Soft Data for Hard Questions: The Challenge of Evidence-Based Practice in Geriatric Care

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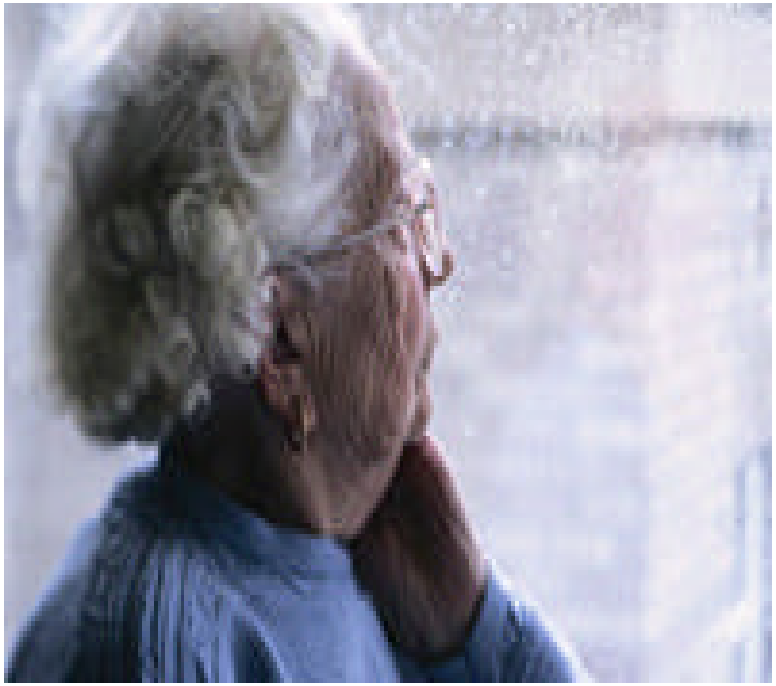
Outline

- Population Aging and the Nature of Geriatric Care
- The Nature of Evidence
  - Evidence and evidence-based practice
- Evidence-Based Assessment and Outcome Measurement in Geriatrics
- A Challenge for Health Informatics
  - Linking hard and soft data
- Use of Soft Data in Geriatric Research and Practice

The Demographic Imperative



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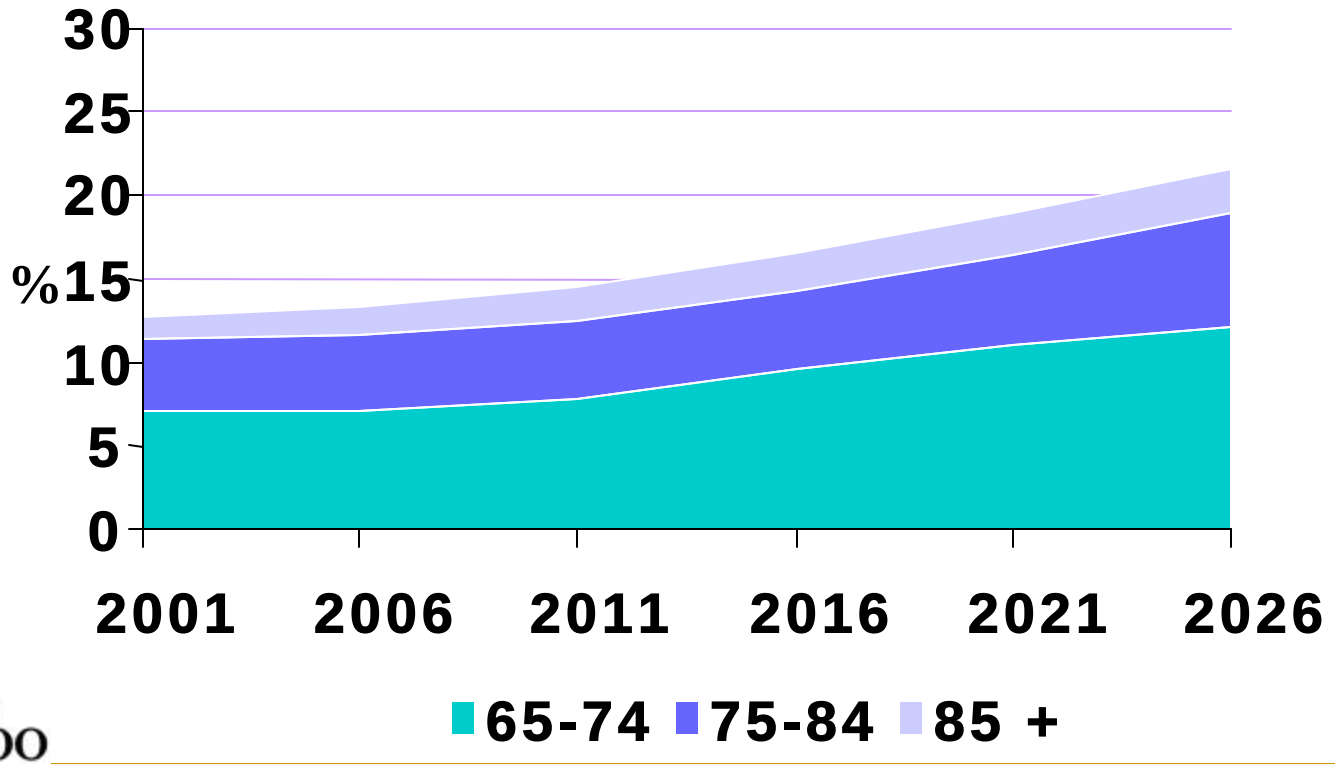
Pieter Bruegel The Elder, 1562

Demographic Aging in Canada



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Ontario Demographic Context

- 40% increase in 75+ by 2016
- 84% increase in 85+ by 2016

Service Utilization by the Elderly

- 43% of total health expenditures accounted for by seniors (65+) in Ontario (2000)
- 32% of health expenditures used by 75+ (2001)
- 47.5% of acute bed days used by 65+ (99-00) - 2.8% of total population

So this must be the golden age of geriatric care…

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Yes

"Geriatric Assessment Programs:
Their Time has Come"
- *Rubenstein & Kane, 1985*

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Not so fast…

"Comprehensive Geriatric Assessment: Mission not yet Accomplished"
- *Cohen & Feussner, 1989*

"The cult of geriatrics is still small, and its influence is not growing."
- *Kane, 2002*

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"When will he be able to sit up and take criticism?"

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Some common names for frail older people who are acutely ill and who seek help at an acute care hospital (Rockwood, 2004)

- dyscopics
- crocks
- train wrecks
- poor historians
- social admissions
- bed blockers
- inappropriate admissions
- long-stay patients
- disasters
- gomers

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Service Utilization by the Elderly

- Less than 4% of Ontarians 75+ access specialized geriatric services

Specialized Geriatric Services: Evidence of Effectiveness

- Frequently cited meta-analysis found evidence of improved function and survival as a result of geriatric intervention, but not for all types or settings
  - Stuck, et al., Lancet, 1993
- Many studies of geriatric services have found ambiguous or inconsistent results

The Case of Geriatric Day Hospitals

"systematic review of 12 randomized trials comparing a variety of day hospitals with a range of alternative services found no overall advantage for day hospital care"

-Forster, et al., BMJ, 1999

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Specialized Geriatric Services

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Specialized Geriatric Services

- Geriatric Assessment Units
- Geriatric Rehabilitation Units
- Geriatric Day Hospitals
- Geriatric Outpatient Clinics
- Geriatric Outreach Teams
- Geriatric Consultation Services

SGS: Common Features

- Comprehensive Geriatric Assessment Approach
- Interdisciplinary Teams
- Consultative Approach (often due to scarce resources) – recommendations to primary care providers
- Medical direction provided by geriatrician or geriatric psychiatrist
- Serve frail older persons – targeting issue

Comprehensive Geriatric Assessment

"A multidisciplinary evaluation in which the multiple problems of older persons are uncovered, described and explained, if possible, and in which the resources and strengths of the person are catalogued, need for service assessed, and a coordinated care plan developed to focus interventions on the person's problems"

- *NIH Consensus Conference, 1987*

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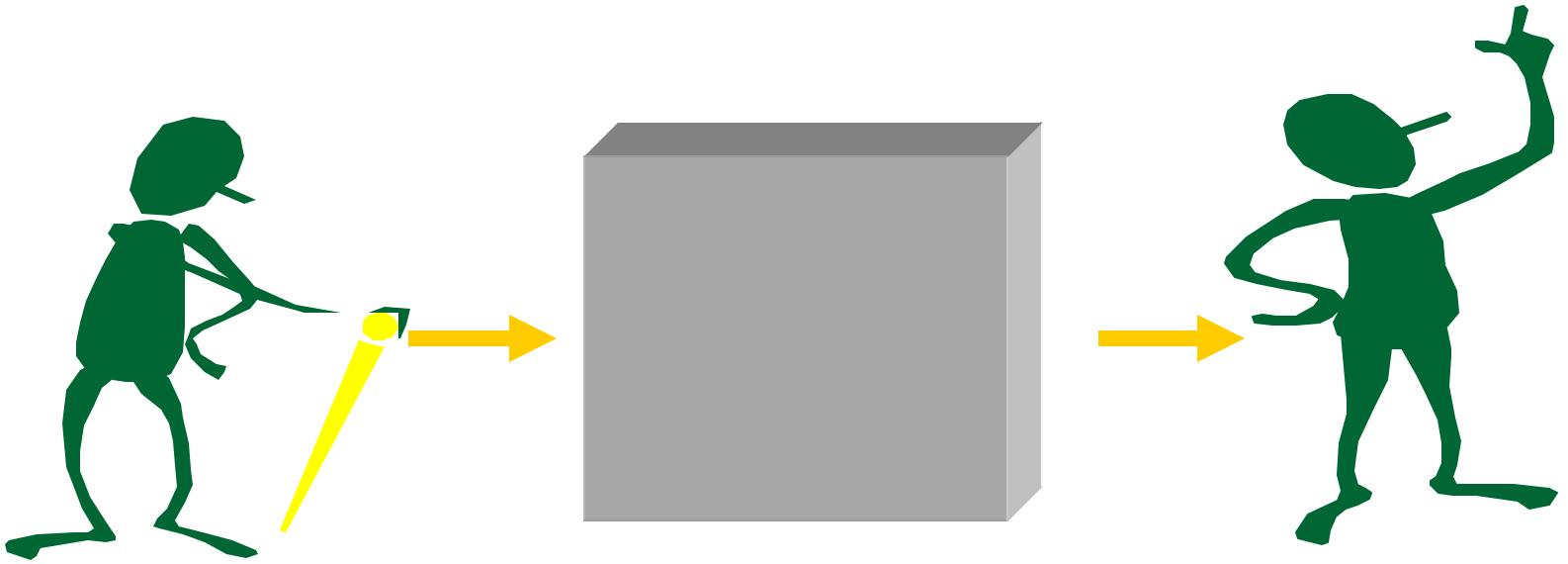
Outcomes of Geriatric Programs

- *Why is it so difficult to demonstrate the outcomes of specialized geriatric services?*

The Challenge of Geriatrics: The Black Box of CGA



-Burns, 1994

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Outcomes of What?

The Black Box

- Settings
- Components & Processes
- Disciplines

- Compared to What?

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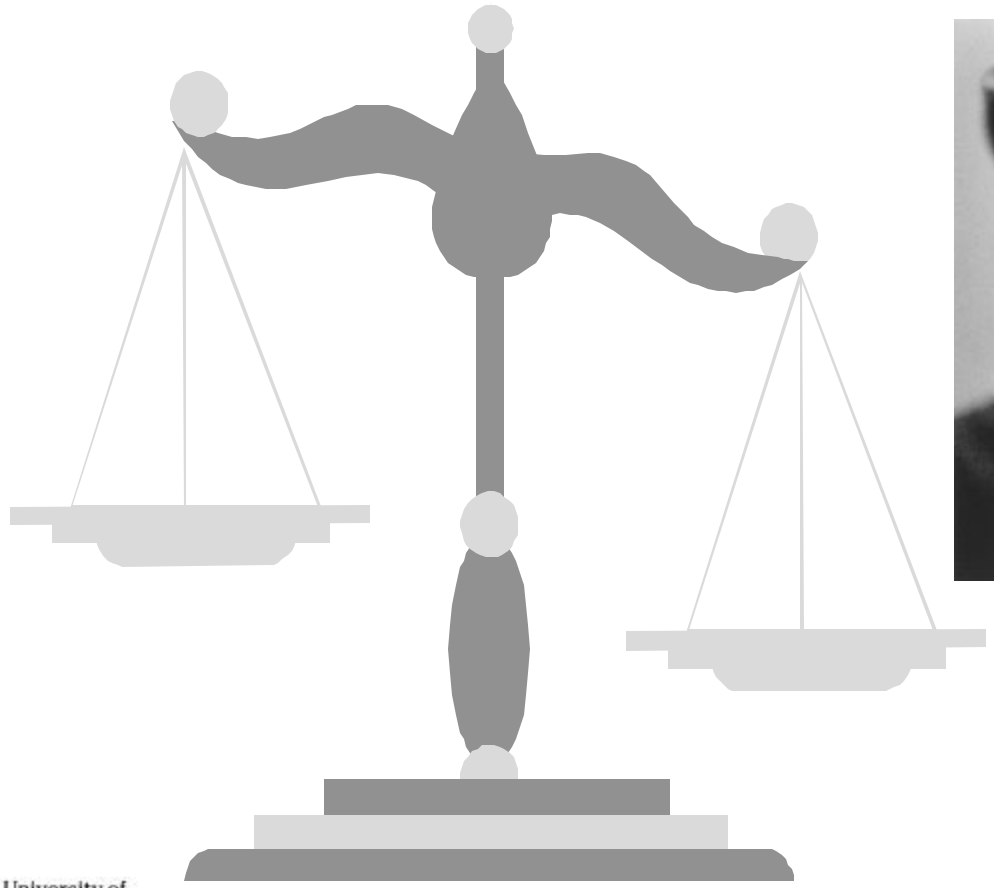
The Challenge of Geriatrics: Targeting Frail Older Persons



Rockwood, Fox, Stolee, et al., CMAJ, 1994

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Frailty is associated with aging, but frail ? old

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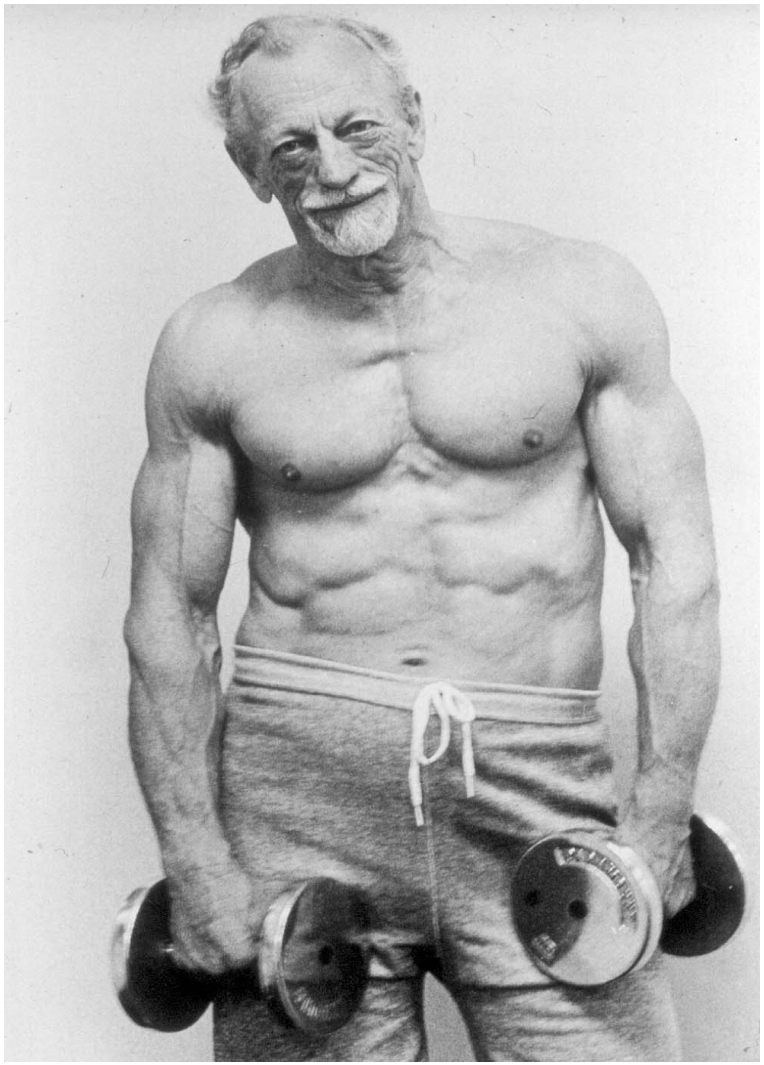

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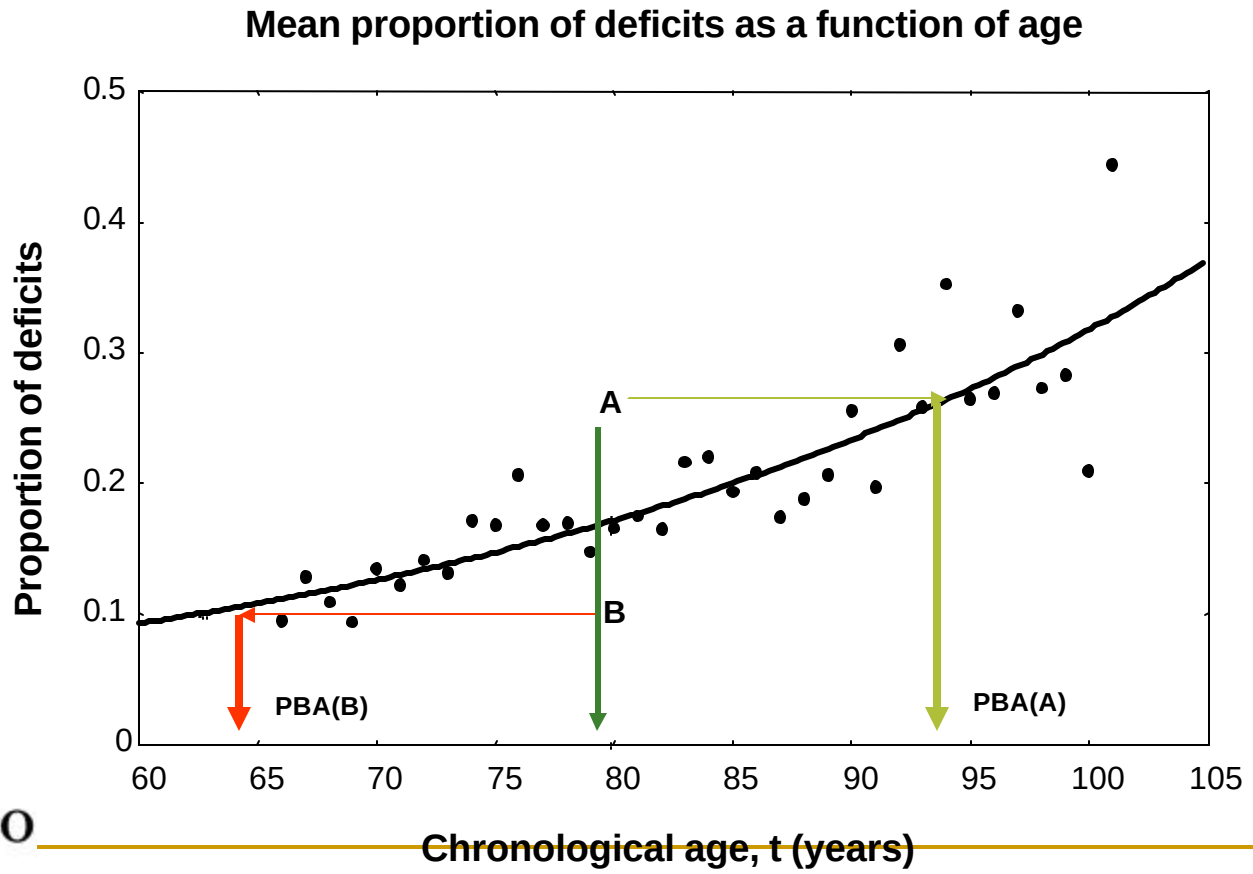
Frailty Index

- Proportion of 40 measured deficits
- Exponential increase with age
- Strong inverse correlation with survival
  - Mitnitski, et al., J Gerontol Med Sci, 2004

Personal Biological Age



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Mitnitski et al. *BMC Geriatrics* 2002;27;2(1)

A Frail Older Person: Mrs. Aasen

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Mrs. Aasen (1)

- 87 years old
- Lives alone in own apartment
- Walking independently
- Homemaking 1X week – bathing & housework
- Fall at MD's office → hip fracture

Mrs. Aasen (2) Comorbidities

- Hypertension many years
- Diabetes 6 yrs – control poor, frequent hypoglycemia
- Small stroke several years ago
- IHD – angina 6 months
- OA hands, knees and shoulder
- Diabetic retinopathy – blind L eye, cataract R eye
- Chronic renal impairment, creatinine 147
- Urinary urgency
- Constipation
- Poor appetite ↓ weight 15 lb 1 year

Mrs. Aasen (3) Medications

- Acetaminophen 500 mg qid
- Beclomethasone aqueous nasal spray
- Codeine 15 mg qid
- Diltiazem CD 300 mg qd
- Ferrous Gluconate 300 mg tid
- Glyburide 5 mg daily
- Nitroglycerin Transdermal 0.4 mg/hr patch
- Pioglitazone 15 mg daily
- Docusate Sodium 100 mg bid
- Senna conc. 8.6 mg 2 daily
- Warfarin 1 mg daily
- 5 PRNs

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Mrs. Aasen (4)

No delirium post-op

MMSE 27/30

Weight 52 kg

Admission FIM: 71/126

Goals:

(1) Walking
(2) ADL and IADL
(3) Stairs
(4) Tub Transfers

New Issues:

(1) Son died shortly after transfer
(2) At risk of depression
(3) UTI and urinary retention
(4) Post-op anemia
(5) Osteoporosis

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Frail Older Persons

- Multiple, complex problems
- Same outcomes not always relevant or feasible for all patients or situations
- Same outcomes can be positive or negative, depending on the patient or situation
- Very small gains can have major clinical or program implications
- Quality of life often more relevant than survival or length of life

Functional Scores in Geriatric Rehabilitation Unit (GRU) and Physical Medicine Rehabilitation Unit (PMRU) In-patients - Knoefel, et al., 2003

	GRUs (n=85)	PMRUs (n=70)	Mean Differ.	Confid. Interval Lower	Upper	p=
Age	81.0	68.5	12.5	9.4	15.6	<0.001
ADM FIM	73.6	82.6	-9.0	-15.6	-2.4	0.008
DC FIM	91.7	107.2	-15.5	-21.9	-9.2	<0.001
FIM Change	18.1	24.0	-5.9	-10.7	-1.1	0.02
Length of Stay	50.8	43.3	7.5	0.6	14.5	0.03
LOS Efficien.	0.37	0.60	-0.2	-0.4	-0.1	<0.001

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Medical Complexity in GRU & PMRU In-Patients - Knoefel, et al., 2003

	GRUs (n=101)	PMRUs (n=100)	Mean Differ.	Confid. Intervals Lower	Upper	p=
TCIRS Admit	12.2	9.3	2.8	1.8	3.9	<0.001
CMI Admit	4.4	3.3	1.1	0.6	1.6	<0.001
# Admit Meds	7.4	6.0	1.4	0.5	2.3	0.003
# Med Changes	14.7	11.1	3.6	0.8	6.4	0.01
# DC Meds	7.8	5.9	1.9	1.0	2.8	<0.001
# Progress Notes	26.3	10.4	15.9	10.4	21.4	<0.001
Rate PNs (/day)	0.51	0.21	0.3	0.2	0.4	<0.001
Lab Test Days	8.5	5.6	2.9	1.3	4.5	<0.001

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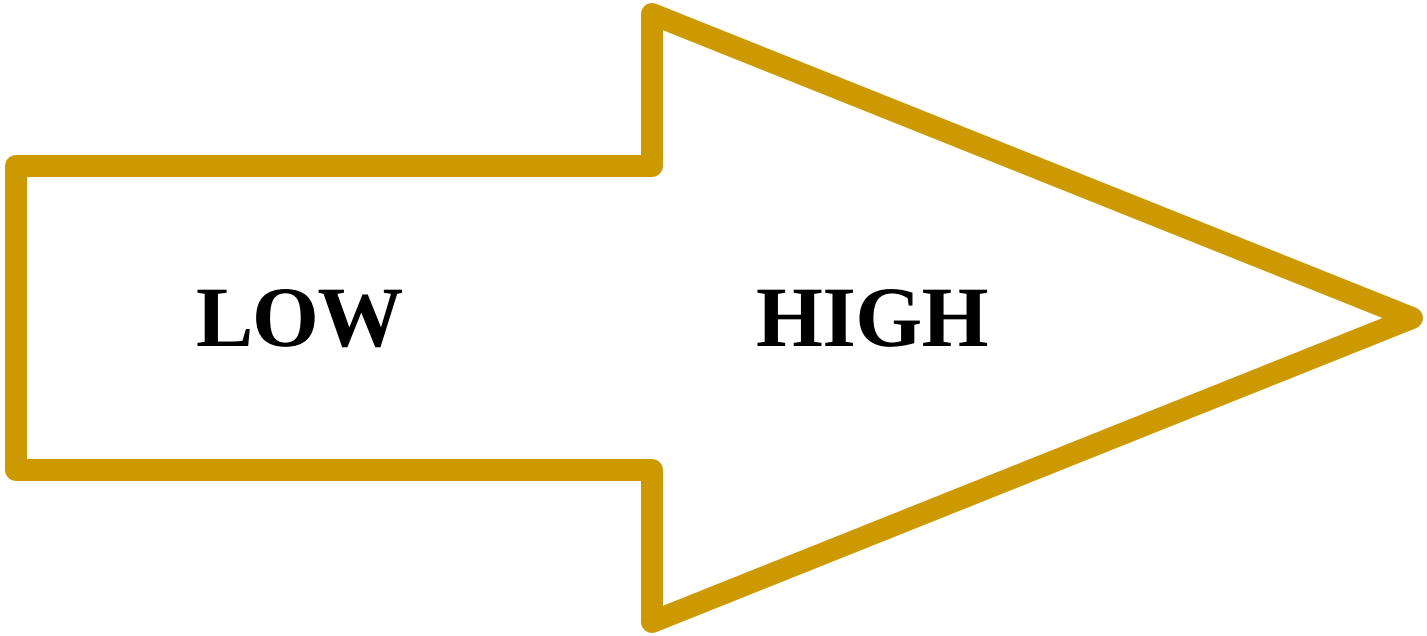
The Challenge of Geriatrics: Inconsistent and Ambiguous Outcomes



Rubenstein & Rubenstein, 1992
Stuck, et al., 1993

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Better Demonstrated CGA Outcomes When…

- Appropriate targeting
- More intensive interventions
- Control over longer-term management: follow-up and implementation of recommendations
- Usual care control group

Which Outcome?

The demonstrated impacts of geriatric programs are greater when appropriate, responsive outcome measures are chosen

The Case of Geriatric Day Hospitals II

- "Commonly used measures of disability may be insensitive to change in the day hospital"
  - Forster, et al., 1999

The Nature of Evidence

- A note about data

- If only we had hard data

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The Trouble with Hard Data: Influences on Health Policy

- Knowledge
- Values and Attitudes
- Institutional Structures

- *Lomas, 1989*

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The Trouble with Hard Data

- The Lake Wobegon Effect

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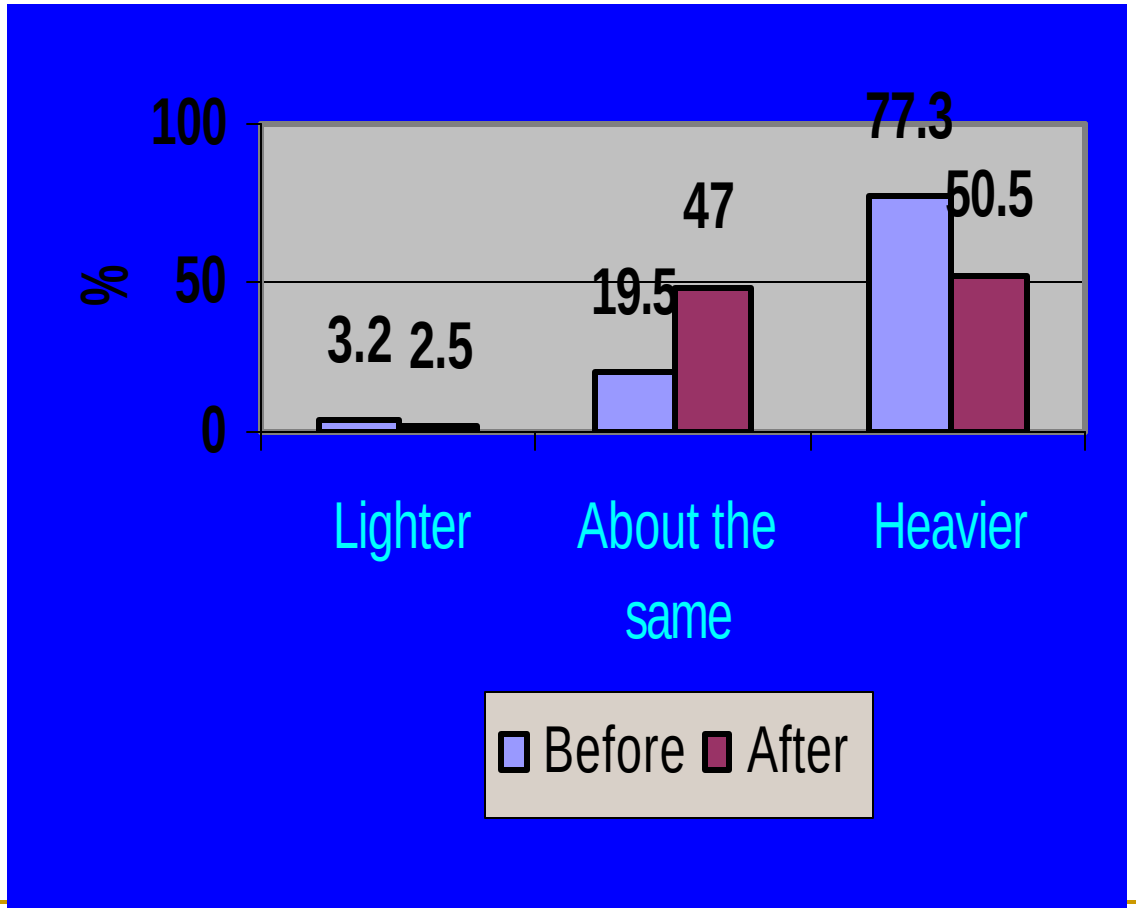
Reduction in Lake Wobegon Effect following P.I.E.C.E.S. training – Rating of "Level of Care" compared with similar facilities



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Hard and Soft Data

- “distinctly human clinical information is often regarded as ‘soft,’ and either omitted or deliberately excluded from the ‘hard’ data of disease that are usually used in ‘scientific’ statistical assessments.” - Feinstein, 1992

What is evidence?

- Scientifically-based information on the effectiveness of interventions and practices, that researchers provide ("transfer") to clinicians and policy makers, that they should apply (?)
  - Stolee, 2005 (a definition he made up for the purposes of this talk)
- A note about "Critical Appraisal"

Guides for reading articles to distinguish useful from useless or harmful therapy I

- Was the assignment of patients to treatments really randomized?
- Were all clinically relevant outcomes reported?
- Were the study patients recognizably similar to your own?

  - Sackett et al., Clinical Epidemiology, 1985

Guides for reading articles to distinguish useful from useless or harmful therapy II

- Were both clinical and statistical significance considered?
- Is the therapeutic maneuver feasible in your practice?
- Were all patients who entered the study accounted for at its conclusion

  - Sackett et al., Clinical Epidemiology, 1985

Studies of Geriatric Mental Health Outreach Programs meeting these 6 criteria:

Evidence (from CHSRF workshop, 2004):

- Is a lot more than research, and it includes a lot of contextual information
- Types of evidence (from Rudolf Klein):
  - Research evidence: produced by accepted research methods
  - Organizational evidence: an organization's capacity to complete the tasks
  - Political evidence: how key public, politicians and other players react to policies, affecting chances of success

Evidence-Based Medicine (or Practice)

- “the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”
  - Sackett, et al., Evidence-Based Medicine, 1997

The Practice of EBM – the next sentence

- "The practice of evidence-based medicine means integrating *individual clinical expertise* with the *best available external clinical evidence* from systematic research"
  - Sackett, et al., Evidence-Based Medicine, 1997

Individual clinical expertise:

- “The proficiency and judgment that individual clinicians acquire through clinical experience and clinical practice.”
  - Sackett, et al., Evidence-Based Medicine, 1997

Best available external clinical evidence:

- “Clinically relevant research, often from the basic sciences of medicine, but especially from patient-centred clinical research”
  - Sackett, et al., Evidence-Based Medicine, 1997

Evidence-Based Practice

- “is based on a self-directed learning model, whereby practitioners must not only continue learning but also continue evaluating their techniques and practice in light of this learning to see what can be improved.”
  - Law, Evidence-Based Rehabilitation, 2002

Practical Wisdom and The Practical Syllogism (with apologies to Aristotle)

- Syllogism:
  - All horses have four legs
  - Seabiscuit is a horse
  - Seabiscuit has four legs

- Practical Syllogism
  - Geriatric rehabilitation is effective for frail older persons with hip fracture (the desired end)
  - Mrs. Aasen is a frail older person with a hip fracture (the particular situation)
  - I will undertake geriatric rehabilitation with Mrs. Aasen (an action to be taken)

Practical Wisdom and The Practical Syllogism II (more apologies to Aristotle)

- Knowledge is incomplete outside its practical application

- Therefore suggest: Knowledge IN Practice rather than Knowledge Transfer TO Practice

Evidence-Based Practice requires:

- An appropriate context: organizational and political support, AND
- Evidence-based methods and tools, AND
- Clinical expertise, judgement and reflective practice AND
- An integration of “hard”, scientific data and “soft”, clinical information and judgement.

Evidence and knowledge in practice:

- Evidence is often not used in clinical practice
  (Grol, Grimshaw, 2003; Bero, Grilli, Grimshaw et al, 1998)
- Not a problem of lack of information
  - A proliferation of evidence-based resources
- Knowledge translation models often
  - Reflect the vantage point of researchers, not clinicians
  - Refer to the need for interactions between researchers and clinicians, but emphasize “transfer” activities

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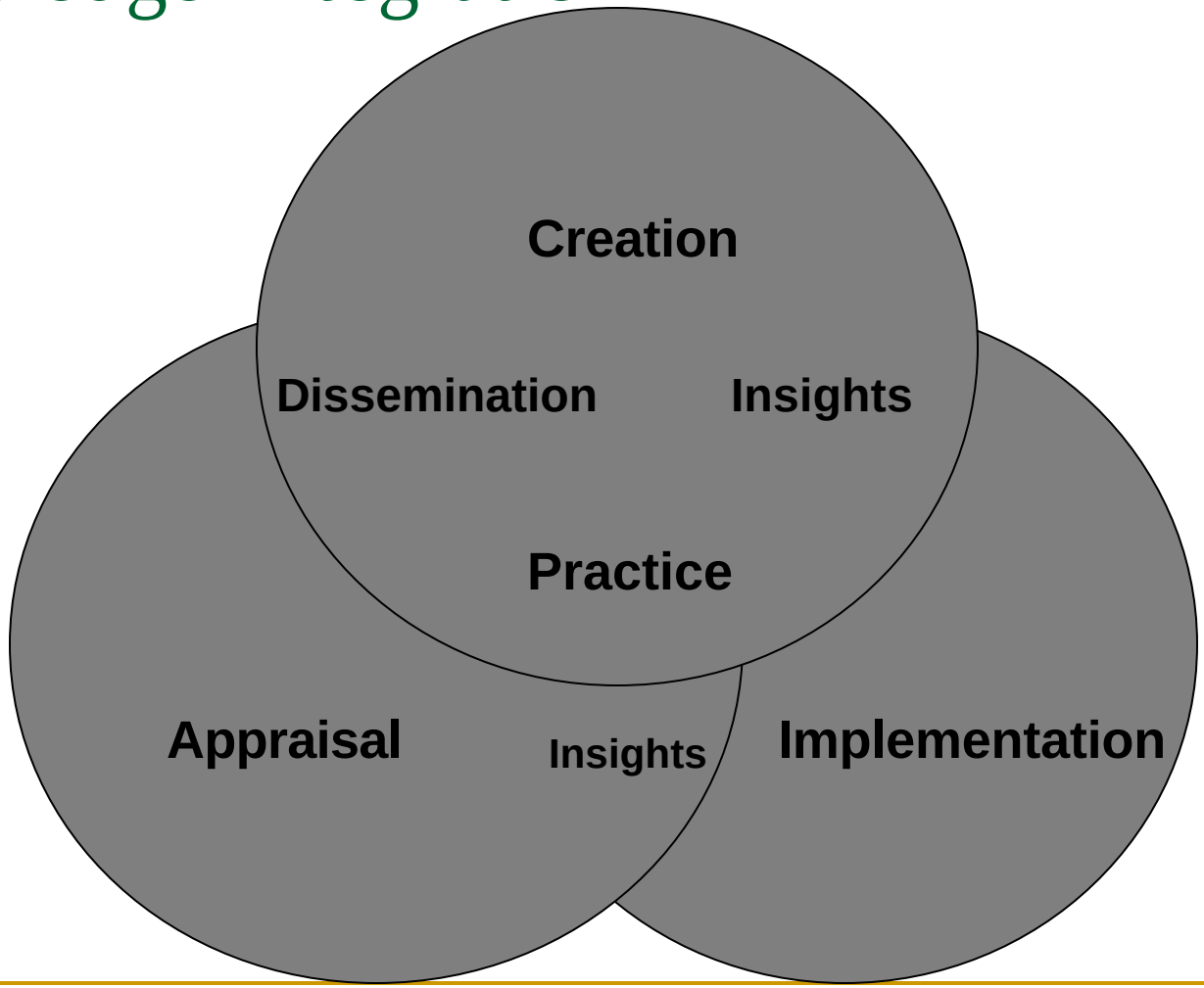
Beyond Knowledge Transfer: A Model of Knowledge Integration



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- Gauthier, Ellis, Stolee, 2003

“Knowledge begins in experiences”

- Johann Pestalozzi (1746-1827, Swiss educational reformer quoted in orientation session for my son’s kindergarten)

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“Knowledge begins in experiences”

- Immanuel Kant

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“Knowledge begins in experiences”

- John Locke

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“Knowledge begins in experiences”

- Karl Marx

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"Conceptual thinking is built on visual understanding; visual understanding is the basis of all knowledge."

- Johann Pestalozzi

http://www.visualcare.co.za/los.htm, retrieved June 6, 2005

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Evidence-Based Assessment and Outcome Measurement in Geriatrics

- A clinical priority
  - Assessment, treatment and care planning
  - Outcome evaluation
  - To guide practice
- A policy and planning priority
  - Benchmarking
  - Resource allocation
- A research priority

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Research Priorities for Geriatric Rehabilitation

- Canadian Consensus Workshop on Geriatric Rehabilitation
  - May, 2003, Ottawa, 75 participants
  - Major theme of research priorities: assessment tools, outcome measures, information systems

  - Stolee, Borrie, Cook, & Hollomby, et al. Geriatrics Today: J Can Geriatr Soc 2004; 7:38-42

Research Priorities for Alzheimer Disease and Related Dementias

- Ontario Consensus Workshop
  - March 31-April 1, 2005, Toronto, 50 participants
  - Identified priorities included: Clinically relevant outcome measures, and research to identify these measures

How to measure outcomes of geriatric programs?

- Look for the “Gold Standard”
- Measure Everything
- Select Standardized Measures

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The Quest for the "Gold Standard"

"We fail to have a Gold Standard...Because no one has made it his or her primary objective to develop a Gold Standard either for measures of health status or for measures of quality of life...I believe Marilyn Bergner and her co-workers have a sufficiently long head start that they deserve support from all the rest of us."

- *Spitzer, 1987*

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The Quest for the “Gold Standard”

“The bitter truth is that there is no gold standard,
there is unlikely ever to be one,
and it is unlikely to be desirable to have one.”

- *Bergner, 1989*

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Working Group Recommendations: Measuring Outcomes in GEM Units

- Physical: 12 Outcomes
- Psychological & Social Functioning: 3 Outcomes
- Health Care Utilization & Cost: 17 Outcomes

-*JAGS, 1991*

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Two-Person Transfer to One-Person Transfer

- Barthel Index
- Katz Index
- FSI
- FIM

- No distinction
- No distinction
- More dependent if require equipment
- Scored on degree of assistance

AD Patients & Caregivers have said they want to...

- “Remember names of friends”
- “Do small repairs around the house”
- “Remember the contents of books and what people tell me”
- “Find the bathroom”
- “Tell jokes”

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AD Patients & Caregivers haven't said they want to...

- Spell WORLD backwards
- Copy intersecting pentagons
- Tap each shoulder twice with 2 fingers keeping their eyes shut
- Point to the large red square and the small yellow circle
- Say how a fly and a tree are alike
- Name animals starting with "S"

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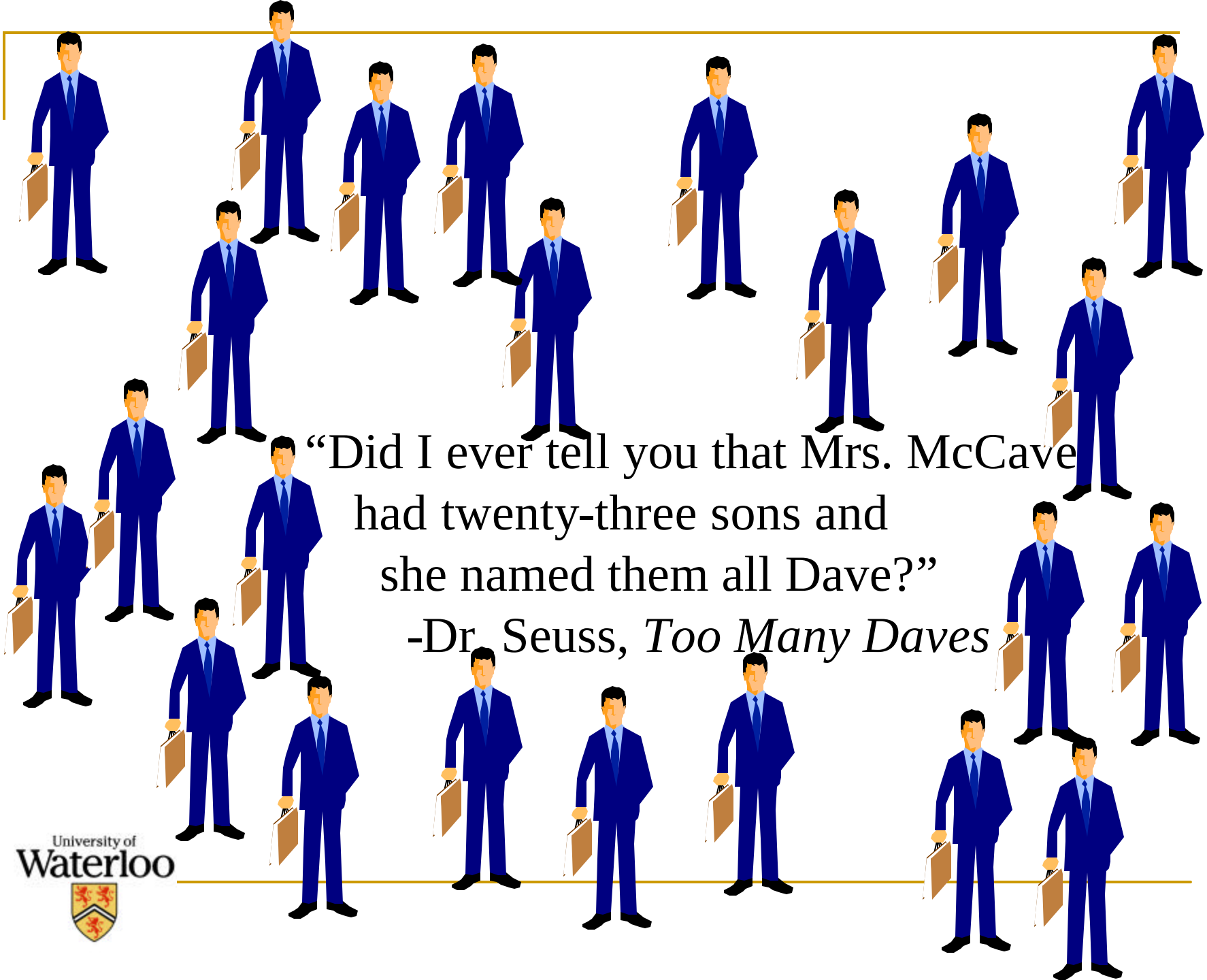

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Goal Attainment Scaling

- Developed by Kiresuk and Sherman in 1968
- Key Features:
  - 5-Point Scale of Individualized Potential Outcomes
  - Summary Goal Attainment Score
- Research and Clinical Applications

Sample GAS Guide

Attainment Levels	**Mobility**	**Discharge Planning**
Much less than expected (-2)	Chairfast	On rehab unit > 6 weeks ✓
Less than expected (-1)	Walks ~ 5 metres with walker ✓	Discharged to nursing home
Expected level (0)	Walks ~ 10 metres with walker, 3 weeks *	Home with daily home support, 4 weeks
Better than expected (+1)	Walks ~ 20 metres with walker	Home with home support, 2-3 times/week *
Much better than expected (+2)	Mobile inside house with cane, walker modest distance outside	Home with weekly home support
Comment		Patient does not wish nursing home placement

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The Goal Attainment Score

$$\text{GA SCORE} = 50 + \frac{10 \sum (w_i x_i)}{\sqrt{.7 \sum w_i^2 + .3 (\sum w_i)^2}}$$

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GAS: A Psychometric Perspective

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Measurement Properties Of GAS

Reliability:

- GAS Score: ICC= .93
- Goal Attainment Levels: ICC= .89

Validity:

	r_s with GAS	DC
BARTHEL	.60	.66
QL-INDEX	.48	.54

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Responsiveness: Geriatric Rehab Unit, Parkwood Hospital, London

Measure	SRM	ES
FIM	**0.79**	**0.69**
QL-Index	**0.78**	**0.79**
GAS	**1.71**	**5.30**

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GAS: A Clinimetric Perspective

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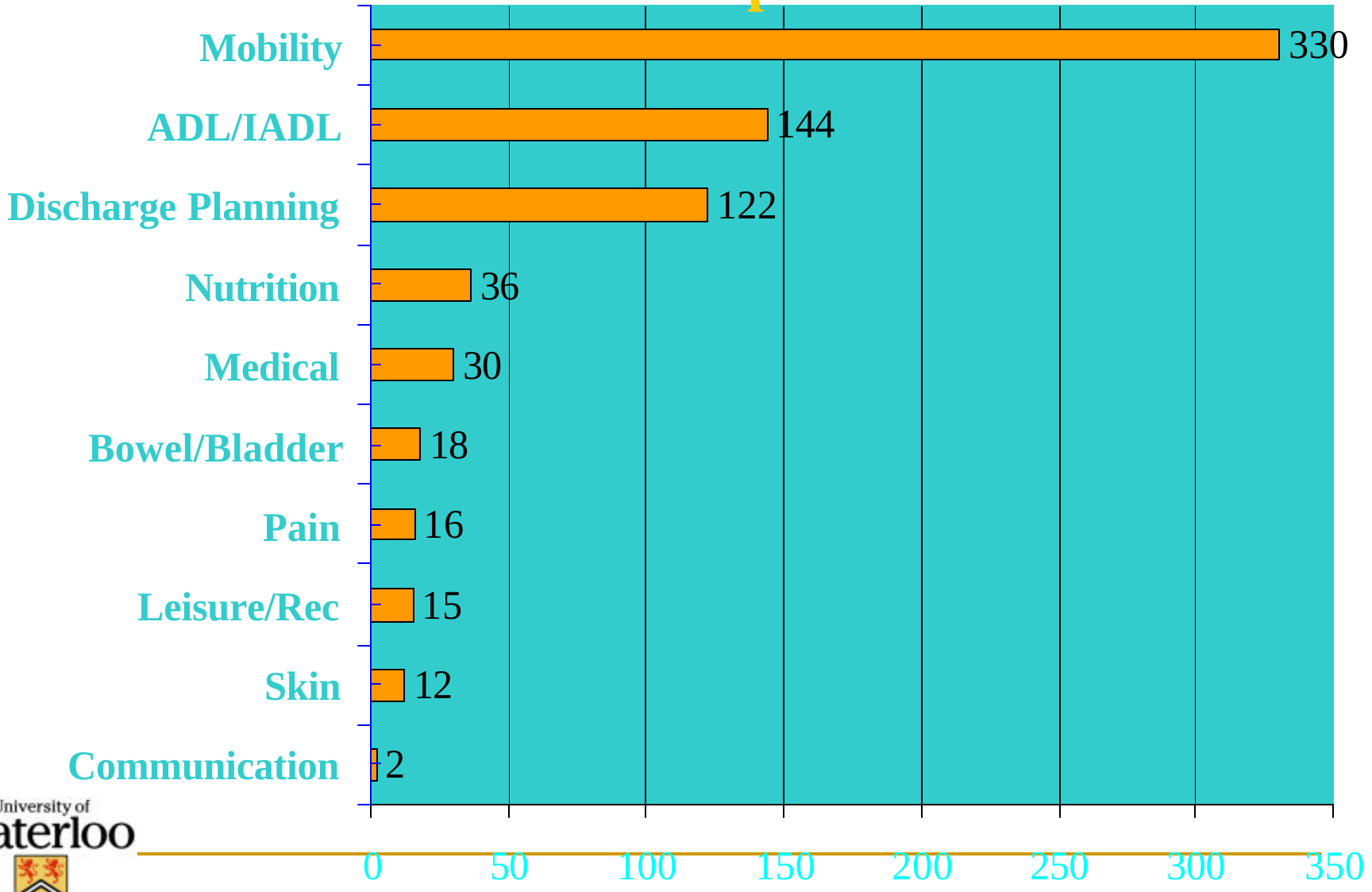
GAS Goals: Geriatric Rehab Unit, Parkwood Hospital



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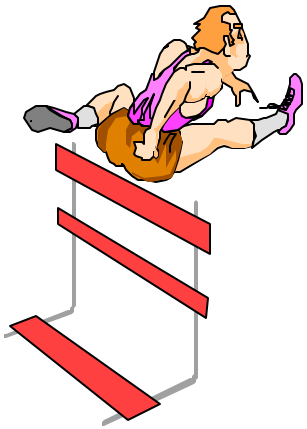
Mobility



- Supervision with walker > independent with walker, 2-3 weeks
- Assist x 1 for transfers > independent transfer, 2 weeks
- Unable to do stairs > stairs with assistance, 2 weeks

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The Argument for Standardization

- “To note the advantages of standardized measures, it is necessary to compare them with what would be left if they were not available...what would be left would be subjective appraisals, personal judgments, or whatever one would want to call the intuitive processes involved.”

  - Nunnally, 1978

The Argument for Individualization

- provide valuable clinical information ("soft data") on what outcomes are important to patients and relevant to specific interventions
- can be a framework for patient-centred care
- can reflect individual preferences and values (more "soft data"), and therefore can be used in QL measurement
- each patient can define their own gold standard
- can meet clinimetric criteria and have acceptable psychometric properties
- responsive to change

A Clinimetric Evaluation of a Mobile Geriatric Assessment Team

- Intervention patients showed significantly greater improvement in outcomes measured by Goal Attainment Scaling (primary outcome measure) in a randomized controlled trial
- No significant difference in any of the standardized measures tested
  - Rockwood, et al., 2000

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The Case of Geriatric Day Hospitals III

- Pilot study underway on feasibility of Goal Attainment Scaling in six Geriatric Day Hospitals affiliated with the Regional Geriatric Programs of Ontario

A Challenge for Health Informatics

- Clinical decision support tools and information systems that accommodate individual clinical expertise and judgment as well as external clinical evidence
- Linking Hard and Soft Data

Hard Data meet Soft Data

Magnetic Resonance Imaging and Individualized Markers of Mild Cognitive Impairment

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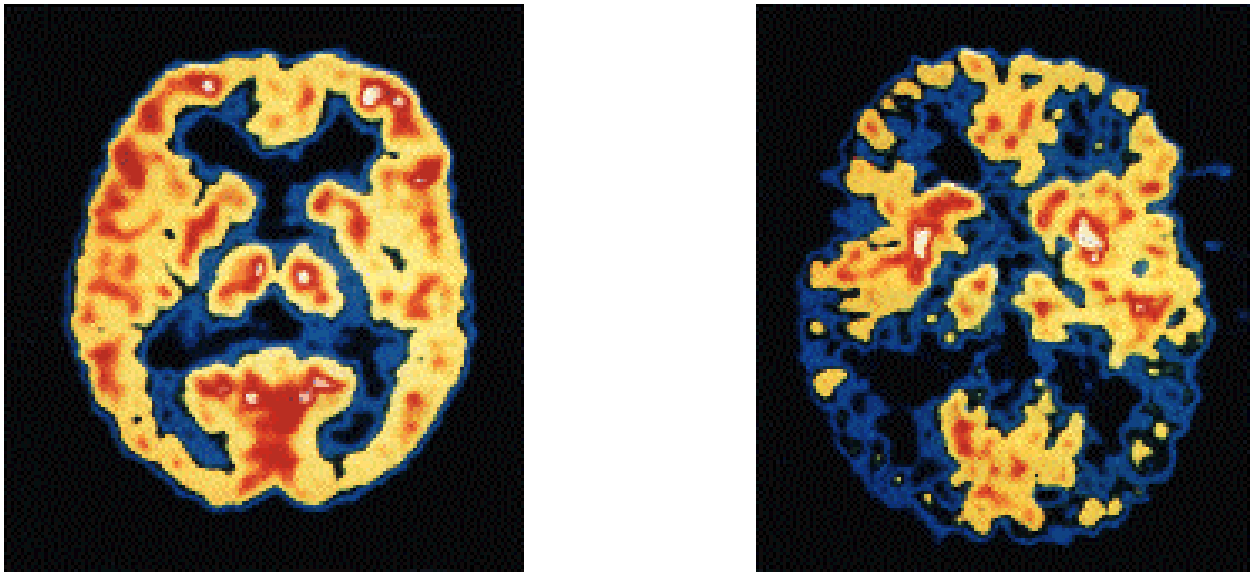
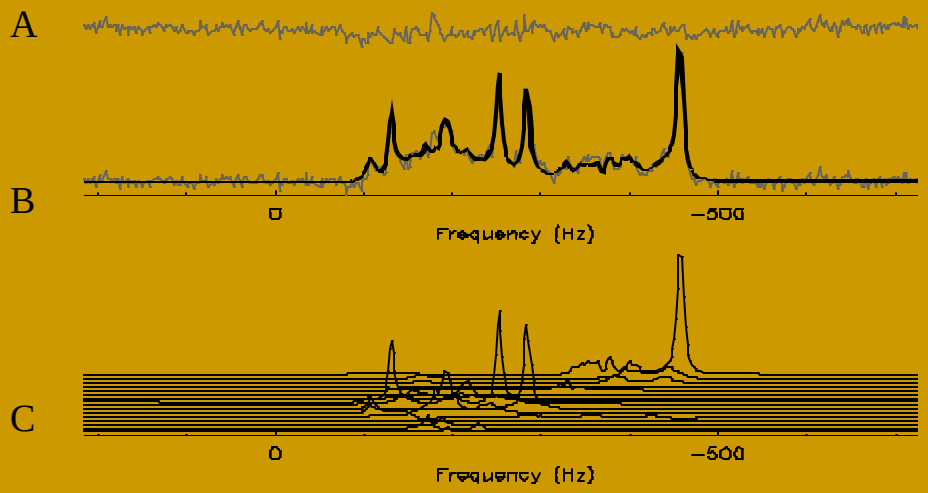
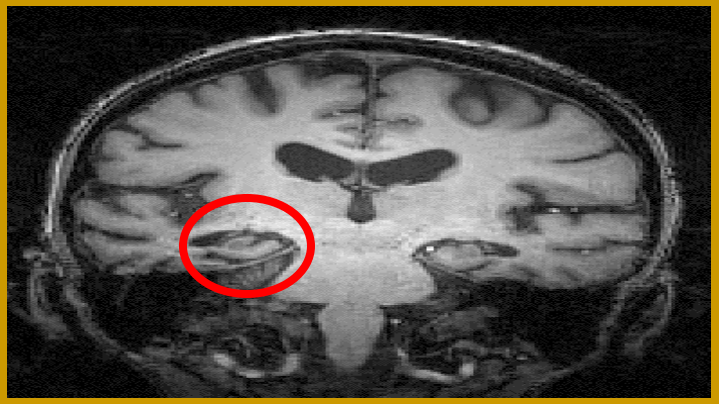
Brain Metabolism in Alzheimer's Disease



PET scans show differences in brain activity between a normal brain (left) and a brain affected by Alzheimer's disease (right). Blue and black denote inactive area s.



4 Tesla in-vivo ^{1}H short echo-time fit spectrum (B) with fit spectrum superimposed (dark line in B). The residual of the fit is shown above (A) and individual metabolite components are shown beneath (C).



Inversion prepared T_1-weighted anatomical image (1.25 mm thick) acquire perpendicular to the hippocampus at 4T in and early stage Alzheimer's patient

Future Directions – Individualized Markers

- Clinically relevant benchmarks
- Patient-centred – measures how MCI manifests itself in each patient
- A method of accounting for the clinically heterogeneous presentation of MCI
- Allows for comparison of change between patients and within individual patients
- A statistical approach for measuring subtle clinical change over time

Mr. Ericson – Individualized Markers

61 year old male

MMSE=29/30

ADAS=5/70

CDR=0.5 Uncertain

Identified marker by spouse:

- Filing of papers

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Mr. Ericson – Individualized Markers

Filing of Papers

+2	Precise filing of documents
+1	Misplaced 2 x month
0	Misplaced 4 – 5 x month (baseline)
-1	Misplaced 3 – 4 x week
-2	Misplaced all of the time

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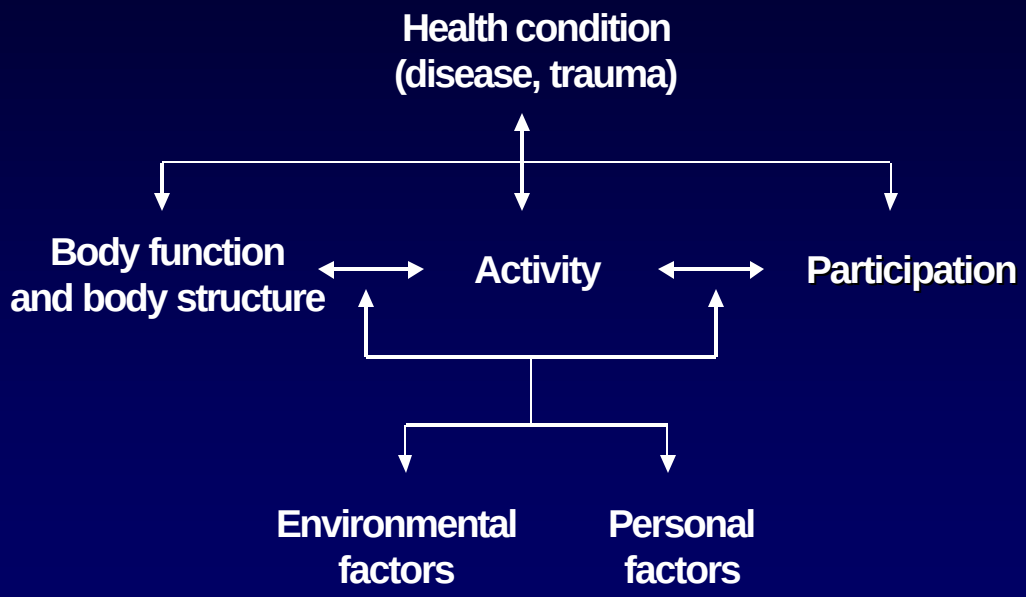
Hard Data meet Soft Data

- Individualized measurement within standardized conceptual framework and consistent terminology

The biopsychosocial model of functioning and disability



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The ICF and Outcome Measurement and Information Systems

- Potential use in formal terminologies for clinical records and reporting systems (Harris, et al., 2003; Ruggieri, 2004)
- Potential for incorporation into Electronic Health Records (Mayo, et al., 2004)

GAS and the ICF

Type of GAS goal	ICF component
Mobility	Activities/Participation
Discharge Planning	Environmental Factors
ADL/IADL	Activities/Participation
Bowel/Bladder	Body Functions/Structures
Medical	Body Functions/Structures

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Advantages of ICF in Geriatric Care

- Standard language for communication within multidisciplinary teams and across settings
- Comprehensive guide to goal-setting
- Potential for standard coding system for both standardized and individualized measures
  - Currently being explored for GAS goals
    - Maintain individualized nature?
  - Cross-walking methodology
    - Collaboration with Dr. Nancy Mayo, McGill University

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Use of Soft Data in Geriatric Research and Practice

- Individualized measures such as GAS can provide a systematic approach for the use of "soft" clinically meaningful data in care planning and outcome measurement
- Soft data processes, such as GAS, give insights into the goals, processes and outcomes of the black box of geriatrics

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Use of Soft Data in Geriatric Research and Practice

- Value of clinically-informed soft data illustrates the importance of clinician engagement in the creation, appraisal and implementation of evidence in practice
- There are exciting possibilities in the linkage of hard data (such as neuroimaging biomarkers) with soft data (such as GAS or other individualized markers)

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Use of Soft Data in Geriatric Research and Practice

- A valuable role in answering the hard questions of evidence-based practice in geriatric care