in the next 30 minutes…

…we’ll review these issues
1. Applying the right approach
2. Stroke: the “upstairs” problem
3. The clinical dilemma
4. The natural history challenge
5. Where to from here?

Acknowledging the contribution of Drs Parsons, Carey and Budd, the acute stroke team at John Hunter hospital, Newcastle, the National Stroke Foundation and the University of Newcastle’s Priority Research Centre for Translational Neurosciences & Mental Health

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evidence-based approach

• Watershed research: “Once upon a time…..”
  – Changed the stroke world as we know it (1, 2)
  – Why we are all in this room today
• Beliefs tested against science (3)
• More confidence in what we do
• Doing the right thing to the right person in the right way and at the right time

Ref:
A printed bound copy of the 'Guide to Managing & Optimising Team Performance' can be ordered for $15 from Leadership and Management Development at senior.leadership@adm.monash.edu.au


### Stroke Unit Care

- Multi-professional
- Meet regularly
- Enthused & educated

When individual team members behave like team players instead of solo performers, the collective output of the team increases, so the whole becomes greater than the sum of its parts.
### Team approach

<table>
<thead>
<tr>
<th>Team behaviour</th>
<th>Y</th>
<th>N</th>
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<tbody>
<tr>
<td>Am I open to new ideas?</td>
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<tr>
<td>Am I open to and do I encourage different ways of working?</td>
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<tr>
<td>Do I share my knowledge and skills with team members?</td>
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<td>Do I seek alternatives and explore options before concluding on a course of action?</td>
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<td>Have I developed working relationships with people from different functions/disciplines?</td>
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<td>Do I work towards win-win solutions?</td>
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<td>Do I only join teams whose goals I highly value?</td>
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<td>Am I reliable? Do I do what I say I am going to do?</td>
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<tr>
<td>Am I results-oriented?</td>
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**The “Hopping” Problem:**

**Lower limb:** Fortunately it’s more difficult to hop than walk, therefore learned non-use is not an issue.

**Upper Limb:** Unfortunately it’s quite easy to learn to do things one-handed so learned non-use is a big problem that is best challenged ASAP!

**Constraint-based Intervention:** Forces the person to stop UL “hopping”! It challenges learned non-use by forcing the engagement of the affected UL & demands involvement from both hemispheres. Not suitable for those with no observable movement.

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**Functionally Significant**

As Client-centred As Possible: As meaningful to the patient as possible

As Task-specific As Possible: Real-life activity in real life settings; can’t be risk free

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1st take home message

To maximise recovery, apply an evidence-based approach when caring for those affected by stroke

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Neural System: a complex labyrinth

Cortex: The end point or journey destination
Subcortex: The connection, journey or road map

Notes re: The brain’s neural system…
✓ Communicates inter- (between) & intra- (within) hemispherically. Lots of connectivity!
✓ Is connected to the body via corticospinal tracts
  ▪ ≤90% contralateral (opposite side)
  ▪ ≥10% ipsilateral (same side)
✓ Is dependent on the vascular system for a reliable supply of oxygen & nutrients

If the brain’s neural system is like a city’s road network….
Vascular System: a supply line

Middle Cerebral artery (MCA): Supplies much of the brain’s motor-related neural regions

Circle of Willis: The largest of the brain’s unique contralateral/collateral supply lines

Notes:

• Responsible for a reliable supply of O₂ & nutrients to the brain
• Any disruption impacts the neural system: Time is brain!

Time is brain!
Each minute 1.9 million neurons die without O₂ & nutrients

**Definition:** Wiki plus IH: **Neuroplasticity** refers to the ability of the brain and nervous system to change structurally and functionally as a result of input from the environment. Plasticity occurs on a variety of levels, ranging from cellular changes involved in learning, to large-scale changes involved in *cortical remapping* in response to injury, e.g., stroke... During most of the 20th century, the general consensus was that the brain's structure is relatively stable after a developmental period in early childhood. This belief has been challenged by new findings revealing that the brain is relatively plastic and in turn, responsive to change, throughout an adult's lifetime.

**Source:** wikipedia.org

• Neuroplasticity
  – Research demonstrates adult brain plasticity
  – Beliefs tested against science = untrue
  – Foundational to ALL stroke recovery

Behavioural Demands: Brain reorganisation is a normal response to behavioural changes.
• Learn the violin and the brain reorganises!
• Attend a workshop and the brain reorganises!
• Start to walk, speak or use the upper limb and the brain reorganises!
• Do nothing and the brain does nothing!
**Functional Regions of Interest**

**Brodman’s Areas (BA)**

- **BA4**: Primary motor cortex (M1)
- **BA6**: Premotor cortex (PMC) & Supplementary motor area (SMA)
- **BA3,1,2**: Primary somatosensory cortex
- **BA5 & 7**: Secondary somatosensory cortex

**Notes:** Post stroke, the SMA.....

- Is important to motor recovery (1)
- Is positioned in medial region of each hemisphere
- Face-off across the interhemispheric fissure
- Communicate via the anterior commissure, a bundle of nerve fibres connecting the hemispheres?

There’s a lot happening in our brains every time we think, move, touch, talk, listen, respond, learn, problem-solve or all of the above!


2nd take home message

To maximise recovery, take advantage of neuroplasticity and the brain’s ability to reorganise.

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The Hot versus Cold problem:
Evidence tells us the average ward is usually environmentally bereft, risk averse & occupationally de-challenging – not the best place for stroke recoverers!!

**Four “Most Important” Principals (IH)**

**As Early As Possible**: When the pt is stable
**As Intense As Possible**: Highest tolerated dose, must include self-directed
**As Client-centred As Possible**: As meaningful to the pt as is environmentally possible
**As Task-specific As Possible**: Real-life activity in real life settings; can’t be risk free

natural history challenge

Performance scores over time

The $600 a day question!

This graph is completely hypothetical!

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To overcome our bias towards “seeing” improvement in patients:

- Establish routinely applied processes to accurately measure outcomes
- Use standardised assessments
- Agree to use the same assessments across the continuum of care:
  - Acute ↔ sub-acute ↔ community
- Select assessments that are:
  - Valid post stroke (1)
  - Reasonably good inter-rater reliability

References:
3rd take home message

To maximise recovery post stroke, we must overcome the “Hot versus Cold” Dilemma

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where to from here…

Looking into the stroke recovery crystal ball I see…..

- More interventions targeting what’s “upstairs”
  - FES is reverse – TC direct current
- Much more family or volunteer involvement
- Move back to Stroke Unit Care
- Tolerance of 3-5% falls in Stroke Rehab Units
- Much more Early Supported Discharge
- Stroke Booster Clinics
To maximise recovery post stroke:
1. Apply an evidence-based approach
2. Take advantage of neuroplasticity and the brain’s ability to reorganise
3. We must overcome the “Hot versus Cold” dilemma
Thank you

time to talk about this


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