STATS SIMPLIFIED

A GUIDE FOR BUSY CLINICIANS TRYING TO UNDERSTAND RESEARCH!

Part 1 of 6

1

LET ME INTRODUCE MYSELF

AND YES…. I LOVE STATS!

This is me

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"BITMOJI ME"

2

and WELCOME to

"STATS SIMPLIFIED"

A GUIDE FOR BUSY CLINICIANS TRYING TO UNDERSTAND RESEARCH!

WHTA
Women's Health Training Associates

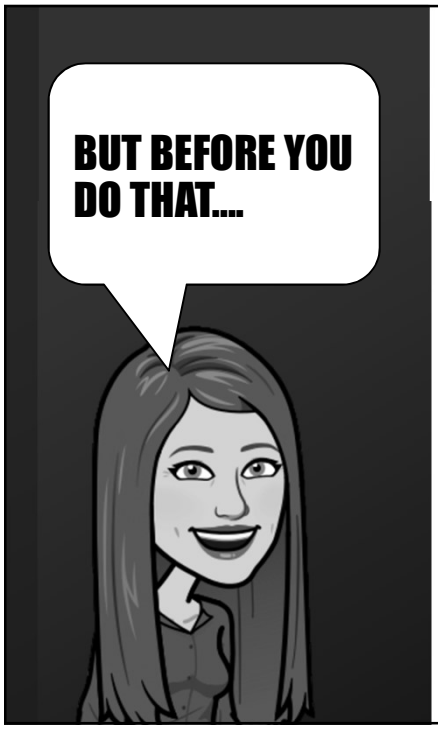
3

- **When people start talking stats…..**

IT MAY MAKE YOU FEEL LIKE YOU WANT TO DO THIS….

OR THIS…..

4



I want you to <u>at least be open to the idea</u> that…..

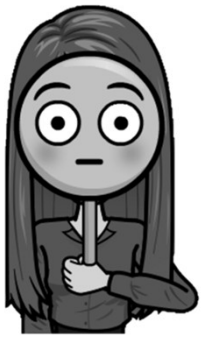
Stats are AMAZING!

And they don't need to be hard

5

Don't Worry!!

The goal of this series is for you soon to be saying……



6

7

A LITTLE DISCLAIMER

- I am going to deliberately **OVERSIMPLIFY** this series.

  But…… this is no different to what we do with patients everyday.
  - Patients need enough information to understand their condition
  - They don't need a full health degree

- You are not trying to be a **biostatistician**

- You just need ***'enough understanding'*** to understand the research you are reading

- ***So I acknowledge I am <u>oversimplifying,</u> but with the hope that***
  - ***You have enough information to get the general idea***
  - ***You don't have so much information that you get confused***

8

6 SECTIONS TO THIS SERIES

1. Basics Maths

Fractions

Percentages (%, ‰, ‱)

Decimals

Converting decimals!

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Why is converting decimals so important?

6 Examples

To be able to realise when reading research that:

- **When p-value is 0.67 there is a 67% chance the result is a fluke**
- **When the p-value is <0.001 there is a <1/1000 chance the result is a fluke**
- **When the ODDs ratio is 0.21 the group is 79% less likely to have the condition**
- **When the RR is 2.1 the group is just over twice as likely to have the condition.**
- **When an ODDs ratio CI is 0.89 – 1.32 the result is insignificant because the real result could be anything from a 11% reduced chance to an 32% increased chance**
- **When the r-value between two variables is only -0.14, there is only a 14% correlation that as one value goes up (eg strength) the rate of the condition (eg POP) goes down**

9

6 SECTIONS TO THIS SERIES

1. Basics Maths

Fractions

Percentages (%, ‰, ‱)

Decimals

Converting decimals!

(but you can skip this if you are fine with maths)

DON'T LET THIS SCARE YOU!!!!

we are getting ahead of ourselves

And I'm going to make this easy!!

10

6 SECTIONS TO THIS SERIES

1. Basics Maths

- Fractions
- Percentages (%, ‰, ‱)
- Decimals
- Converting decimals!
- (skip this if you are fine with maths)

2. Averages and Distribution

- Mean vs Median
- Standard Deviation
- 95% Confidence Intervals

3. Significance

- P- value
- Statistical significance?
- Clinical significance?

4. Risk Comparison

- Relative Risks - 'RR'
- Odds Ratios – 'OR'

5. Correlations

- Intra-class Correlation Co-efficient- 'ICC'
- Rank Correlation – 'r-value'

6. Other

- Intention to Treat - ITT
- Number needed to treat - NNT

11

LET'S START!!

THE BASICS

1. Fractions
2. Percentages % , Permille ‰ and Permyriad ‱
3. Decimals
4. Converting Decimals

12

BASIC MATHS … FRACTIONS eg $\frac{3}{70}$

- Fractions simply represent the portion you have, compared to the total
  - **Portion you have** = **TOP NUMBER**
  - **Total number** = **BOTOM NUMBER**

EXAMPLES

eg 1. If 80 women give birth, and 10 of them have an avulsion

10 is how many we have with an avulsion

80 is the total number of women giving birth So → **10/80** women who gave birth had an avulsion

Eg 2. Amongst a group of 200 women with a BMI > 30, 70 have urinary incontinence

70 is how many we have with incontinence

200 is the total number of ♀ with BMI > 30 So → **70/200** ♀ with a BMI > 30 had UI

13

BASIC MATHS … FRACTIONS $\frac{3}{70}$

In our examples on the previous slide

$\frac{\mathbf{10}}{\mathbf{80}}$

women who gave birth had an avulsion

$\frac{\mathbf{70}}{\mathbf{200}}$

women with a BMI > 30 had urinary incontinence

This is called raw data

14

BASIC MATHS … FRACTIONS

$\frac{3}{70}$

$\frac{10}{80}$

women who gave birth
had an avulsion

$\frac{70}{200}$

women with a BMI > 30
had urinary incontinence

The first thing we can do to make this more understandable is to simplify the fractions

Note: Simplify just means "Make smaller"

15

BASIC MATHS … FRACTIONS

$\frac{3}{70}$

$\frac{10}{80} \overset{\div 10}{=} \frac{1}{8}$

women who gave birth
had an avulsion

$\frac{70}{200} \overset{\div 10}{=} \frac{7}{20}$

women with a BMI > 30
had urinary incontinence

SIMPLIFYING FRACTIONS (making smaller)

ONLY TWO RULES TO REMEMBER!!!!!

1. You are only allowed to use ÷ (you can't use minus to make smaller)
2. Whatever you do to the TOP you MUST do to the BOTTOM

Let's choose (just for ease) to simplify these fractions by a factor by 10

16

BASIC MATHS … FRACTIONS

$\frac{3}{70}$

$\frac{1}{8}$ = **1 out of 8** women who gave birth had an avulsion

$\frac{7}{20}$ = **7 out of 20** women with a BMI > 30 had urinary incontinence

SIMPLIFYING FRACTIONS (making smaller)

ONLY TWO RULES TO REMEMBER!!!!!

1. **You are only allowed to use ÷**
2. **Whatever you do to the TOP you MUST do to the BOTTOM**

17

WHERE ARE WE UP TO?

THE BASICS

1. Fractions
2. Percentages %, Permille ‰ and Permyriad ‱
3. Decimals
4. Converting Decimals

18

BASIC MATHS … PERCENTAGES eg 64%

- A percentage is just another way to write a fraction.
- There is nothing more to it (sort of like writing 'Hello' in Japanese is "Konnichi wa". They mean the same thing)
- To understand percentages, just count the zeroes in the symbol, and put them with the number 1 in the bottom of the fraction.
- Put simply…… % is just a fraction / 100
- Even the word "percent" says this: ____ **per "cent"** (cent = hundred)

NOTE!
If percentage is just a fraction out of 100, then % is always just telling us how many out of every 100

EXAMPLES

eg 1. If 23% of women have Stage 2 POP
23/100 women have stage 2 prolapse

Eg 2. If 60% of women have stage 1, 2, or 3 prolapse
60/100 women have stage 1-3 prolapse

19

% , ‰ and ‱

20

FYI….. % , ‰ AND ‱

People only occasionally use these….. But they sometimes come up in research (usually in population research)

Percent	**%**	**=**	2 zeroes =	/00	**= per 100**
Permille	**‰**	**=**	3 zeroes =	/000	**= per 1,000**
Permyriad	**‱**	**=**	4 zeroes =	/0000	**= per 10,000**
					etc.

Examples: in a research paper it is quoted that

- **6‰** of women have complications after LSCS → **6 / 1000 women have complications**
- **94‱** of women in a country have stage 4 POP → **94 / 10,000** women have Stage IV POP
- The maternal mortality rate in Australia is **6.8‱‱** → Aust has a maternal mortality rate of **6.8 deaths per 100,000**

21

NOW WHERE ARE WE UP TO?

THE BASICS

1. Fractions
2. Percentages % , Permille ‰ and Permyriad ‱
3. Decimals ⬅
4. Converting Decimals

22

BASIC MATHS … DECIMALS eg 0.64

Let's think…..

Percentage symbols were just another way to express a fraction

- with **%, ‰,** ‱ → the number of zeroes told you what number to put at the bottom of the fraction.

  % = 2 zeroes = /100 ‰ = 3 zeroes = /1000 ‱ = 4 zeroes = /10,000

DECIMALS

- Decimals are also just a different way to express a fraction, but this time **the number of decimal places** (numbers after the decimal point) tell you how many zeroes in the bottom of the fraction (/100 ; /1,000 ; /10,000)

Examples	0.64	→ 2 decimal places	→ 2 zeroes	→ 64/100
	0.009	→ 3 decimal places	→ 3 zeroes	→ 9/1000
	0.1	→ 1 decimal place	→ 1 zero	→ 1/10

23

BASIC MATHS … DECIMALS eg 0.64

This is where it gets important!

DECIMALS

- Decimals are also just a different way to express a fraction, but this time **the number of decimal places** (numbers after the decimal point) tell you how many zeroes in the bottom of the fraction (/100 ; /1,000 ; /10,000)

Examples	0.64	→ 2 decimal places	→ 2 zeroes	→ 64/100
	0.009	→ 3 decimal places	→ 3 zeroes	→ 9/1000
	0.1	→ 1 decimal place	→ 1 zero	→ 1/10

24

DECIMALS IN RESEARCH

eg 0.64

DECIMALS are used All the Time!!!

- Unfortunately …. Decimals are a bit abstract to think about.
- But if you convert them to a percentage or fraction they often seem more REAL!!!!
- Let's first practice changing them to percentages and fractions and then we will look at some real examples…..

25

CONVERTING DECIMALS

Let's start by converting….. first to a fraction / 100 then to a percentage

Decimal	Fraction	Percentage
0.67	67/100	
0.05	5/100	
0.21	21/100	
0.4	4/10 = 40/100	
0.1	1/10 = 10/100	

Now let's convert….. Straight to a percentage

Decimal	Percentage
0.34	
0.02	
0.7	

26

NOW WHERE ARE WE UP TO?

THE BASICS

1. Fractions
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3. Decimals
4. Converting Decimals to percentages

Final Step

Applying this knowledge

27

APPLYING YOUR KNOWLEDGE!

In a sample of 500 women aged 50 - 80 years, 120 are found to have stage 1 prolapse, 150 are found to have stage 2 prolapse, 30 are found to have stage 3 prolapse and 5 are found to have stage 4 prolapse.

QUESTIONS WE WANT TO ANSWER:

1. **What fraction of women had stage 1 or 2 prolapse?**
2. **What fraction of women were found to have stage 4 prolapse?**
3. **What percentage of women had stage 4 prolapse? (hint: you needed to simplify your fraction in 2)**
4. **What percentage of women had no prolapse or stage 1 prolapse?**

28

ANSWERS

In a sample of 500 women aged 50 - 80 years, 120 are found to have stage 1 prolapse, 150 are found to have stage 2 prolapse, 30 are found to have stage 3 prolapse and 5 are found to have stage 4 prolapse

1. **What fraction of women had stage 1 or 2 prolapse**?
2. **What fraction of women were found to have stage 4 prolapse**?
3. **What is the percentage of women with stage 4 prolapse? (hint: you needed to simplify your fraction in 2)**
4. **What percentage of women had no prolapse or stage 1 prolapse?**

No Prolapse = 195 Stage 1 Prolapse = 120 Total = **315**/500 divide by 5 = 63/100 = 63%

NOTE: there is an error in the recording here !!! SORRY
(I was obviously too busy working out the slide dynamics to check my numbers!

29

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Decimals

Converting Decimals to Percentages!

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30