Vascular Cognitive Impairment – Cognitive Rehabilitation after Stroke

Stroke from Prevention to Rehabilitation Symposium (2019-1-12)

Prepared by Mr. William Ng & Ms. Domnina Cheung
Occupational Therapist, Kowloon Hospital
Sharing from a local Occupational Therapist’s perspective
Outline of presentation

Understanding Vascular Cognitive Impairment (VCI)

→ Screening
→ Assessment
→ Rehabilitation

Case Study

Challenges and Opportunities
Outline of presentation

Understanding Vascular Cognitive Impairment (VCI) → Screening → Assessment → Rehabilitation

Case Study

Challenges and Opportunities
Understanding Vascular Cognitive Impairment (VCI)
Vascular Cognitive Impairment

- All forms of cognitive disorder associated with cerebrovascular disease, regardless of the specific mechanism involved, ranging from MCI to dementia.
- Diagnosis must be based on cognitive testing involving a minimum of 4 cognitive domains:
  1. Executive/attention
  2. Memory
  3. Language
  4. Visuospatial functions

Screening
“MINI-MENTAL STATE”
A PRACTICAL METHOD FOR GRADING THE COGNITIVE STATE OF PATIENTS FOR THE CLINICIAN*
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and
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<table>
<thead>
<tr>
<th>Subtest</th>
<th>Points</th>
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<td>Temporal orientation</td>
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<tr>
<td>Spatial orientation</td>
<td>3 points</td>
</tr>
<tr>
<td>Registration</td>
<td>3 points</td>
</tr>
<tr>
<td>Attention and calculation</td>
<td>3 points</td>
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<tr>
<td>Remote memory</td>
<td>3 points</td>
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<tr>
<td>Naming 2 objects</td>
<td>2 points</td>
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<td>REPEAT</td>
<td>1 point</td>
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<tr>
<td>Stage command</td>
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</tr>
<tr>
<td>Writing a complete sentence</td>
<td>1 point</td>
</tr>
<tr>
<td>Reading and obey</td>
<td>1 point</td>
</tr>
<tr>
<td>Copy the diagram</td>
<td>1 point</td>
</tr>
</tbody>
</table>

Example:

1. What is the approximate time?
2. What day of the week is it?
3. What is the date today?
4. What is the month?
5. What is the year?
6. Where are we now?
7. What is this place?
8. In which district are we, or what is the address here?
9. In which town are we?
10. In which zone are we?
11. Repeat the following words: CAR, VASE, BRICK.
12. Subtract: 106.7 - 95.7 = 6.7 = 79.7 = 72.7 = 6.5
13. Can you remember the 3 words you have just said?
14. Watch and pen:
15. "NO IF, ANDS OR BUTS"
16. "Take this piece of paper with your right hand, fold it in half, and put it on the floor."
17. Write a sentence that makes sense:
18. Close your eyes:
19. Copy the diagram:
## Manuals, Books, and Equipment

<table>
<thead>
<tr>
<th>Item number</th>
<th>Product description</th>
<th>List price</th>
</tr>
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</table>
e-Manuals are not returnable. Please see our FAQ before ordering e-Manuals. | $64.00     |
| WW-4924-TM  | MMSE Clinical Guide with Pocket Norms Card               | $78.00     |

## Forms and Booklets

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<td>$68.00</td>
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每份HKD10.7

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Copyright issues
Validation of the Abbreviated Mental Test (Hong Kong version) in the elderly medical patient

LW Chu, CKW Pei, MH Ho, PT Chan

The Abbreviated Mental Test is a useful screening test for abnormal cognitive function in the elderly patient. It is widely used in UK geriatrics practice. A modified local version of the Abbreviated Mental Test is also commonly used in Hong Kong. In the present study, the local version of the 10-question Abbreviated Mental Test was validated against clinical diagnoses of normal/abnormal cognitive function (DSM-III-R criteria). Sixty-nine patients (aged 65 years and older) referred to the Acute Geriatric Assessment Team at the Queen Mary Hospital were assessed. Nine patients (13%) were excluded because of a language barrier, deafness, dysphasia, aphasia, and/or severe dysarthria. Sixty patients completed the test and the clinical assessment. An incorrect answer in each of the test items was found to be significantly associated with abnormal cognitive function (P<0.005). For the Abbreviated Mental Test score, the best cut-off point was found to be six (below six was considered abnormal); this yielded a sensitivity of 96% and a specificity of 94%.

Chu et al., HKMJ 1995; 1:207-211. Validation of the Abbreviated Mental Test (Hong Kong version) in the elderly medical patient
The Montreal Cognitive Assessment, MoCA: A Brief Screening Tool For Mild Cognitive Impairment

Ziad S. Nasreddine, MD, Natalie A. Phillips, PhD, Valérie Bédirian, BSc, Simon Charbonneau, MPS, Victor Whitehead, MSW, Isabelle Collin, PhD, Jeffrey L. Cummings, MD, and Howard Chertkow, MD


HK-MoCA
HK-MoCA
Age and education corrected normative data of total score of HK-MoCA

<table>
<thead>
<tr>
<th>Age</th>
<th>Education</th>
<th>16th</th>
<th>7th</th>
<th>2nd</th>
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<tbody>
<tr>
<td>65-69</td>
<td>0-3</td>
<td>17</td>
<td>14</td>
<td>9</td>
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<td></td>
<td>4-6</td>
<td>19</td>
<td>18</td>
<td>13</td>
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<td>7-9</td>
<td>21</td>
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<td>16</td>
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<td></td>
<td>10-12</td>
<td>22</td>
<td>20</td>
<td>17</td>
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<tr>
<td></td>
<td>&gt;12</td>
<td>25</td>
<td>23</td>
<td>21</td>
</tr>
<tr>
<td>70-79</td>
<td>0-3</td>
<td>15</td>
<td>14</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>4-6</td>
<td>18</td>
<td>15</td>
<td>10</td>
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<td>7-9</td>
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<td>10-12</td>
<td>22</td>
<td>19</td>
<td>18</td>
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<tr>
<td></td>
<td>&gt;12</td>
<td>22</td>
<td>20</td>
<td>16</td>
</tr>
<tr>
<td>≥80</td>
<td>0-6</td>
<td>13</td>
<td>13</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>&gt;6</td>
<td>17</td>
<td>15</td>
<td>13</td>
</tr>
</tbody>
</table>

Impairment is determined when score ≤ age and education corrected percentile cutoff
Assessment
Cognitive Assessment from Occupational Therapy aspect

**Bottom-up (component-based):**
- Divide cognition into different cognitive domains
- Use of standardized neuropsychological assessment
  - e.g. vigilance, orientation, attention, memory, executive function, speech and language, visual-perceptual, etc

**Top-down (function-based):**
- Take into consideration of client’s function with such cognitive profile
- Address the interrelationship of the person, environment and occupation
  - e.g. what problems the client is encountering, physical and social environment
Bottom-up (component-based)

- Different validated standardized cognitive assessment incl.
  - ✔ Neurobehavioral Cognitive Status Examination (NCSE)
  - ✔ Rivermead Behavioral Memory Test (RBMT)
  - ✔ Everyday Memory Questionnaire (EMQ)
  - ✔ Trail making A/B
  - ✔ Stroop Color-Word Test
  - ✔ Behavioral Inattention Test
  - ✔ Behavioral Assessment of the Dysexecutive Syndrome (BADS)
  - ✔ Paced Auditory Serial Addition Test (PASAT)
Standardized Neuropsychological Assessment
Top-down (function-based)

- Relation of client’s cognitive profile and his/her functional performance
- Use of functional scale e.g. Functional Independent Measure (FIM), Lawton Instrumental ADL scale
- Similar cognitive profile may have different functional presentations
- Interrelation of client’s cognitive, physical, motor, psychosocial and functional performance
- Executive functioning including initiation and inhibition, cognitive flexibility, planning, organizing, self regulatory and monitoring, social interaction, etc
- Social environment/support – vital in cognitive rehabilitation
- Work capacity evaluation and work rehabilitation
### Functional Independence Measure (FIM) Instrument

<table>
<thead>
<tr>
<th>Self-Care</th>
<th>Admit</th>
<th>Disch</th>
<th>Follow-Up</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Eating</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B. Grooming</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>C. Bathing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Dressing - Upper Body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E. Dressing - Lower Body</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Toileting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>G. Sphincter Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H. Bowel Management</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Transfers</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>J. Bed, Chair, Wheelchair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K. Tub, Shower</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L. Locomotion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M. Walking/Wheelchair</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>N. Stairs</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communication</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N. Comprehension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O. Expression</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P. Social Cognition</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q. Social Interaction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>R. Problem Solving</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>S. Memory</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cognitive Subtotal Score</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL FIM Score</td>
<td></td>
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</table>

#### Functional Measures

<table>
<thead>
<tr>
<th>Functional Measures</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>HARTMAN-MAEIR, Adina; HAREL, Hagit; KATZ, Noomi.</td>
<td></td>
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</table>


#### Kettle Test

**Scoring of task performance:**

<table>
<thead>
<tr>
<th>Step</th>
<th>Score</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Opening the water faucet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Filling the kettle with about 2 cups of water</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Turning off the faucet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Assembling the kettle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Attaching the electric cord to the kettle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Plugging the electric cord in an electric socket</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Turning on the kettle</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8. Assembling the ingredients</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Putting the ingredients into the cups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. Picking up the kettle when water boils</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Pouring the water into the cups</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12. Adding milk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13. Indication of task completion (e.g. verbal, gesture, serving)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Scoring:**

Rating of performance on the thirteen steps of the task:

- Each step scored 0-4.
- 0 = intact performance
- 1 = slow and/or trial & error, and/or questionable performance, but with careful monitoring
- 2 = received general cues
- 3 = a. Received specific cuesing
  1. Incomplete performance (for example, puts part of ingredient into kettle)
  2. Deficient performance (for example, puts cover upside-down)
- 4 = received physical demonstration or assistance.

Total score 0-52, higher scores reflecting more severe problems in performance.

**Note:** If a cue was given, indicate why and what cue was given in the comments column.
Rehabilitation
What an OT does?

• To **restore** the lost functions or to utilize remaining intact cognitive functions of clients for daily living tasks in their own contexts in the community

• Goal of cognitive rehabilitation: To restore the specific cognitive deficits, directly or by compensation, and to generalize the new skills to **real-life situations**

• Restorative (Bottom-up) & Compensatory (Top-down) approach

Cognitive Remediation (Bottom-up)

- Restore lost functioning & make use of **implicit learning**: over-learning or procedural learning

Adaptive Approach (Top-down)

- Direct training of functional skills e.g. by use of **external devices** in functional skills performance
- Environmental modification: adapt the **environment** to suit the needs of clients or simplify **demand** of daily routine

OT intervention
Treatment Rooms, M/F, Cognitive Training Centre for Brain Injury, Kowloon Hospital (Rehab Blk)

Room 1 (Computer remedial, APT)

Room 2 (New case, individual consultation)

M060 (ICMR Treatment room)

Room 3
(Work Rehab)

Room 6
(OLSR Volunteer Group, Cognitive Group Training, Baduanjin Group)
Restorative/Remediating approach

- Use of specific cognitive remedial programs / computerized cognitive training
- Home-based / Hospital-based training
- Ranging from
  - simple orientation
  - cognitive stimulation
  - cognitive training addressing specific cognitive domains
Notebook/Orientation Board

For reality orientation to time, place and person
Commercial cognitive training resources – for cognitive stimulation and home program

[Visual scan and processing speed]

[Training simulating daily activities]
Commercial cognitive training resources – for cognitive stimulation and home program

**Cognitive Mobile Apps**
(HAHO, IT and Allied Health 2017-18 project)
With use of N-back mechanism

**App: Brainastics**
(with performance recording for client and therapist)

Use of mobile devices (tablets/mobiles)
Specific computerized remedials
(e.g. visual memory, multi-tasking and alternating attention, working memory, visual scanning and neglect)
Illustration of use of an Evidence-based Cognitive Training Program (component-based)

— **Attention Process Training**

Attention Process Training-II (APT-II) & Clinical Model of Attention

• Evidence-based training program
• Provide hierarchy of attention, i.e. focused, sustained, alternating and divided attention
• Provides attention training tasks which specifically address different domains of attention
APT-II training materials involve visual and auditory stimuli (mainly number, alphabets and some semantic words)
Effectiveness of an Attention Training Program for Patients with Acquired Brain Injury in an Outpatient Setting

NG CW1, CHAN KL1, CHEUNG TYD1, CHEUNG P1, CHAN YL1, NG SWS1
1Occupational Therapy Department, Kowloon Hospital

Introduction

Attention deficit is one of the most common cognitive impairments in ABI survivors which results in poorer functional outcome. Clinical model of attention considers attention a multidimensional cognitive capacity which include focused, sustained, selective, alternating and divided attention. Attention Process Training Program (APT) assumes attentional abilities can be improved by providing opportunities for stimulating specific attention.

In view of lack of published studies evaluating effectiveness of attention training program with use of APT in local clinical practice for Chinese population, this study serves to evaluate the effectiveness of an attention training program, which adopts concepts and training tasks from Attention Process Training version II and clinical model of attention, for patients with ABI in a local outpatient setting.

Methodology

Participants were all assigned to one single intervention group which composed of three 1.5 hour sessions weekly for 5 weeks.

8 local Chinese ABI survivors completed the study. Statistical significant improvement (p<0.05) was found in all five areas of outcome measures,

1. specific attention domains;
2. general cognitive function;
3. everyday attention function;
4. functional attention goal and
5. rehabilitation outcome.

It also leads to positive effect on achievement of functional attention goal. The improvement was consistently found in all participants.

Furthermore, subacute ABI group, i.e. post ABI less than 12 months, showed a faster and more significant improvement gained from the program than chronic group. This may shed light on future attention rehabilitation planning and intensity of training among patients with ABI according to post-injury time.

Results

To conclude, the attention training program, adopted tasks from APT-II and framework from clinical model of attention, has significant positive effects on all domains of outcome measures. Such findings indicated the training program may have potential beneficial effect among local Chinese patients with ABI.

Conclusion
Attention Process Training III (APT-III)

- With an updated framework of attention

1. Basic sustained attention
2. Executive control: working memory
3. Selective attention
4. Suppression
5. Alternating attention

請計算出最高和最低價錢的總和

- 煮烏頭 $66
- 薑汁豆苗 $45
- 炸春卷 $28
- 炸雞排 $36
- 焗時蔬 $30
選出不是綠色的蔬菜
菠菜
西蘭花
白蘿蔔
菜心
Suppression training task

- Automatic response: Vegetable is green in color
- Client need to inhibit automatic response

選出不是綠色的蔬菜
菠菜
西蘭花
白蘿蔔
菜心
Adaptive / Compensatory approach

- Top-down approach, focusing client’s function and problem solving in the daily tasks
- Direct training of functional skills by relearning of alternative or compensatory methods, aiming at enhancing independence in functional task
- Use of different cognitive strategies e.g. visual imagery
- Disease education, enhance awareness and insight of cognitive impairment

• Develop by local Occupational Therapists since 2005, consist of training and assessment modules.
• 2D, non-immersive design
• Reasons: learning steps, no cyber-sickness
• 5 modules:
  – ATM
  – MTR
  – Shopping
  – Cooking
  – Road safety
• 3 difficulty levels

Virtual Reality IADL software (eIVR), 2005
Individual Intervention & Cognitive Group Training

Internal Cognitive Mechanism:

- Facilitate clients to learn and internalize cognitive strategies that they could apply in their ADLs
  - Problem Solving: medication management, handling finance, places navigation
  - Judgment: encounter difficulties in making selections in daily tasks
  - Social skills training with immediate feedback from therapist
  - Functional skills training

External Cognitive Mechanism:

- **External aids:**
  - Teach and reinforce the use of external memory aids, scheduling and reminder e.g. use of mobile phone in marking schedules and appointments

- **Homework:**
  - Sharing of own experience or “new knowledge” at every group training
  - Require client to self initiate and make use of external aids

Cognitive Training Group

• Reality orientation
• Executive function/Inhibition ability
• Social skills practice
• Problem solving
• Compensation techniques
• Functional skills training
• Carer support
• Homework (Share knowledge)
• Cognitive Stimulation Therapy
Environmental structuring/adaptation

- Occupational Lifestyle Redesign/modifications
- Adjustment of life role
- Restructure and establish a new pattern of daily activities
- Enable clients to adapt to their new life roles together with their carer
- Carer empowerment: Social support and advice given to carer
Beyond Cognitive Rehabilitation

- Client’s Daily Functioning
- Leisure (Interest) / Psychosocial
- Life Role Adaptation
- Psychosocial Evaluation and Training
- Work Rehabilitation
- Home Based Program
- Community Integration Program
Occupational Lifestyle Redesign Volunteer Group
Psychosocial Group Training
Neurofeedback and tDCS

Collaboration with Rehab Dept, KH
Case Study
Case illustration (Mr. X)

- Male, 58 years old, married with 2 children
- Dx: Left CVA with thromboembolectomy and stenting done
- Premorbid job:
  Principal of a Catholic primary school, chairperson of Catholic principal committee
- Initial Assessment (4/2017):
  - AMT= 4/10 (cutoff at 6/10),
  - HK-MoCA failed
  - significant global dysphasia (expressive > receptive)
  - ADL independent
- Unable to communicate with others / unable to work
- Patient is very upset due to the role change and reduced cognitive and functional performance
Case illustration (Mr. X)

- **Outcome (2/2018):**
  - AMT= 10/10
  - HK-MoCA= 23/30
  - MS Aphasia Screening Test= 87/100
  - RBMT standard score= 20/24, mild memory impairment

- **Findings:**
  - Significant improvement in communication
  - familiarize use of external aids for compensating cognitive impairment e.g. use mobile phone for scheduling and voice input instead of typing
Case illustration (Mr. X)

• Successfully return to work as a principal, recertified driving license

• **Learning points:**
  • Patient’s motivation
  • Importance of goal setting
  • Social support
  • Work environment

• Go beyond cognitive rehabilitation: 
  *Work rehabilitation, Role identification and resumption*
Recap of OT Intervention on Cognitive Rehabilitation

- Remediation
- Compensatory
- Functional Assessment
- Work Assessment and Rehabilitation
- Holistic Care (Psychosocial/well-being)
- Carer Empowerment/Home Program
- Lifestyle Modification
- Community Care
Challenges and Opportunities
• Every client is an unique individual
• Every client has its own cognitive impairment and manifestation (no one size fits all)
  • Limitations of standardized cognitive assessment, ceiling and learning effect, language requirement
• Increasing evidence based intervention
• New technology and treatment
• Emphasizing client’s role and goal
Actions

Prevention  Early Detection of Cognitive Impairment  Cognitive and Functional Rehabilitation  Public Awareness
REFER OT FOR MMSE

REFER OT FOR COGNITIVE ASSESSMENT AND REHABILITATION
References

- Chu et al., *HKMJ* 1995; 1:207-211. Validation of the Abbreviated Mental Test (Hong Kong version) in the elderly medical patient


- Tom N. Tombaugh; A comprehensive review of the Paced Auditory Serial Addition Test (PASAT), *Archives of Clinical Neuropsychology*, Volume 21, Issue 1, 1 January 2006, Pages 53–76


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• Dr. Shea Yat Fung, AC(MED), Queen Mary Hospital
• Ms. Connie Lee, SOT, Queen Mary Hospital
• Brain Health Special Interest Group, The Hong Kong Geriatrics Society
Thank you
Q & A

(Contact: ncw584@ha.org.hk)