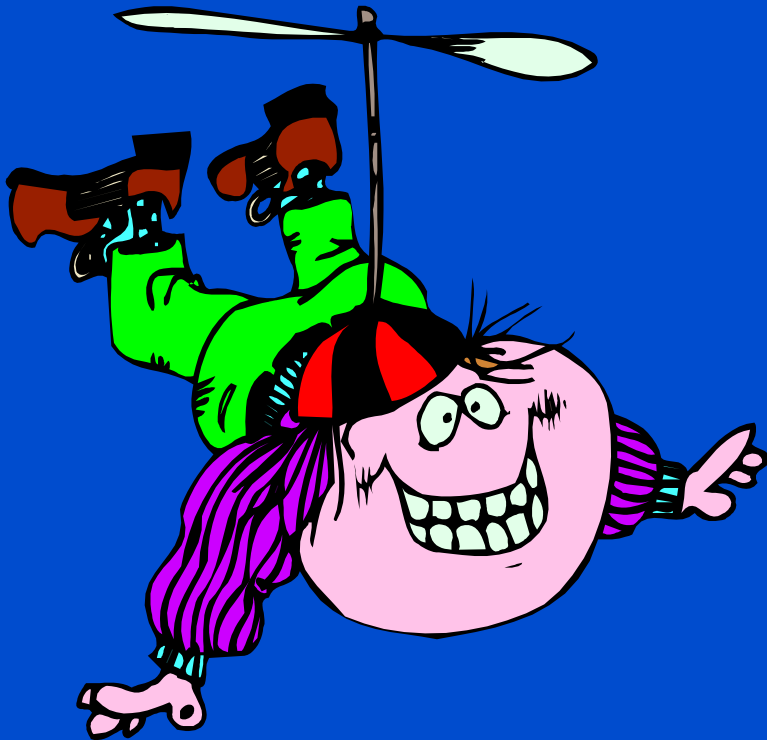


# Preference-Based Measures

Ron D. Hays, Ph.D. ([hays@rand.org](mailto:hays@rand.org))

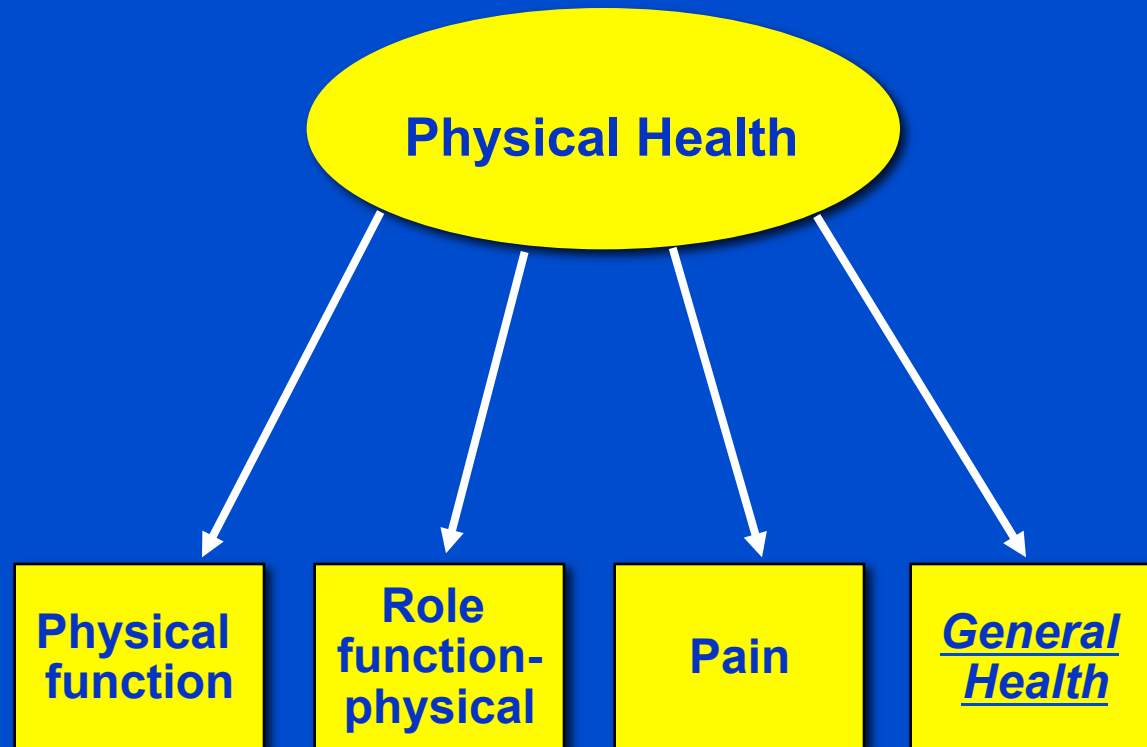
February 9, 2004

# Types of HRQOL Measures

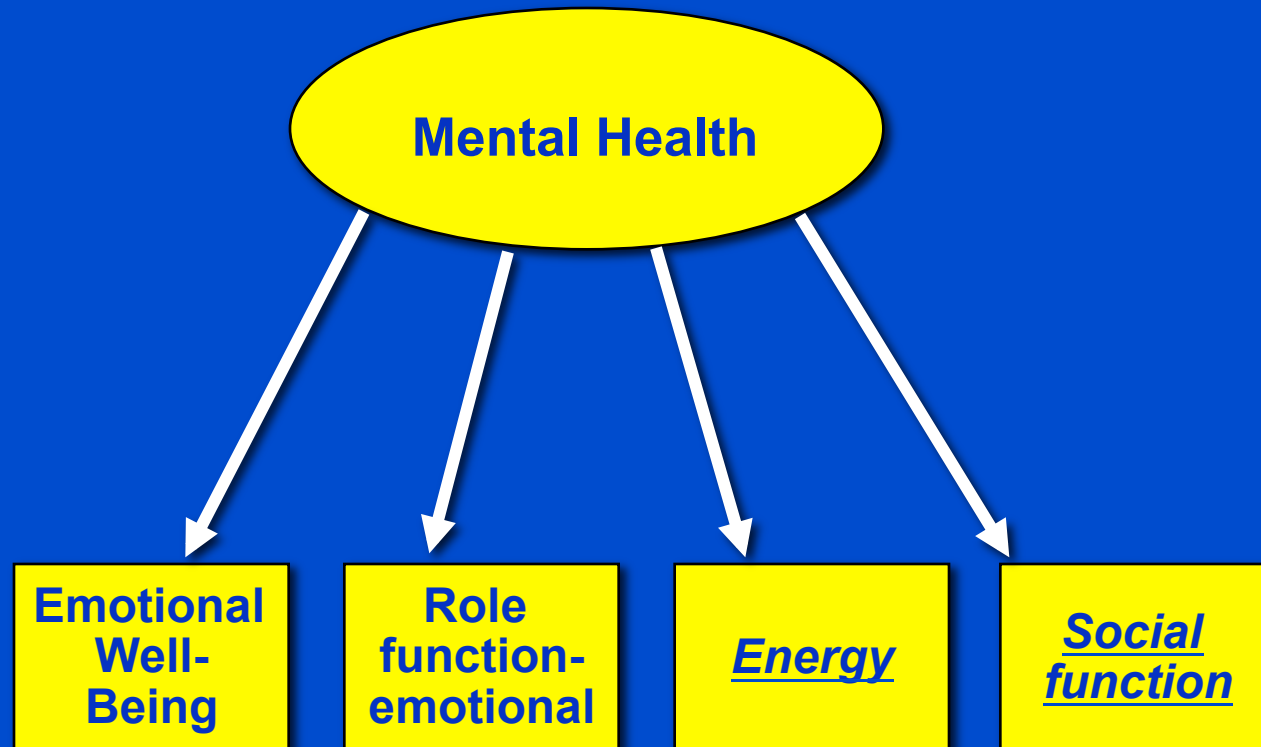


- Profile
  - Generic
  - Targeted
- Preference-based

# Physical Health



# Mental Health



## SF-36 PCS and MCS

$$\begin{aligned} \text{PCS\_z} = & (\text{PF\_z} * .42402) + (\text{RP\_z} * .35119) + \\ & (\text{BP\_z} * .31754) + (\text{GH\_z} * .24954) + \\ & (\text{EF\_z} * .02877) + (\text{SF\_z} * -.00753) + \\ & (\text{RE\_z} * -.19206) + (\text{EW\_z} * -.22069) \end{aligned}$$

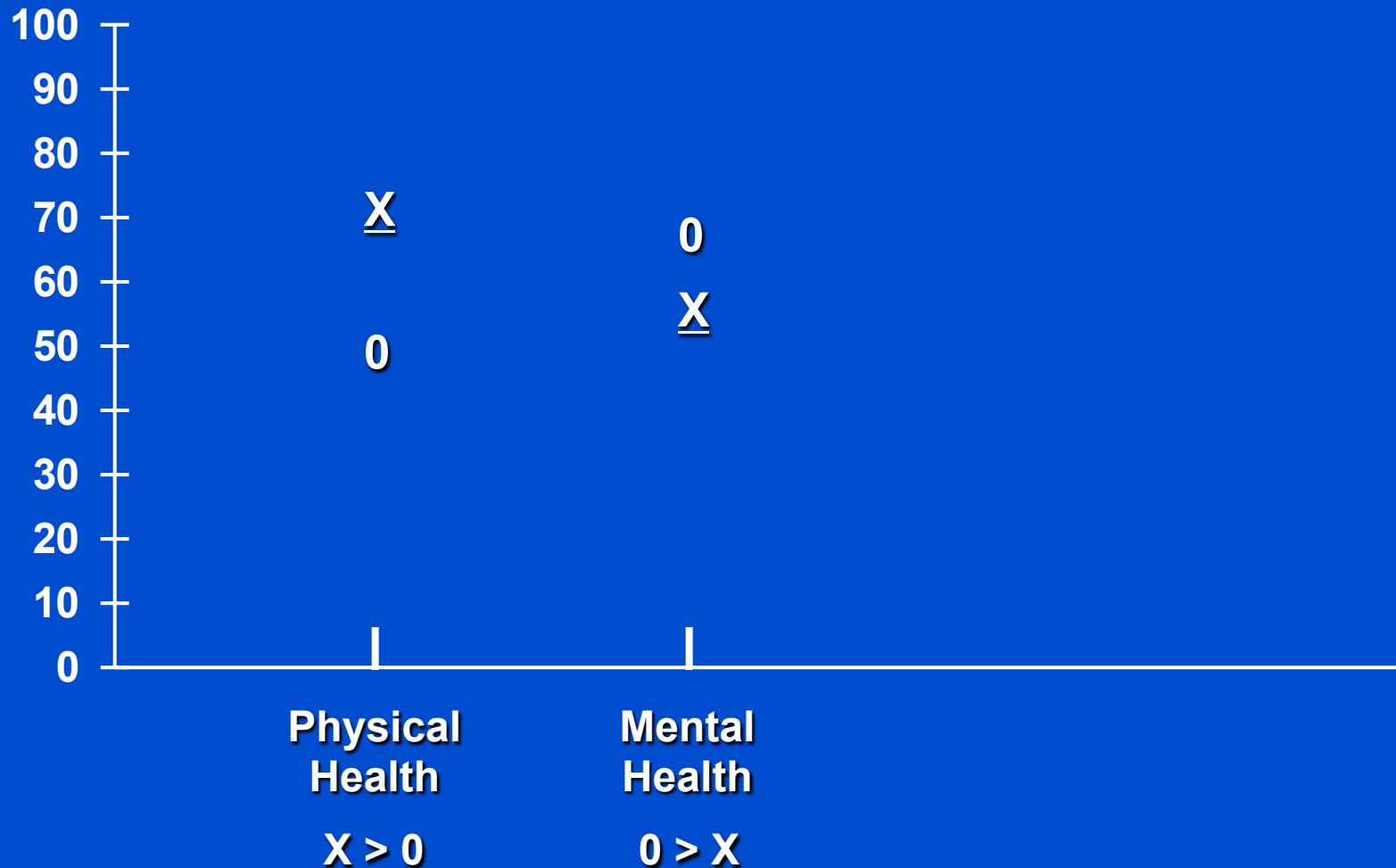
$$\begin{aligned} \text{MCS\_z} = & (\text{PF\_z} * -.22999) + (\text{RP\_z} * -.12329) + \\ & (\text{BP\_z} * -.09731) + (\text{GH\_z} * -.01571) + \\ & (\text{EF\_z} * .23534) + (\text{SF\_z} * .26876) + (\text{RE\_z} \\ & * .43407) + (\text{EW\_z} * .48581) \end{aligned}$$

# T-score Transformation

$$\text{PCS} = (\text{PCS}_z * 10) + 50$$

$$\text{MCS} = (\text{MCS}_z * 10) + 50$$

# 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

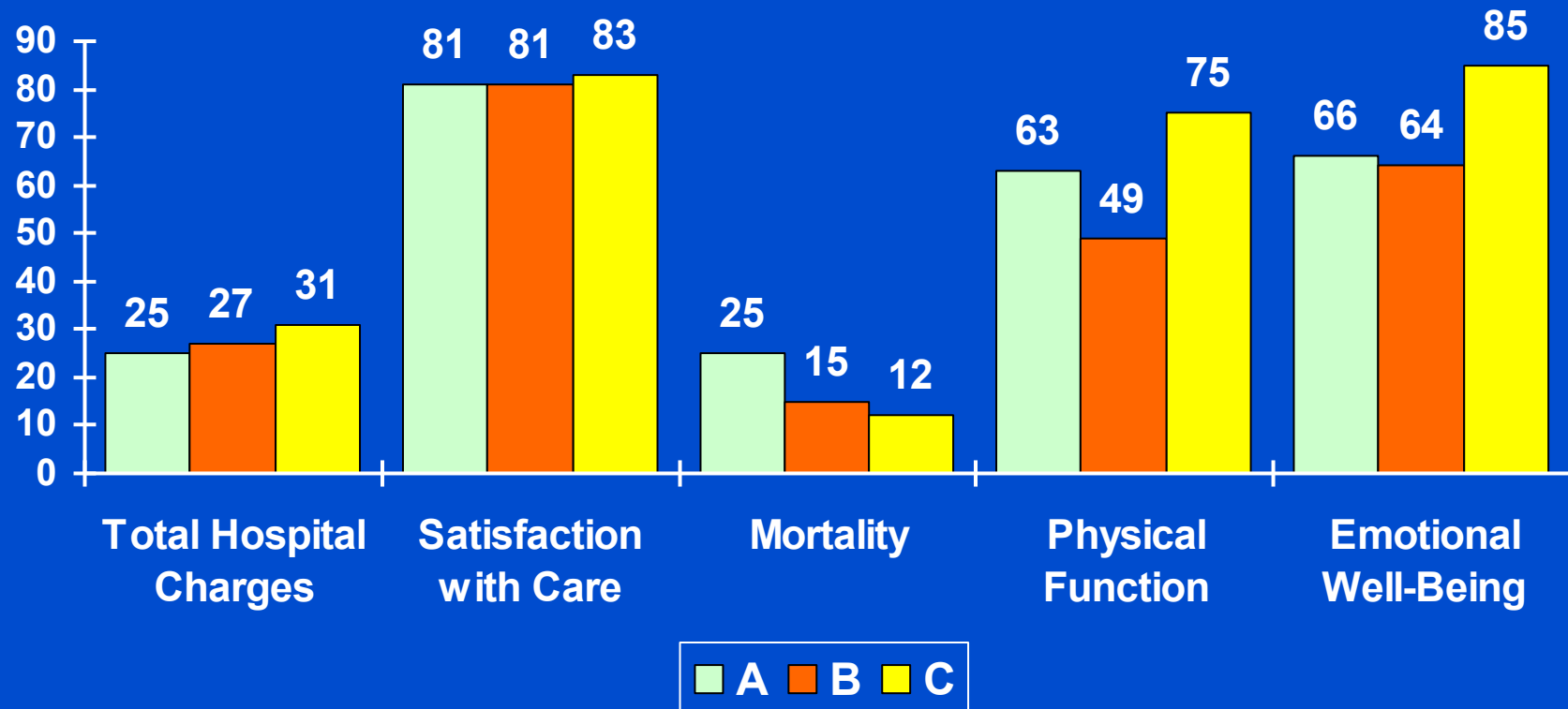
**Marathoner 1.0**

**Person in coma 1.0**

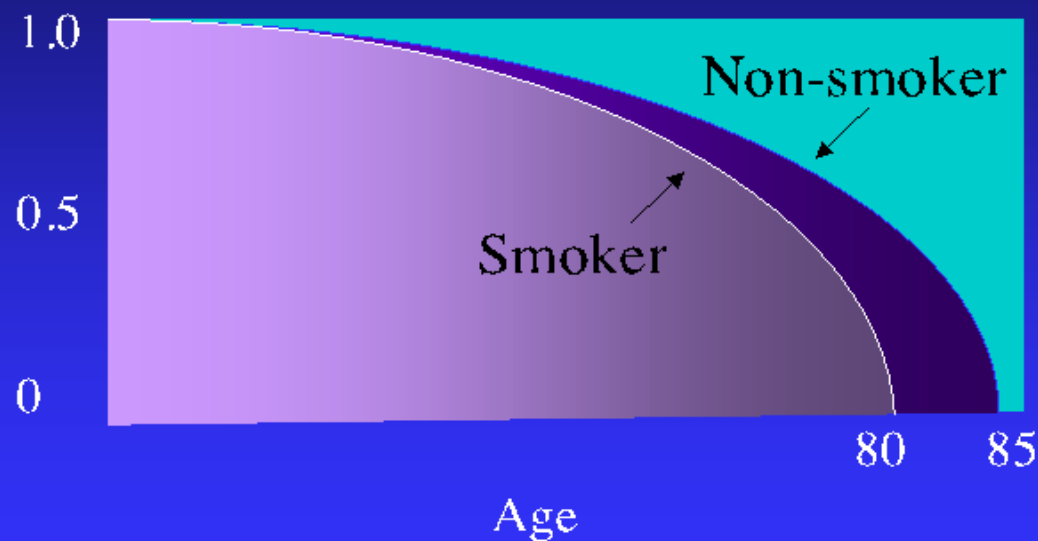


# Profile + Mortality

## Outcomes for Acute MI (n = 133)



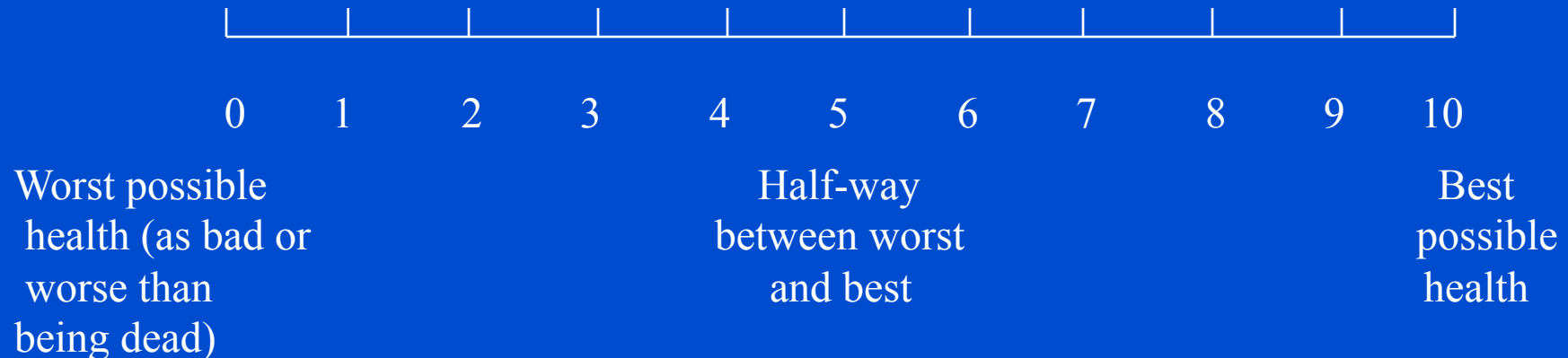
## Quality-adjusted life-years (QALYs)



Tengs, T. Presented at Health Services Research Seminar,  
VA Hospital, San Diego, July, 2000

# Overall Health Rating Item

Overall, how would you rate your current health?  
(Circle One Number)



# Preference-Based Measure-- Quality of Well-Being Scale

- Summarize HRQOL in QALYs
  - Physical activity (PAC)
  - Mobility (MOB)
  - Social activity (SAC)
  - Symptom/problem complexes (SPC)



- 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

Adult (18-65)

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



# QWB Physical Activity Levels

1) In wheelchair and moved oneself or had difficulty:

lifting  
stooping  
using stairs  
walking, etc.

2) In bed, chair, couch, or wheelchair and did not move oneself

---

# **QWB Mobility Levels**

- 1) Did not drive car or use public transportation**
- 2) In hospital, nursing home, or hospice**

# **QWB Social Activity Levels**

- 1) Limited or did not perform role activities**
- 2) Did not feed, bath, dress, or toilet oneself**

# QWB Symptom/Problem Complexes

**Worst Symptom/problem complex experienced**

**Breathing smog → Loss of consciousness**

# Quality of Well-Being States and Weights

Component	Measures	States	Weights	
Physical activity	Physical function	In bed, chair, couch, or wheelchair*	<u>-.077</u>	
		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.	<u>-.090</u>	
		Did not drive car or use public transportation	-.062	
Social activity	Role function and self-care	Did not feed, bath, dress, or toilet	<u>-.106</u>	
		Limited or did not perform role	-.061	
Symptom/problem	Physical symptoms and complexes problems	Worst symptom from loss of consciousness to breathing	<u>-.407</u>	
				-.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   | <input type="checkbox"/> |
| I have some problems in walking about | <input type="checkbox"/> |
| I am confined to bed                  | <input type="checkbox"/> |

#### Self-Care

- |  |                          |
|--|--------------------------|
| I have no problems with self-care                | <input type="checkbox"/> |
| I have some problems washing and dressing myself | <input type="checkbox"/> |
| I am unable to wash or dress myself              | <input type="checkbox"/> |

#### Usual Activities (eg. work, study, housework, family or leisure activities)

- |  |                          |
|--|--------------------------|
| I have no problems with performing my usual activities   | <input type="checkbox"/> |
| I have some problems with performing my usual activities | <input type="checkbox"/> |
| I am unable to perform my usual activities               | <input type="checkbox"/> |

#### Pain/Discomfort

- |                                    |                          |
|------------------------------------|--------------------------|
| I have no pain or discomfort       | <input type="checkbox"/> |
| I have moderate pain or discomfort | <input type="checkbox"/> |
| I have extreme pain or discomfort  | <input type="checkbox"/> |

#### Anxiety/Depression

- |                                      |                          |
|--------------------------------------|--------------------------|
| I am not anxious or depressed        | <input type="checkbox"/> |
| I am moderately anxious or depressed | <input type="checkbox"/> |
| I am extremely anxious or depressed  | <input type="checkbox"/> |

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

# Health state 424421 (0.59)

- Your health limits you a lot in moderate activities (such as moving a table, pushing a vacuum cleaner, bowling or playing golf)
- You are limited in the kind of work or other activities as a result of your physical health
- Your health limits your social activities (like visiting friends, relatives etc.) most of the time.
- You have pain that interferes with your normal work (both outside the home and housework) moderately
- You feel tense or downhearted and low a little of the time.
- You have a lot of energy all of the time

# **Cost/QALY (1993 US dollars)**

- \$0 Seat belt laws
- \$2k Pneumococcal 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

# Ad Hoc Preference Score Estimates

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

Keeler, E. B., et al. Cost-effectiveness of outpatient geriatric assessment with an intervention to increase adherence. Med Care, 1999, 37 (12), 1199-1206.

# Is CGA worth paying for?

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

◆  $r = 0.69 \rightarrow b = .003$

◆  $\Delta QWB = 4.69 \times .003 = .014$

◆  $.014 \times 5 \text{ yrs.} = \underline{0.07 \text{ QALYs}}$

◆ 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?

$$\left[ 1 - \frac{x}{10} = QALY \right]$$

# Time Tradeoff

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

$$X = 0 \rightarrow QALY = 1$$

$$X = 1 \rightarrow QALY = 0.9$$

$$X = 5 \rightarrow QALY = 0.5$$

$$X = 10 \rightarrow QALY = 0$$

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

# 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

**$X = 1.00 \rightarrow QALY = 1.00$**

**$X = 0.50 \rightarrow QALY = 0.50$**

**$X = 0.00 \rightarrow QALY = 0.00$**

# Hypothetical Health States

## Physical Health

---

P3	0.00	High
P2	-0.20	Medium
P1	-0.50	Low

## Mental Health

---

M3	0.00	High
M2	-0.30	Medium
M1	-0.40	Low

# Mapping Health States into Quality of Life

