Critical Appraisal – what it is…

- The process of systematically weighing up the quality and relevance of research to see how useful it is in decision making.
- It is the balanced assessment of benefits and strengths of research against its flaws and weaknesses.
- It is the process of assessing and interpreting evidence, by systematically considering its validity, results and relevance to your own work.
- It can help you make informed decisions.
- It is a skill that needs to be practised.
How do I appraise?

✓ Mostly common sense.
✓ You don’t have to be a statistical expert!
✓ **Checklists** help you focus on the most important aspects of the article.
✓ Will help you decide if research is valid and relevant.
✓ Ready-made checklists help you assess validity, results and relevance
✓ Different checklists available for different types of research (RCTs, systematic reviews, etc)
✓ Available free from CASP
✓ [http://www.casp-uk.net/](http://www.casp-uk.net/)
Critical appraisal of any study design must assess:

**Validity**
- Were sound scientific methods used?
- Chance / Bias / Confounding Factors

**Results**
- What are the results and how are they expressed?

**Relevance**
- Are the findings generalisable – can they be applied to settings / situations outside the research study? Do these results apply to my local context?
Significant terms to look for!

Sample size

- Bigger sample means less uncertainty
- Before calculating the sample size, a **clinically significant** treatment effect is estimated
- **POWER** calculation…(before the study begins… calculates how large the sample should be in order to have a high chance of detecting a true difference between the groups.
- Avoids a type I (false positive) or type II (false negative) error
- Sample size increases when a small treatment effect is expected & with higher power.
- Look for **80% - 90%** power
Potential Errors…

Bias

- The deviation of results from the truth due to **systematic error** in the research methodology. E.g.:
  - Selection Bias – may result in the sample being unrepresentative e.g. volunteer bias
  - Measurement Bias – issues related to how the outcome was measured e.g. Instrument bias, recall bias, Attention bias
  - Intervention Bias – differences in the how the treatment was carried out or subjects exposed to the factor of interest e.g Timing bias, withdrawal bias, Contamination bias

**Publication bias**, occurs when the decision to publish a study is influenced by the direction of the study results

The **file drawer effect** is that many studies in a given area of research may be conducted but never reported, and those that are not reported may on average report different results from those that are reported.
Potential Errors…

Confounding Factors

• Where part of the observed relationship between two variables is due to the action of a third variable

**Known confounders:** e.g. age, gender, smoking, etc.

**Confounder** - A factor that can cause the outcome of interest, but is not the factor under investigation
Randomisation (in RCTs)

- Randomisation ensures individuals have an equal chance of being allocated to any Group

- Potential **confounding factors** will be equally distributed between groups

- Successful randomisation requires that group allocation cannot be predicted in advance – allocation concealment avoids bias

- Allocation concealment ensures all those involved in the trial are unable to predict the allocation of the next participant until that participant is enrolled. Methods include telephone randomisation, or using consecutive sealed opaque envelopes.

- A good study should indicate who generated the randomisation sequence, the method used, and how concealment was achieved & monitored
Intention to treat analysis

• Analysing people, at the end of the trial, in the groups to which they were randomised, even if they did not receive the intended intervention.

- A strategy for analyzing data in which all participants are included in the group to which they were assigned, regardless of whether they completed the intervention given to the group.
- Intention-to-treat analysis prevents bias caused by loss of participants.
Loss to follow-up

- Loss of contact with some participants, so that researcher cannot complete data collection as planned.
- A common cause of missing data, especially in long-term studies.

- How important are the losses?
  - 5% probably OK but >20% poses threat to validity
  - Losses equally distributed?
Heterogeneity/ Homogeneity

- In systematic reviews heterogeneity refers to variability or differences between studies in the estimates of effects
  - "statistical heterogeneity" (differences in the reported effects),
  - "methodological heterogeneity" (differences in study design)
  - "clinical heterogeneity" (differences between studies in key characteristics of the participants, interventions or outcome measures).

- In systematic reviews homogeneity refers to the degree to which the results of studies included in a review are similar.
  - “Clinical homogeneity”, in trials included in a review, the participants, interventions and outcome measures are similar or comparable.
How are the results presented and what is the main result? Statistical Analysis

- What sort of data have they got & have they used appropriate statistical tests?
- Are the results expressed in terms of likely harm or benefit?
  - Odds Ratio
  - Relative Risk
  - Absolute Risk Reduction
  - Relative Risk Reduction
  - Numbers Needed to Treat
- How meaningful is the result?
First: Identify Event Rates

Event Rates form the basis of other calculations: Relative Risk, Absolute Risk Reduction, Relative Risk Reduction, Odds Ratio. Numbers Needed to Treat

Number of people experiencing an event (the primary outcome) as a proportion of the number of people in the population

- Control Event Rate (CER)
- Experimental Event Rate (EER)
The **EVENT RATE** is the proportion of patients in a group in whom the event is observed.

<table>
<thead>
<tr>
<th></th>
<th>Outcome event</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Migraine</td>
<td>No Migraine</td>
</tr>
<tr>
<td><strong>Experimental group</strong></td>
<td>a 5</td>
<td>b 25</td>
</tr>
<tr>
<td><strong>Control group</strong></td>
<td>c 10</td>
<td>d 20</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>a + c 15</td>
<td>b + d 45</td>
</tr>
</tbody>
</table>
### Odds v. Risk

10 horses running, you bet on 1 horse

<table>
<thead>
<tr>
<th>‘Risk’ of winning</th>
<th>Odds of winning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/10</td>
<td>1/9</td>
</tr>
<tr>
<td>You versus all the runners</td>
<td>You versus the rest</td>
</tr>
</tbody>
</table>
CER and EER

- **Control Event Rate (CER)** is the proportion of patients in the control group in whom migraine is observed.
  
  For a **RISK** calculation \( \text{CER} = \frac{c}{c+d} \) 10/30 0.33 33%
  
  For an **ODDS** calculation \( \text{CER} = \frac{c}{d} \) 10/20 0.5 50%

- **Experimental Event Rate (EER)** is the proportion of patients in the experimental in whom migraine is observed.
  
  For a **RISK** calculation \( \text{EER} = \frac{a}{a+b} \) 5/30 0.17 17%
  
  For an **ODDS** calculation \( \text{CER} = \frac{a}{b} \) 5/25 0.2 20%
Risk of benefit or harm

- **Relative Risk (RR)** = compares the risk in 2 different groups of people
- tells us how many times more likely it is that an event will occur in the treatment group relative to the control group

**EER / CER**

Relative Risk of 1 means the risk is the same in each group

<1 = treatment reduces risk of event

>1 = treatment increases risk of event

So in our case **EER 0.17/ CER 0.33**

**RR= 0.51**
Absolute Risk Reduction is the difference in risk between the Control Event Rate (CER) and the Experimental Event Rate (EER).

- ARR = 0  Treatment has no effect
- ARR positive – Treatment is beneficial
- ARR negative – Treatment is harmful

\[(\text{CER} - \text{EER}) \quad 10/30(1/3) \quad 0.33 \quad \text{MINUS} \quad 5/30 \quad (1/6) \quad 0.17 \quad \text{ARR} = 0.16\]
Numbers Needed to Treat

- It is the number of people who need to be treated with a specific intervention for a given period of time to prevent one additional adverse outcome or achieve one additional beneficial outcome.
- If $\text{NNT} = 1$ this means a favourable outcome occurs in EVERY patient.
- NNT the lower the better.

Number needed to treat (NNT)
\[ \text{NNT} = \frac{1}{\text{ARR}} \] 1.00/0.16 6.25

- Higher numbers are acceptable for prophylactic measures ie to prevent disease. Example, NNT for vaccine programmes etc.
Relative Risk Reduction (RRR)

...tells us the reduction in the rate of the outcome treatment group relative to that in the control group.

\[
RRR = \frac{ARR}{CER} \quad \text{Or can be} \quad 1 - RR
\]

\[
ARR 0.16 / CER 0.33 = 0.484848485 = 49%
\]

or

\[
1 - RR 0.51 = 0.49 = 49%
\]

RRR = 49%
**Absolute risk reduction** (also called the risk difference) is the simple difference in the event rates (40%-30%=10%) 

**Relative risk reduction** is the difference between the event rates in relative terms. Here, the event rate in the treatment group is 25% less than the event rate in the control group (i.e., the 10% absolute difference expressed as a proportion of the control rate reduction is 10/40 or 25% less.)
Odds ratio (OR)

- Expresses the odds of having an event compared with not having an event in two different groups.

\[ \text{OR} = \frac{\text{odds in the treated group}}{\text{odds in the control group}} \]

- \( \text{OR} = 1 \) treatment has identical effect to control.
- \( \text{OR} < 1 \) event is less likely to happen than not (i.e. the treatment reduces the chance of having the event).
- \( \text{OR} > 1 \) event is more likely to happen than not (increases the chances of having the event).

Clinical trials typically look for treatments which reduce event rates, and which have odds ratios of less than one.
Calculating the odds ratio (OR) for our migraine trial

\[
\frac{a}{b} / \frac{c}{d} = \text{OR}
\]

\[
\frac{5}{25} / \frac{10}{20} = 0.4
\]

\[
\text{OR} = 0.4
\]

\[
\text{OR} < 1
\]

Therefore this drug reduces the chance of having a migraine.
How precise are the results?

P Values - significance test

- **P=** Probability
- **A p-value** is a measure of statistical significance which tells us the probability of an event occurring due to chance alone
- **P values only from 0 to 1**
- If P Value is very small (e.g. P<0.001) the result is unlikely to be due to chance (1 in 1000)
- In general, p-values of either 0.05 or 0.01 are used as a cut-off value, although this value is arbitrary
  - *P-value of <0.05 indicates the result is unlikely to be due to chance,*
  - *P-value of >0.05 indicates the result might have occurred by chance.*
- **Generally, look for P<0.05 (1 in 20)**
How precise are the results?

Confidence Intervals

• An alternative way of assessing the effects of chance
• The result of the trial is a “point estimate” – if you ran the trial again you will get a different result
• The Confidence Interval gives the range in which you think the real answer
• The 95% CI is the range in which we are 95% certain that the true population value lies
• Look at how wide the interval is, and the values at each end

\[
\bar{X} \pm z \times \left( \frac{\sigma}{\sqrt{n}} \right)
\]
Confidence Intervals
Confidence Intervals

Actual length of fish 128cm
95% CI 110cm to 140cm
What can a CI tell us?

- Tells us whether the result is significant or not
- The width of the interval indicates precision. Wider intervals suggest less precision
- Shows whether the strength of the evidence is strong or weak.
- The general confidence level is 95%. Therefore, the 95% CI is the range within which we are 95% certain that the true population value lies
Statistical Significance – relates to the size of the effect and the 95% CI in relation to the null hypothesis

Null hypothesis (no effect) = 1

= confidence interval

♦ = point estimate

A Statistically significant result (P<0.05 but low precision)

B Statistically significant result (P<0.05 with high precision)

C Not statistically significant result (P>0.05) with low precision

D Not statistically significant result (no effect) with high precision
Forest plots/ blobbograms

The shorter the Confidence Interval (CI) the more confident we can be that the results are true.

If the CI crosses the line of no effect, then the results of that study are not statistically significant.
Interpretation of forest plots

- Look at the title of the forest plot, the intervention, outcome effect measure of the investigation and the scale
- The names on the left are the authors of the primary studies included in the MA
- The small squares represent the results of the individual trial results
- The size of each square represents the weight given to each study in the meta-analysis
- The horizontal lines associated with each square represent the confidence interval associated with each result
- The vertical line represents the line of no effect, i.e. where there is no statistically significant difference between the treatment/intervention group and the control group
- The pooled analysis is given a diamond shape. The horizontal width of the diamond is the confidence interval
Forest plots/ blobbograms

Compression stockings for preventing deep vein thrombosis in airline passengers

**Fig**

**Ana** 1.1. Comparison 1 Wearing stockings versus not wearing stockings, Outcome 1 Symptomless deep vein thrombosis.

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Stockings n/N</th>
<th>No stockings n/N</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
<th>Weight</th>
<th>Odds Ratio M-H, Fixed, 95% CI</th>
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</thead>
<tbody>
<tr>
<td>LONFLIT 2</td>
<td>1/411</td>
<td>19/422</td>
<td></td>
<td>38.6%</td>
<td>0.05 [0.01, 0.39]</td>
</tr>
<tr>
<td>LONFLIT 4 - Kendall1</td>
<td>0/72</td>
<td>0/72</td>
<td></td>
<td>0.0%</td>
<td>0.0 [0.0, 0.0]</td>
</tr>
<tr>
<td>LONFLIT 4 - Kendall2</td>
<td>0/66</td>
<td>2/66</td>
<td></td>
<td>5.1%</td>
<td>0.19 [0.01, 4.12]</td>
</tr>
<tr>
<td>LONFLIT 4 - Scholl1</td>
<td>0/179</td>
<td>4/179</td>
<td></td>
<td>9.3%</td>
<td>0.11 [0.01, 2.03]</td>
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<tr>
<td>LONFLIT 4 - Scholl2</td>
<td>0/136</td>
<td>3/135</td>
<td></td>
<td>7.2%</td>
<td>0.14 [0.01, 2.71]</td>
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<tr>
<td>LONFLIT 4 - Traveno1</td>
<td>0/97</td>
<td>0/98</td>
<td></td>
<td>0.0%</td>
<td>0.0 [0.0, 0.0]</td>
</tr>
<tr>
<td>LONFLIT 4 - Traveno2</td>
<td>0/75</td>
<td>0/71</td>
<td></td>
<td>0.0%</td>
<td>0.0 [0.0, 0.0]</td>
</tr>
<tr>
<td>LONFLIT 5</td>
<td>2/178</td>
<td>7/180</td>
<td></td>
<td>14.2%</td>
<td>0.28 [0.06, 1.37]</td>
</tr>
<tr>
<td><strong>Scurr 2001</strong></td>
<td>0/100</td>
<td>12/100</td>
<td></td>
<td>25.6%</td>
<td>0.04 [0.00, 0.60]</td>
</tr>
</tbody>
</table>

**Total (95% CI)** 1314 / 1323 = 100.0% 0.10 [0.04, 0.25]

Total events: 3 (Stockings), 47 (No stockings)
Heterogeneity: Chi² = 2.61, df = 5 (P = 0.73); I² = 0.0%
Test for overall effect: Z = 4.92 (P < 0.00001)

**Ana** 1.2. Comparison 1 Wearing stockings versus not wearing stockings, Outcome 2 Superficial vein thrombosis.
Relevance

- Were all important outcomes considered so the results can be applied?
  - Does your local setting / population differ from that in the research in ways that would produce different results?
  - Can you provide the same treatment in your local setting?
  - Does any benefit reported outweigh any harm?
  - Should policy or practice change as a result of this research?
Exercise

- In small groups, work through the Critical Appraisal checklist for RCTs with the journal article:

Other CA methods

Simplifying critical appraisal
The two mnemonics method

- What question did the study address?
  - **PICO**

- Were methods valid?
  - **RAMMbo**
Appraisal checklist - RAMMbo

Was the Study valid?

1. Recruitment
   • Who did the subjects represent?

2. Allocation
   ■ Was the assignment to treatments randomised?
   ■ Were the groups similar at the trial’s start?

3. Maintenance
   ■ Were the groups treated equally?
   ■ Were outcomes ascertained & analysed for most patients?

4. Measurements
   ■ Were patients and clinicians “blinded” to treatment? OR
   ■ Were measurements objective & standardised?

Study statistics (p-values & confidence intervals)
GATE Frame: PECOT

- Population
- Exposure
- Comparison
- Outcome
- Time

GATE: Graphic Appraisal Tool for Epidemiology
Conclusion

- Critical Appraisal is part of Evidence Based Healthcare
- It takes practice
- Use CASP checklists
- Depth of Appraisal is your choice
- Only you can assess usefulness
Resources for Critical Appraisal

Basildon Healthcare Library Website – www.btuheks.nhs.uk
Journal Club Support Service page
Useful Websites page

Rod Jackson et al (2006) **The GATE frame: critical appraisal with pictures** *Evidence Based Nursing* 9;68-71

**CASP** (Critical Skills Appraisal Programme)
http://www.casp-uk.net/

**JAMA** Users’ Guides to the Medical Literature
http://www.cche.net/usersguides/main.asp


**BestBETs** CA database
http://www.bestbets.org/cgi-bin/browse.pl?~show=appraisal

What is a systematic review?, What is a meta-analysis?, What are confidence intervals?
http://www.evidence-based-medicine.co.uk/what_is_series.htm
Resources for Critical Appraisal

Centre for Evidence Based Medicine
http://www.cebm.ne
CATmaker www.cebm.net/index.aspx?o=1216

Centre for Reviews and Dissemination
http://www.york.ac.uk/inst/crd/index.htm

CRITICAL APPRAISAL\CONSORT Statement Glossary.htm
http://rctbank.ucsf.edu/BaT/html-files/glossary.html


Warner Library Blog –
…includes section on Critical Appraisal
Link to current reading list
Links to tutorial & CASP checklists
http://broomfieldwarner.wordpress.com/