Health-Related Quality of Life

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February 2, 2005 (3:00-6:00 pm)

Room 5312

Resource Allocation Problem

Everyone in health care wants reimbursement for their services

Options range from acute surgery, prevention, to long term care

But there is a limited amount of money

How do we spend limited resources to enhance population health?

Cost Effective Care

Cost [?]

— — — — — — — — — —

Effectiveness [?]

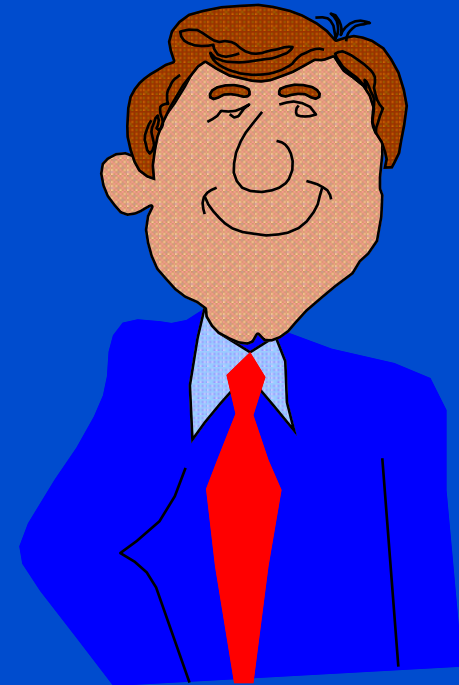# "Outcomes"--How is the Patient Doing?

Physiological

- Vital signs (pulse, BP, temperature, respiration)

- Hematocrit

- Albumin

Physician observation

- Physical performance

Self-report indicators

- Functioning and well-being
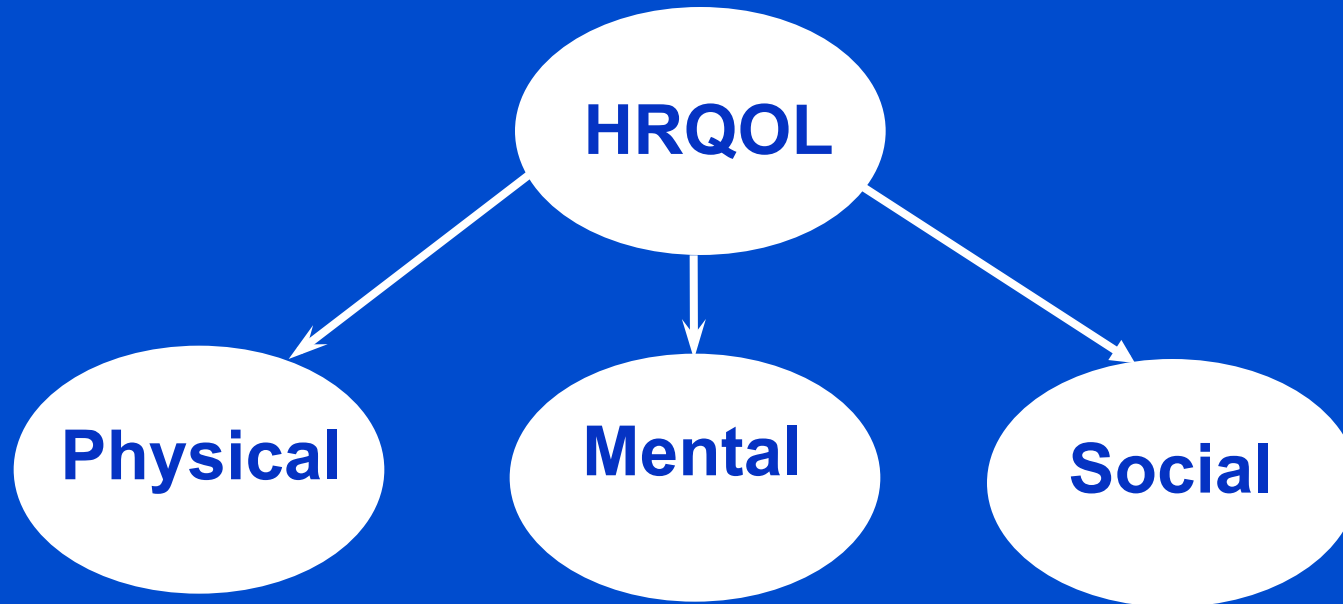
Health-Related Quality of Life is:

What the person can DO (functioning)

- **Self-care**

- **Role**

- **Social**

How the person FEELS (well-being)
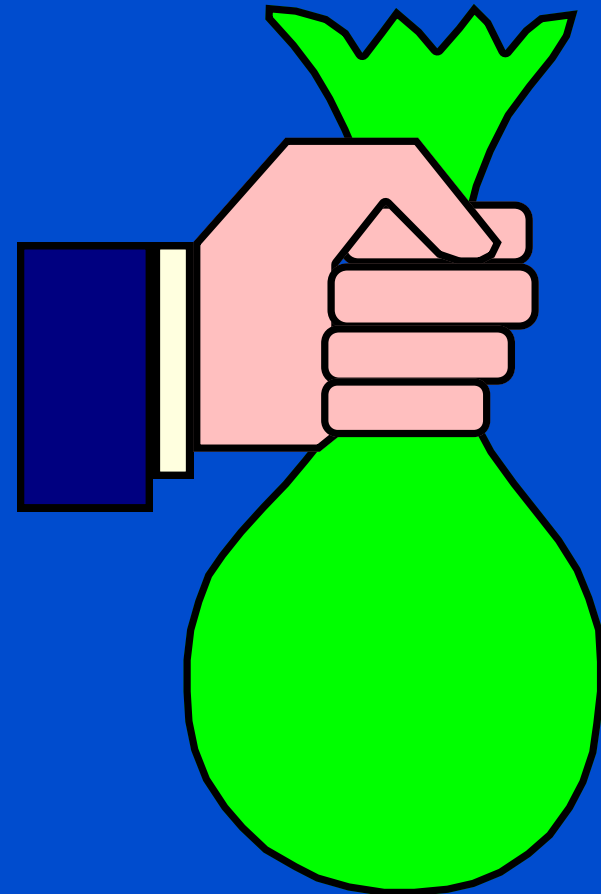
- **Emotional well-being**

- **Pain (5th vital sign; APS)**

- **Energy**

HRQOL is Multi-Dimensional

HRQOL is Not

- **Quality of environment**

- **Type of housing**

- **Level of income**

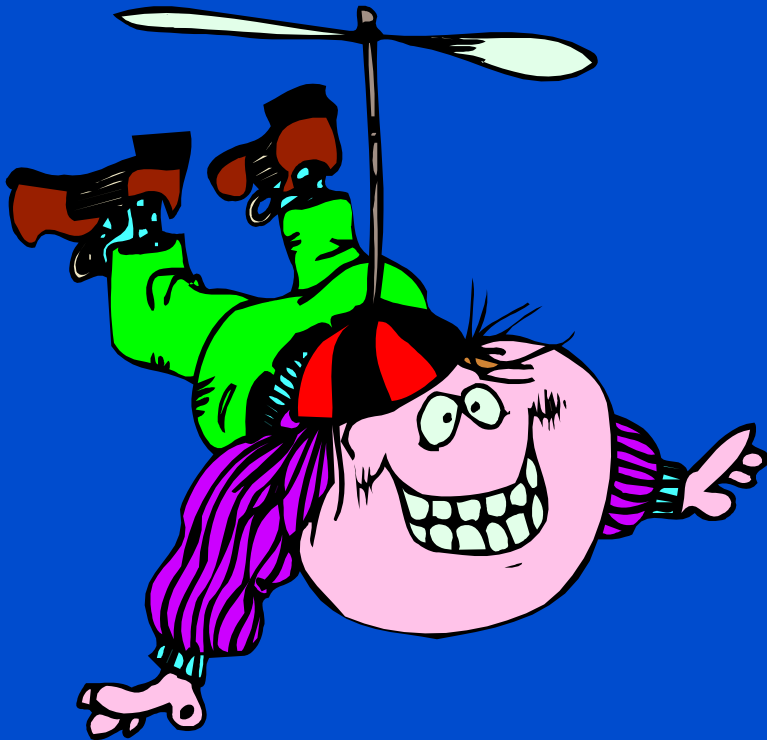- **Social Support**

HRQOL Outcomes

Summarize overall results of health care:

Cost

$$\overline{}$$

△ HRQOL

Types of HRQOL Measures
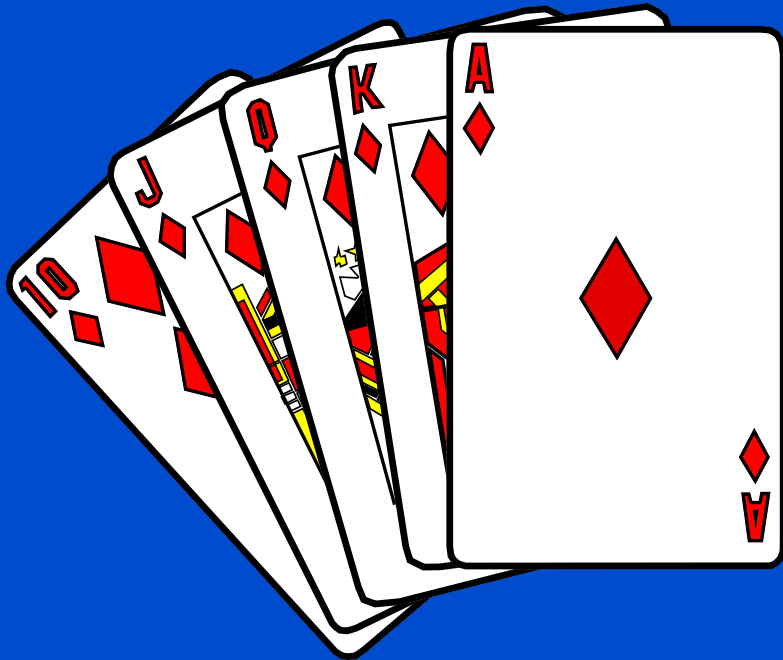
- Profile
  - Generic
  - Targeted
- Preference-based

Advantages of Generic Measures

Allow comparisons across different people

- Across disease groups

- Sick versus well

- Young versus old

Can detect unexpected side effects

Generic HRQOL Item

In general, would you say your health is:

Excellent

Very Good

Good

Fair

Poor

Overall Health Rating Item

Overall, how would you rate your <u>current health</u>?

(Circle One Number)

```
|____|____|____|____|____|____|____|____|____|____|
 0    1    2    3    4    5    6    7    8    9    10
```

Worst possible
health (as bad or
worse than
being dead)

Half-way
between worst
and best

Best
possible
health

Overall Quality of Life Item

Overall, how would you rate your quality of life?

|___|___|___|___|___|___|___|___|___|___|

0   1   2   3   4   5   6   7   8   9   10

Worst possible
quality of life
(as bad or worse
than being dead)

Half-way
between worst
and best

Best possible
quality of life

Health versus *Quality of Life*

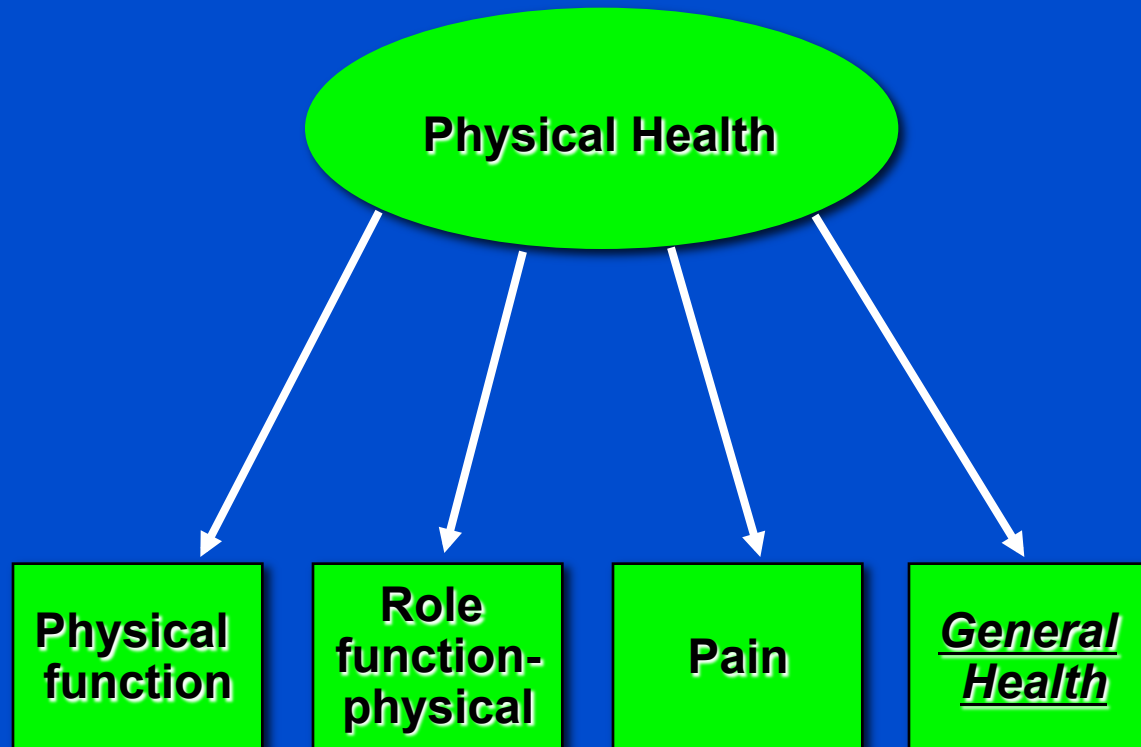"In general, how would you rate your health?"

"Overall, how would you rate your quality of life?"

Generic HRQOL: 8 SF-36 Scales

- **Physical functioning**

- **Role limitations/physical**

- **Pain**

- **General health perceptions**

- **Social functioning**

- **Energy/fatigue**

- **Role limitations/emotional**

- **Emotional well-being**

SF-36 Mental Health

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                    ┌─────────────────┐
                    │  Mental Health  │
                    └─────────────────┘
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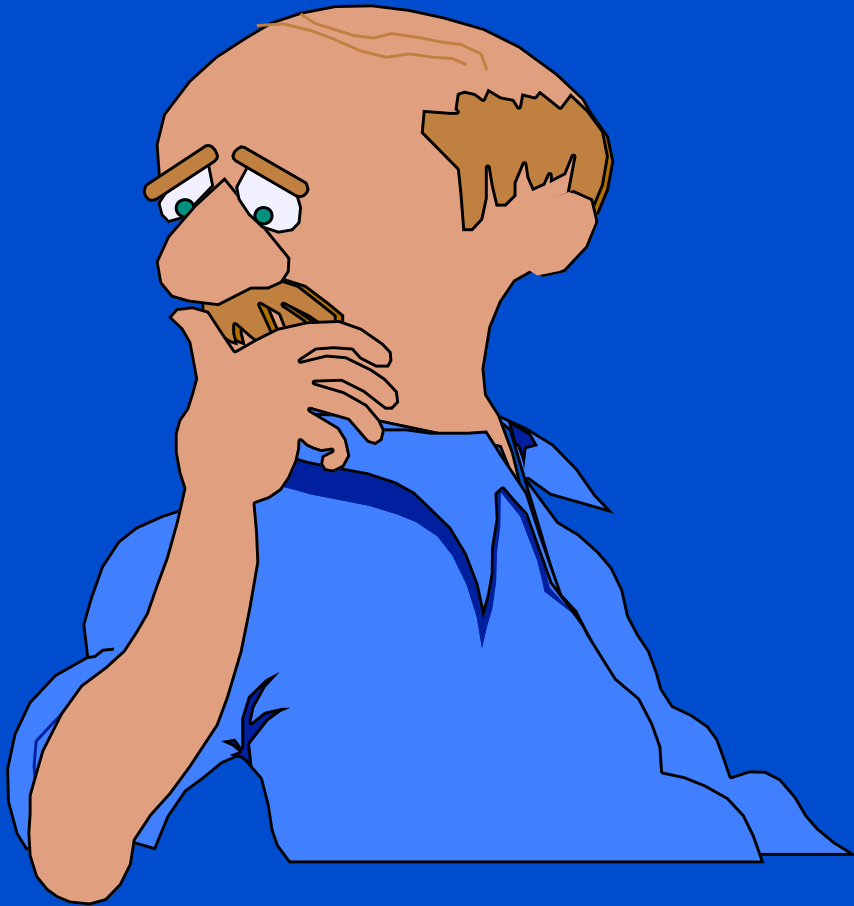| Emotional Well-Being | Role function-emotional | *Energy* | *Social function* |
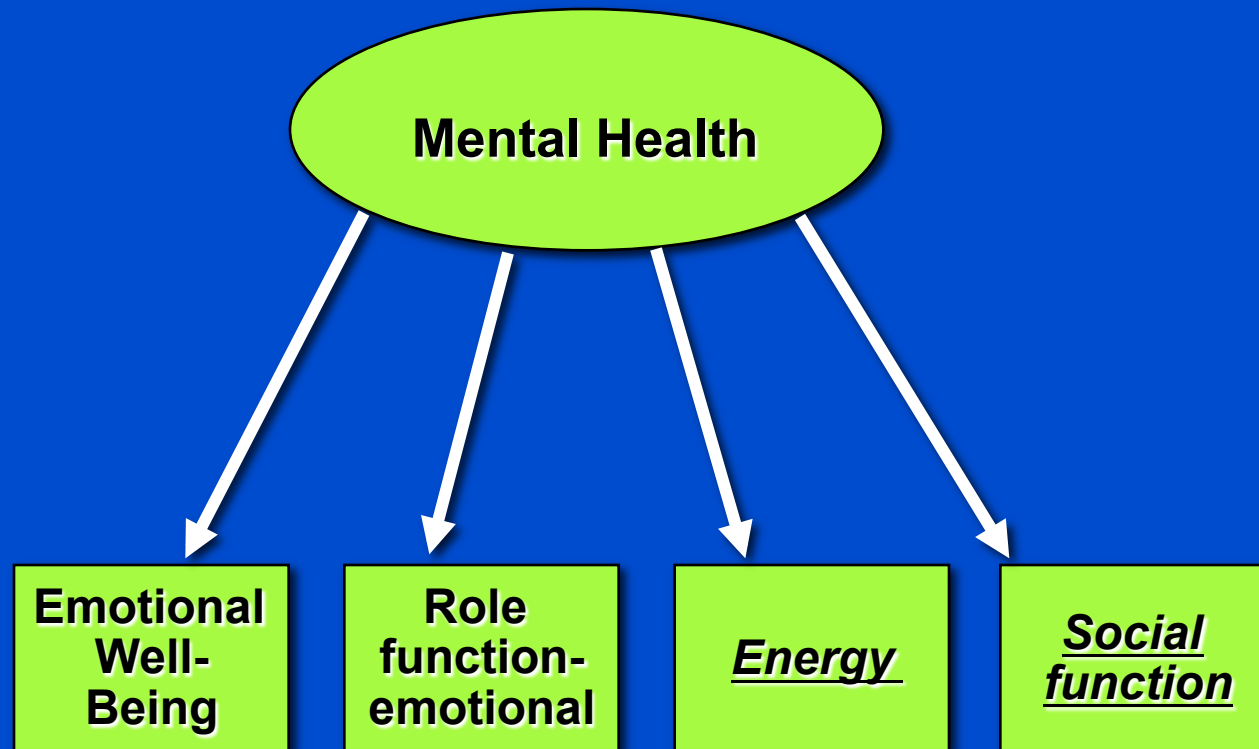
Physical Functioning Item

Does your health now limit you in bathing or dressing yourself?

Yes, limited a lot

Yes, limited a little

No, not limited at all

Emotional Well-Being Item

How much of the time during the past 4 weeks have you been very nervous?

None of the time

A little of the time

Some of the time

Most of the time

All of the time

Scoring Generic HRQOL Scales

Average or sum all items in the same scale.

Transform average or sum linearly to

- **0-100 possible range**

- **T-score metric**

Formula for Transforming Scores

$$X = \frac{(\text{original score} - \text{minimum}) * 100}{(\text{maximum} - \text{minimum})}$$

$$Y = \text{target mean} + (\text{target SD} * Zx)$$

$$Z_X = \frac{(X - \overline{X})}{SD_X}$$

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A7   =

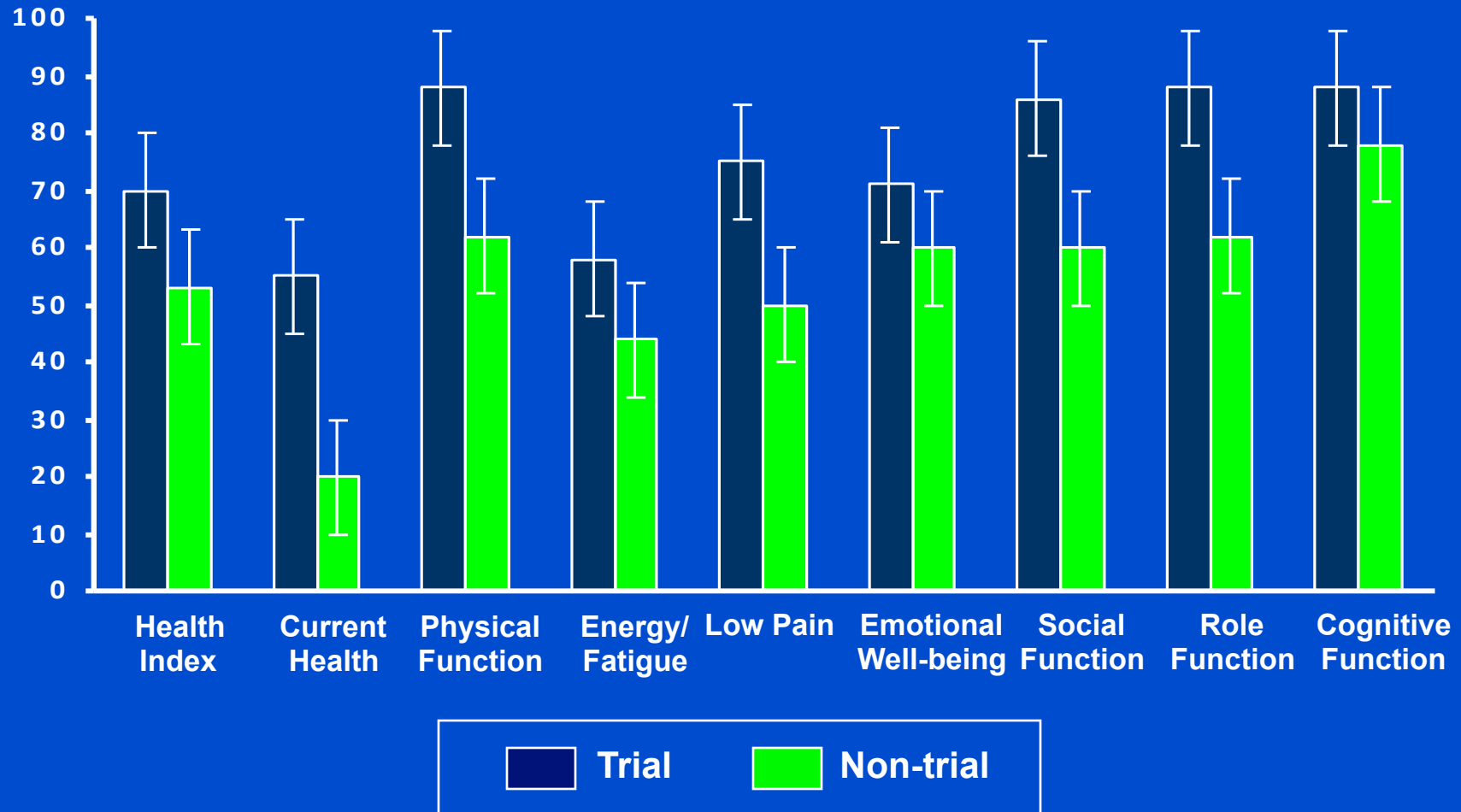|	A	B	C	D	E	F	G
1	1	0	39.5285	-1.26491	37.3509		
2	2	25	39.5285	-0.63246	43.6754		
3	3	50	39.5285	0	50		
4	4	75	39.5285	0.63246	56.3246		
5	5	100	39.5285	1.26491	62.6491		
6	raw	x	SDx	Zx	T-score		
7							
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Sheet1 / Sheet2 / Sheet3 /

Ready

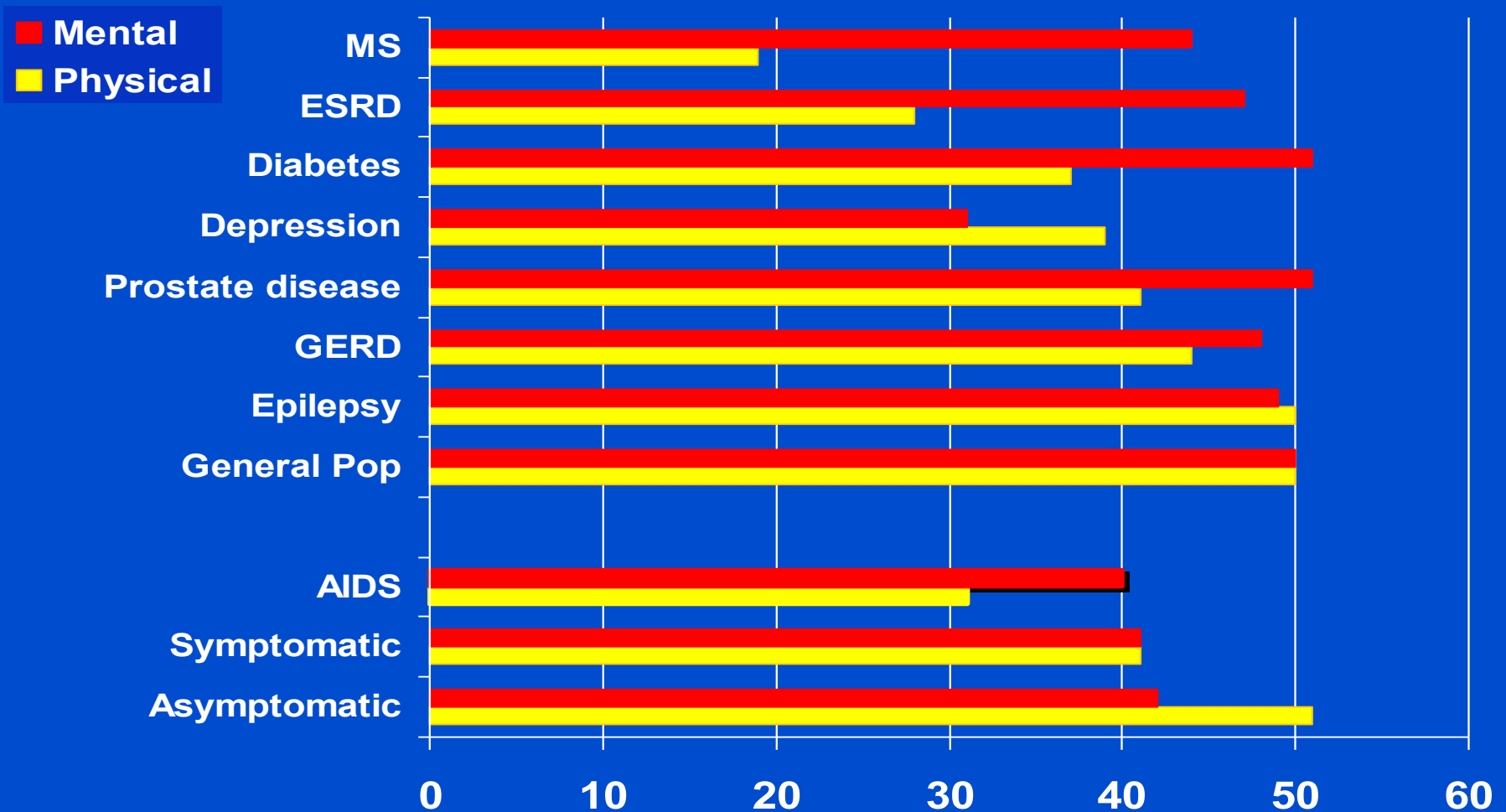# Uses of Generic Measures

Cross-Sectional

- **Comparison of Different Samples**

- **Profiles of Different Diseases**

- **Longitudinal**

- **Profiles of Different Diseases**

- **Examining Antecedents**

- **Predicting utilization or mortality**

HRQOL Scores of Clinical Trial and Non-Clinical Trial HIV Patients
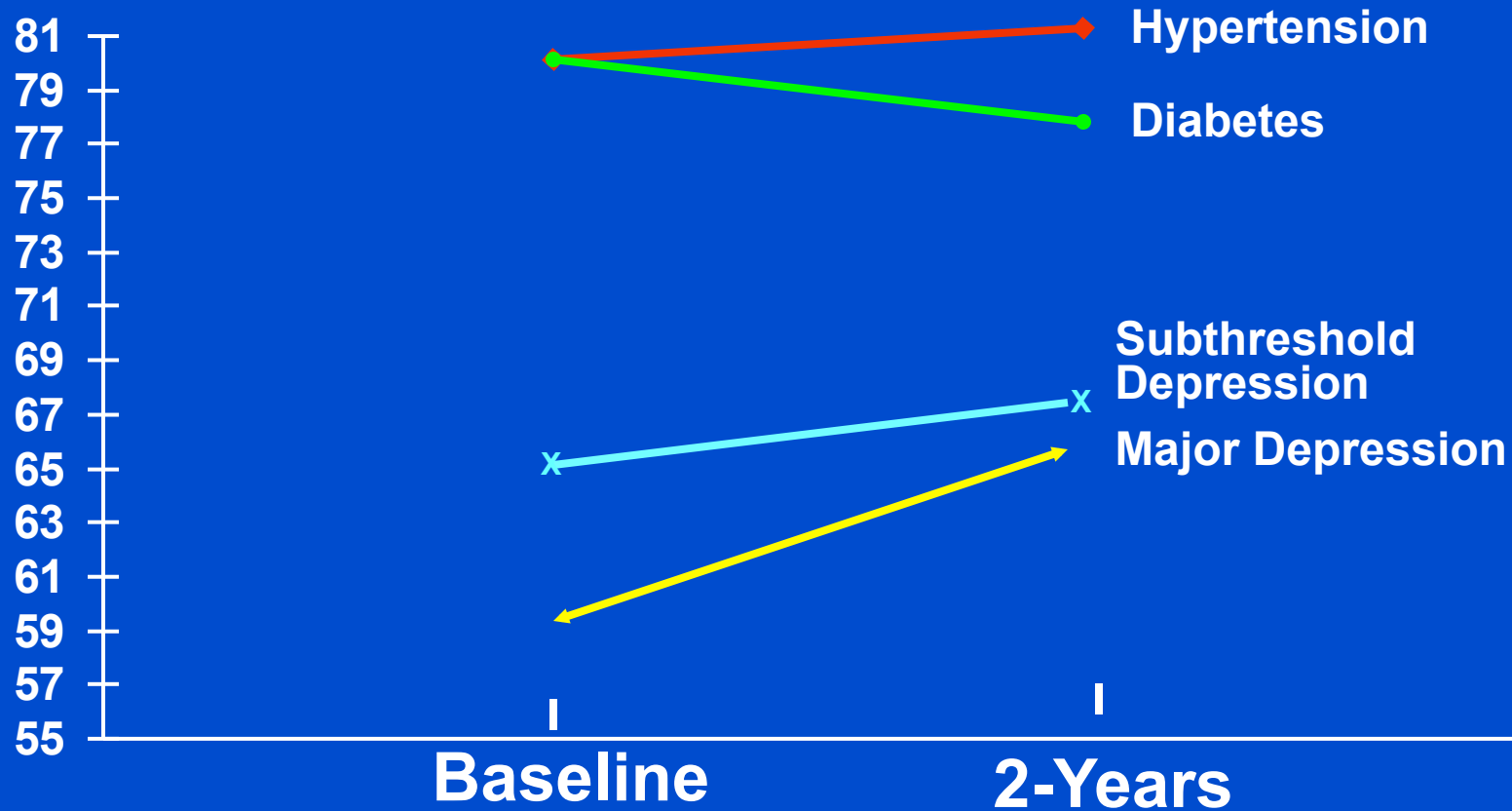
Cunningham et al. (1995)

Legend: Trial (dark blue), Non-trial (green)

Categories: Health Index, Current Health, Physical Function, Energy/Fatigue, Low Pain, Emotional Well-being, Social Function, Role Function, Cognitive Function

HRQOL of Those with Chronic Illness Compared to General Population

Legend:
- **Mental** (red)
- **Physical** (yellow)

Categories (top to bottom):
- MS
- ESRD
- Diabetes
- Depression
- Prostate disease
- GERD
- Epilepsy
- General Pop
- AIDS
- Symptomatic
- Asymptomatic

X-axis: 0, 10, 20, 30, 40, 50, 60

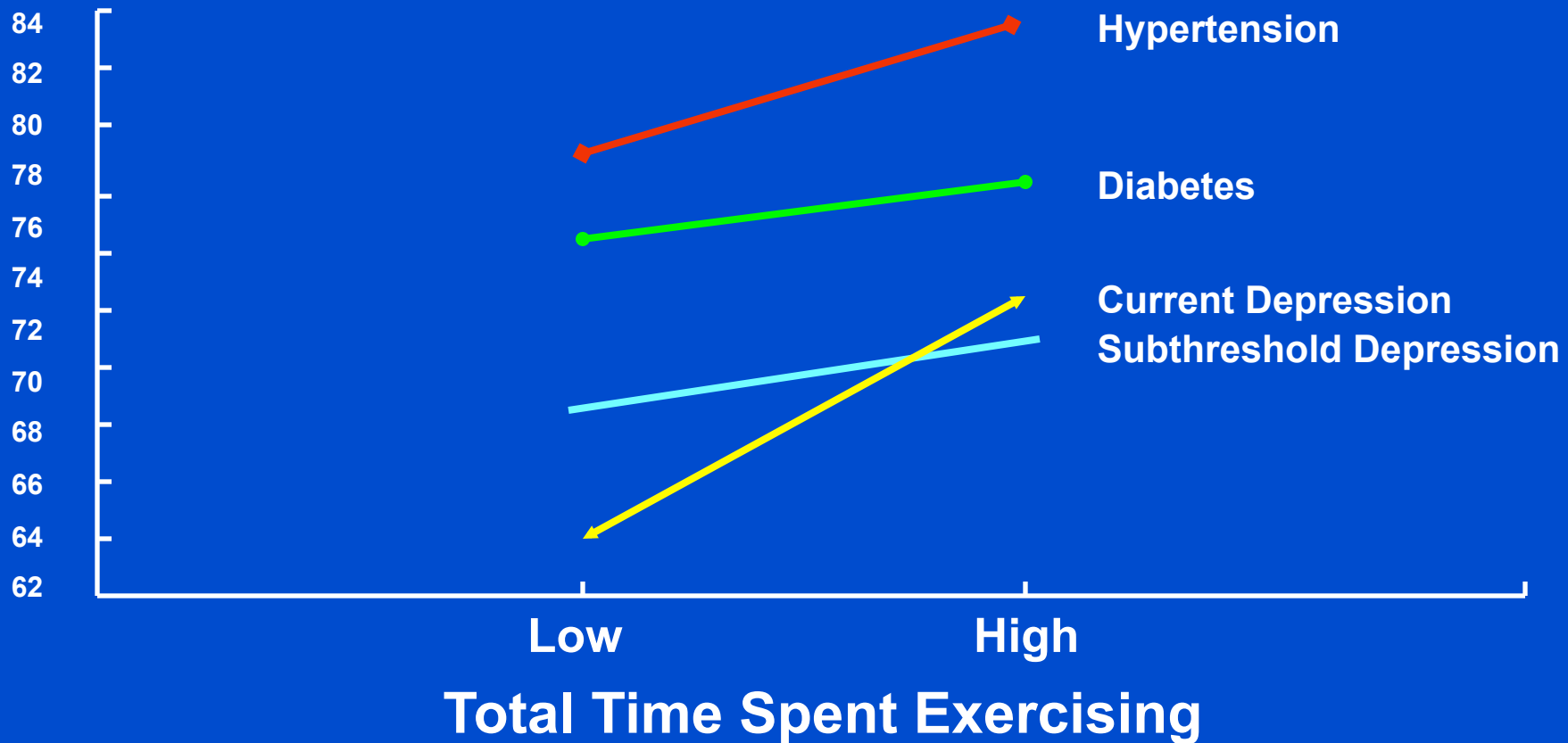*Hays, et al. (2000), American Journal of Medicine*

Course of Emotional Well-being Over 2-years for Patients in the MOS General Medical Sector


Hays, R.D., Wells, K.B., Sherbourne, C.D., Rogers, W., & Spritzer, K. (1995).
Functioning and well-being outcomes of patients with depression compared
to chronic medical illnesses. Archives of General Psychiatry, 52, 11-19.

Association of Exercise with Physical Functioning 2-years After Baseline in the MOS

Total Time Spent Exercising

Chart showing physical functioning scores (62–84) plotted against Total Time Spent Exercising (Low to High) for four conditions: Hypertension (red), Diabetes (green), Current Depression (yellow), and Subthreshold Depression (cyan).
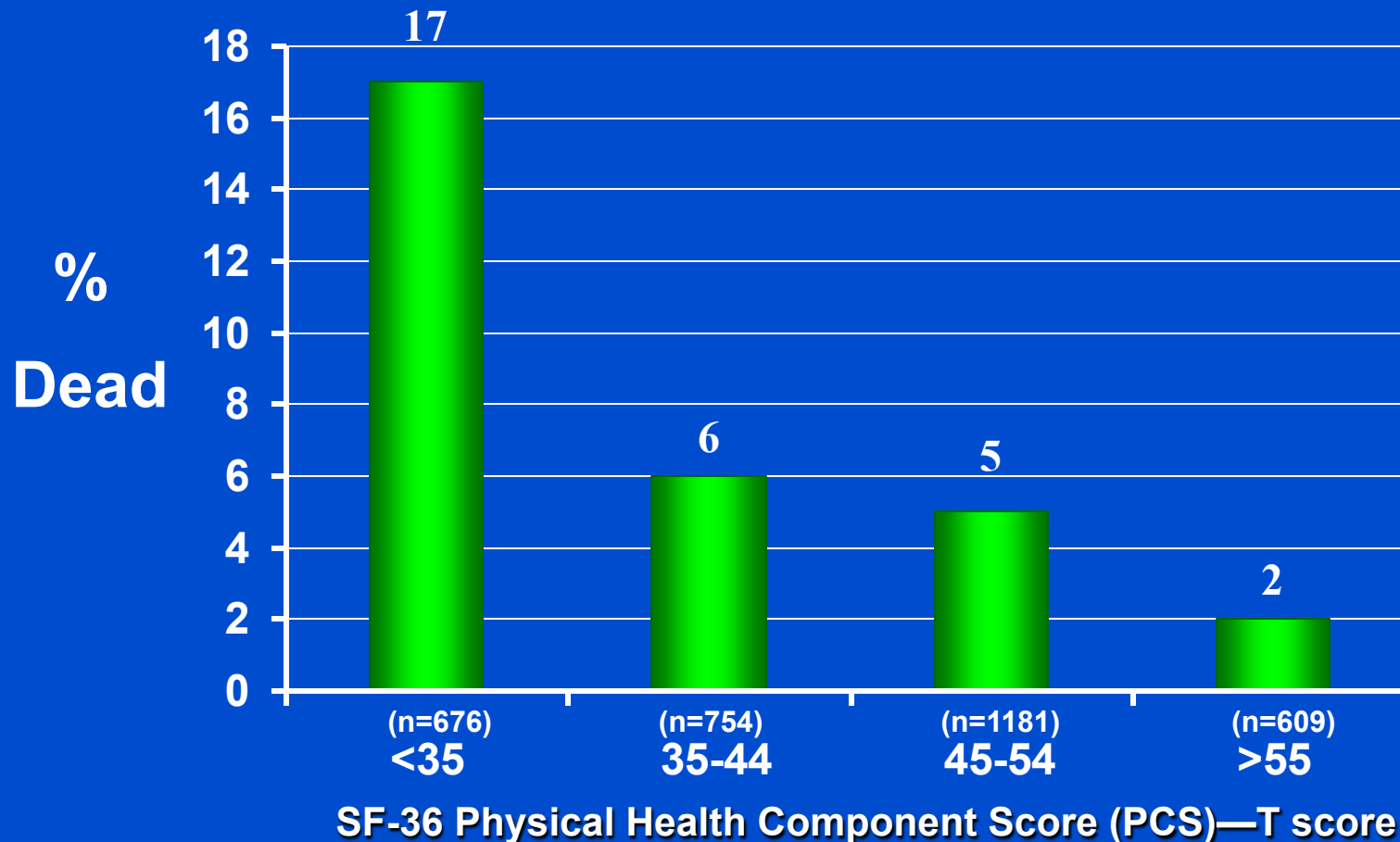
Stewart, A.L., Hays, R.D., Wells, K.B., Rogers, W.H., Spritzer, K.L., & Greenfield, S. (1994). Long-term functioning and well-being outcomes associated with physical activity and exercise in patients with chronic conditions in the Medical Outcomes Study. Journal of Clinical Epidemiology, 47, 719-730.

Generic Health Ratings Associated with Hospitalizations (N = 20,158)

% Hospitalized in past 3 months (y-axis, 0–30)

Poor	Fair	Good	Very Good	Excellent
26	14	6	4	3
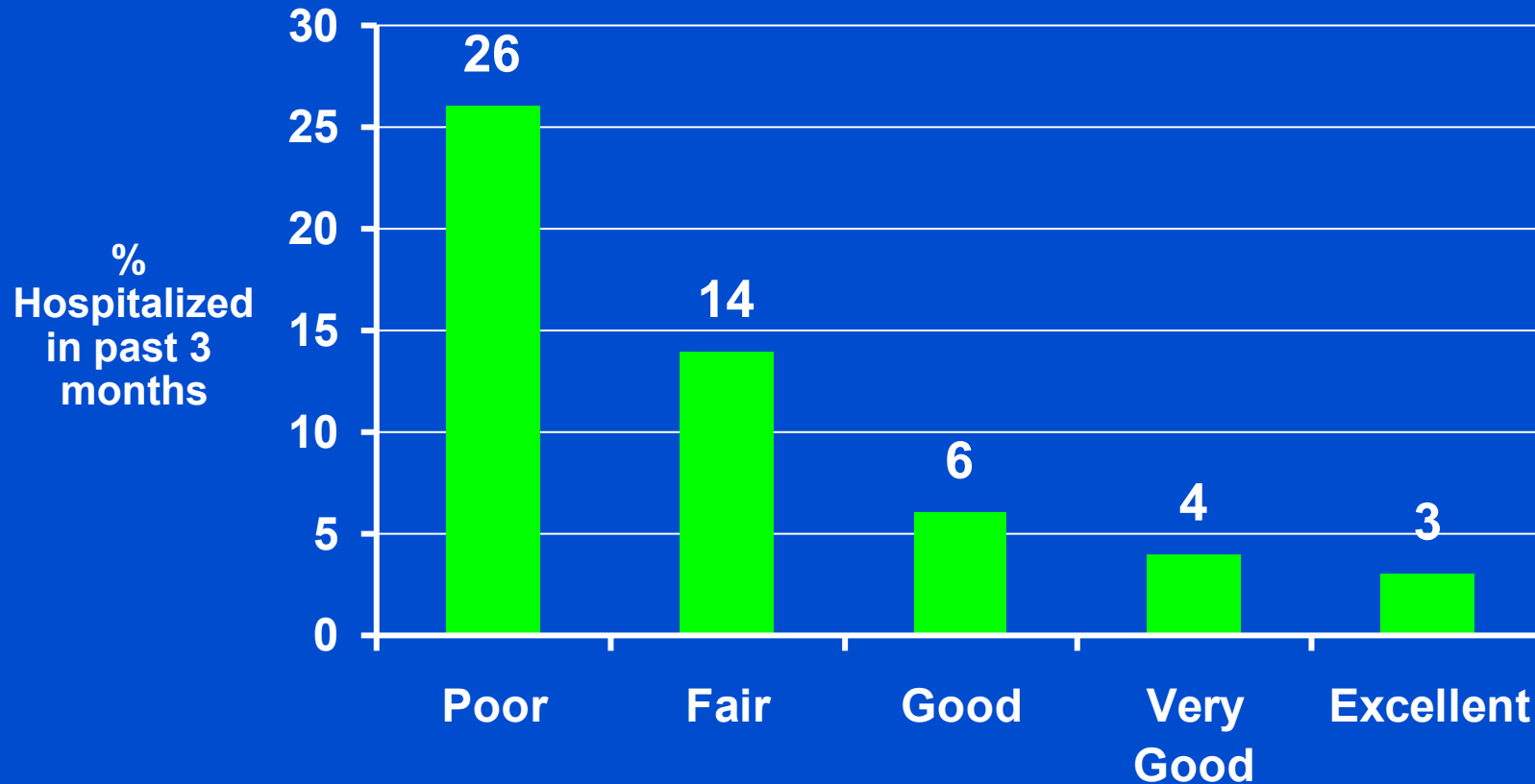
Kravitz, R. et al. (1992). Differences in the mix of patients among medical specialties and systems of care: Results from the Medical Outcomes Study. JAMA, 267, 1617-1623.

Five-Year Mortality Rates
by Levels of Physical Health

% Dead

| | 17 | 6 | 5 | 2 |

(n=676) <35
(n=754) 35-44
(n=1181) 45-54
(n=609) >55

SF-36 Physical Health Component Score (PCS)—T score

Ware et al. (1994). SF-36 Physical and Mental Health Summary Scales: A User's Manual.

Targeted HRQOL Measures

- Designed to be relevant to particular group.

- Sensitive to small, clinically-important changes.

- Important for respondent cooperation.

- More familiar and actionable.

Persons with mobility impairments object to SF-36 physical functioning items:

Does your health now limit you in (if so, how much) …

   climbing several flights of stairs

   climbing one flight of stairs

   walking more than a mile

   walking several hundred yards

   walking one hundred yards

Andresen & Meyers (2000, Archives of Physical Medicine and Rehabilitation)

Mattson-Prince (1997)

Dropped 10 physical functioning items because of perception that they were demeaning to people with SCI

Spinal Cord, 35, 326-331

Kidney-Disease Targeted Items

During the last 30 days, to what extent were you bothered by each of the following?

- Cramps during dialysis

- Washed out or drained

(*Not at all* to *Extremely*)

IBS-Targeted Item

During the last 4 weeks, how often were you angry about your irritable bowel syndrome?

None of the time

A little of the time

Some of the time

Most of the time

All of the time

NEI-RQL-42 Far Vision Item

How much difficulty do you have judging distances, like walking downstairs or parking a car?

No difficulty at all

A little difficulty

Moderate difficulty

A lot of difficulty

Spinal Cord Independence Measure

Self care (feeding, bathing, dressing, grooming)

Respiration and sphincter management

Mobility (in bed and preventing pressure ulcers, bed-wheel chair, wheelchair-toilet-tub transfers)

Kidney Disease-Targeted Scales

- Symptoms/problems (12 items)

- Effects of kidney disease (8 items)

- Burden of kidney disease (4 items)

- Work status (2 items)

- Cognitive function (3 items)

- Quality of social interaction (3 items)

- Sexual function (2 items)

- Sleep (4 items)

HRQOL in Men Treated for Localized Prostate Cancer

Cross-sectional study of managed care pop.

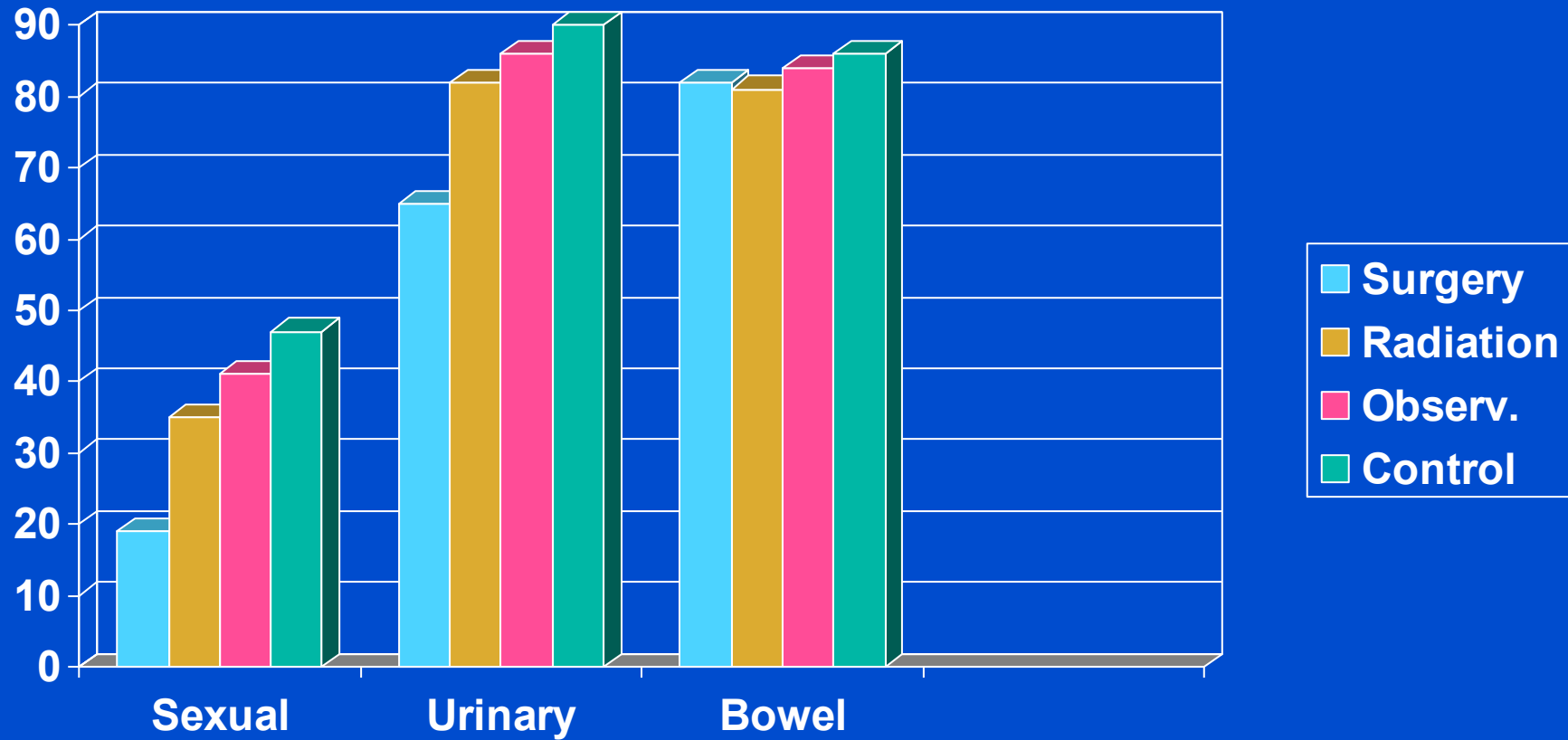**Sexual, urinary and bowel function and distress**

214 men with prostate cancer

    98 radical prostatectomy

    56 primary pelvic irradiation

    60 observation alone

273 age/zip matched pts. without cancer

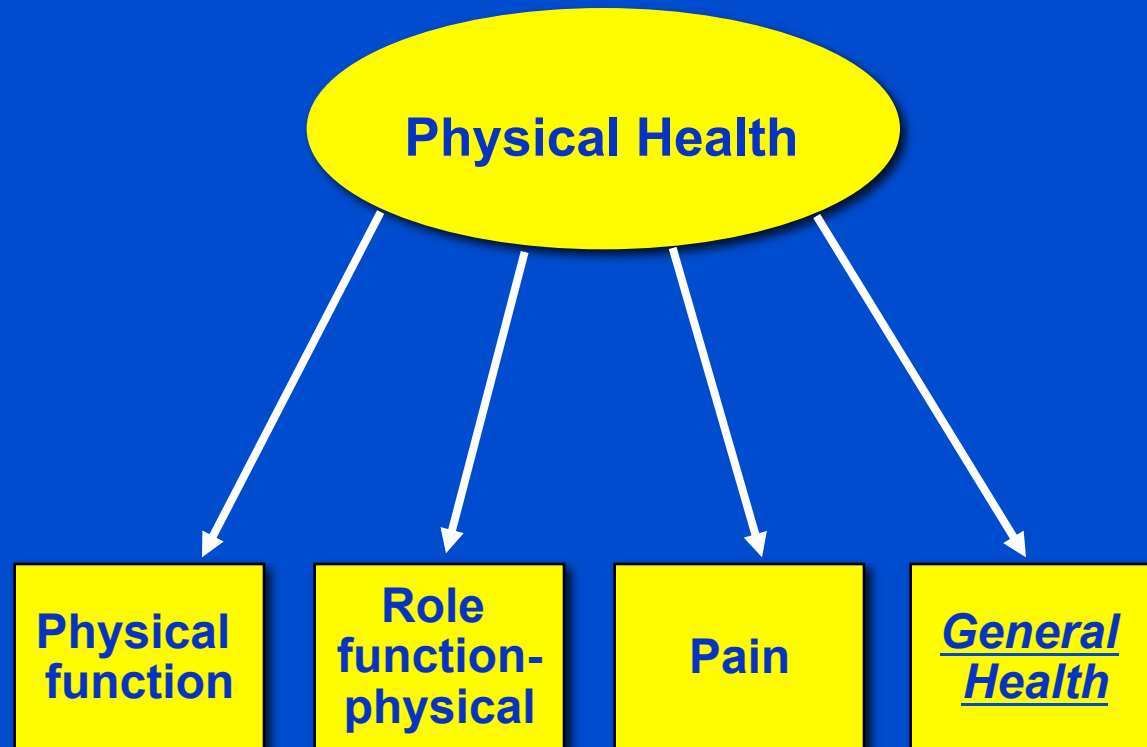# Sexual, Urinary and Bowel Function
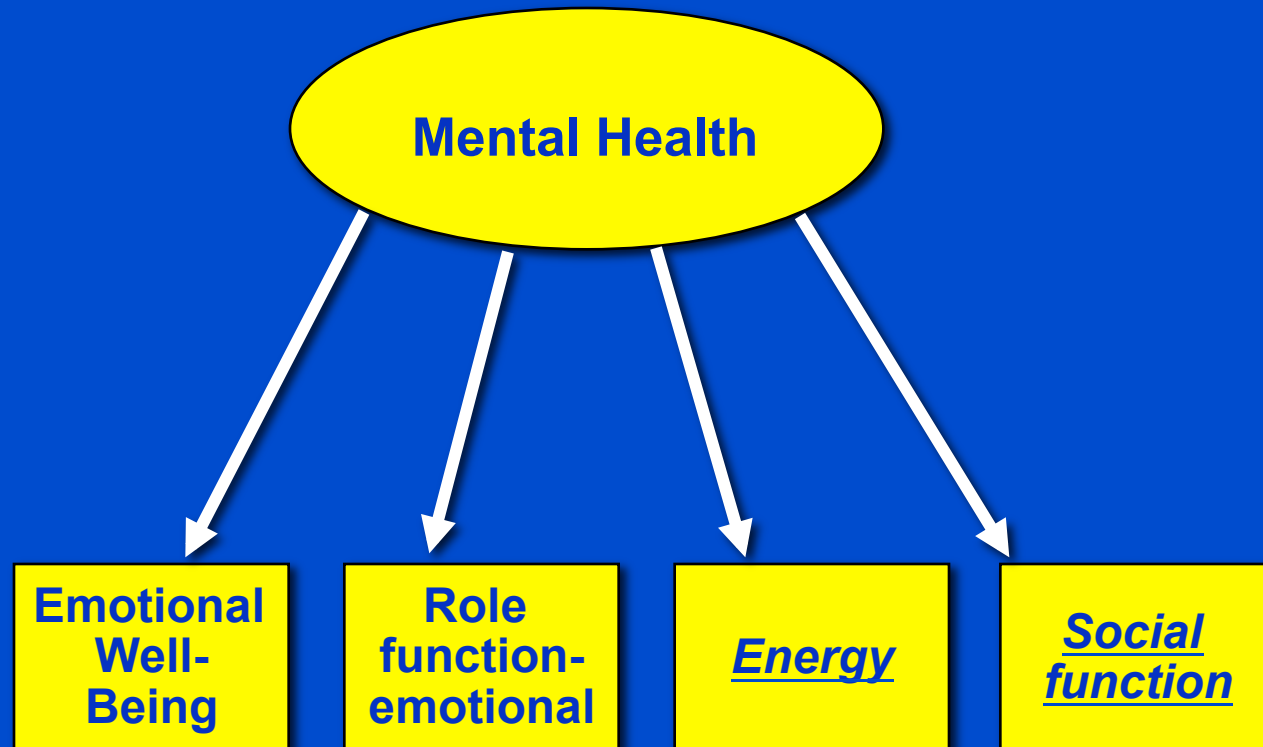
Check-in Point

Generic Profile Measures

Targeted Profile Measures

-> Summarizing Profile Information

Physical Health

Mental Health

SF-36 PCS and MCS

PCS = (PF_Z * .42402) + (RP_Z * .35119) +
(BP_Z * .31754) + (GH_Z * .24954) +
(EF_Z * .02877) + (SF_Z * -.00753) +
(RE_Z * -.19206) + (EW_Z * -.22069)

MCS = (PF_Z * -.22999) + (RP_Z * -.12329) +
(BP_Z * -.09731) + (GH_Z * -.01571) +
(EF_Z * .23534) + (SF_Z * .26876) +
(RE_Z * .43407) + (EW_Z * .48581)

T-score Transformation

$$PCS = (PCS\_z * 10) + 50$$

$$MCS = (MCS\_z * 10) + 50$$

Debate About Summary Scores

- Taft, C., Karlsson, J., & Sullivan, M. (2001). Do SF-36 component score accurately summarize subscale scores? Quality of Life Research, 10, 395-404.

- Ware, J. E., & Kosinski, M. (2001). Interpreting SF-36 summary health measures: A response. Quality of Life Research, 10, 405-413.

- Taft, C., Karlsson, J., & Sullivan, M. (2001). Reply to Drs Ware and Kosinski. Quality of Life Research, 10, 415-420.
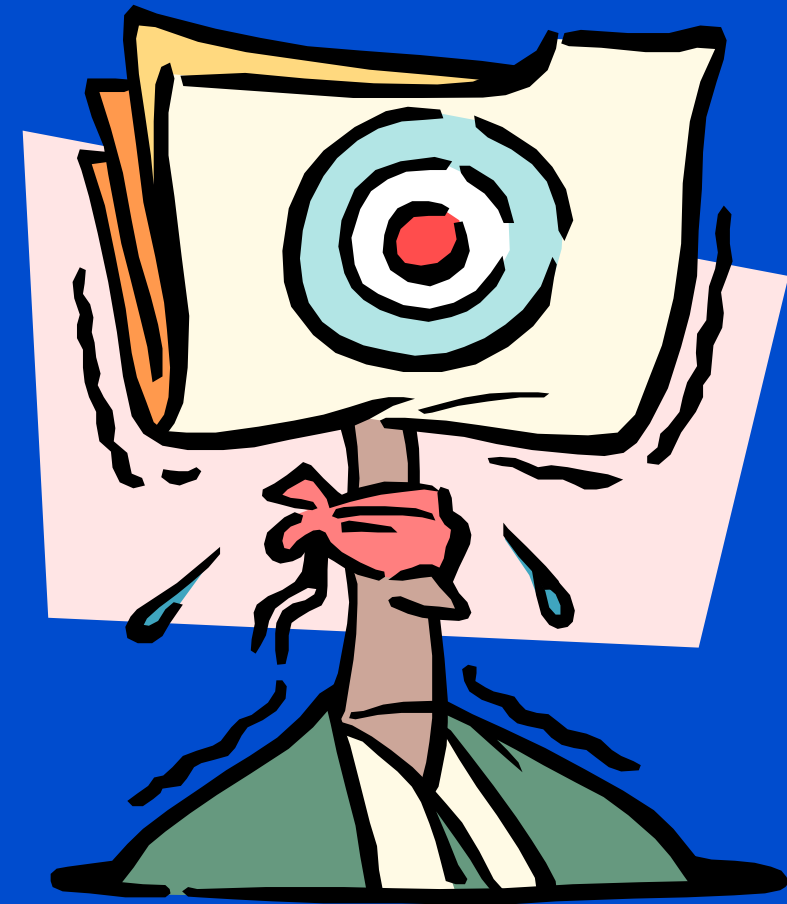
536 Primary Care Patients Initiating Antidepressant Tx
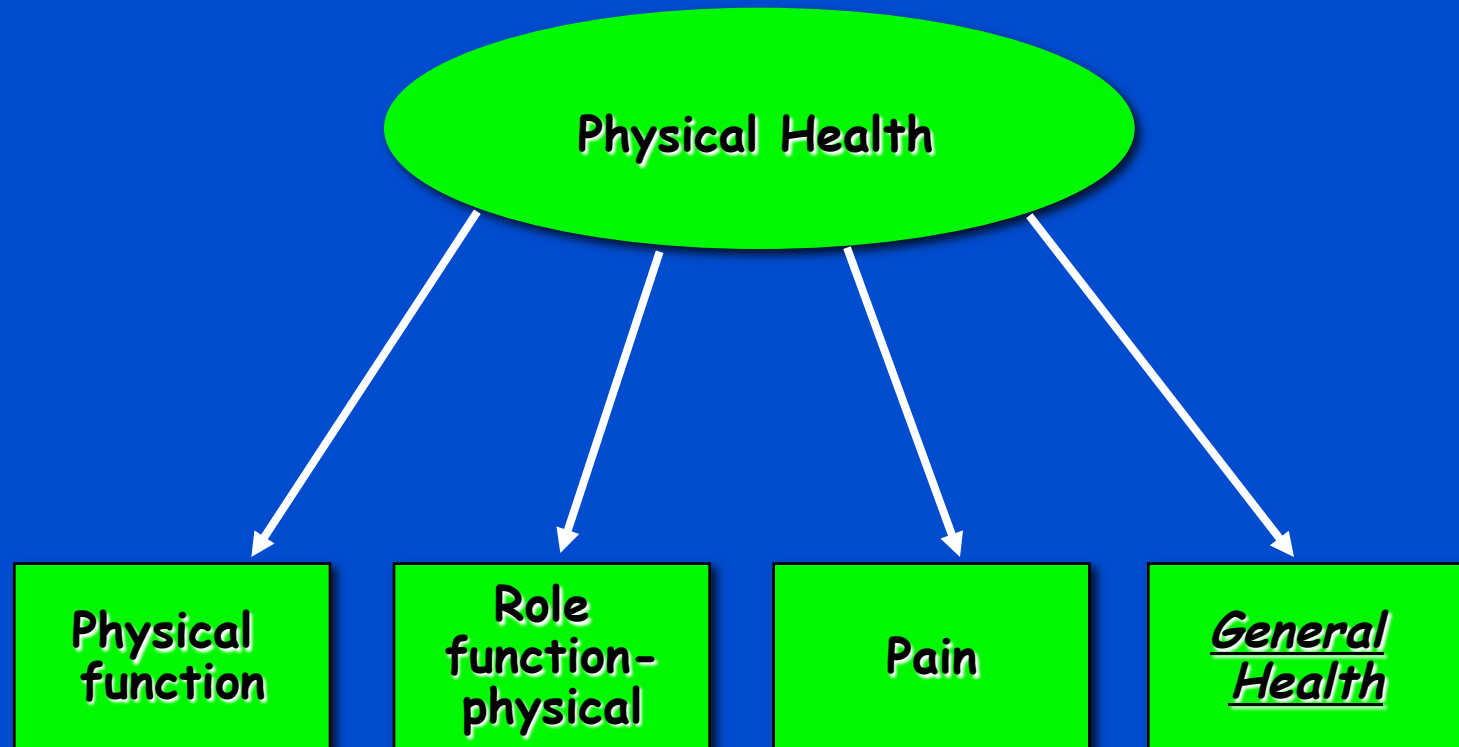
◈ 3-month improvements in physical functioning, role—physical, pain, and general health perceptions ranging from 0.28 to 0.49 SDs.

◈ Yet SF-36 PCS did <u>not</u> improve.

◈ Simon et al. (<u>Med Care</u>, 1998)

Four scales improve 0.28-0.49 SD, but physical health summary score doesn't change

Physical Health

Physical function

Role function- physical

Pain

General Health

# n = 194 with Multiple Sclerosis

- Lower scores than general population on
  - Emotional well-being (↓ 0.3 SD)
  - Role—emotional (↓ 0.7 SD)
  - Energy (↓1.0 SD)
  - Social functioning (↓1.0 SD)
- Yet SF-36 MCS was only <u>0.2</u> SD lower.
- RAND-36 mental health was <u>0.9</u> SD lower.

Nortvedt et al. (<u>Med Care,</u> 2000)

Four scales 0.3-1.0 SD lower, but mental health summary score only 0.2 SD lower

Mental Health

Emotional Well-Being

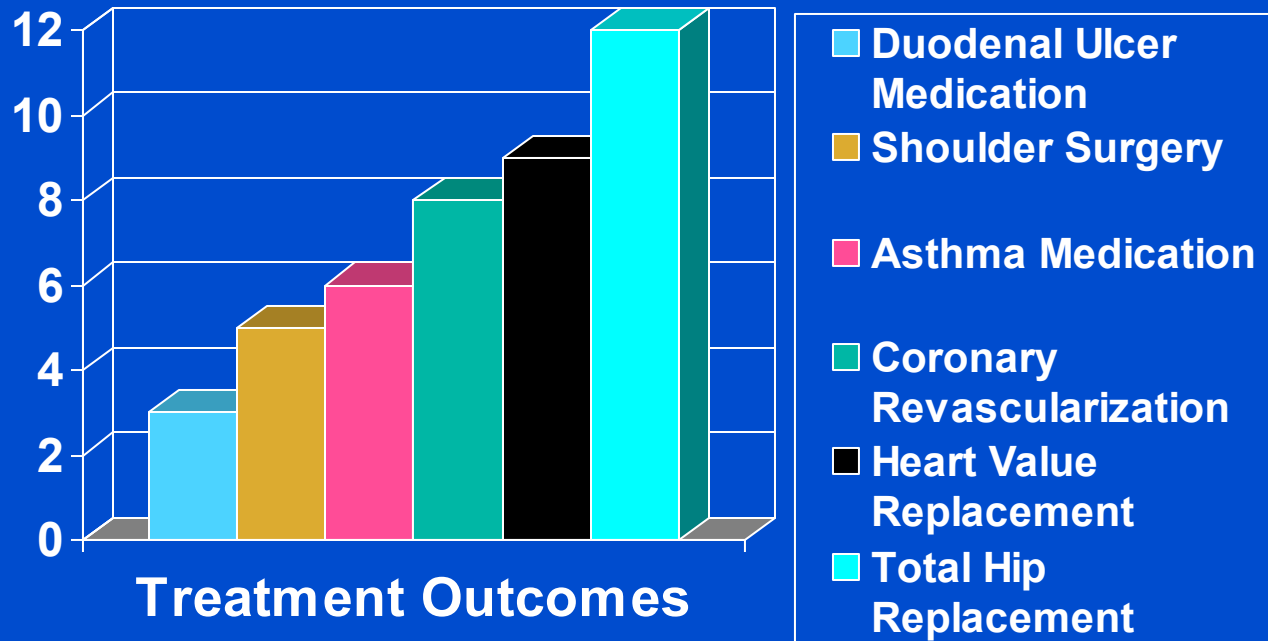**Role function-emotional**

Energy

Social function
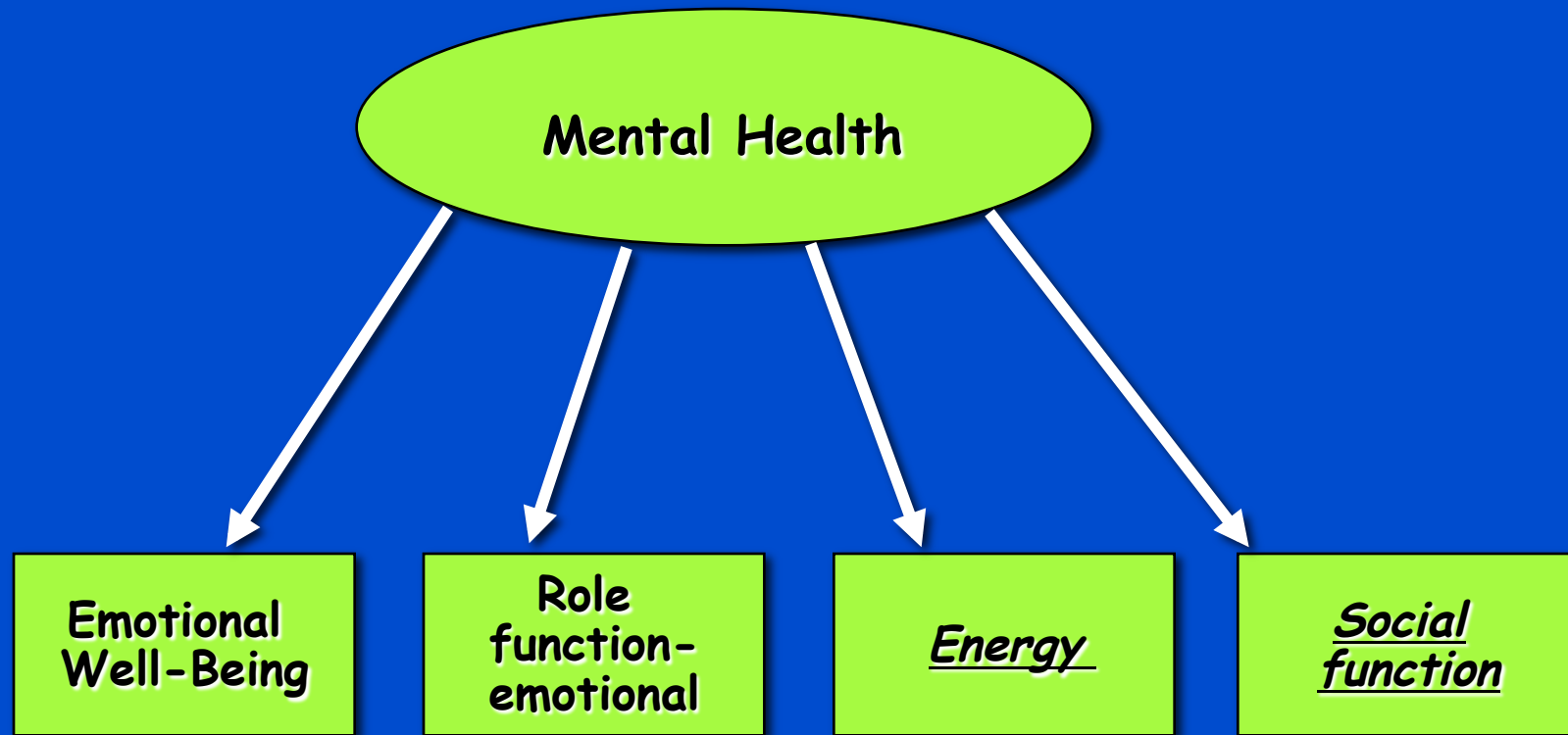
Alternative Weights

Farivar, S. S., & Hays, R.D. (2004, November). Constructing correlated physical and mental health summary scores for the SF-36 health survey. Paper presented at the annual meeting of the International Society for Quality of Life Research, Hong Kong. (<u>Quality of Life Research</u>, 13 (9), 1550).

Treatment Impact on Physical Health

Impact on SF-36 PCS

Treatment Outcomes

- Duodenal Ulcer Medication
- Shoulder Surgery
- Asthma Medication
- Coronary Revascularization
- Heart Value Replacement
- Total Hip Replacement

Treatment Impact on Mental Health
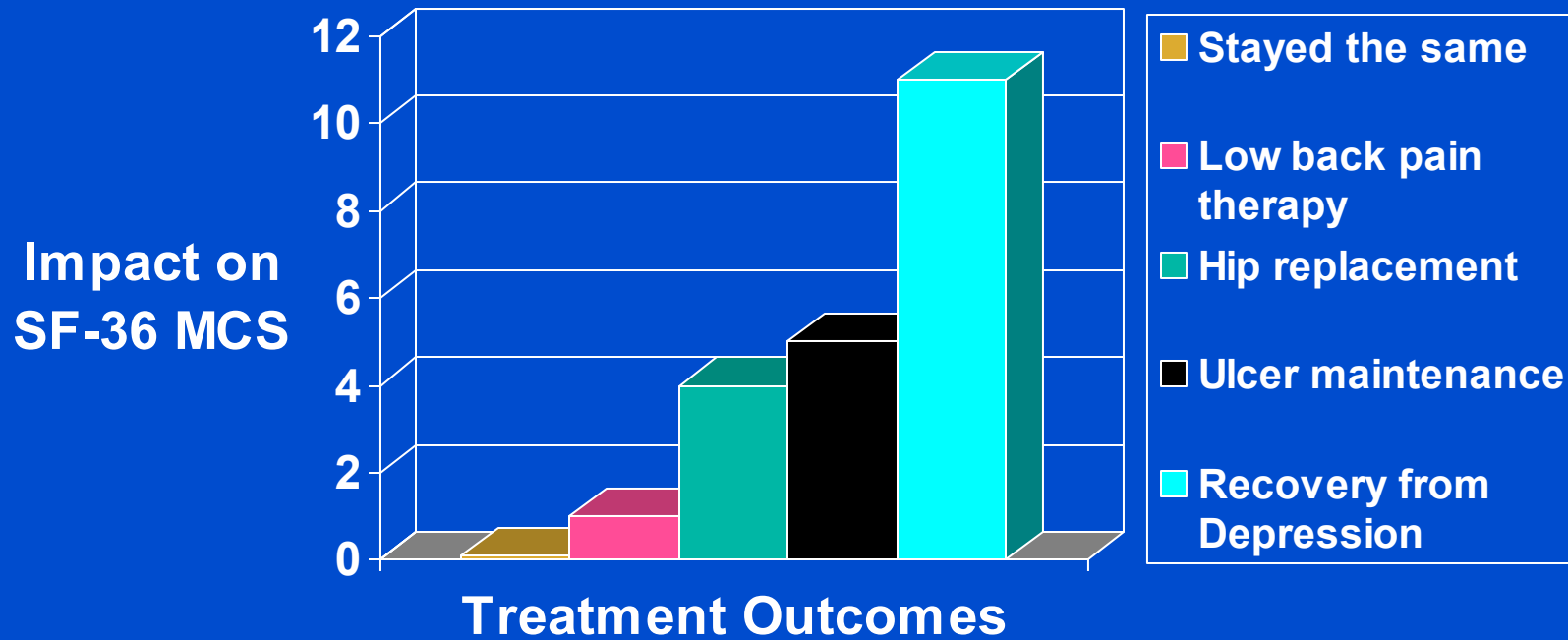
Is New Treatment (X) Better Than Standard Care (O)?

Single Weighted Combination of Scores

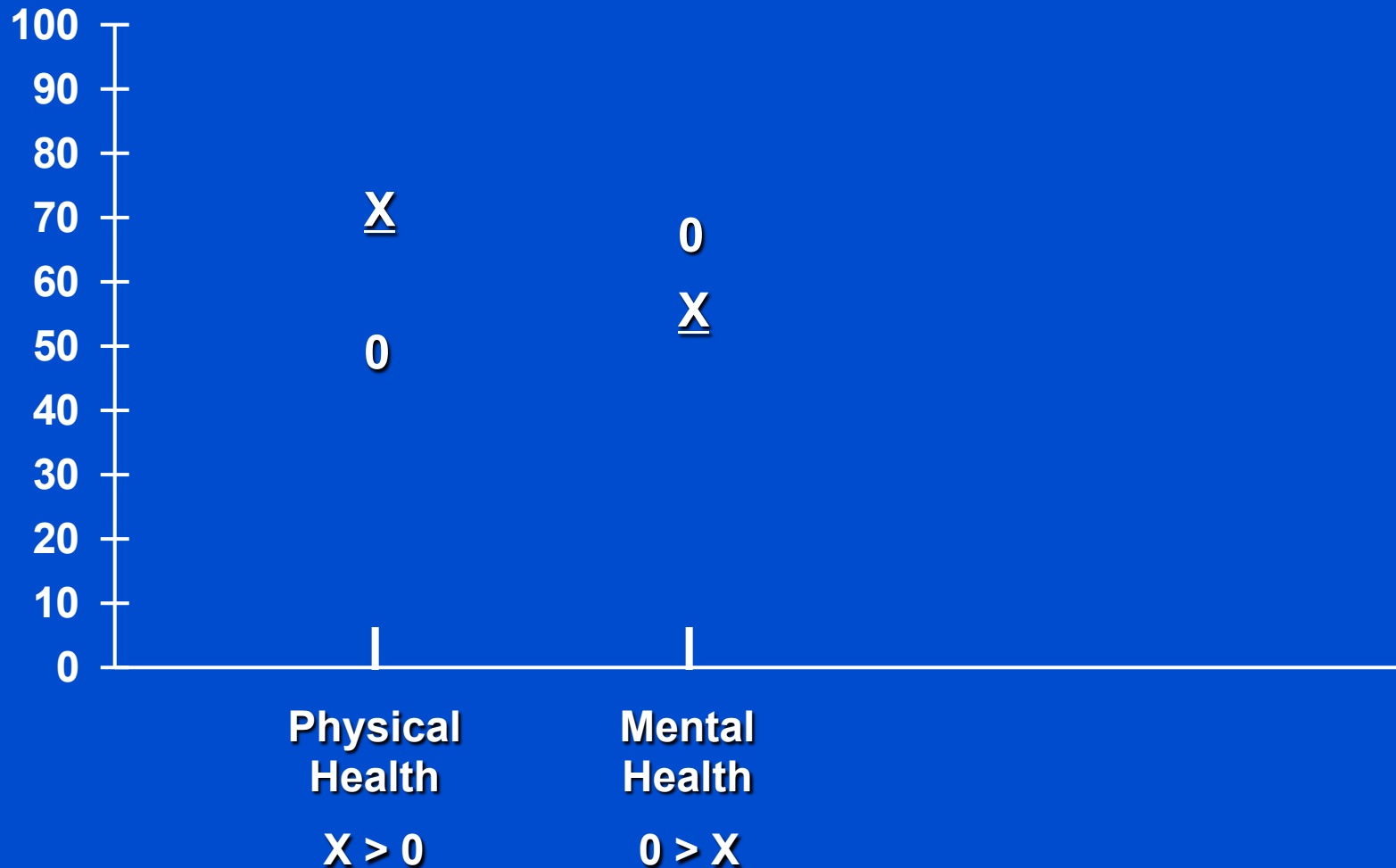## Perceived Health Index (n = 1,862; reliability = 0.94)

Highest	Lowest	Quartile on Index
35%	84%	at least 1 moderate symptom
7%	70%	at least 1 disability day
1%	11%	hospital admission
2%	14%	performance of invasive diagnostic procedure

Perceived Health Index = 0.20 Physical functioning + 0.15 Pain + 0.41 Energy + 0.10 Emotional well-being + 0.05 Social functioning + 0.09 Role functioning.

Bozzette, S.A., Hays, R.D., Berry, S.H., & Kanouse, D.E. (1994). A perceived health index for use in persons with advanced HIV disease: Derivation, reliability, and validity. Medical Care, 32, 716-731.

Is Use of Medicine Related to Worse HRQOL?

Person	Medication Use	HRQOL (0-100 scale)
1	No	dead
2	No	dead
3	No	50
4	No	75
5	No	100
6	Yes	0
7	Yes	25
8	Yes	50
9	Yes	75
10	Yes	100

Group	n	HRQOL
No Medicine	3	75
Yes Medicine	5	50

Survival Analysis

Marathoner   **1.0**

Person in coma   **1.0**

Profile + Mortality Outcomes for Acute MI (n = 133)

	Total Hospital Charges	Satisfaction with Care	Mortality	Physical Function	Emotional Well-Being
A	25	81	25	63	66
B	27	81	15	49	64
C	31	83	12	75	85
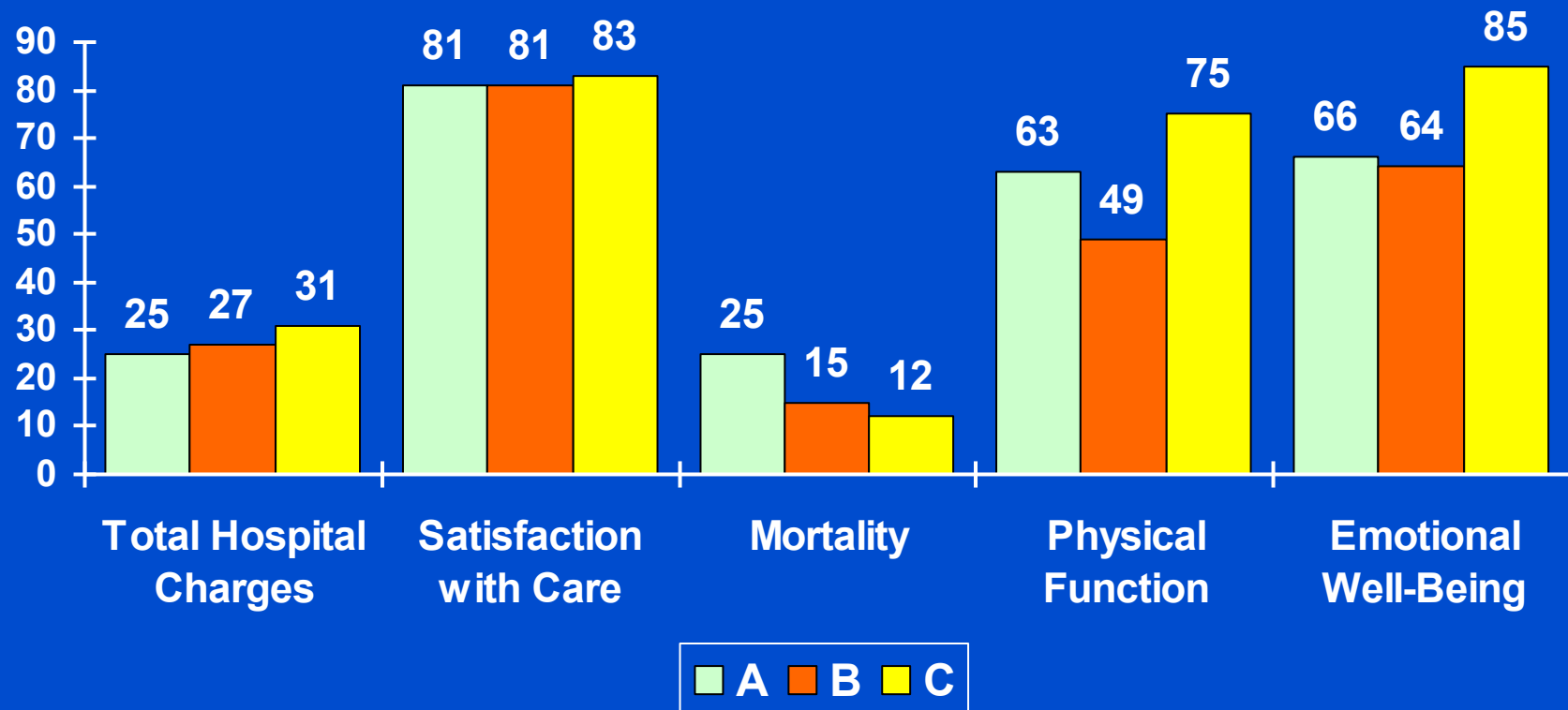
Preference-Based Measure-- Quality of Well-Being Scale

- **Summarize HRQOL in QALYs**

  -- Physical activity (PAC)

  – Mobility (MOB)

  – Social activity (SAC)

  - Symptom/problem complexes (SPC)

Dead	Well-Being
0	1

- **Well-Being Formula**   w = 1 + PAC + MOB + SAC + SPC

Quality of Well-Being Weighting Procedure

Each page in this booklet tells how an imaginary person is affected by a health problem on one day of his or her life. I want you to look at each health situation and rate it on a ladder with steps numbered from zero to ten. The information on each page tells 1) the person's age group, 2) whether the person could drive or use public transportation, 3) how well the person could walk, 4) how well the person could perform the activities usual for his or her age, and 5) what symptom or problem was bothering the person.

Example Case #1

<u>Adult (18-65)</u>
Drove car or used public transportation without help
Walked without physical problems
Limited in amount or kind of work, school, or housework
Problem with being overweight or underweight

```
10  Perfect Health
 9
 8
 7
 6
 5
 4
 3
 2
 1
 0  Death
```

Quality of Well-Being States and Weights

Component	Measures	States	Weights
Physical activity	Physical function	In bed, chair, couch, or wheelchair*	-.077
		In wheelchair* or had difficulty lifting, stooping, using stairs, walking, etc.	-.060
Mobility	Ability to get around or transport oneself	In hospital, nursing home, or hospice.	-.090
		Did not drive car or use public transportation	-.062
Social activity	Role function and self-care	Did not feed, bath, dress, or toilet	-.106
		Limited or did not perform role	-.061
Symptom/problem	Physical symptoms and complexes problems	Worst symptom from loss of consciousness to breathing	-.407
			-.101
		smog or	
unpleasant air			

* moved vs. did not move oneself in wheelchair

EQ-5D

Mobility

Self-care

Usual activities

Pain/discomfort

Anxiety/depression

- 243 states, 3 levels per attribute

Your own health state today

By placing a tick in one box in each group below, please indicate which statement best describes your own health state today.

Do not tick more than one box in each group.

Mobility
I have no problems in walking about ☐
I have some problems in walking about ☐
I am confined to bed ☐

Self-Care
I have no problems with self-care ☐
I have some problems washing and dressing myself ☐
I am unable to wash or dress myself ☐

Usual Activities (eg. work, study, housework, family or leisure activities)
I have no problems with performing my usual activities ☐
I have some problems with performing my usual activities ☐
I am unable to perform my usual activities ☐

Pain/Discomfort
I have no pain or discomfort ☐
I have moderate pain or discomfort ☐
I have extreme pain or discomfort ☐

Anxiety/Depression
I am not anxious or depressed ☐
I am moderately anxious or depressed ☐
I am extremely anxious or depressed ☐

On each dimension, respondent gets three choices of level.

HUI-3

Vision

Hearing

Speech

Ambulation

Dexterity

Cognition

Pain and discomfort

Emotion

- **972,000 states, 5-6 levels per attribute**

SF-6D Summary Measure

- Brazier et al. (1998, 2002)
    - 6-dimensional classification (collapsed role scales, dropped general health)
    - Uses 11 SF-36 items (8 SF-12 and 3 additional physical functioning items)
    - 18,000 possible states
    - 249 states rated by sample of 836 from UK general population

Quality-adjusted life-years (QALYs)
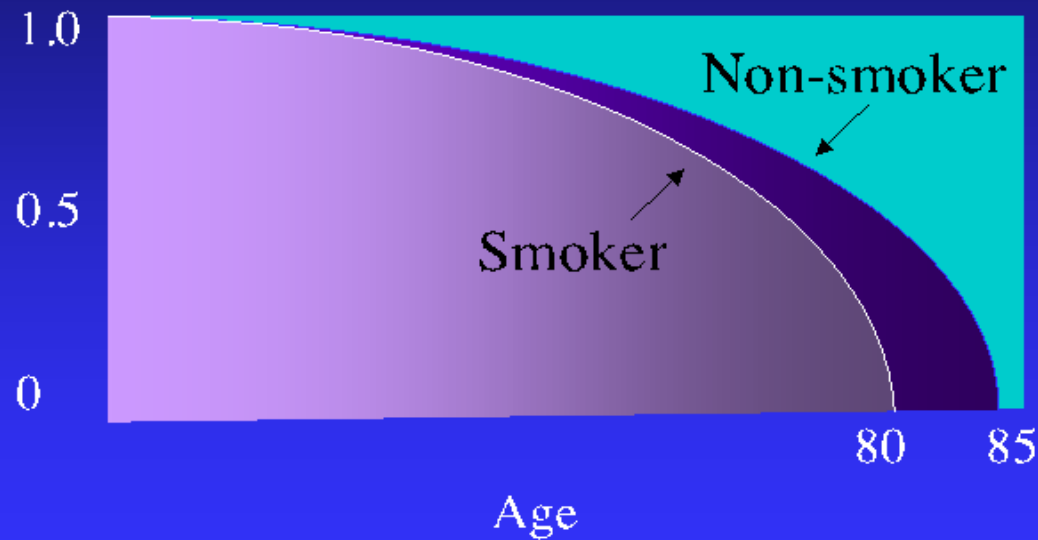
Cost/QALY (1993 US dollars)

- $0 Seat belt laws

- $2k Pneumonococcal vaccine

- $6k Smoking cessation counseling

- $12k Oral gold for rheumatoid arthritis

- $40k CABG, 2-vessel disease; hemodialysis

- $167k Mammography screening

- $293k Hip replacement

- $663k CABG, 1-vessel disease

Questions?

www.rand.org/health/surveys.html

http://gim.med.ucla.edu/FacultyPages/Hays/

Appendix: Ad Hoc Preference Estimate

Comprehensive Geriatric Assessment (n = 363 community-dwelling older persons) lead to improvements in SF-36 energy, social functioning, and

- Physical functioning (4.69 points) in 64 weeks

- Cost of $746 over 5 years beyond control group

Is CGA worth paying for?

Change in QALYs associated with 4.69 change in SF-36 physical functioning

◈ r = 0.69 -> b = .003 x 4.69 =.014 (△QWB)

◈ .014 x 5 yrs. = <u>0.07 QALYs</u>

◈ Cost/QALY: $10,600+

<$20,000 per QALY worthwhile

Limitations of Preference Measures

Complexity of task

Coarseness of health states

Sensitivity to method of elicitation

Time Tradeoff (TTO)

- Choice between two certain outcomes

- Years of life traded for quality of life

- Simple to administer alternative to SG

Time Tradeoff

Choice #1: Your present state (e.g., paralysis)

Life Expectancy: 10 years

Choice #2: Complete mobility

How many years (x) would you give up in your current state to be able to have complete mobility?

$$[\ 1 - \frac{X}{10} = QALY\ ]$$

Time Tradeoff

How many years (x) would you give up in your current state to be able to have complete mobility?

X = 0 → QALY = 1

X = 1 -> QALY = 0.9

X = 5 -> QALY = 0.5

X = 10 -> QALY = 0

$$[1 - \frac{X}{10} = QALY]$$

Standard Gamble

Classical method of assessing preferences

- **Choose between certain outcome and a gamble**

- **Conformity to axioms of expected utility theory**

- **Incorporates uncertainty (thus, more reflective of treatment decisions).**

Standard Gamble (SG)

Choice #1: Your present state (e.g., paralysis)

Choice #2: X probability of complete mobility
         1-X   probability of death

Preference Value: Point at which indifferent
                                between choices, varying X

[X = QALY]

Standard Gamble (SG)

X probability of complete mobility

X = 1.00 → QALY = 1.00

X = 0.50 → QALY = 0.50

X = 0.00 → QALY = 0.00

Mapping Health States into Quality of Life

Exists **Measured**

P3, M3 → Perfect QOL

0.9

P2, M3 → 0.8

P3, M2 → 0.7

P3, M1 → 0.6

P2, M2
P1, M3 → 0.5

P2, M1 → 0.4

0.3

P1, M2 → 0.2

P1, M1 → 0.1

Dead