Goal attainment scaling in easy stages

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Objectives

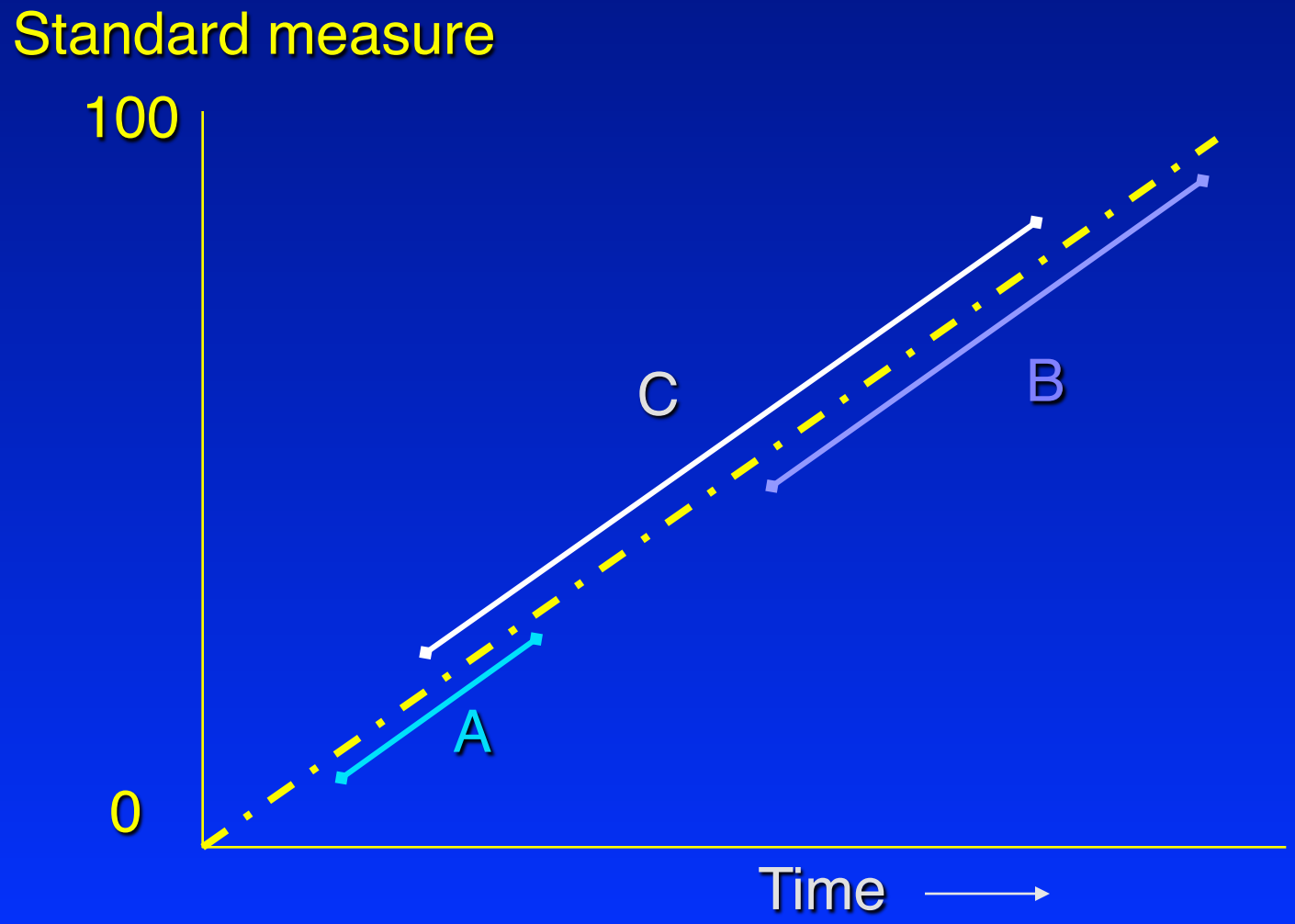
- Essential Background
  - **What is goal attainment scaling?**
  - **Why might we want to use it?**
- How to do it
  - **In easy stages**
    - What the clinicians needs to know
    - Further steps for research purposes only

Essential background

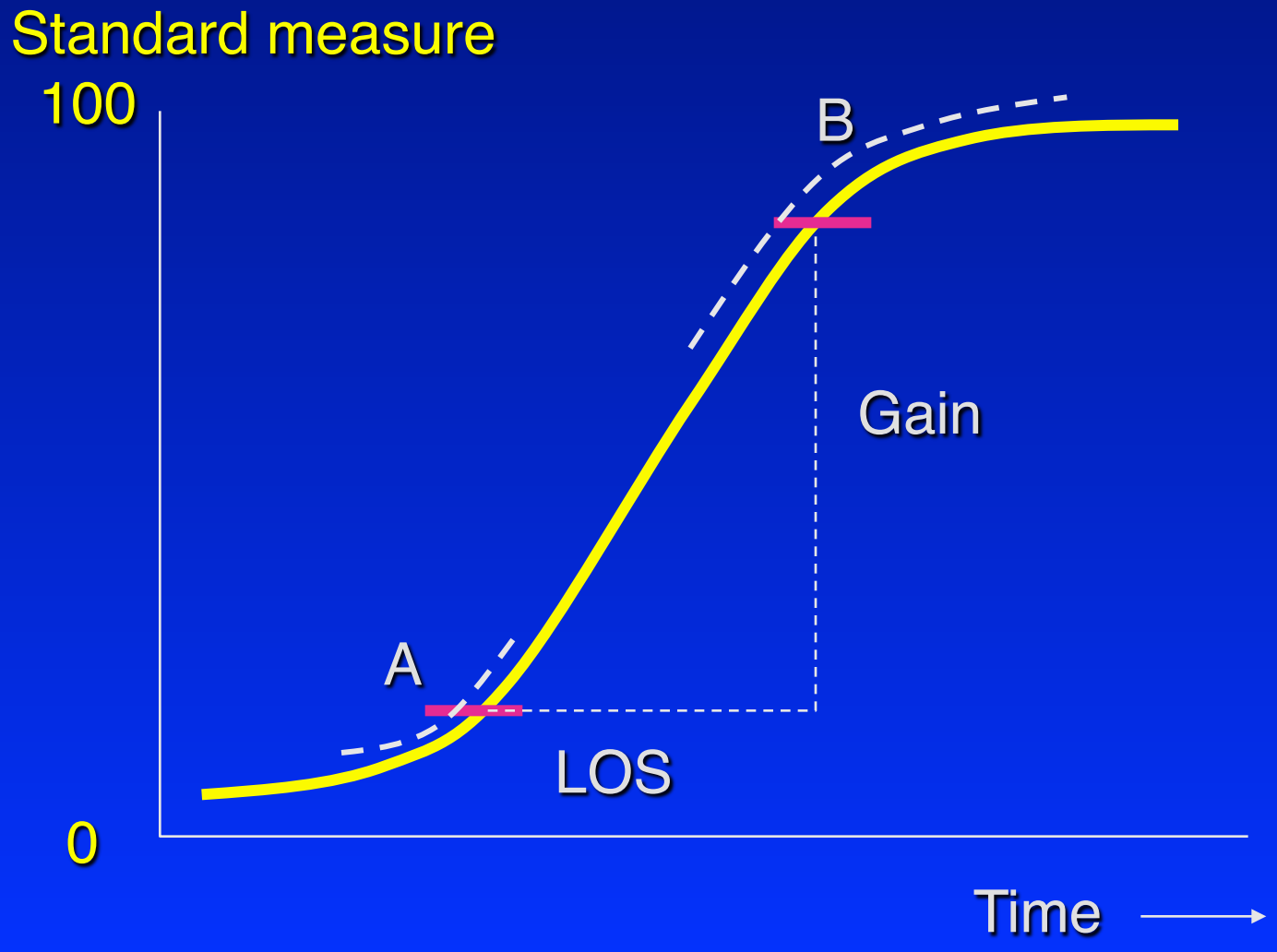
Outcome measurement 1

- Standardised measures (eg FIM / Barthel Index)
  - **Standard set of items/tasks**
  - **Scored on standard levels**
- A useful yardstick
  - **To compare different populations**
  - **Or to measure change from baseline**
- Often disappointing indicator of outcome
  - **Fail to reflect the actual aims of treatment**
    - Or benefits that are important to the patient
  - **Insensitive**
    - If many items are unchanged

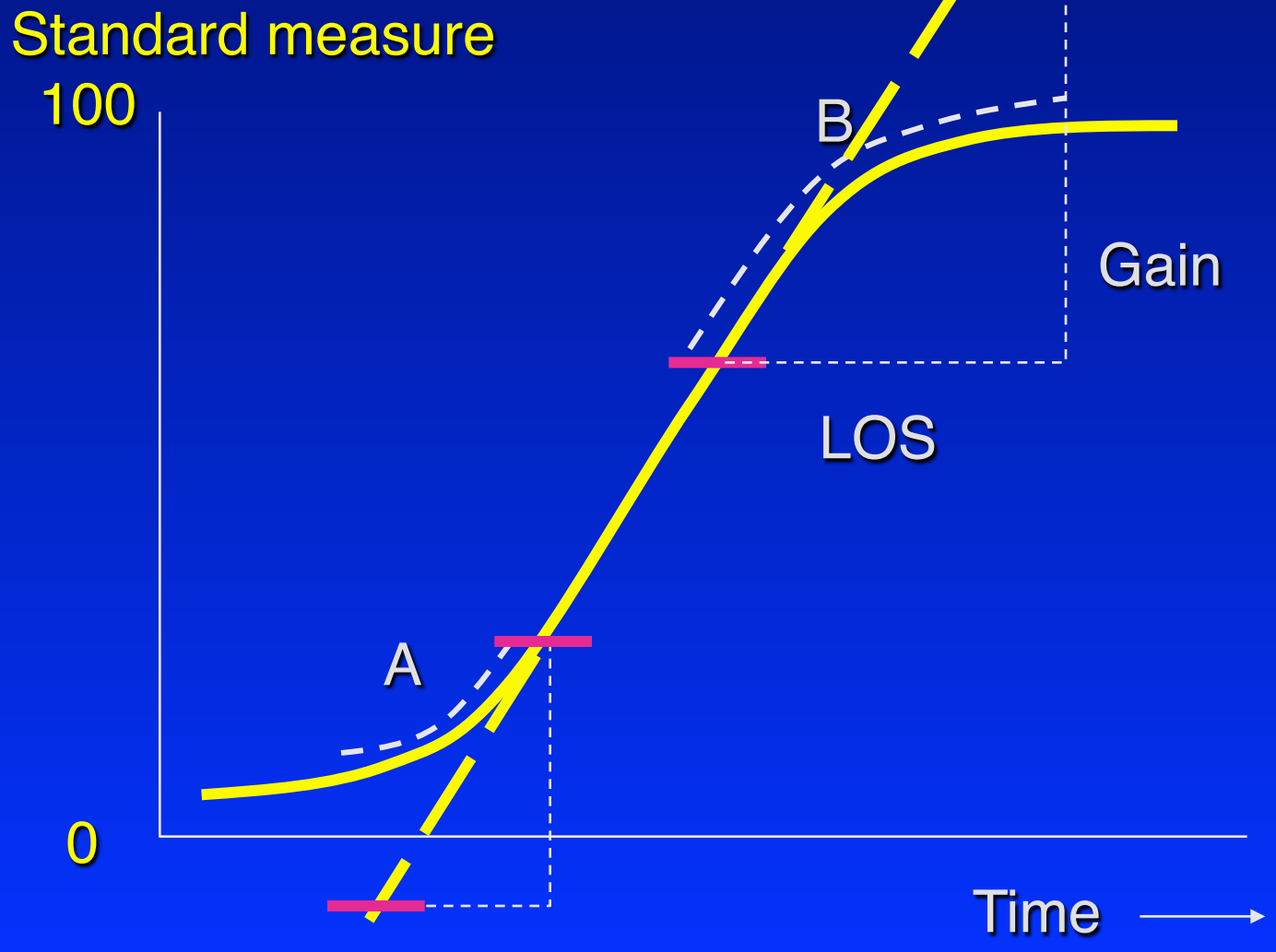
Useful standard yardstick



S-shaped curve



Floor and ceiling effects



Problems

- Population diversity
  - **Different levels of functioning**
    - Different potential for recovery
  - **Different goals for rehabilitation**
- Focal interventions
  - **Small changes lost in the 'noise' of global scales**
- Therapist-led scoring
  - **Objective, but not necessarily user-focused**

Alternatives

- Achievement of individual goals
  - **Person-centred approach**
    - Record what matters to the individual patient
  - **Flexible**
    - Tailored to the individual's ability
  - **Sensitive**
    - Specifically reflect aims of treatment
- But
  - **Difficult to compare populations**
  - **How to assimilate several goals**
    - Into one overall score?

What is goal attainment scaling?

- A method of scoring
  - **Extent to which goals are achieved**
    - In a standardised way
  - **Goals combined to a single GAS T-score**
    - Reflecting achievement of expected goals
- GAS T score (Advanced stage)
  - **Provides basis for comparison**
  - **That allows for individual differences**

Why use GAS?

- Person-centred perspective
  - **It measures what matters to the patient**
  - **Provides two types of information**
    - Quantitative
      - Assessment of success
    - Qualitative
      - What the patient wanted to achieve
- It reflects the intentions of treatment
  - **What we aimed to achieve**
- Provides a more sensitive measure
  - **Does not include irrelevant items**

GAS is conceptually different

- Not a measure of function
  - **Measures achievement of expectation**
- Depends on two things
  - **Individual's ability to change**
  - **Teams ability to predict outcome**
    - Requires experience and knowledge
- It is reasonable to expect
  - **That clinicians offering treatment**
    - have some idea of the likely outcome
      - In order to weigh up benefit vs harm of the intervention
- GAS does not replace standardised measures

Goal attainment scaling made easy

Easy stages

- Stage 1
  - **Goal setting**
- Stage 2
  - **Rating goal achievement**
- Stage 3
  - **Weighting for importance**
- Stage 4
  - **The GAS formula**
- Stage 5
  - **Using GAS for research**
    - Follow-up guides

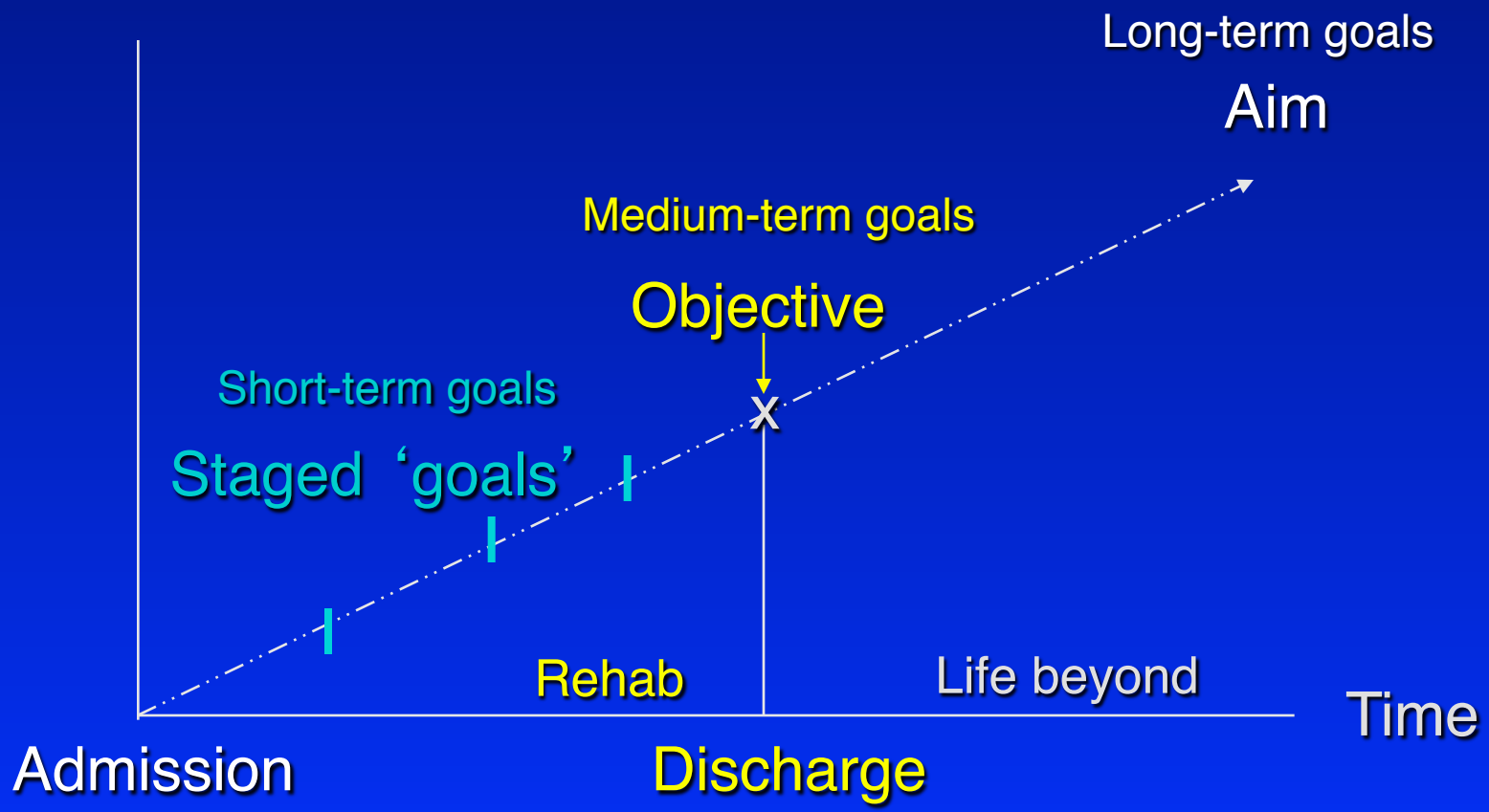
All that clinicians need to know

Optional

For geeks and researchers only!

Stage 1:
Goal setting

Terminology



Strictly- speaking – 'Objective attainment scaling' (OAS)

Goal setting – a critical step

- Discuss and agree
  - **With patient / family**
  - **With multidisciplinary Team**
- Expected outcomes for treatment
  - **If expectations unrealistic**
    - Negotiate what can reasonably be achieved
  - **Is the expected outcome worthwhile?**
- Describe and document expected outcome
  - **Ensure that this is understood and agreed.**

Common goals in Rehabilitation

- Reducing impairment
- Mobility, dexterity
- Passive function
  - **reducing care needs**
- Activities
  - **independence in ADL/ EADL**
- Symptom relief
  - **pain, depression**
- Communication
- Cognitive / psychosocial function
- Managed discharge

GAS could include any of all of these
- Pt's goals
- Family's goals
- Therapists goals

Defining the goals

- Rehab goals must be SMART
  - **Specific**
  - **Measurable**
  - **Achievable**
  - **Realistic**
  - **Timed**

Patient says: - “I want to be able to use my arm normally”
Rehab team: must develop a SMART equivalent

Example

- Jane
  - **“I want to be able to get dressed more easily”**
- SMART
  - **To reduce the spasticity in Jane’s arm**
    - So she can put her arm into the sleeve of her jacket
    - Without help from another person
    - By [specified date]

How many goals?

- There is no set number of goals
  - **Can vary from patient to patient**
- BUT - goal definition / negotiation
  - **Can be time-consuming**
- For practical purpose
  - **Set nor more than 3-5 goals**

    (3 is plenty in most cases)
    - 1 primary goal
    - 2-3 secondary goals

Stage 2:
Rating goal attainment

GAS – 5-point scale

- Score 0

  "The most probable level achieved if the pt receives the expected treatment"

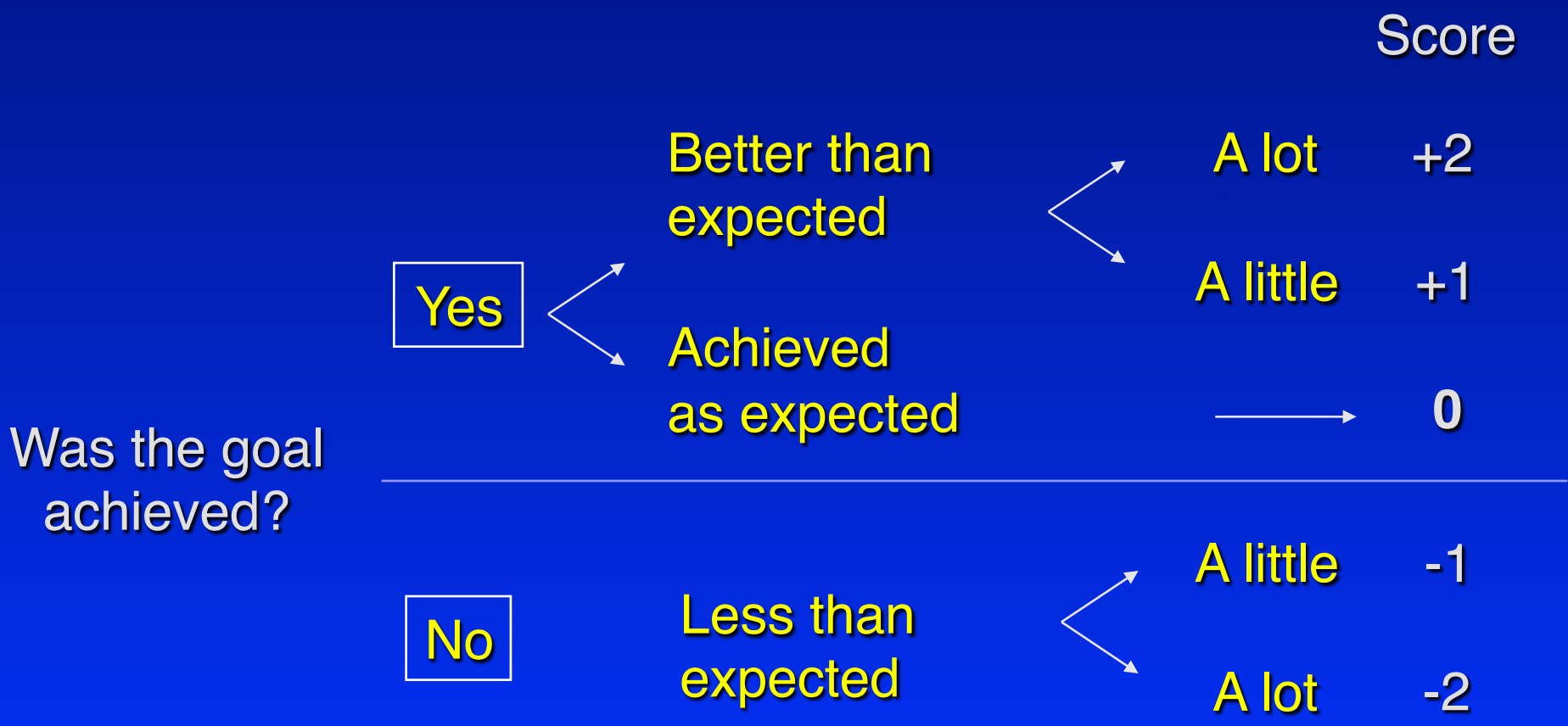
-2	-1	0	+1	+2
A lot less	A bit less	**Expected Outcome**	A bit more	A lot more

- Weighting is optional

Baseline scores

- Baseline rating
  - **Usually -1**
    - To allow for possibility of deterioration
  - **Unless no worse condition is clinically plausible – for example**
    - pain 10/10 - or as bad as it could be
    - Unable to do task at all
  - **If could not be worse**
    - score -2 at baseline

Rating goal attainment



GAS without numbers

- Some clinicians
  - **Prefer not to use numbers**
    - Think in terms of:
      - Achieved
      - Partially achieved
      - No change
- The following verbal tree
  - **Provides all the information required**
    - To assign scores retrospectively
      - Without forcing numbers on clinicians

Baseline level

Baseline rating

Base line level
With respect
to that goal

Some function

-1

Unable to do task
Or as bad as they could be:
Eg pain score 10/10

-2

Alternative (verbal rating)

Using GAS to negotiate

- “I want to use my hand normally”

-2	-1	0	+1	+2
Unable to use hand at all	Requires help to get hand around cup, unable to hold cup upright.	**Use hand to grasp and stabilise cup whilst pouring a drink**	Use hand to lift cup to mouth and drink	Using hand normally

Score allocation

		Depends on baseline score:	Baseline -1	Baseline -2
Was the goal achieved?	Yes	A lot more	+2	+2
		A little more	+1	+1
		As expected	**0**	**0**
	No	Partially achieved	(-1)	-1
		Same as baseline	**-1**	**-2**
		Worse	-2	

Stage 3:
Goal weighting (optional)

Goal weighting

- Some goals
  - **Matter more to the patient than others**
  - **Present more of a challenge than others**
- To take these factors into account
  - **Goals can be weighted for**
    - Importance
      - to the patient/family
    - Difficulty
      - rated by the team

Weighting scale

Importance (for Patient / family)		Difficulty (rated by Team)	
Not at all	0	Not at all	0
A little	1	A little	1
Moderately	2	Moderately	2
Very	3	Very	3

Weight = Importance x Difficulty

Example

- A 54-year-old lady
  - **with post-stroke spasticity**
  - **Is treated with botulinum toxin**
- Goals for treatment
  - **To reduce her shoulder pain**
    - From pain score 7/10 (currently) to 4/10
  - **To make dressing easier**
    - To get her arm through the sleeve of her jacket with only incidental help
  - **To make it easier to maintain axillary hygiene**
    - Improve carer rating of ‘ease of cleaning under arm from 4/10 (currently) to 6-7/10

Taking this example

Applying weighting, baseline and outcome scores:

Goals	Importance	Difficulty	Baseline Score
Reduce pain to 4/10	3	3	-1
Get arm through jacket sleeve with minimal help	2	3	-1
Easier to clean under arm	2	2	-1

Baseline GAS = 36.6

Taking this example

Applying weighting, baseline and outcome scores:

Goals	Importance	Difficulty	Baseline Score	Outcome Score
Reduce pain to 4/10	3	3	-1	0
Get arm through jacket sleeve with minimal help	2	3	-1	-1
Easier to clean under arm	2	2	-1	+1

Baseline GAS = 36.6 Achieved GAS T score = 48.6

Demo GAS calculation sheet

Interpreting GAS T scores

- If all goals achieved as expected
  - **GAS T-score will be 50**

If the patient does:	Expected range for GAS T scores
Better than expected	50-60
Much better than expected	>60
Less well than expected	40-50
Much less than expected	<40

EASY!

Clinicians need go no further

(GAS scores can be calculated using a simple spreadsheet)

Stage 4:
Applying the formula

For those curious to understand how the formula works

Step 1

- If used verbal rating
  - **Allocate scores to each goal**
- Achievement rating
  - **Depends on baseline score**
    - Rate goal achievement
    - According to the following table

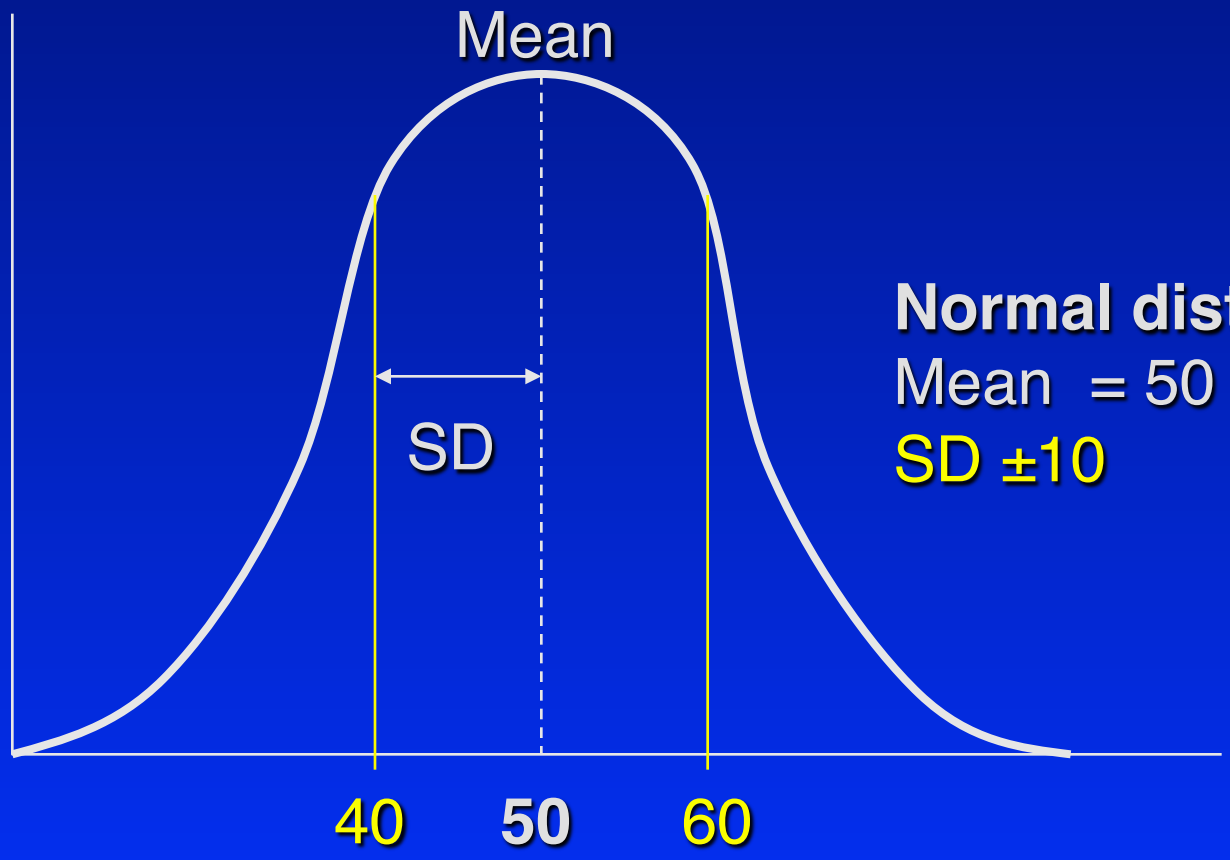
Score allocation

		Depends on baseline score:	Baseline -1	Baseline -2
Was the goal achieved?	Yes	A lot more	+2	+2
		A little more	+1	+1
		As expected	**0**	**0**
	No	Partially achieved	(-1)	-1
		Same as baseline	**-1**	**-2**
		Worse	-2	

What does the formula do?

- Calculates a GAS T-Score:
  - **The composite GAS score**
    - (ie the sum of attainment levels x relative weights for each goal)
  - **Is transformed to a standardised measure**
    - Mean 50 and Std Dev ± 10
- If results exceed and fall short of expectations equally
  - **GAS T-scores form a normal distribution**
  - **Allow statistical analysis**
    - Using parametric techniques

Distribution of GAS T scores



Normal distribution
Mean = 50
SD ±10

What is the GAS formula?

$$= 50 + \frac{10 \Sigma(w_i x_i)}{[(1-\rho) \Sigma w_i^2 + \rho(\Sigma(w_i)^2]^{1/2}}$$

- Where
- w_i = the weight assigned to the ith goal
- x_i = the numerical value achieved (between –2 and + 2)
- ρ = the expected correlation of the goal scales (normally 0.3)

- If weights are equal, $w_i = 1$

Simplifies to:

$$= 50 + \frac{10\ \Sigma(w_i\, x_i)}{\sqrt{(0.7\ \Sigma w_i^2 + 0.3(\Sigma w_i)^2)}}$$

- Hence the Mean 50 and Std Dev ± 10
  - NB This formula only works
  - **Where Goal achievement scored on a scale Centred around 0**
  - Cannot be applied for Alternatives such as →

-1	0	+1	+2
Worse	No change	Partially achieved	Achieved

How do we apply the formula

- To calculate GAS
  - **Look up in tables**
  - **Spreadsheet calculator**
- Or, if you really want to…
  - **Follow the worked example**

Taking our example

54-year-old lady with post-stroke spasticity
Treatment with botulinum toxin

Goals	Importance	Difficulty	Baseline Score	Outcome Score
Reduce pain to 4/10	3	3	-1	0
Get arm through jacket sleeve with minimal help	2	3	-1	-1
Easier to clean under arm	2	2	-1	+1

Baseline GAS = 36.6 Achieved GAS T score = 48.6

Goal	Importance	Difficulty	Weight	Baseline	Achieved
Pain	3	3	9	-1	0
Dressing	2	3	6	-1	-1
Hygiene	2	2	4	-1	+1
			19		

$$= 50 + \frac{10\ \Sigma(w_i\, x_i)}{\sqrt{(0.7\ \Sigma w_i^2 + 0.3(\Sigma w_i)^2)}}$$

$$\sqrt{(0.7 \times (81+36+16) + 0.3 \times (19)^2}$$

$$\sqrt{(0.7 \times 133) + (0.3 \times 361)}$$

$$\sqrt{93.1 + 108.3}$$

$$\sqrt{201.4}$$

$$14.2$$

GAS scores

Baseline

Sum (w x score) = -19

(x10): $\frac{-190}{14.2} = -13.4$

(Plus 50): (50 – 13.4) = 36.6

Outcome:

Sum (w x score) = -2

(x10): $\frac{-20}{14.2} = -1.4$

(Plus 50): 50 -1.4 = 48.6

Change = 12

Alternatively

- To calculate without weights
  - **Apply formula**
    - With all weights = 1
- Small difference to calculation
  - **But not much**
  - **The main value of goal weights**
    - Is in the qualitative interpretation

Goal	Importance	Difficulty	Weight	Baseline	Achieved
Pain	3	3	9	-1	0
Dressing	2	3	6	-1	-1
Hygiene	2	2	4	-1	+1
			19		

$$= 50 + \frac{10\ \Sigma(w_i\, x_i)}{\sqrt{(0.7\ \Sigma w_i^2 + 0.3(\Sigma w_i)^2)}}$$

$$\sqrt{(0.7 \times (1+1+1) + 0.3 \times (3)^2}$$

$$\sqrt{(0.7 \times 3) + (0.3 \times 9)}$$

$$\sqrt{2.1 + 2.7}$$

$$\sqrt{4.8}$$

$$2.2$$

GAS scores

Baseline

Sum (w x score) = -3

(x10): $\frac{-30}{2.2} = -13.6$

(Plus 50): 50 – 13.6 = 36.4

Outcome:

Sum (w x score) = 0

(x10): $\frac{0}{2.2} = 0$

(Plus 50): 50 + 0 = 50

Change = 13.6

Stage 5:
using GAS for Research

Problems with GAS

- Critics claim
  - **GAS is too subjective**
- To make it more robust
  - **Originators recommend**
    - Using follow-up guide
      - Pre-define levels for each rating

Example of follow-up guide

	-2	-1	0	+1	+2
Pain levels (Rated out of 10)	>8/10	5-8/10 B	4/10 ✓	1-3/10	Pain free
Get arm through jacket sleeve	Unable to get arm through sleeve	Requires help throughout task B ✓	Minimal help required (incidental only)	Achieves without help but takes extra time (> 5 minutes)	Achieves without help in timely manner (<5 minutes)
Easier to clean under arm (rated by carer)	Carer rating of ease = 1-2/10	Carer rating of ease = 3-5/10 B	Carer rating of ease = 6-7/10	Carer rating of ease = 8-9/10 ✓	Able tp manage without help

Pros and cons

- Advantages of follow-up guide
  - **A priori goal setting**
    - Less subjective
      - Theoretically improved reliability
  - **Required gold standard**
    - For research purposes
- Disadvantages
  - **Very time consuming**
    - Not practical for routine clinical use

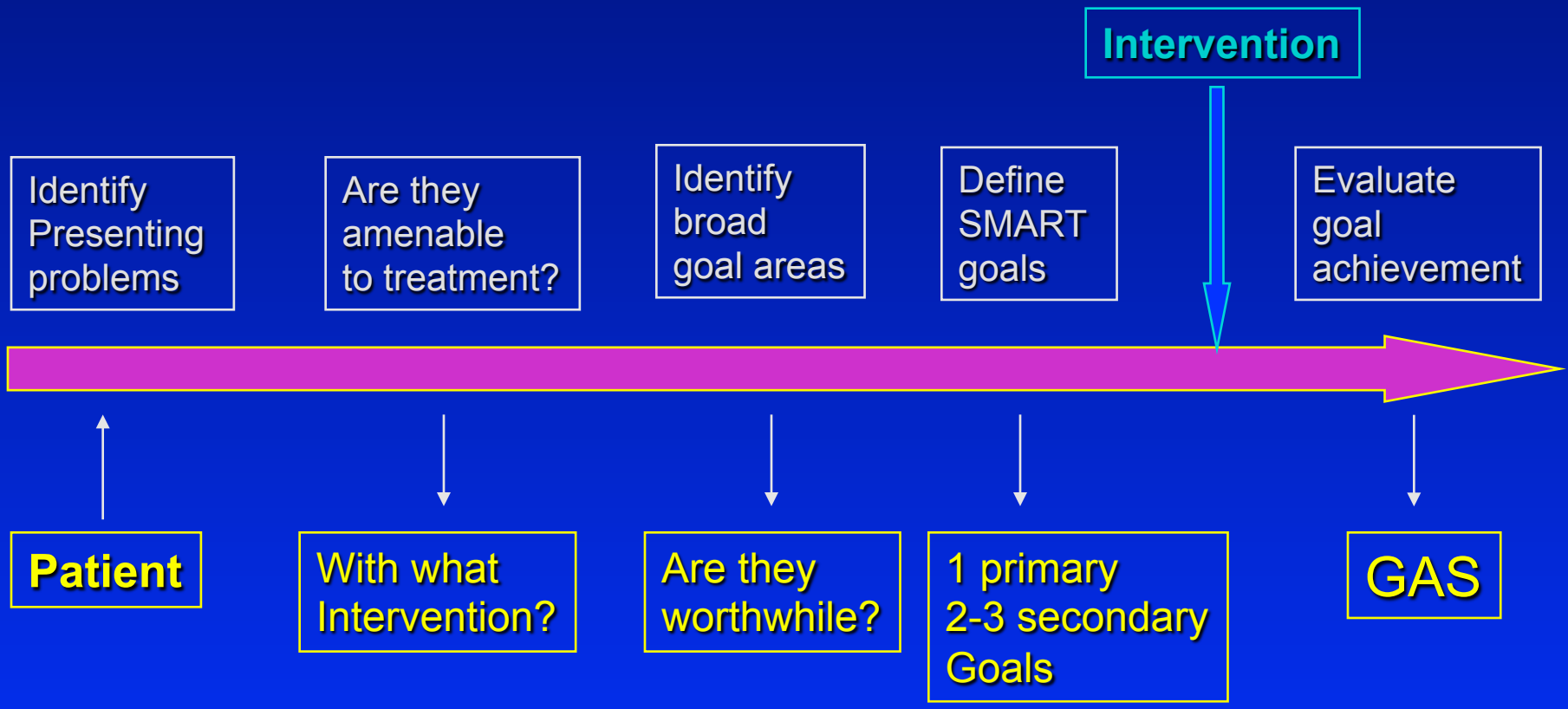
Statistical Analysis

- GAS formula designed to give
  - **Continuous data**
  - **Normally distributed**
    - Mean = 50, SD 10
  - **Allow use of parametric statistics**
- Critics argue
  - **Goal scores are still ordinal**
    - Should use non-parametric methods
- No hard rule
  - **In practice both give fairly similar results**

GAS without tears

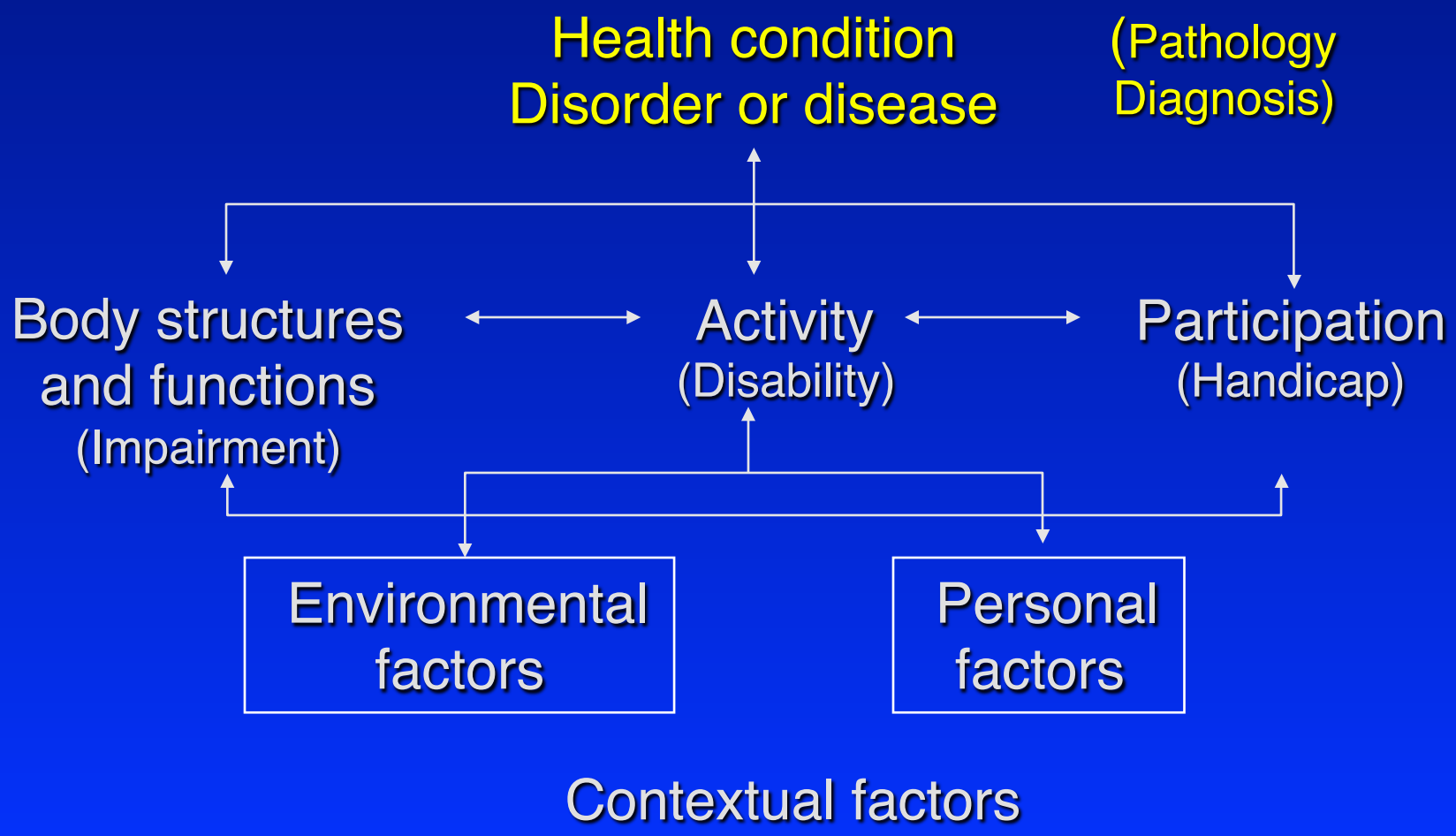
- Build GAS into clinical thinking
  - **Decision-making**
  - **Outcome evaluation**
- Part of routine practice

6 key steps


Intervention
Identify Presenting problems
Are they amenable to treatment?
Identify broad goal areas
Define SMART goals
Evaluate goal achievement
Patient
With what Intervention?
Are they worthwhile?
1 primary 2-3 secondary Goals
GAS

WHO ICF

(International classification of functioning, disability and health)



Mapping goals onto ICF

Goal area	Task	ICF
Impairment		
Pain relief	Pain	b280
Passive movement	Maintaining joint range	b735, b710
Activities / participation		
Mobility	Walking / gait	d450
Dexterity	Fine hand use	d440
Self care	General independence	d500
	Dressing	d540
	Eating / drinking	d550, d560
Domestic	Cooking	d630
	Household tasks	d640
Recreation	Leisure / hobbies	d920