

# STATISTICS

## LEVELS OF EVIDENCE

Oxford 2011 levels of evidence

Therapeutic

RCT

Systematic Review

of LI RCTs  
(homogeneous)

II Prospective cohort study  
Poor quality RCT (80% FU)  
Systematic RV L2 studies  
or non homogeneous LI

III Case-control study  
Retrospective cohort  
SR LIII studies

IV Case series

V Expert opinion

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Screening criteria (Modified Wilson criteria)

I Condition should be **I**mportant

A Treatment should be **A**cceptable

T Diagnostic & **T**reatment facilities should be available

R **R**ecognisable latent or early symptomatic stage

O **O**pinions on who to treat as patients must be agreed

G **G**uaranteed safety, sensitivity & specificity

E **E**xamination must be acceptable

N The untreated **N**atural history must be known

I Tests are **I**nexpensive & simple to perform

C Screening must be **C**ost effective

# STATISTICS

How many with disease test positive

Sensitivity = ability of a test to identify true cases =  $TP / (TP + FN)$

sensitivity  
↓

PPV

→ Test +ve

Test -ve

Disease +ve

TP

FN

Disease -ve

FP

TN ← NPV

↑ specificity

How many without disease test -ve

Specificity = ability of a test to exclude FPs =  $TN / (TN + FP)$

PPV is the probability that a subject who tests positive is truly +ve =  $TP / (TP + FP)$

NPV is the probability that a subject who tests negative is truly negative =  $TN / (TN + FN)$

## ERRORS

False alarm

Type I

Difference is found but in reality there is not

False +ve

5% chance of difference occurring by chance

Can protect against T1 by ↓ significance levels but

this ↑ T2 errors unless ↑ study size

Type II

False negative. No difference is found but in reality

there is one. Result of too small a sample

Important to perform a power analysis (80%)

# STATISTICS

## CONTINGENCY TABLE

qualitative data

used to tabulate the actual numbers of subjects (or observations) that fall into the categories defined by the rows & columns of the table.

Analysis performed from contingency table

Chi-square test

Fisher's exact test ( $n < 5$ )

Odds ratio & relative risk (Ratio of odds)

## SURVIVAL ANALYSIS

Study of outcome of an intervention over time. Allows variable dates of entry & different lengths FU.

Fixed intervals = actuarial life-table

At time of failure = KM

Define endpoint eg revision

Med completed  
| | lost to FU

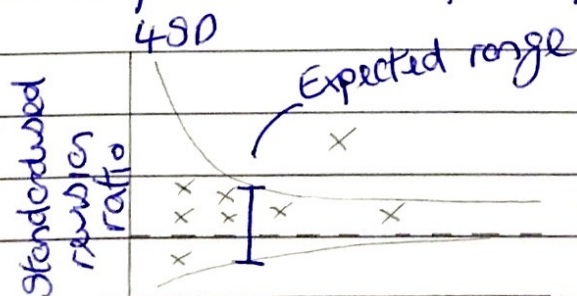
For each time period # at risk, # failures, # withdrawals

Survivorship curve is the cumulative estimate of survival plotted with 95% CI

## FUNNEL PLOTS

Used to measure performance

Scatter plots with superimposed control limits (2, 3 or 4 SD)



NJR 90 day mortality  
for hospital & surgeon  
After risk adjustment

Expected n of revisions  
(more risky operations  $\rightarrow$ )

# SCREENING

WHO

Disease

Important

Treatment available

Latent stage

NHx understood

Agreed policy who to treat

Test

Available to everyone

Acceptable to pt

Accurate (sensitive & specific)

Cost effective