

 Canadian Stroke Network
Réseau canadien contre
les accidents cérébrovasculaires


**Measuring the Outcomes of
Stroke Rehabilitation**


*Results of a Canadian Stroke Strategy/Heart and
Stroke Foundation National Consensus Panel*

 Networks of Centres
of Excellence
Réseaux de centres
d'excellence

canadianstrokenetwork.ca accidentscerebrovasculaires.ca

 Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires

 Networks of Centres
of Excellence
Réseaux de centres
d'excellence

 HEART
AND STROKE
FOUNDATION
OF ONTARIO

Objectives

By the end of this presentation should be able to:

1. Identify three reasons for selecting a core set of rehabilitation outcome measures for Canada
2. Name psychometric issues that must be considered when selecting responsive outcome measures
3. Name some important consensus based measures of Stroke Rehabilitation outcomes using the International Classification of Functioning framework
4. Recognize stroke rehabilitation system performance indicators that could be used at their organization




Partners

- **Canadian Stroke Network**
- **Canadian Stroke Strategy**
- **Heart and Stroke Foundation of Ontario**



Planning Group

- **Mark Bayley**
- **Patty Lindsay**
- **Nicol Korner Bitensky**
- **Johanne Desrosiers**
- **Alison MacDonald**
- **Sharon Wood-Dauphinee**
- **Robert Teasell**
- **Katherine Salter**
- **Jeff Jutai**
- **Laurie Cameron**
- **Nancy Deming**




Why an expert panel?

- Evidence from a survey of wide variability in use of outcome tools and assessment measures
- Stroke Rehabilitation Evidence Based Review has identified a large number of assessment tools used in stroke
- Canadian Stroke Strategy- Evaluation of the status of stroke care in Canada
- Stroke Rehabilitation services could be enhanced by use of standardized outcomes to identify professional training needs, lack of resources and other systemic issues.




Objectives of the Consensus panel

1. Using the International Classification of Functioning to prioritize a set of outcome measures in the domains of body structure and function, activity and participation that could be used to evaluate the outcomes of stroke rehabilitation in Canada
2. Identify preliminary indicators of performance of of stroke rehabilitation process



Background Information


- Considerations for selecting Responsive Outcome Measures
- International Classification of Functioning
- Overview of Findings from Stroke Rehabilitation Evidence Based Review
- Survey of Canadian Clinicians



Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires

Considerations for Selecting Responsive and Interpretable Outcome Measures


Your stroke team indicates they want to measure the outcomes of their patients. What are the considerations in selecting measures?



Ideal Measures for Outcomes


You need a well developed **evaluative** measure with strong psychometric properties for use in clinical practice.

- An **evaluative** measure assesses an individual or group at baseline and again at one or two points, usually to determine if change has occurred. **It needs to be responsive to reflect change in patient status when it occurs.**



General Considerations

- Is there a cost associated with use of the measure?
- How long does it take to complete / administer the measure?
- How much equipment is required?
- Is the measure available in the language of the patient?
- Can it be completed by a proxy (family member, health professional)?




Consider the Content of the Measure

- On inspection, does the measure look as if it includes all important areas?
 - Determine how it was developed; who contributed?
- Do the items look appropriate for your patients and **do you think that most patients will change on many items?**
 - Check the response options: VASs; dichotomous; several ordinal categories. How many is enough? This has impact on reliability and responsiveness.




What are important Psychometric properties of Measures?



Reviewing Reliability


- Reliability: the degree to which –
 - A measure is free from random error
 - The observed score is different from the true score



Types of Reliability


- **Stability – test-retest (longitudinal)
- Inter- and Intra-rater

Assessed by correlation coefficients: Cronbach's alpha, Intra-class Correlation Coefficient (ICC), Kappa or Weighted Kappa (K or WK) etc.




Verifying Validity

- **Validity:** the extent to which a measure really measures what it claims to measure
- Reflects an absence of both random and systematic error (bias)
- Not an all or none property –rather a matter of degree



Types of Validity

- Content
- Criterion-Related
 - Concurrent (SIS; FIM, Barthel; SF-12; SF-36)
 - Predictive (BBS; falls)
- Construct
 - Convergent (RNL; QOL)
 - Discriminant (divergent) (Zung; MCS & PCS)
 - *Known Groups (discriminative)
 - *Longitudinal (correlate change scores)



Responsiveness

- What is it? Unlike reliability and validity it is not a traditional psychometric property.
- How is it defined? Many ways / no consensus.
- How is it evaluated? Even more ways.


Terwee et al Qual Life Res 2003;12:349-62

- How should it be reported? Quantitatively.
- How should it be interpreted? Two main approaches.



What are we trying to measure?


- **Meaningful change** – to patient, to health professional, to payer
- **Minimal Clinically Important Difference (MCID) (MID)**



Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires


Networks of Centres
of Excellence
Réseaux de centres
d'excellence

HEART
AND STROKE
FOUNDATION
OF ONTARIO



- Minimal Clinically Important Difference (MCID) (MID)
 - “the smallest difference in score in the domain of interest which patients perceive as beneficial.....”

Jaeschke et al. Controll Clin Trials. 10:407-15, 1989




Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires

Networks of Centres
of Excellence
Réseaux de centres
d'excellence

HEART
AND STROKE
FOUNDATION
OF ONTARIO


Interpretation of Change

- Interpretability means the capacity to assign a qualitative meaning to a quantitative score.
 - Ware & Keller. Quality of life and Pharmacoeconomics in Clinical Trials, Lippencott Raven, 1996:445-60.
- This score can be at a single point in time or one that reflects change over time.



Today we have estimates of MCID values for many measures but few for stroke measures*

- *Berg Balance Scale (0-56) 6 points
- *2 minute Walk Test 19 m
- Lower Ext. Functional Scale (0-80) 9 points
- *Box and Block Test 7 blocks
- *6 Minute Walk 54m (95% CI 33-71m)
- *SF-36: 8 Scales (0-100) ~3-6 points
- *Sickness Impact Profile (0-100) ~3-5 points
- *Stroke Impact Scale (0-100) ~10-15 points



Summary

- Need to consider all the factors
 - Reliability
 - Validity
 - Responsiveness

Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires

Networks of Centres
of Excellence
Réseaux de centres
d'excellence

HEART
AND STROKE
FOUNDATION
OF ONTARIO

What domains should we measure in Stroke patients?


Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires

Networks of Centres
of Excellence
Réseaux de centres
d'excellence

HEART
AND STROKE
FOUNDATION
OF ONTARIO


International Classification of Functioning (Health condition)

```
graph TD; BF[Body Functions & Structure] <--> A[Activity]; A <--> P[Participation]; E[Environmental Factors] <--> PR[Personal Factors]; A <--> BF; A <--> P; E <--> PR; A <--> Top[ ];
```



ICF Brief Core Set for Stroke

• ICF component	ICF code	• ICF category title
• Body functions	b110	• Consciousness functions
	86 b114	• Orientation functions
	82 b730	• Muscle power functions
	75 b167	• Mental functions of language
	50 b140	• Attention functions
	25 b144	• Memory functions
• Body Structures	s110	• Structure of brain
	7 s730	• Structure of upper extremity
		• Structure of Lower extremity




ICF Brief Core Set for Stroke

Activities and participation	<ul style="list-style-type: none"> • Walking • Speaking • Toileting • Eating • Dressing • Communicating-receiving spoken messages
Environmental Factors	<ul style="list-style-type: none"> • Immediate Family • Health Care providers • Health Care System




What measures are commonly used in the literature?




Stroke Outcome measures in SREBR

- 1968-2004 Total number of outcome citations = 1105
- Large number of authors created own study specific outcomes = 175
- Physical assessments not using a single standardized scale = 178 citations
- Citations of previously published scales= 752
- Only 35 previously published assessment scales were cited 5 or more times

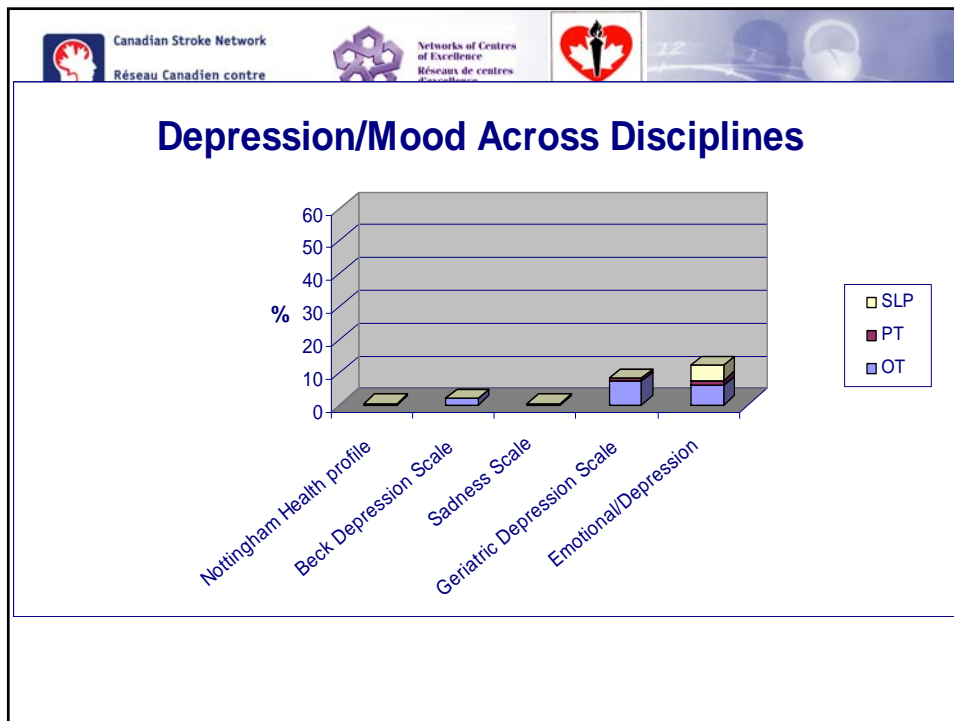
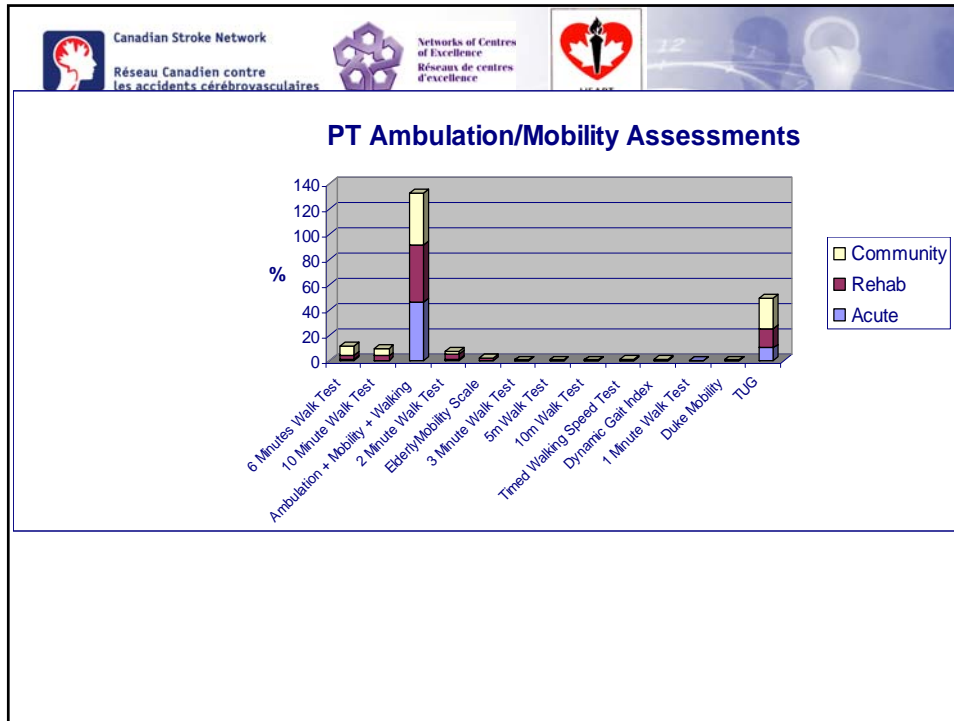


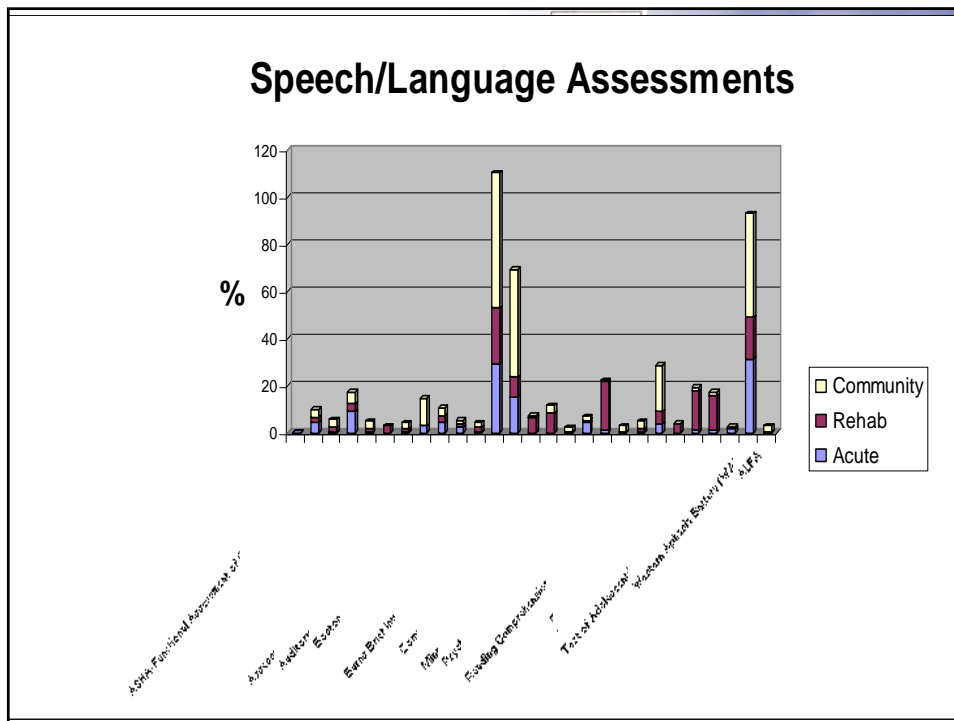
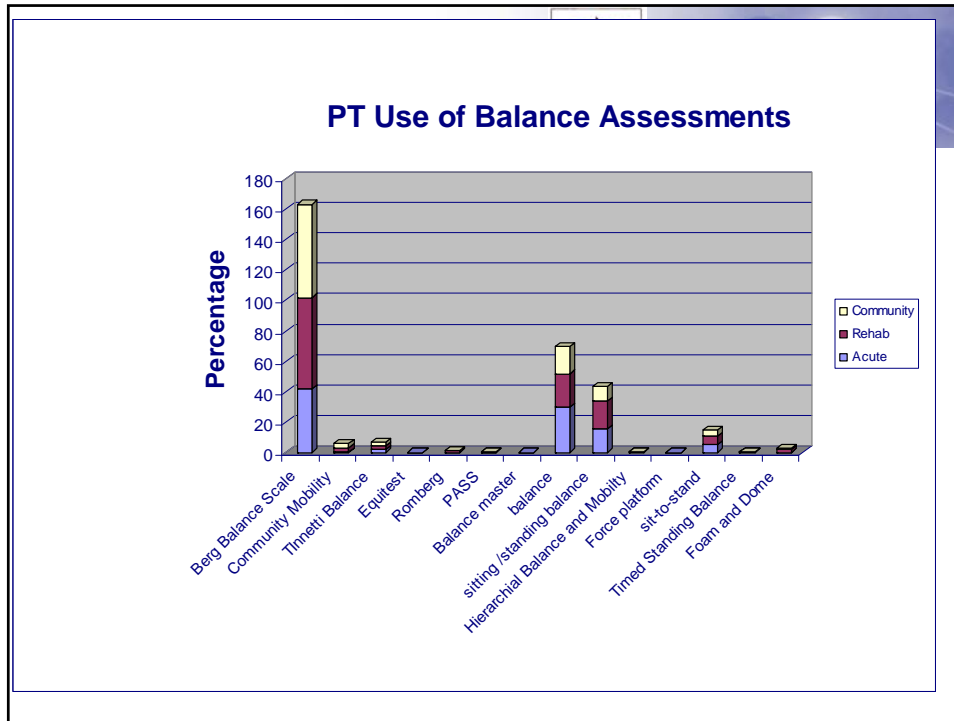
Most often cited outcomes 1968 - 2004	No. of citations
BI	98
Timed walk assessments (varying times & distances)	44
Fugl-Meyer Assessment of Stroke Recovery	38
FIM	29
Modified Ashworth Scale	23
Nottingham EADL	19
Nottingham Health Profile	16
MMSE	15
Frenchay Activities Inventory	15
SF-36	15
Motor Assessment Scale	14
HADS	12
Action Reach Arm Test	12
Rankin Handicap/modified Rankin/Oxford Handicap	11
GHQ-28	10
Rivermead Mobility Inventory	10
Motricity Index	9
HRSD	9
PICA	9
Berg Balance Scale	9
9-hole peg test	9
Scandinavian Stroke Scale	8
Brunnstrom scale	7

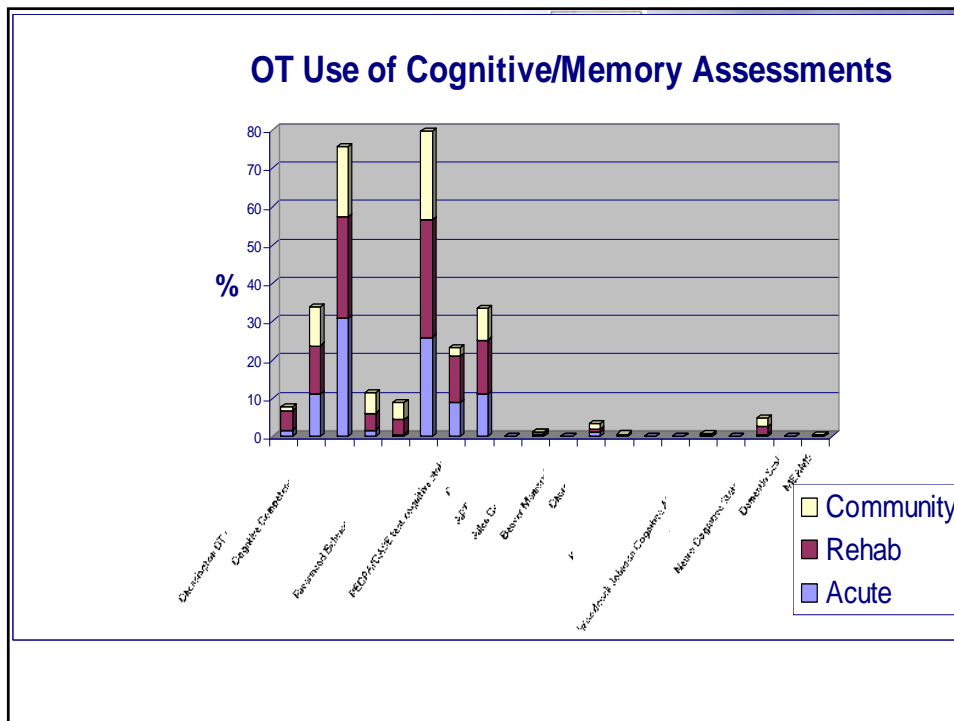
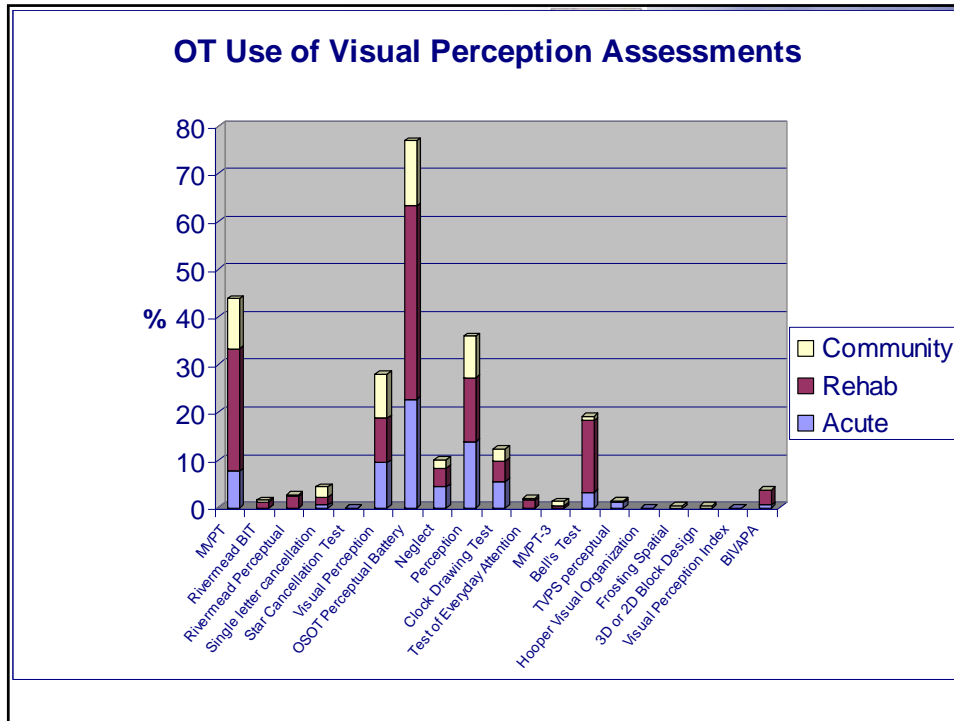



What measures are Canadian Clinicians using?

- Nicol Korner Bitensky et al surveyed about 1800 rehabilitation clinicians in Canada by telephone
- Asked to answer scenarios concerning typical stroke patients
- Asked about what measures they used









Summary of Survey findings

- Inconsistent use of measures
- Frequently used only at admission and not at discharge
- Not necessarily using measures tested for responsiveness




Consensus Panel Principles for selection

- Tried to select measures that worked across the continuum
- Can be interprofessional administration
- Can be administered in reasonable time at beginning and end of Rehabilitation
- Minimize cost of training
- Ideally available in English and French.




Consensus Process

- Divided panel into small groups
- Technique de Recherche D'Information par Animation d'un Groupe D'experts (TRIAGE) by Desrosiers was used
- all the proposed tools are written on cardboard cards
- *a number of headings are placed on the wall including MEMORY, CANDIDATES,, WASTE BASKET, REFRIGERATOR, VETO AND SELECTION.*
- Sort the tools into the categories and narrow the selections




Summary of Body, Function and structure Tools

- Measures of Stroke Severity-
 - Orpington or NIHSS
- Medical Comorbidities
 - Charlson
- Upper Extremity Structure and Function-
 - Chedoke McMaster Stroke Assessment
- Lower extremity-
 - Chedoke McMaster Stroke Assessment
- Spasticity –
 - Modified Ashworth Scale
 - Alternate use the spasticity subscale of CMSA




Summary of Body, Function and structure Tools

- Visual Perception-
 - Comb and Razor(interdisciplinary admin)
 - Behavioural Inattention Test (Sunnybrook NAP)
 - Line Bisection (Unilateral Spatial Neglect)
 - Alternates- Rivermead, OSOT and MVPT
- Language
 - Screening in Acute and followup
 - » Frenchay Aphasia Screening Test (FAST)
 - Impairment
 - » Boston Diagnostic Aphasia Assessment (homework)
- Speech Intelligibility Tool- none used in the literature



Summary of Body, Function and structure Tools

- Cognition-
 - Screening
 - » SCORE team Recommended MMSE and Line Bisection + Semantic fluency but not useful in rehabilitation followup
 - » Initial selection Cambridge (CAM-COG)




Summary of Body, Function and structure Tools

Depression-

- Hospital Anxiety Depression Scale (SCORE Screening tool)
- stroke Aphasic Depression Questionnaire


Alternates

- ?Geriatric Depression Scale
- ? Beck Depression Scale
- ?PHQ-9




Activity Assessment Scales

- Upper Extremity-
 - Chedoke Arm and Hand Activity Inventory
 - Box and Block
 - Nine Hole peg test
- Lower extremity-
 - Chedoke inventory
 - Timed up and Go
 - 6 minute Walk test
 - Alternate- Rivermead Mobility index
- Balance-
 - Berg Balance Scale



Activity Assessment Scales

- Functional Communication-
 - Amsterdam(ANELT)
 - Alternate- ASHA-Functional Assessment of Communication of Activities of Daily Living (ASHA-FACS)
 - Consultation Required with Aphasia experts



Activity Assessment Scales

Activities of Daily Living-

- Functional Independence Measure (FIM)
- Request CIHI-NRS to calculate Barthel Index from the FIM for comparison with European research


Instrumental Activities of Daily Living-

- Reintegration to Normal living Index (RNL)(self- report)
- Life H-Leisure Section



Participation

- Stroke Impact Scale
- Reintegration to Normal Living Index




What is the difference between a rehabilitation outcome measure and a process indicator?



Components of Rehab for Evaluation

- Process measures explored for:
 - Acute care
 - Inpatient rehab
 - Day hospital
 - Ambulatory setting
 - Home-based care
 - Community programs



Process Measures


Some Common Indicators of Access

- Days waiting to enter stroke rehabilitation program – all settings
- Days waiting for access to outpatient and community services by provider type
- Types of therapy services and providers
- Duration and intensity of services by provider type
- ALC Days waiting to be discharged from inpatient rehab
- Distribution of rehab patients by FRG
- Length of stay in rehab setting



Acute Care

- Rehab provided in **inpatient acute care** setting during early days after admission
 - Time to assessments for rehab potential and needs
 - Intensity and duration of rehab services by provider type
 - Standardized tool scores for assessment and functional outcomes
 - Time between referral for rehab and transfer to rehab services
 - Referral rates for community-based rehab




Inpatient Rehabilitation

- Intensity and duration of rehab services by provider type
- Stroke unit – number of patients treated on stroke rehab units
- Documentation of rehab plan e.g. task specific therapy
- Details about environment
- Patient education



Rehab provided in day hospitals, outpatient ambulatory, and other community settings


- Time to assessments for rehab potential and needs
- Time from referral to commencement of therapy
- Intensity and duration of rehab services by provider type
- Standardized tool scores for assessment and outcomes
- Details about environment
- Patient education
- Social support
- Primary care utilization
- Fitness to drive
- Caregiver burden
- Vocational assessments



Some Cautionary Tales


- Electronic stroke Referral service used in acute care for referral to rehab the
 - Alpha FIM
 - Charlson Comorbidities
 - Chedoke

Challenges in training all staff, staff turnover, trusting the measure
- SCORE project uses five outcome measures
 - FIM , Box and Block, 6 minute Walk test, Chedoke arm and Hand inventory, Chedoke McMaster Stroke Assessment and Euroqol-5D
 - Challenges in completion.




Some Thoughts on Choosing Outcomes

- Less is More – avoid the temptation to want to answer all the questions on your first attempt
- Consider the time in administration
- Consider the time to train people
- Consider how much equipment is needed
- Consider whether it will change your practice




Some Thoughts on Choosing Outcomes

- Pick tools that are transdisciplinary if possible
- Think about who is going to use the Results of all your work in collecting outcomes
 - Is this for you as a clinician to plan your practice?
 - Do you want to show those administration people that you make a difference?
 - Do you want to show the fundors that you make a difference
 - (What do you think they are interested in?)



Clinical vs Process measures


- Do you want to measure team or program operations or are you interested in patient recovery
- Is there an efficiency issue that needs to be measured



Objectives


By the end of this presentation should be able to:

1. Identify three reasons for selecting a core set of rehabilitation outcome measures for Canada
2. Name psychometric issues that must be considered when selecting responsive outcome measures
3. Name some important consensus based measures of Stroke Rehabilitation outcomes using the International Classification of Functioning framework
4. Recognize stroke rehabilitation system performance indicators that could be used at their organization



Conclusions

1. A core set of rehabilitation outcome measures for Canada is required as there is variability in current practice, need to consistently evaluate system and compare across provinces in Canadian Stroke Strategy
2. issues that must be considered when selecting responsive outcome measures include the reliability, validity and responsiveness of the measure. These properties can now be estimated quantitatively



Conclusions

3. Good quality Stroke Rehabilitation outcomes can be identified for all aspects of the the International Classification of Functioning i.e. Body Structures and Function, Activity and Participation
4. System performance indicators are measures of how groups of patients are managed and involve measures of quality and efficiency of care



Canadian Stroke Network
Réseau Canadien contre
les accidents cérébrovasculaires



Networks of Centres
of Excellence
Réseaux de centres
d'excellence



HEART
AND STROKE
FOUNDATION
OF ONTARIO

Next Steps

- Dissemination through the Canadian stroke Strategy and Ontario Stroke System
- Discussions with CIHI National Rehabilitation Recording System to adopt measures