

MEASURING CHANGE – RESPONSIVENESS OR SENSITIVITY?

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OBJECTIVE

- ❖ Discusses ways of establishing if an OM can measure change over time and how this property can be reported using descriptive and statistical methods.
- ❖ Critically appraise evidence about the development and measurement proprieties of OMs
- ❖ Discuss the consideration related to the application of evidence base to OMs



INTRODUCTION

- When choosing an OM for practice, it is important to establish whether **responsiveness** has been evaluated because this will enable you to decide whether this instrument will actually measure change in your patient/client.



Responsiveness: the ability to measure **clinically meaningful or important change**.

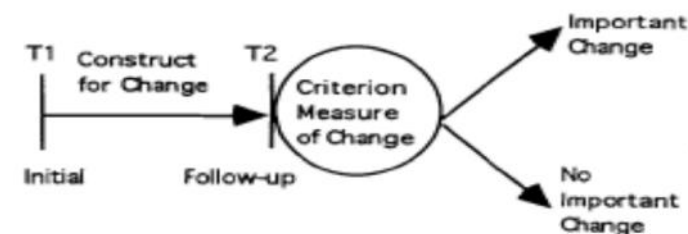
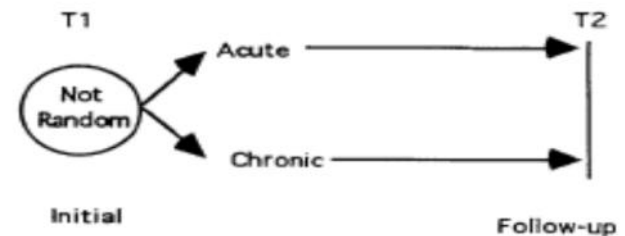
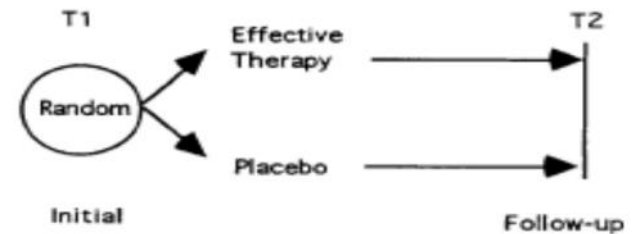
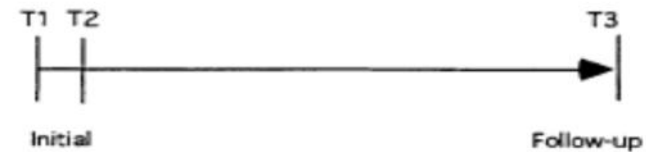
Responsiveness is an important component of the test's validity, especially if the test is to be used to evaluate the effectiveness of interventions.

Responsiveness the change is noticeable to the patient or health professional



STUDYING RESPONSIVENESS

- 1 Patients will improve over time.
- 2 Patients will display little or no change between T1 and T2. Substantial improvement will be demonstrated between T2 and T3.
- 3 Patients receiving the effective therapy will display more improvement than patients receiving placebo.
- 4 Using the natural course of a disease or condition, where one group may be expected to have a more rapid rate of change than another e.g. flaccid and spastic stage of hemiplegia
- 5 This design is similar to 1 but it employs an external measure of change. At the follow-up point in time the patient is judged as having achieved change or not. The construct applied then is whether the new measurement has identified this change also



REPORTING (ANALYZING) RESPONSIVENESS

There are a variety of different ways reported when the responsiveness of a measurement is being analyzed. They include:

- Effect size (ES)
- Standardized response mean (SRM)
- Relative efficiency
- Receiver operator characteristic curve.



EFFECT SIZE (ES) “AVERAGE CHANGES”

A standardized measure of change obtained by dividing the average change between initial and follow-up measurements by the standard deviation of the initial measurement. It is used in association with design 1.

$$\text{Effect size (ES)} = \frac{\text{average changes}}{\text{SD of initial scores}}$$

Effect size scores

Small	0.2	Moderate	0.5	Greater	0.8
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Easy to calculate and understand

Used with ratio or interval level of measures

To determine extent of a relationship/difference between variables

Use in case of studying outcome measures and effect of intervention

Enables sample size calculations.

Facilitates comparison between scientific studies



EVIDENCE-BASED APPROACH TO CHOOSING OUTCOME MEASURES

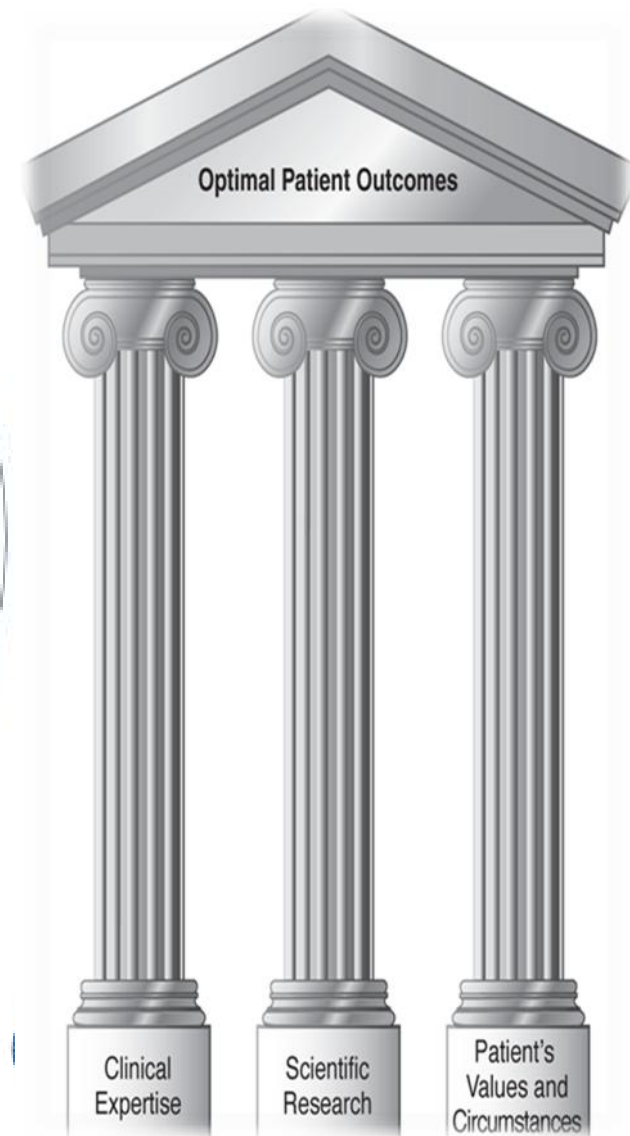
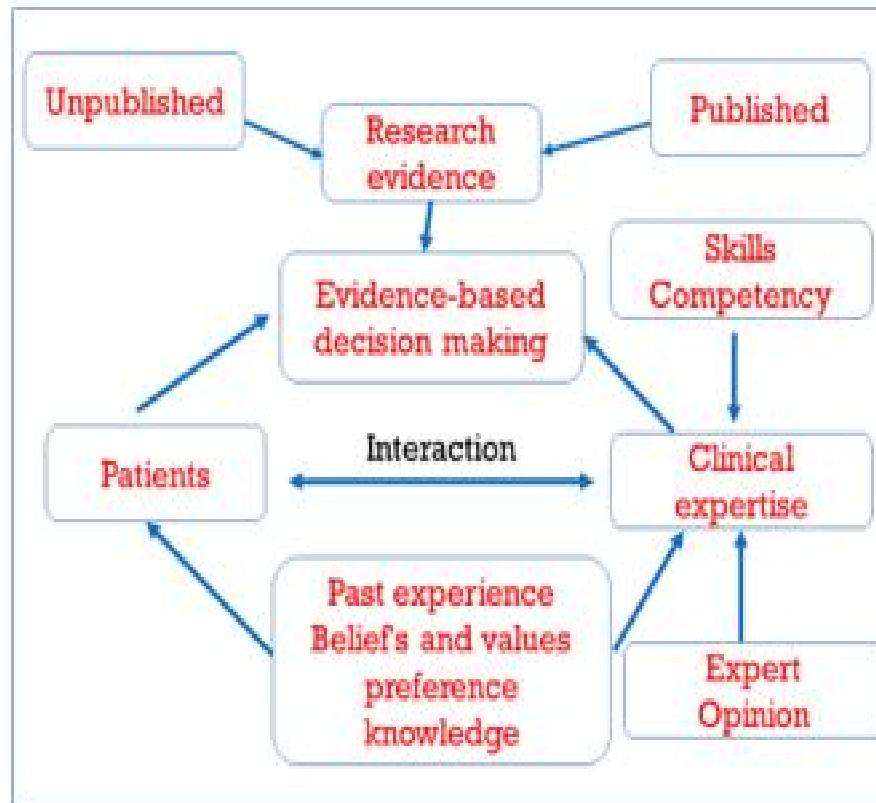


EVIDENCE-BASED APPROACH TO CHOOSING OMS

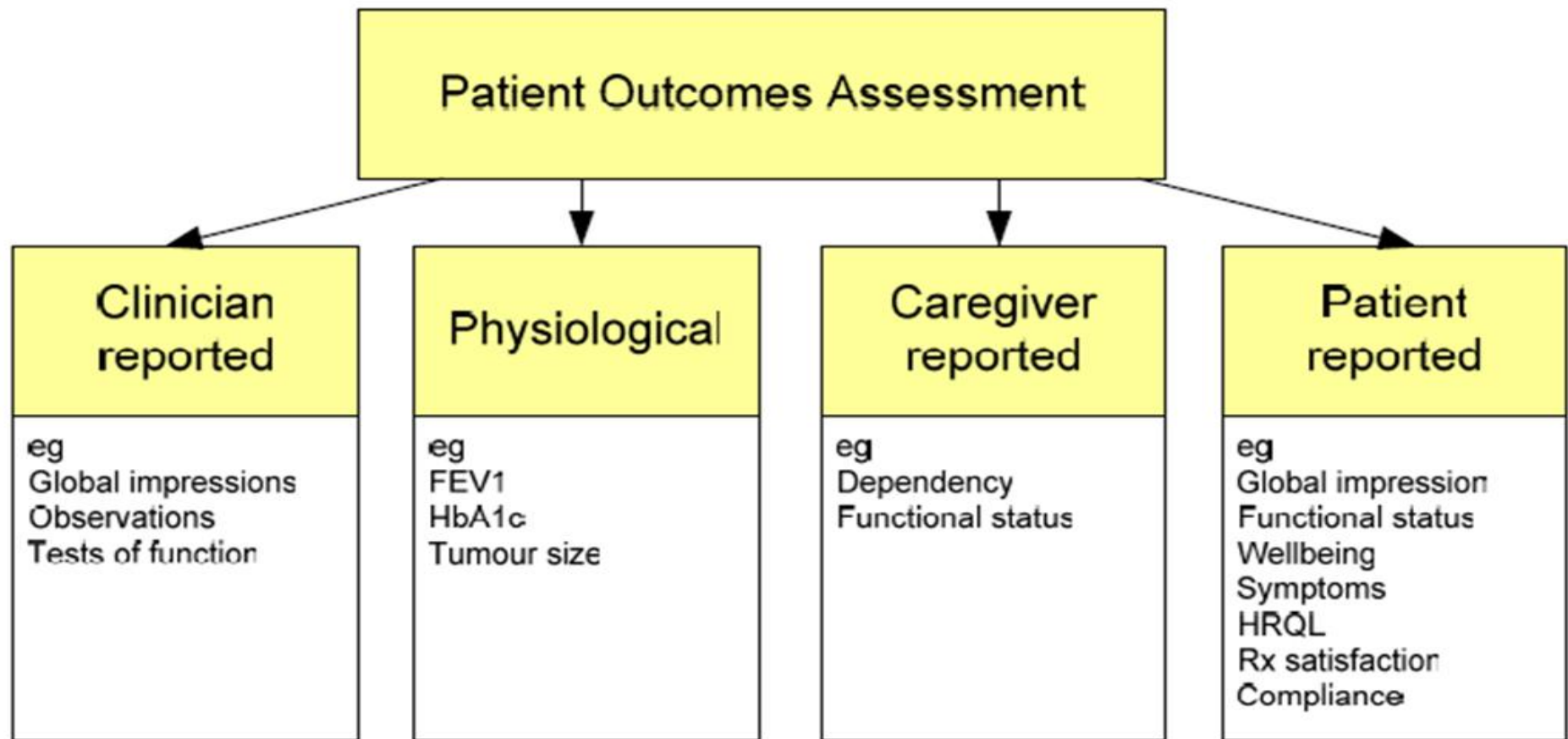
- An evidence-based approach to selecting outcome measures involves making judgements about the quality of the validity and reliability studies, interpreting the findings and deciding whether they are applicable to one's own specific practice.

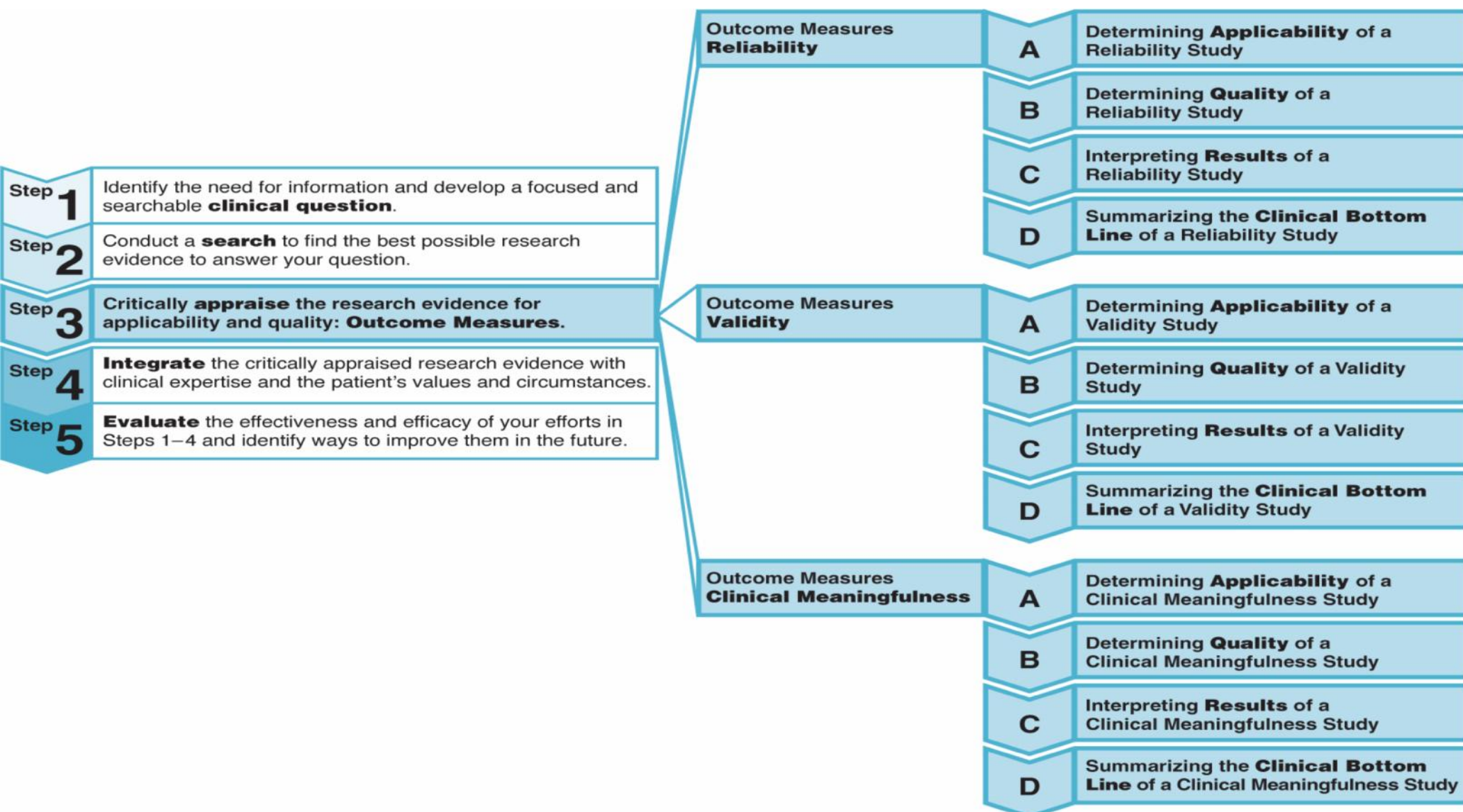


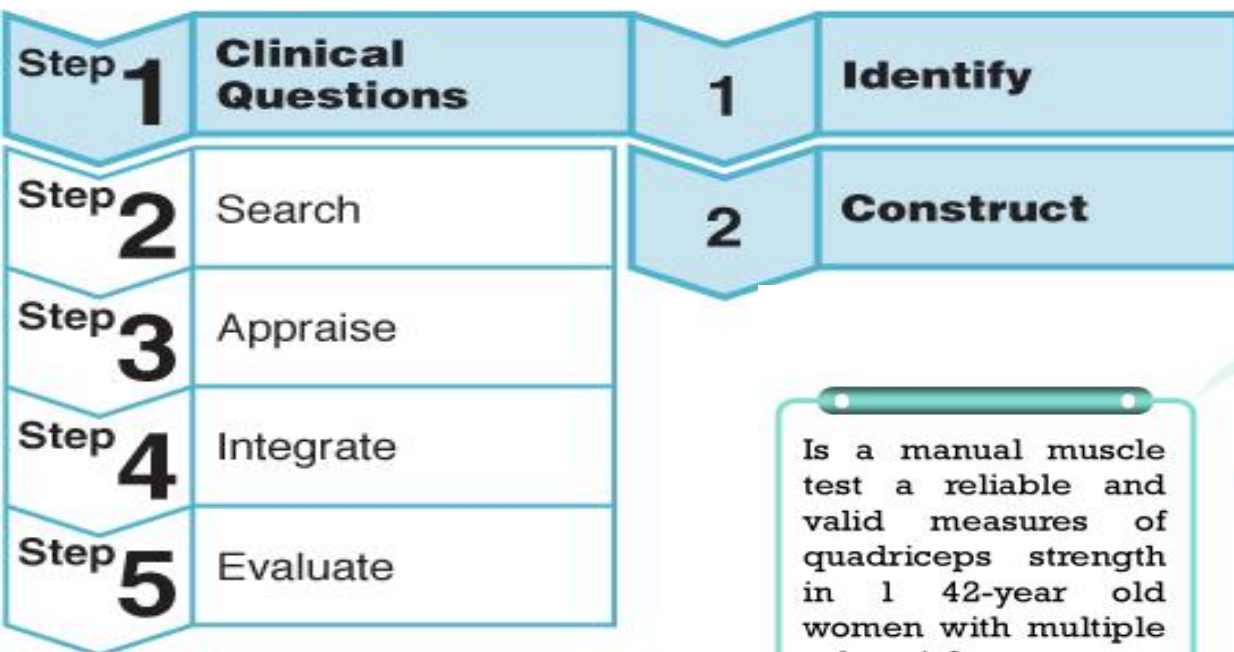
Social culture, economic and political context



GENERAL METHODS USED FOR OUTCOME ANALYSIS







Asking a Question

Is a manual muscle test a reliable and valid measures of quadriceps strength in 1 42-year old women with multiple sclerosis?

Clinical OMs

PICO model

Is a manual muscle test as reliable and valid as hand held dynamometer for measuring quadriceps strength in 1 42-year old women with multiple sclerosis?

Will the Postural Assessment Scale for Stroke Patients (PASS) detect change in balance following rehabilitation in an 82 years old women with hemiplegia?

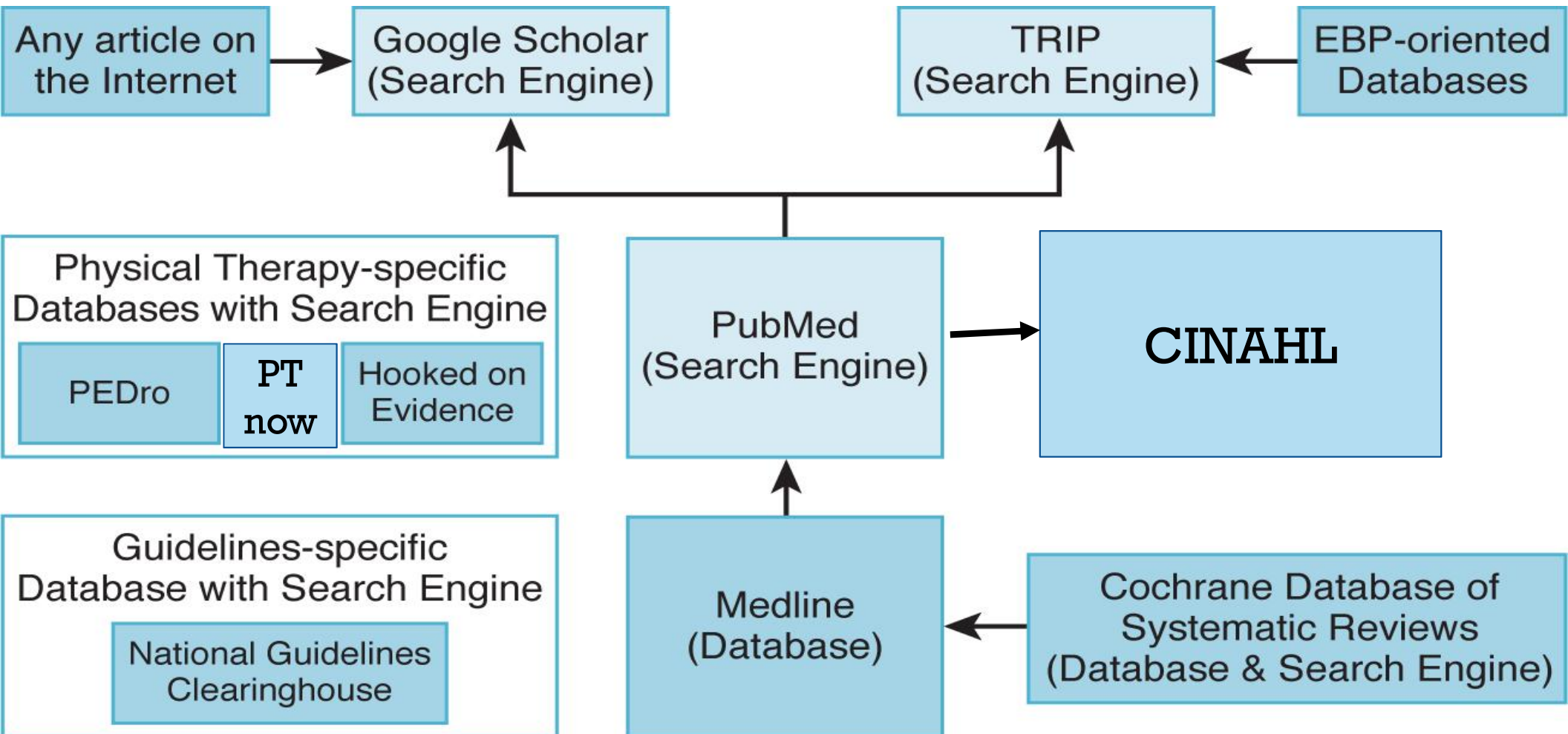
Self-reported
outcome
measure

PICO model

Is the Postural Assessment Scale for Stroke Patients (PASS) more sensitive to change than berg balance scale following rehabilitation in an 82 years old women with hemiplegia



SEARCHING FOR EVIDENCE



CRITICAL APPRAISAL OF OUTCOME MEASURES RESEARCH



APPRAISING EVIDENCE OF OM_s

Several checklists for measurement properties exist

- Scientific advisory committee (SAC) of the medical outcome trust in 2002
- COSMIN checklist (www.cosmin.nl).
- Christina Jerosch-Herold's Checklist for critical appraisal of OM_s
- Oxford center for evidence base

No consensus on terminology and definitions

None is generally accepted and widely used

Psychometric properties

Relevant Study result

Evidence to patient/client



APPRAISING EVIDENCE ON PROMS USING SAC

Conceptual and measure model

Is the OM of interest easy
to **administer**?

Is the OM of interest is
reliable?

Is the OM of interest is **valid**?

Is the OM of interest is **responsive**?

Cultural and
language adaptation

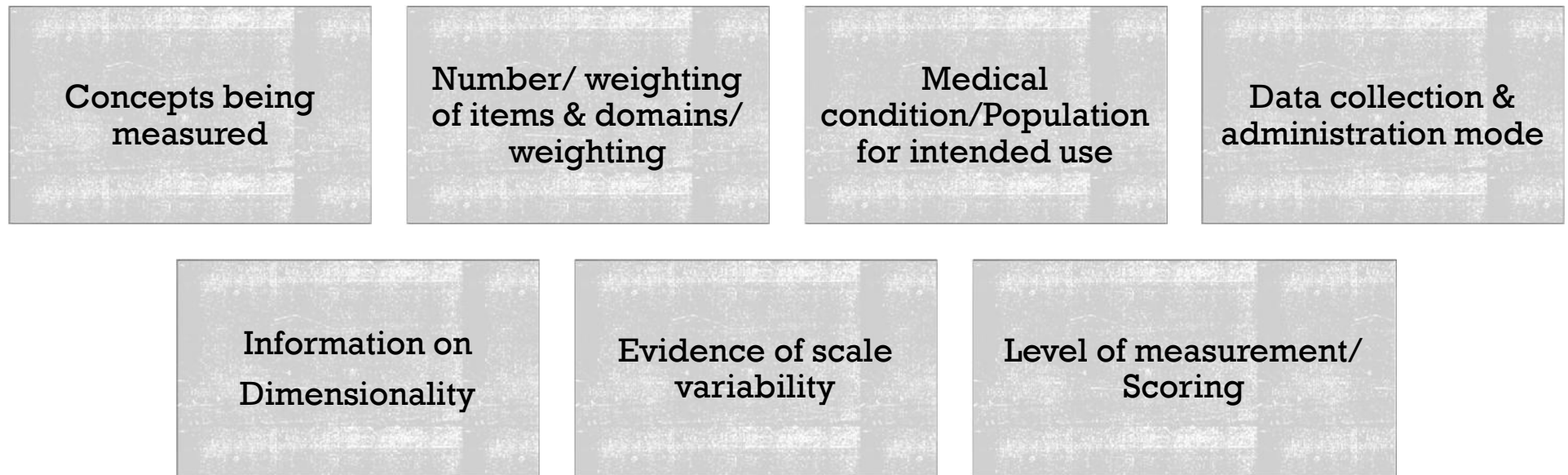
Is there more than
one **alternative**
form/methods ?

Can scores on OM of interest be
interpreted in meaningful way?



CONCEPTUAL AND MEASUREMENT MODEL

- **A conceptual model** is a rationale for and description of the concepts and the populations that a measure is intended to assess and the relationship between those concepts



RESPONDENT AND ADMINISTRATOR BURDEN

- Respondent burden is defined as the time, effort, and other demands placed on those to whom the instrument is administered.
- Administrative burden is defined as the demands placed on those who administer the instrument.

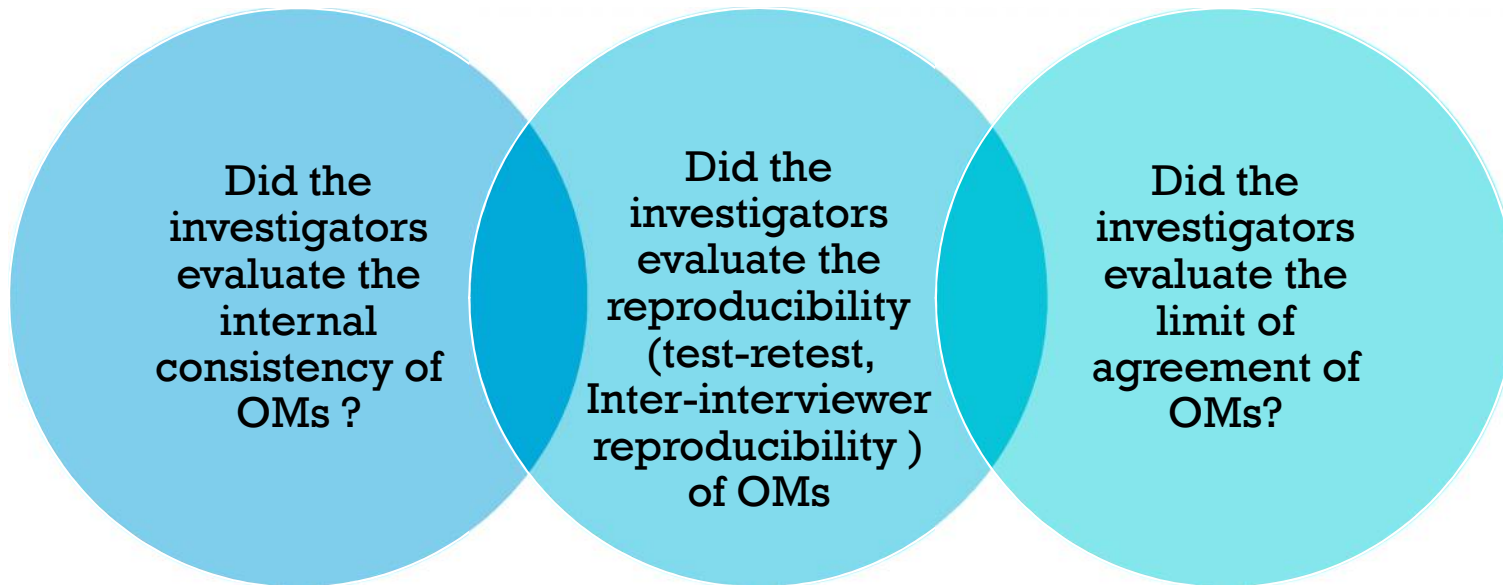
Factors that can be evaluated includes the following:

- ◇ Length of questionnaire or interview & Inadequate time
- ◇ Formatting , Font size too small to read easily
- ◇ New instructions for each item and typical style
- ◇ Requirement that patients consult records to complete responses
- ◇ Privacy of the setting
- ◇ Questions that patients are unwilling to answer
- ◇ Need for physical help in responding (e.g., turning pages, holding a pen, assistance with a telephone or computer keyboard)



INSTRUMENT RELIABILITY

IS THE INSTRUMENTS OF INTEREST IS RELIABLE



Have appropriate statistical measures been used to assess reliability?
What are the confidence limits, if given?

INSTRUMENT RELIABILITY

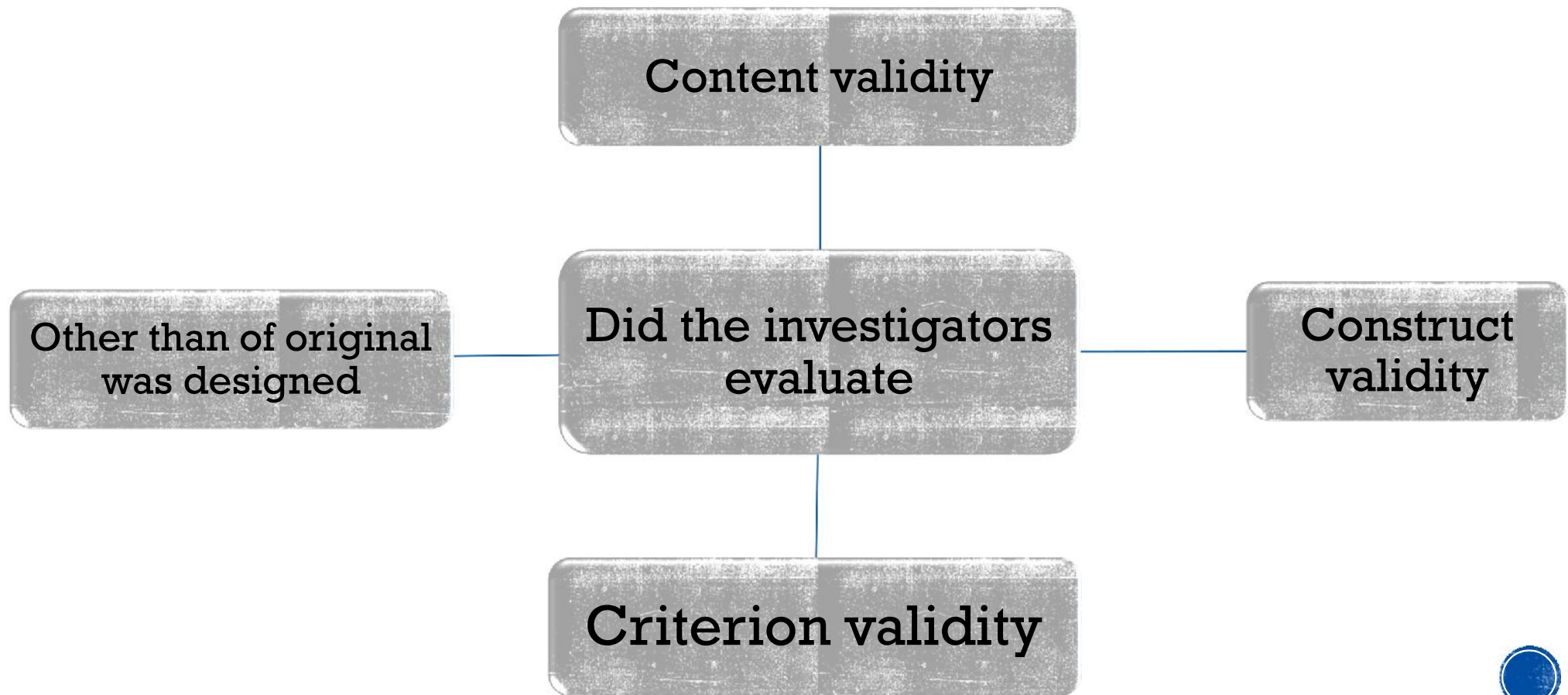
IS THE OM OF INTEREST IS RELIABLE

Reliability types	Review criteria
Internal consistency reliability and test information.	(a) methods of sample collection and sample size; (b) characteristics of the sample (c) the testing conditions (d) descriptive statistics for the instrument under study Cronbach's coefficient alpha, item total correlation
Reproducibility test-retest, Inter-interviewer	(a) methods of sample collection and sample size; (b) characteristics of the sample ((c) the testing conditions (d) descriptive statistics for the instrument under study ICC, (> 0.90 excellent , 0.75-0.89 good, < 0.75 poor to moderate Kappa, weight Kappa 0.8-1 perfect agreement 0.6-0.8 substantial agreement 0.4-0.6 moderate agreement 0.21-0.4 fair agreement 0.01-0.20 slight agreement <0.0 poor agreement



INSTRUMENT VALIDITY

IS THE OM OF INTEREST IS VALID?



INSTRUMENT VALIDITY

IS THE OM OF INTEREST IS VALID?

Reliability types	Review criteria
Content/construct Criterion/ others	(a) methods of sample accrual and sample size; (b) characteristics of the sample ((c) the testing conditions (d) descriptive statistics for the instrument under study (e) provide the hypotheses tested and data relating to the tests (construct) (f) provide a clear rationale and support for the choice of criteria measures



INSTRUMENT RESPONSIVENESS / INTERPRETABILITY

- Ability to detect changes

Assessment of responsiveness involves statistical estimation of an effect size statistic

Does the instrument capture clinical change?

What is the magnitude of the responsiveness of the instrument (effect size or standard response mean)?

Is there evidence of floor or ceiling effects?



INSTRUMENT RESPONSIVENESS /INTERPRETABILITY

- **Interpretability** is defined as the degree to which one can assign easily understood meaning to an instrument's quantitative scores.
- **Interpretability** of a measure is facilitated by information that translates a quantitative score or change in scores to a qualitative category or other external measure that has a more familiar meaning.



ALTERNATIVE MODES OF ADMINISTRATION

- Alternative modes of administration used for the development and application of instruments can include self-report, interviewer-administered, trained observer rating, computer-assisted self-report, computer-assisted interviewer-administered, and performance-based measures.
- In alternative modes may include self-administered or interviewer-administered versions of the original source instrument that are to be completed by proxy respondents such as parents, spouses, providers, or other substitute respondents.



CULTURAL AND LANGUAGE ADAPTATIONS OR TRANSLATIONS

- Many instruments are adapted or translated for applications across regional and national borders and populations.
- In the MOT and SAC context, cultural and language adaptations have referred to situations in which instruments have been fully adapted from original or source instruments for cultures or languages different from the original.
- Language adaptation might well be differentiated from translation.



CULTURAL AND LANGUAGE ADAPTATIONS OR TRANSLATIONS

Cultural and language adaptations are situations in which instruments have been fully adapted from original or source instruments for cultures or languages different from the original.

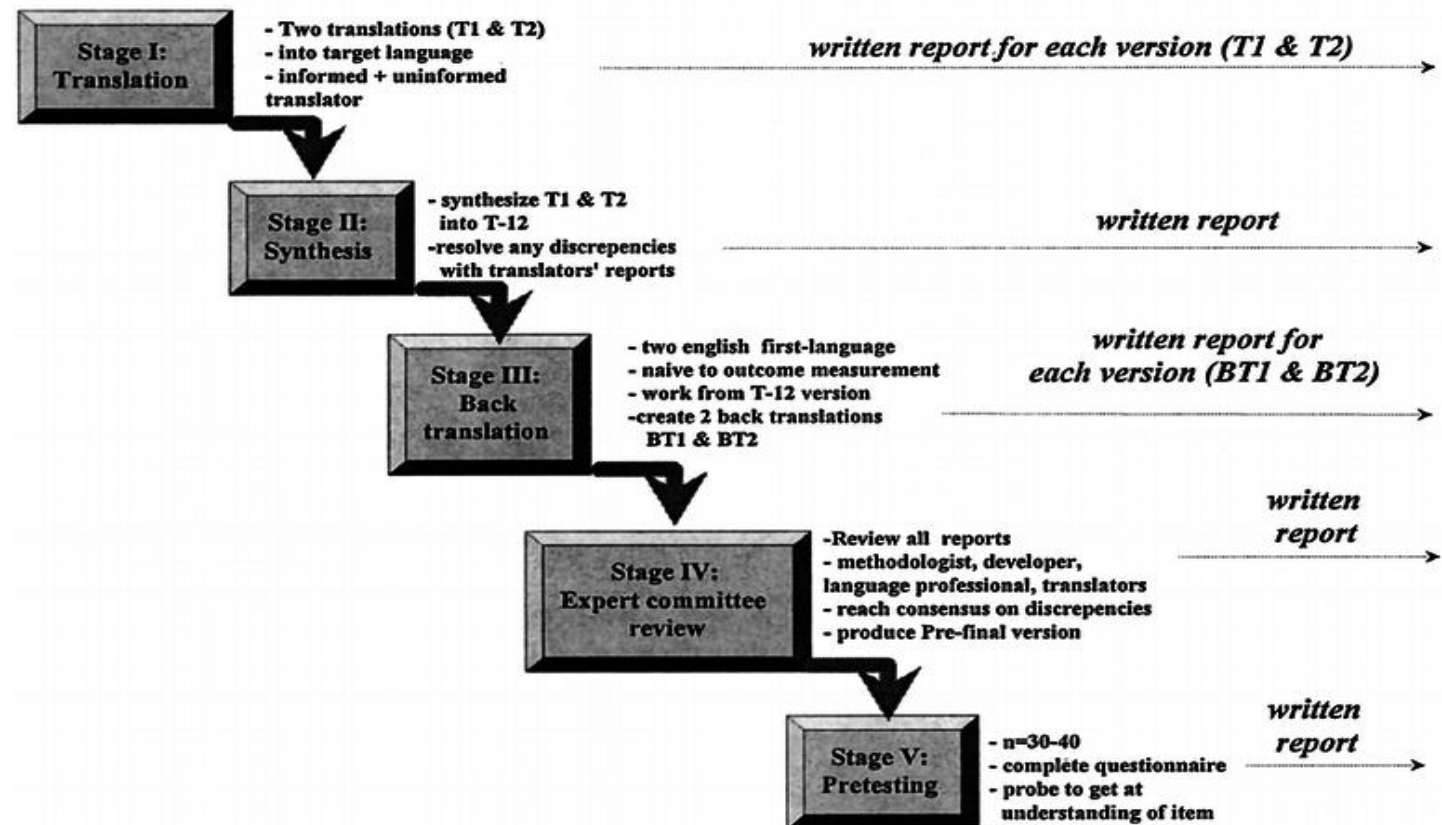
Conceptual and linguistic equivalence

- **Conceptual equivalence** is refers to equivalence in relevance and meaning of the same concepts being measured in different cultures and/or languages.
- **Linguistic equivalence** is refers to equivalence of question wording and meaning in the formulation of items, response choices, and all aspects of the instrument and its application

measurement properties



CULTURAL AND LANGUAGE ADAPTATIONS OR TRANSLATIONS



RELEVANT STUDY RESULTS (FINDINGS)

Results reported that are specific to your clinical questions

- Cronbach's alpha ()
- Correlation coefficient (s)
- Effect size (s)
- Standardized response mean (SRM)
- Others
- Statistical significant and/precision of the relevant study results

P-values for each relevant statistics reported by authors

Confidence interval for each relevant statistics reported by authors



APPLICATION OF EVIDENCE TO PATIENT/CLIENT

Are there clinically meaningful differences between the subjects in the study and your patients/client?

Yes/no/insufficient

Can you administer the OMs of interest appropriately in your clinical setting with your current resources ?

Yes/no/ insufficient

Does the OMs of interest fit within the patient/client expressed values and preference?

Yes/no

Will you use the PROMs of interest for this patient/client?

yes/no



I think I have given input to `u`

Now Start appraising OMs



