Leveraging Rehabilitation to Optimize Neuroplasticity & Improve Patient Outcomes in Acute Care & Rehabilitation

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QHC Quinte Health Care

STROKE NETWORK of Southeastern Ontario

- A clinically-evident stroke occurs every 10 minutes in Canada
- Stroke is the leading cause of adult neurological disability, the second leading cause of dementia and the third leading cause of death
- There is an urgent need to focus on stroke recovery and rehabilitation since it offers the most hope for stroke survivors

Corbett, D. 2013

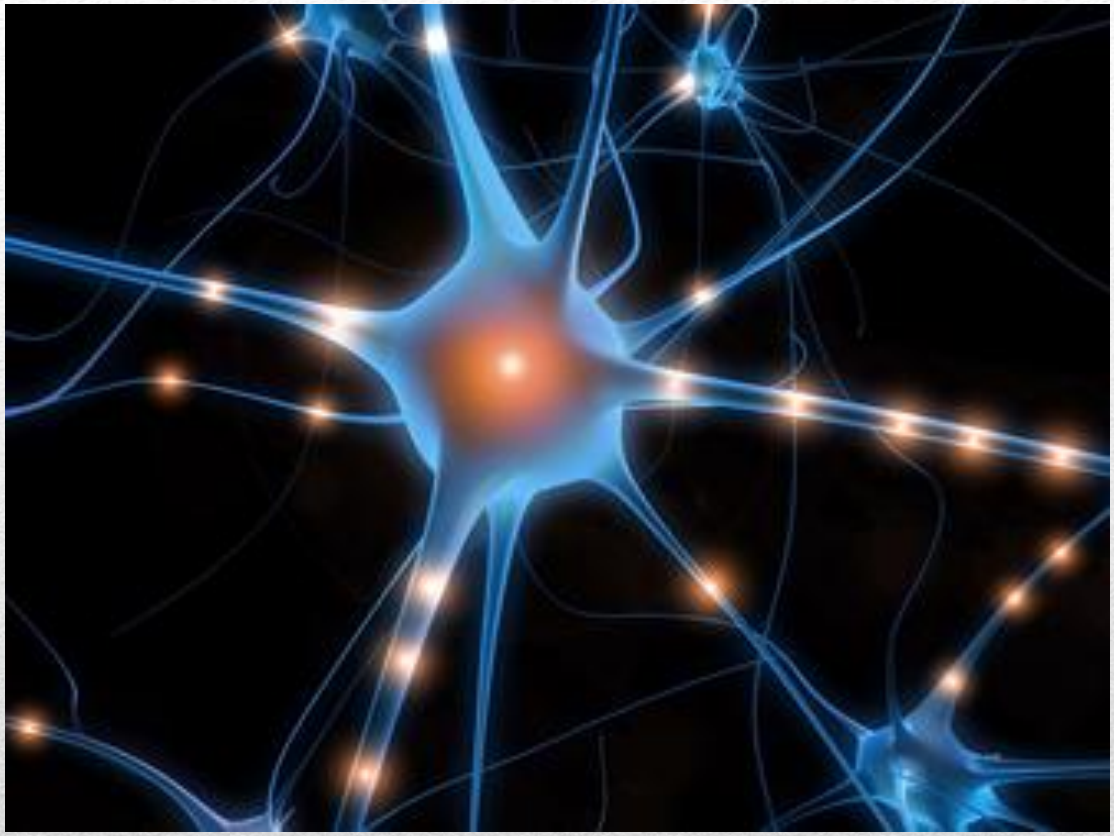
Fact

- Up until late 1960s early 1970s it was thought that the adult brain was "hardwired" with permanently connected circuits

- Therefore, brain damage was irreversible with little hope for any significant recovery

Corbett, D. 2013

The Evidence



"Neuroplasticity"

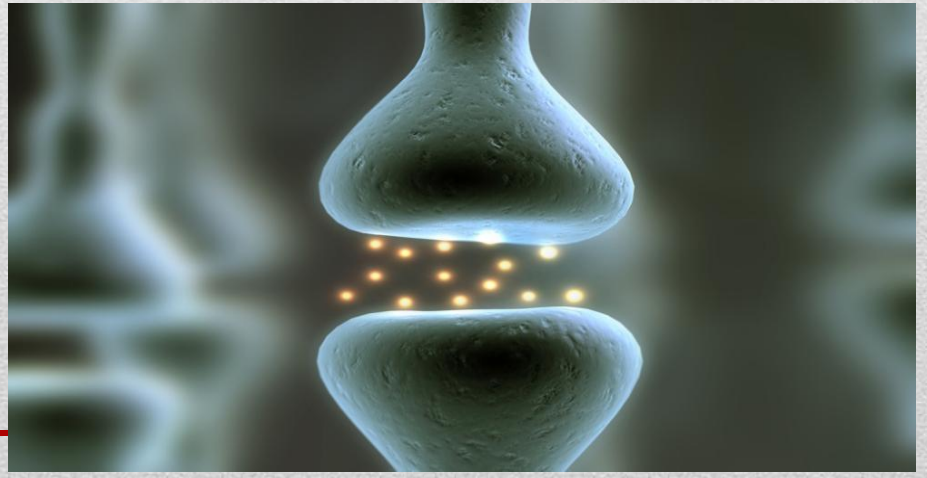
- Researchers then discovered growth and reorganization of neurons in the adult CNS after an injury
- The brain is not structurally static but continuously changes in structure and function Shumway-Cook, A. Woollacott, M. (2007)
- Neuroplasticity: Adaptive changes in response to injury and experience (e.g. sprouting of new connections, neurogenesis, angiogenesis) Corbett, D. 2013

Neuroplasticity

- Brain plasticity: A term referring to the capacity of a system to achieve new functions by transforming, on a long term basis and under environmental constraint, either it's constituting elements or it's internal connectivity network

Will et al 2004

Neuroplasticity



- Research suggests we have multiple pathways innervating any given part of the sensory or motor cortex, only the dominant pathway showing functional activity
- Sensory and motor maps in the cortex are constantly changing in accordance with the amount of activation that occurs through peripheral inputs
- The map of each of our brains is therefore unique as a result of our individual experiences and different environments that we were brought up in

Shumway-Cook, A. Woollacott, M. (2007)

Neuroplasticity

- The brain is incredibly plastic
- Plasticity can occur over weeks and months
- It can occur through the entire nervous system
- The neuromuscular and musculoskeletal systems adapt according to use and disuse

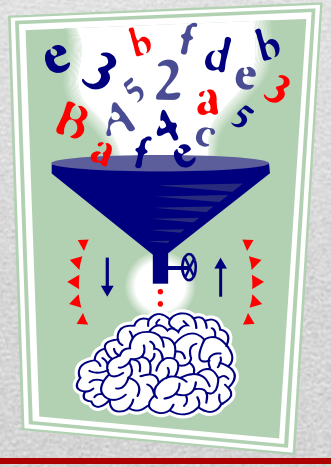
Harnessing neuroplasticity to dramatically improve stroke recovery is the new frontier in stroke research

Corbett, D 2013

Neuroplasticity

- Rehabilitation is a potent stimulus that can evoke positive or negative change
- Following a lesion, cortical maps will demonstrate both an immediate reorganization and a longer-term change
- Experience is very important in shaping cortical maps
- Importance of enriched rehabilitation by changing the physical environment or offering more varied activities
- Therapy needs to be informed and analytical in order to guide functionally appropriate neural plasticity

The Bobath Concept Lecture Series 2013



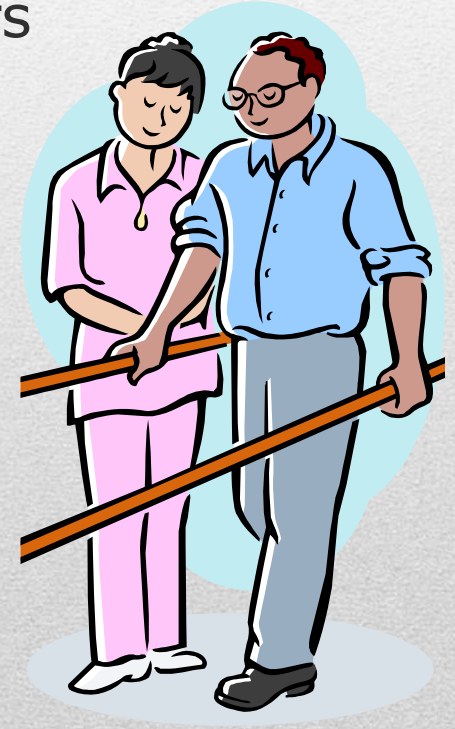
Clinical Implications

Clinical Implications

- Intensity and specificity are required to promote plastic changes

- Therapists are agents of change:
  Manipulation of the physical stressors to create an adaptive response
  The Bobath Concept Lecture Series 2013

- If we leave patients without rehabilitation for weeks or months, their brains will show changes in organization reflecting disuse
  Shumway-Cook, A. Woollacott, M. (2007)



Key Elements to optimize stroke rehabilitation:

- Daily Activity that is intensive, challenging and meaningful
- Treatment in a complex, stimulating environment
- Additional practice outside of scheduled therapy time

  2013 Best Practice Recommendations for Stroke Care

- Timing, repetition and intensity matter

Clinical Implications

- Studies have shown that there is a "critical" or "sensitive" period following stroke when interventions are most effective

- Enrichment plus Rehab was an effective therapy when initiated early (5 to 14 days) after the stroke, but had limited benefit when started later (30 days)

Biernaskie et al 2004

Critical Period for Stroke Recovery

- There is evidence to indicate that the time window for stroke recovery, as with that of normal learning, never really closes. However, the plastic processes that characterize early brain development and the semi-acute phase after stroke diminish and slow with time.

Murphy, T. and Corbett, D 2009

Critical Period for Stroke Recovery

- Rehabilitation should begin as early as possible once medical stability is reached (Evidence Level A)
- Timely transfer of appropriate patients from acute to rehabilitation is recommended as follows:
  - Ischemic strokes to rehab by day 5
  - Hemorrhagic strokes to rehab by day 7

Canadian Best practice Recommendations for stroke care 2010

Time Matters

- Contrary to best practice in stroke rehabilitation, research shows that hospitalized people with stroke in either acute or inpatient rehabilitation units spend most of their waking day -

  inactive (48%)

  alone (54%)

  in their bedroom (57%)

  West, T. and Bernhardt J 2012

2013 Best Practice Recommendations for Stroke Care

What is Rehabilitation Intensity?

As defined by the Ontario Stroke Network Stroke Reference Group (2012), Rehabilitation Intensity is:

- The patient time spent in individual therapy that is aimed at achieving therapy goals based on physical, functional, cognitive, perceptual and social means in order to maximize the patient's recovery
- Time that a patient is engaged in active face-to-face treatment which is monitored or guided by a rehabilitation therapist

- Stroke patients should receive, through an individualized treatment plan, a minimum of 3 hours of direct task-specific therapy per day by the core therapies for at least 6 days per week

  Wang, H. et al 2013. Ontario Stroke Network Stroke Reference Group 2012
- Maximum of 33% of therapy time with therapy assistants
- Does not include groups
- Does not include independent exercises

Rehabilitation Intensity

- Patients who received total therapy time less than 3 hours per day had significantly lower total functional gain than those treated for greater than 3 hours per day

Wang. H et al 2012

- The Ontario Stroke Network's Stroke Evaluation and Quality Committee has identified rehabilitation intensity as a key indicator for evaluating system efficiency and effectiveness.

Why is Rehabilitation Intensity Important?

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- Meeting the Best Practice Recommendations of a minimum of 3 hours of direct therapy will result in:

- Better patient outcomes
- Shorter lengths of stay
- Improved patient flow through the system
- Potential for reduced ALC days in hospital
- Achievement of recommended best practice stroke care

2013 Best Practice Recommendations for Stroke Care

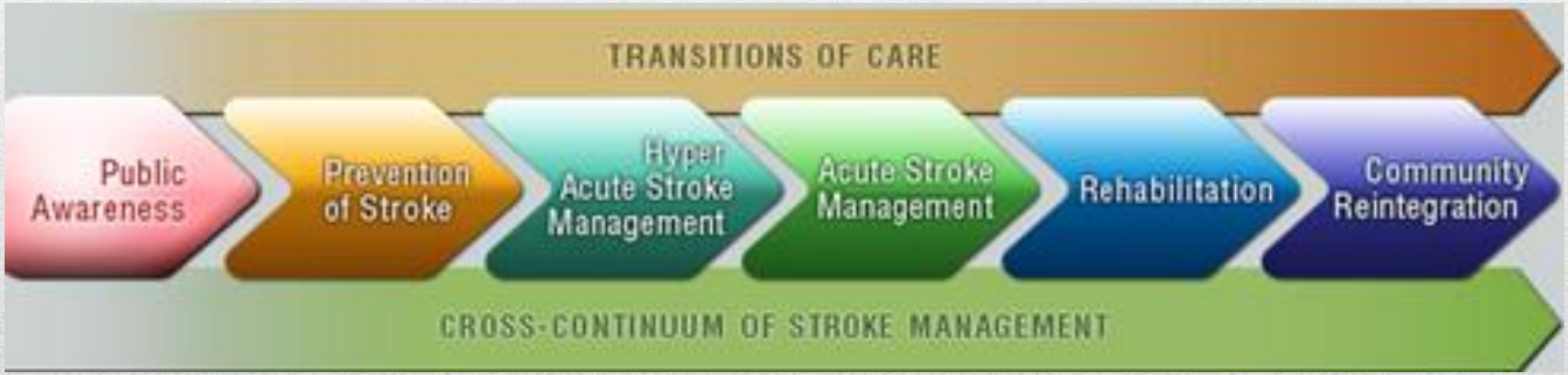
- Need timely and equitable access to the expert interprofessional evidence-based care
- Need provision of appropriate intensity of therapy in stroke rehabilitation
- Need to improve patient flow to maximize the window of neuroplasticity and improve patient outcomes
- Not thinking about bed availability, think about it from a patient-centred approach

➢ **In the right place at the right time for the patient**

Where Do We Go From Here?

2013 Best Practice Recommendations for Stroke Care

www.strokebestpractices.ca



Rehabilitation:

- **Start early, expert team approach**
- **Intensive rehabilitation therapy**
- **Community/outpatient follow-up**

Rehabilitation across the continuum of care

WHAT IS REHAB?

Rehabilitation improves recovery from disability, restoring function, quality of life and community integration.

It is a progressive, goal-oriented, team approach to enable optimal potential in all abilities: physical, cognitive, communicative, emotional and psychosocial.

2013 Best Practice Recommendations for Stroke Care

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- Early Supported Discharge from hospital to community demonstrates improved patient functional outcomes and health-related quality of life Langhorne, P. 2005
- Importance of outpatient stroke rehabilitation
- Outpatient therapy improves functional outcomes

Early Supported Discharge

Outpatient & Community-Based Rehabilitation

- Equitable and timely access to outpatient and/or community-based rehabilitation is critical in the recovery of the stroke survivor
  - Rehabilitation Day Hospital
  - Enhanced CCAC rehabilitation services

  (Demonstrated positive outcomes)

- Minimum of 45 minutes per day (up to 3 hours per day), 3-5 days per week, based on individual patient needs and goals.

  Canadian Best Practice Recommendations For Stroke Care 2013

  (Evidence Level B)

- Stroke = Main cause of ALC days (out of stroke, hip #s, hip and knee TJRs and ABI)
- ED/ALC pressures will be mitigated through improved timely access to intensive outpatient and community-based rehabilitation services

  Ontario Stroke Network
- Bed days lost = system costs

  Jin, A. Bagg, S. Martin, C.
- Therapy is less expensive than more time spent in hospital beds

Consider This.....

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2012 – 13 Provincial Stroke Report Card Indicators						
Indicator	Provincial Benchmark	Provincial Median	South East Region Rate	QHC BG	QHC PECM	QHC TM
% Acute ALC Days/Total LOS	12.4	18.5	24.7	13.9	31.4	16.2
Median Days from stroke onset to inpt rehab	6.0	10.0	12.0	6.0	N/A	N/A
Median FIM efficiency for moderate stroke	1.2	0.9	0.8	1.1	N/A	N/A
% Severe stroke within inpt rehab admissions	49.0	39.6	45.5	46.4	N/A	N/A

CIHI 2012-13 – ED (NACRS), acute (DAD) and rehab (NRS) databases

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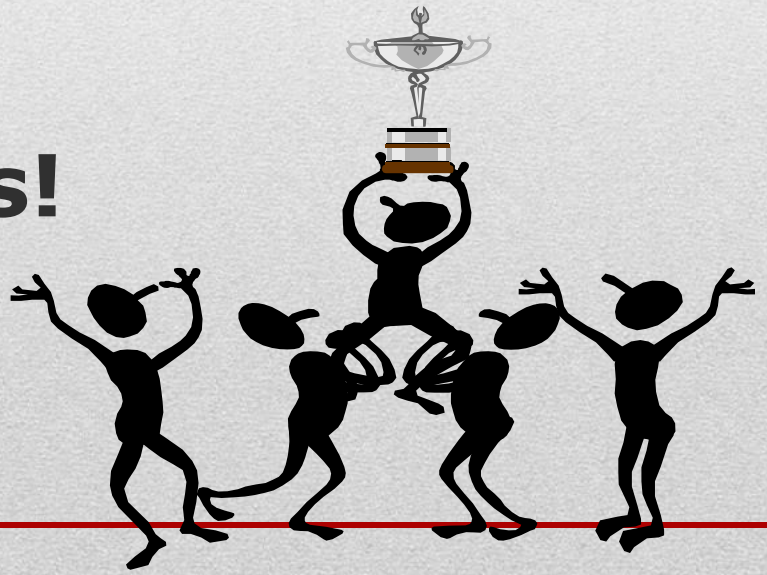
- Access to expert evidence-based care
- Positive patient journey
- Excellent patient outcomes
- Money reinvested to improve care

Jin, A. Bagg, S. Martin, C.

Everybody wins!



GOAL

- QUESTIONS?
- THANK YOU!

www.strokenetworkseo.ca