Making sense of the evidence:
some skills for evidence-based practice (EBP)

Dr Amanda Burls

Tabriz 28th May 2007

Objectives for this session

- You will discover that
  - EBP makes for happier doctors ☺
  - EBP is not a burden
  - EBP can be easy to learn
- You will learn how to make sense of results
  - P-values
  - Confidence intervals
  - Meta-analysis
- We will have fun!

Please join in!

- Interrupt
  - if something is **unclear**
  - you **disagree**
  - you want to give your **opinion**
- Tell me to **"Slow Down!"** when I talk too fast
- If you want to discuss something in **Farsi** together, do so
- Ask questions – there is **no** such thing as a stupid question

"I feel that EBP is too demanding to be a truly realistic aim"

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

H

"I feel that EBP is too demanding to be a really realistic aim"

Please write the number that corresponds with your view on the piece of paper

1. Strongly agree
2. Agree
3. Neither agree nor disagree
4. Disagree
5. Strongly disagree

Now

- Fold your paper in half
- Fold it in half again
- Exchange your paper with someone
- Exchange the paper you now have with someone different
- And again….

Now, please…

- Open the paper in front of you
- Raise your hand when I ask about the number on the piece of paper in front of you

It is a mistake to think that EBP requires you **to be certain** and look up the evidence about every question that arises.

- Does this treatment work?
- Is there a better treatment?
- Will it work as well in my patient?
- Does the positive test mean that my patient really has this disease?
- What if there are harmful effects that the trial was not big enough to show?
- What does my patient value?

Chinese proverb

To be uncertain is uncomfortable but to be certain is ridiculous

EBM – removes stress of uncertainty

EBP – **removes the stress** of uncertainty

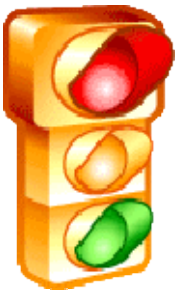
- **In EBP it is good to say "I don't know"**
- (It is **not** OK to **pretend** we know)
- EBP helps us recognise important uncertainty
- EBP helps us address knowledge gaps quickly
- In EBP we share your concerns and solutions
- EBP helps us prioritise, e.g.
- deal with **questions that will come up again**
- deal with **questions where people disagree**

EBP changes conflict to collaboration ☺

Critical appraisal

- Lots of checklists
- Lots of questions

Critical appraisal
making sense of evidence



- Validity
  - Can I believe the results or could they be caused by the way the study was carried out or analysed?
- Results
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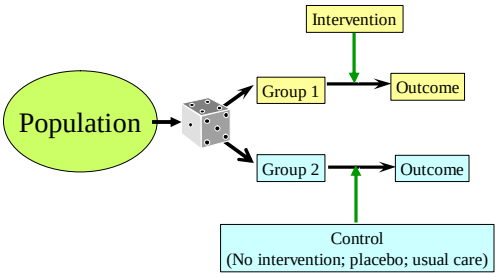
  - Would I be likely to get similar results in my patient?

Validity for RCTs – **only one question!**

Were the groups similar in all respects other than the intervention?

Randomised controlled trial



Were the groups similar in all respects ?

- Randomisation?
  - Generates similar groups
- Allocation concealment?
  - Keeps groups similar (stops researcher influence)
- Baseline characteristics?
  - Checks groups are similar
- Blinding?
  Stops groups becoming different real or apparent
- Groups treated in same way?
  - Keeps groups similar
- Loss to follow up?
  - Check groups do not become dissimilar

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Were the groups similar in all respects other than the intervention?

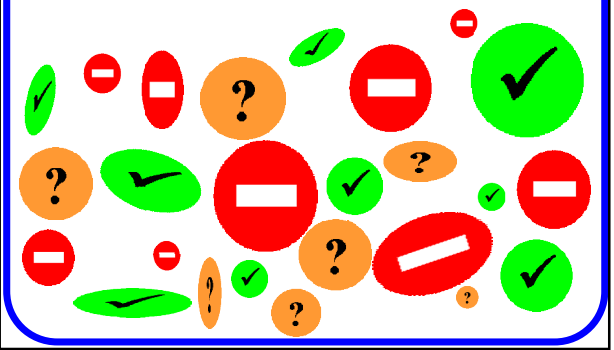
Validity for systematic reviews – *only two questions*

- Did the reviewers capture the evidence that exists?
- Is this evidence valid?

Randomised controlled trial

- Does not work
- Equivocal
- Works

The evidence that exists



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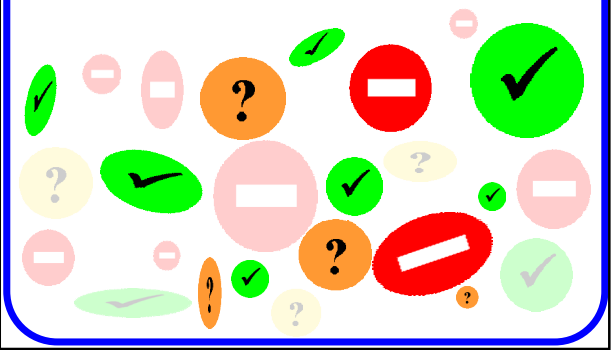

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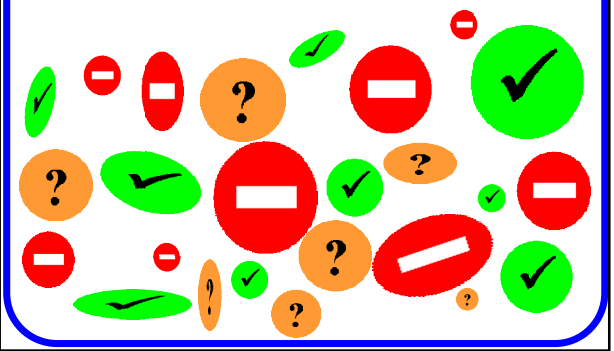

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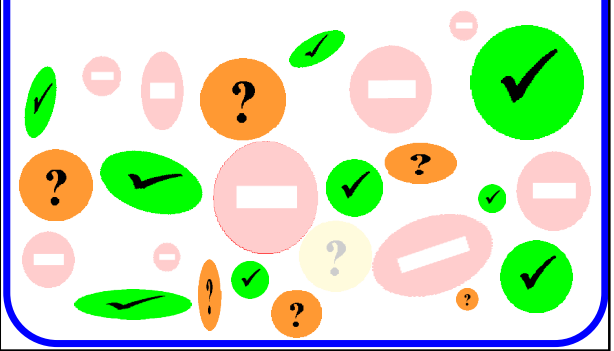

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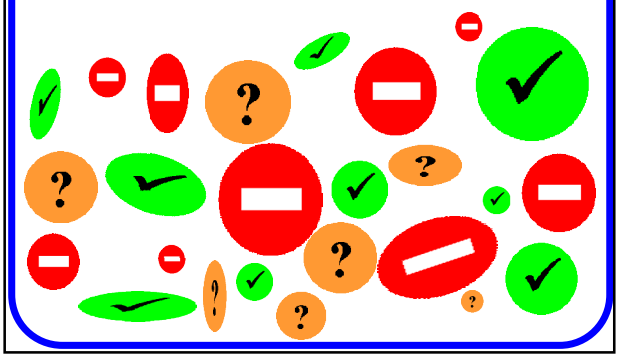

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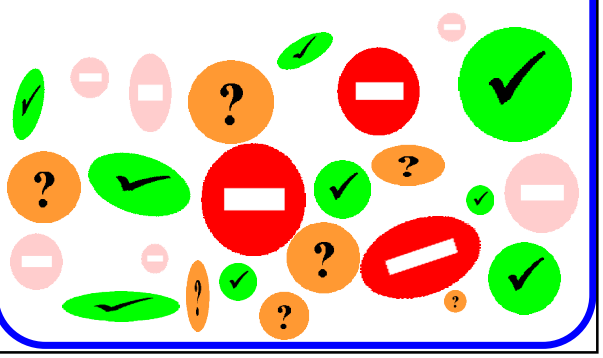
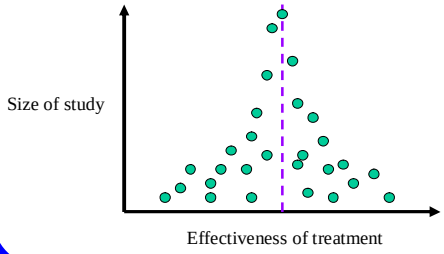


A funnel plot



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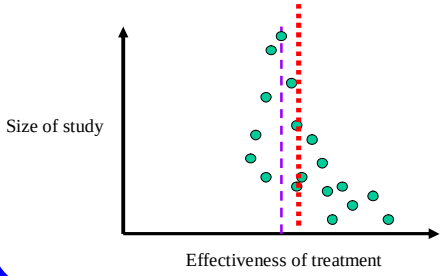

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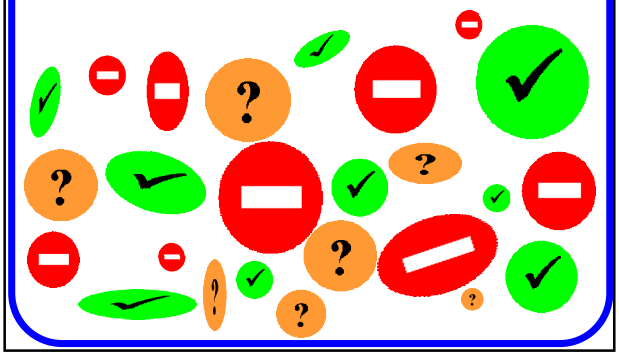

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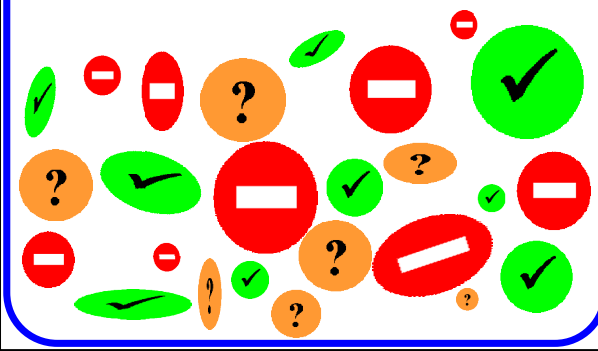

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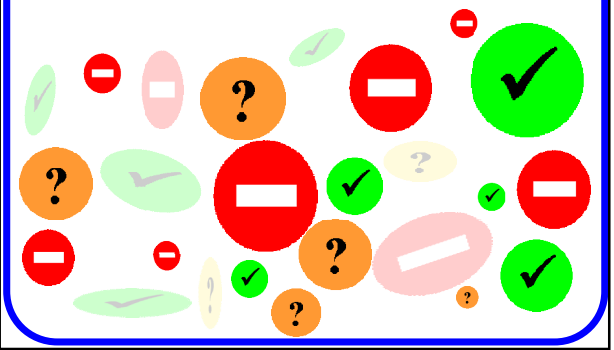
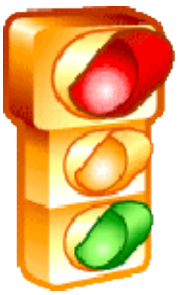


Critical appraisal
making sense of evidence



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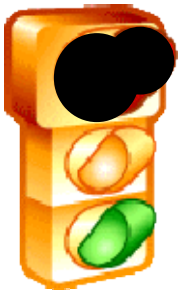
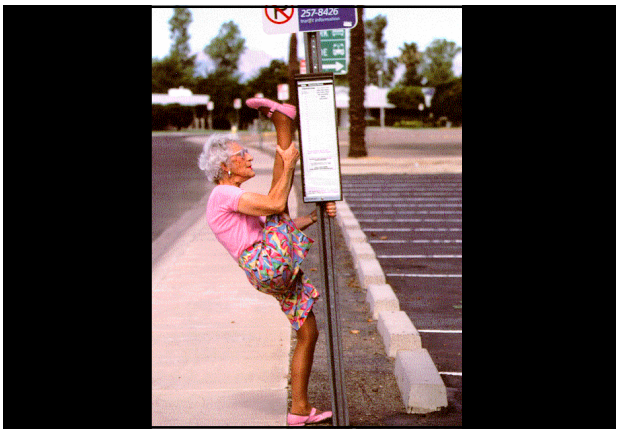


- **Validity** ✓
- **Results**
- **Relevance**

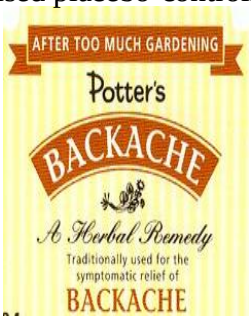
Making sense of results

Warning!

- Everything I say from now onwards assumes that the results being considered come from an *unbiased* study!



A randomised placebo-controlled trial



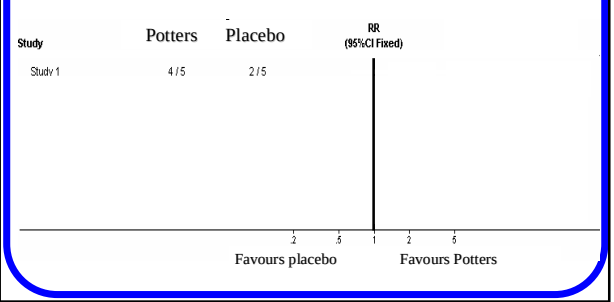
Well conducted RCT – no bias

- Five people with backache received Potters
- Five people received placebo
- 4 out of 5 with Potters got better
- 2 out of 5 with placebo got better

2X2 Table

		Outcome		
		Better	No improvement	
Intervention	Potters	4	1	5
	Placebo	2	3	5

No backache at 3 months
(Potters versus placebo trial)



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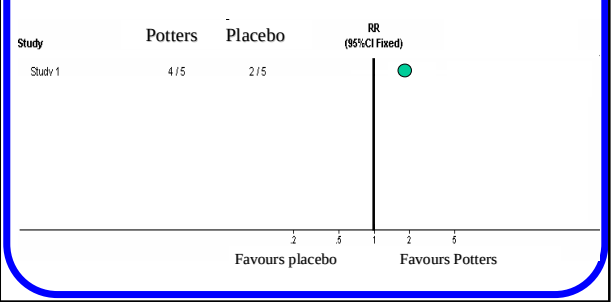
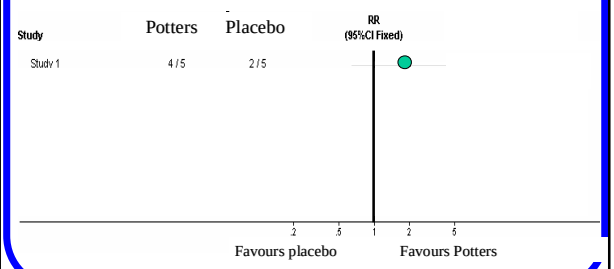


No backache at 3 months

Do you think this study proves Potters works?



It could be due to chance!

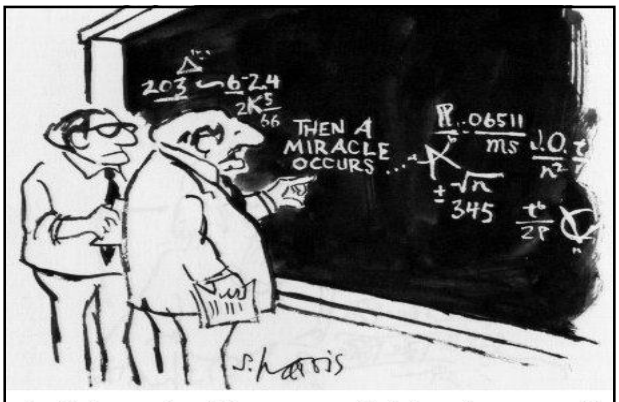
- What if there had 1000 people in each arm and 800 got better with Potters and only 200 got better on placebo?
- Would you believe Potters works now?
- What is the minimum number you would want in each arm to believe the trial (assuming result is same: 40% better with placebo and 80% with Potters)?

What is the minimum number you would want in each arm to believe the trial?

- Write your estimate on a piece of paper

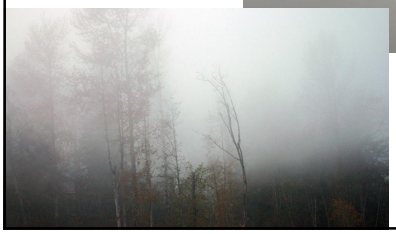
Scores

- 0-20
- 21-40
- 41-60
- 61-100
- 101-200
- >200



"I think you should be more explicit here in step two."

Quantifying uncertainty due to chance



p-value

P-value in a nutshell

The Null Hypothesis

So what does p=0.5 mean?

So what does p=0.05 mean?

0 — 1

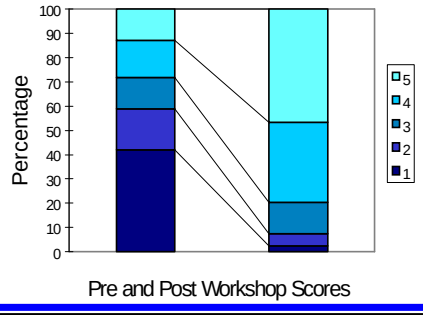
Impossible — *Absolutely certain*

- p = 0.5
  quite likely - evens chance - 50:50 - 1 in 2
- p = 0.001
  very unlikely - 1 in 1000
- p = 0.01
  unlikely - 1 in 100
- p = 0.05
  fairly unlikely - 1 in 20 - 5 times in 100

Self-assessed understanding - score

- 5 - I understand the term and could explain it
- 4 - I understand the term but could not define it
- 3 - I know have a vague idea what it means
- 2 - I have heard it but don't know what it means
- 1 - I have never heard of the term

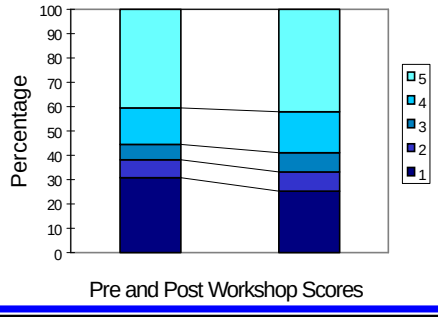
"Odds ratio"



A trick question!

P<0.00001

"MAAG"



P<0.00001

Moral

Any observed difference between two groups, *no matter how small*, can be made to be "statistically significant" - at *any* level of significance - by taking a sufficiently large sample.

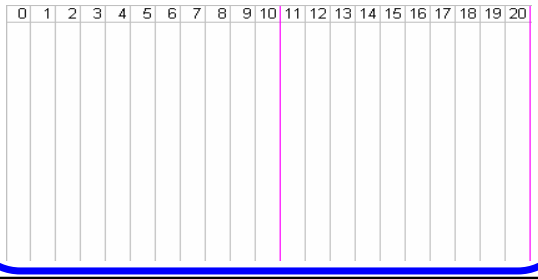
- Question: Is there a better way to express uncertainty due to chance?
- Answer: Yes!
- The confidence interval

Confidence intervals

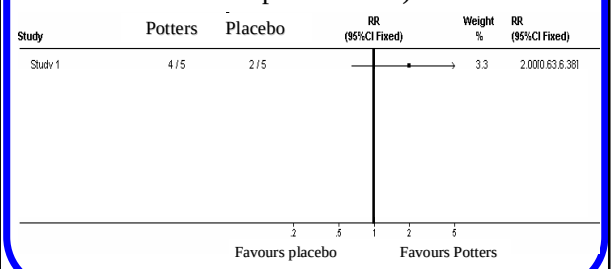
- I have a big barrel full of sweets
- Half are red and half are blue
- They are all mixed up
- Today I put 20 sweets in this bag without looking at the colour of the sweets
- How many red sweets did I put in the bag?

- Question: How can we express uncertainty due to chance?
- Answer: the p-value
- Is there a better answer?
- The confidence interval!

How many **red** sweets did I put in the bag?



No backache at 3 months
(Results of our Potters tablet versus placebo trial)



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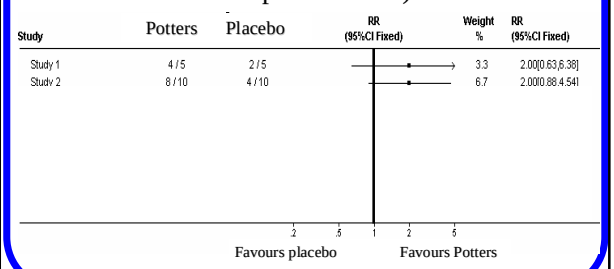

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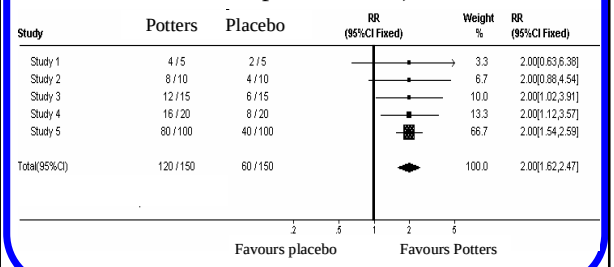
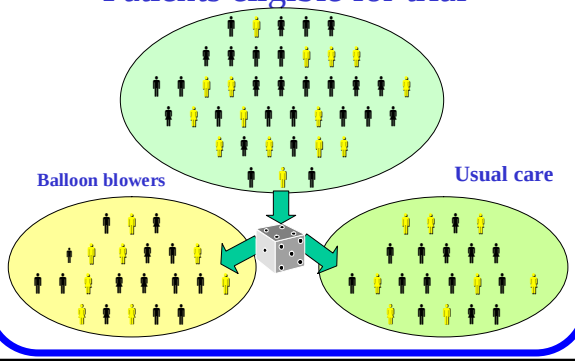


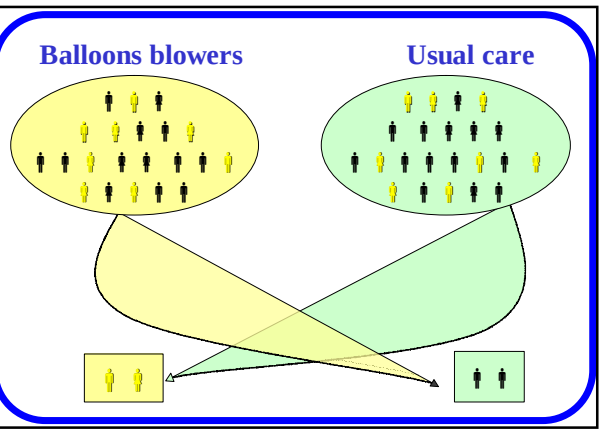
When things go wrong

- What if patients don't get the treatment they were randomised to receive or get the wrong treatment?

Balloon blowing for health

Patients eligible for trial



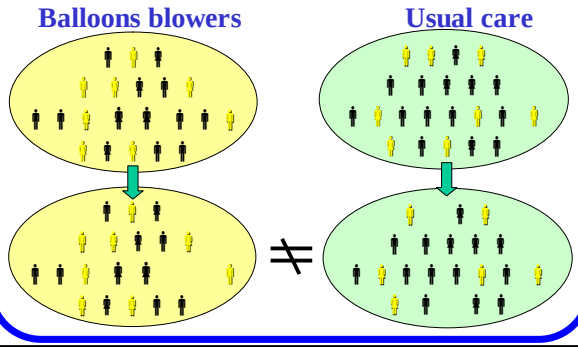


What strategies can a researcher adopt to deal with this problem?

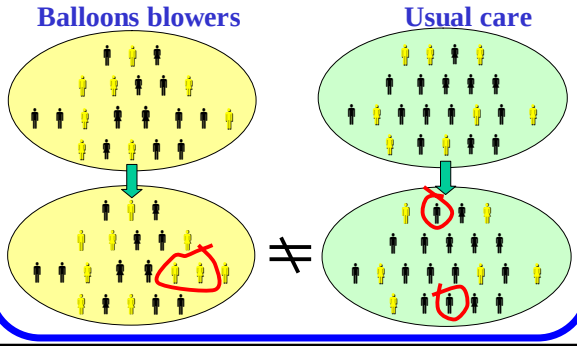
Strategies to deal with this

1. Reject trial as spoilt
2. Exclude patients who did not get right treatment (comparing the outcomes only for those people who got the treatment they were supposed to)
3. Analyse according to the treatment people actually got
4. Treat people as if they got the treatment they were supposed to and analyse results comparing randomised groups regardless of treatment actually received
5. Adjust for the imbalance in the analysis

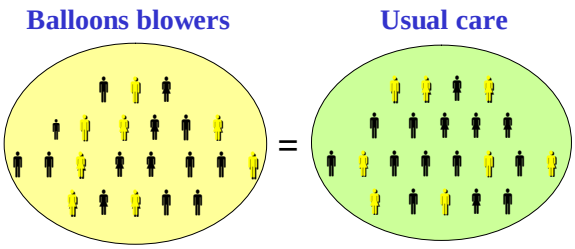
Strategy 2 - Exclusion



Strategy 3 – Care received



Strategy 4 - Intention-to-treat



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  - Confidence intervals
  - Meta-analysis
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