TeleStroke with Security-enhanced Mobile Imaging Distribution System (SEMIDS)

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Background of Ischaemic Stroke


- Intravenous thrombolysis (TPA) within 4.5 hours from stroke onset improves chance of recovery by 30%.

- Time-critical treatment:
  - Narrow therapeutic window
  - Every 20 mins delay ↓ NNT by

- Owing to lack of Neurologists in HA (~60 Neurologists in HA), wide service gap existed.

- TPA rate in HK was < 2 % compared with >10% in the west.

- Medical legal issues
A stroke specialist’s opinion in favor of or against the use of thrombolytic treatment with rTPA is recommended through teleconsultation when on-site expertise is not available (Class I, Level of Evidence B)

Schwamm et al Stroke 2009, 40:2616-2634:
Difference in TeleStroke Model between HK and Other Countries

Western Countries

District Hospital (Spoke Hospital)

Specialty Hospital (Hub Hospital)

Hong Kong

Specialty Hospital (Hub Hospital)

Faculty of Medicine
The Chinese University of Hong Kong
TeleStroke Model in HK is Unique

Special Considerations in HK:
- Teleconsultation is performed outside hospital area through remote login to hospital network
- Frequent hiccups when logging in hospital network system for teleradiology
- Security in patient’s personal information

Special Needs for TeleStroke System in HK:
- Portable Device (e.g. iPads, Tablets)
- An efficient image viewing system
- Enhanced security measures
Started 24-hour TPA in PWH since May 2012

CUHK and PolyU Jointly Introduce TeleStroke for 24-hour Thrombolysis Service at Prince of Wales Hospital
Security-enhanced Mobile Imaging Distribution System (SEMIDS)

Innovated by Dept of Health Technology and Informatics, PolyU.

- CT brain images can be viewed in all iSO platform (i.e. iPhone, iPad, MacBook Air etc)
- Only one patient’s image is processed each time
- Only patient’s last name and last 4 digits of ID no. will be shown
- No image is saved on device
- Excellent image quality
- Turn-around time for CT brain image was 110 seconds through WiFi and 610 seconds through HSPA mobile network
Stroke Nurse Special Training

• 9 months of special training on the following aspects:
  – Diagnosis of stroke
  – Determination of onset time
  – Accurate history taking
  – Physical examination
  – Real-time demonstration of physical disability through facetime with iPhone
  – SEMIDS operation
  – Delivery of thrombolysis
  – Post-thrombolysis care.
• NIHSS certificate
Viewing CT brain images through SEMIDS
TeleStroke through SEMIDS Facilitates 24-hour Thrombolysis Service

- 24-hr Thrombolysis service was commenced since May 2012.
- Total 90 patients were evaluated by TeleStroke.
- Of which, 59 patients were given thrombolytic therapy.
- The number of patients who were treated with thrombolytic therapy has increased by more than 3 folds (23 patients / yr. Vs 72 patients/yr.)
- Average LOS for each thrombolysed patient is 10 days less compared to non-treated patients.
## Comparison of Treatment Outcome By TeleStroke vs On-site Neurologists

<table>
<thead>
<tr>
<th>3 Mths Recovery &amp; Complication</th>
<th>TPA by TeleStroke (59 patients)</th>
<th>TPA by on-site Neurologist (57 patients)</th>
<th>*p</th>
</tr>
</thead>
<tbody>
<tr>
<td>mRS 0-1 No or minimal symptoms</td>
<td>19 (32.2%)</td>
<td>21 (36.8%)</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td>mRS 2-3 Mild to moderate disability. Need mild degree of help in self-care. Can walk unaided.</td>
<td>7 (11.8%)</td>
<td>4 (7%)</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td>mRS 4-5 Severe disability. Need frequent help in self-care. Need to walk with aids or bedridden.</td>
<td>12 (20.3%)</td>
<td>15 (26.3%)</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td>Symptomatic intracranial bleed</td>
<td>4 (6.7%)</td>
<td>2 (3.5%)</td>
<td>&gt; 0.1</td>
</tr>
<tr>
<td>Death</td>
<td>6 (10.1%)</td>
<td>6 (10.5%)</td>
<td>&gt; 0.1</td>
</tr>
</tbody>
</table>
2013亞太區HIMSS 數碼醫療 傑出資訊及傳訊技術獎

2013 Asia Pacific HIMSS Digital Healthcare Outstanding Information & Communication Technology Award
Conclusion

- TeleStroke is feasible in Hong Kong
- It alleviates manpower shortage and facilitates 24-hr thrombolysis service.
- As compared to other countries, different equipments and softwares are need in Hong Kong.
- SEMIDS appears to be a reliable method for teleradiology for TeleStroke in Hong Kong.
Future Direction for 24-hour Thrombolysis Service in Hong Kong

TeleStroke removes geographical barriers

Hub Hospital

Spoke Hospital

Spoke Hospital

Spoke Hospital
Acknowledgment

NTEC and HA IT Team
Prof. FH Tang, Poly U
Former CCE Dr. Fung Hong
PWH Neurologist
PWH ASU staff
Security-enhanced Imaging Distribution System (SEMIDS)

Hospital Authority egateway server

Hospital Authority Network

PACS server

PACS Network in PWH

SEMIDS Mobile Application Server

CT Brain

Cellular Phone Network
Delay in ePR CT brain images in 25/90 cases:

- 5-10 mins in 11 cases
- 10-20 mins in 2 cases
- > 20 mins in 11 cases (include cases with failure in ePR access)
TeleStroke in PWH during Nonworking Hours

PWH AED

Stroke patient admitted <3 hours of symptom onset will be assessed by Stroke Nurse for eligibility for thrombolysis

Potential TPA candidates will be sent to Acute Stroke Unit

Acute Stroke Unit in PWH

Stroke Nurse demonstrate clinical deficit through videoconference with Neurologists

Videoconference

Off-site Neurologists with portable mobile devices

Neurologist determine eligibility for thrombolysis based on clinical and radiological findings.

Teleradiology with ePR & SEMIDS