

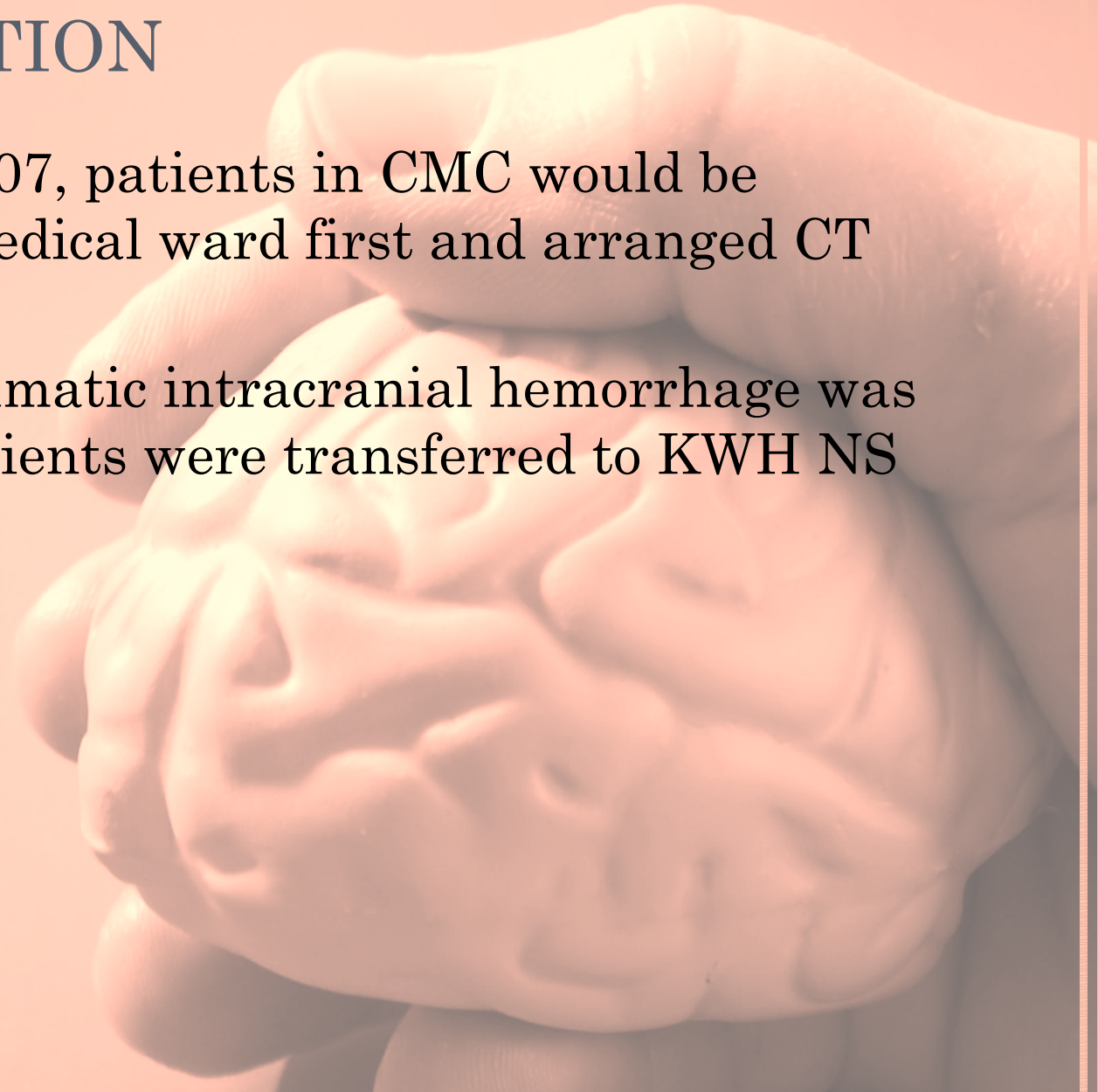
**EARLY RADIOLOGICAL INTERVENTION  
AND TRANSFER TO NEUROSURGICAL  
UNIT ON THE CARE OF PATIENTS WITH  
NON-TRAUMATIC INTRACRANIAL  
HEMORRHAGE**

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# INTRODUCTION

- Before Nov 2007, patients in CMC would be admitted to medical ward first and arranged CT brain
- After non-traumatic intracranial hemorrhage was confirmed, patients were transferred to KWH NS unit



# PROBLEMS

- Additional intra-hospital patient transfer
- Delay of specialised management in designated neurosurgical unit
- Possible complaints about delay of definitive treatment and care in specialised unit

## 中風延誤救治可致命

昨日又發生救護車遇塞車致病人延誤送院事件。一名男子在家中突然中風陷半昏迷，救護車趕赴搶救病人途中卻遇上塞車，雖然交通警員奉召到場開路，但救護車延遲了 25 分鐘才到場，由報警至病人送抵醫院要逾一小時，傷者搶救後情況危殆。

# NEW ARRANGEMENT

- A new arrangement of fast-tracking care for patients suspected of cerebrovascular disease was introduced in November 2007
- A close collaboration:
  - AED: initial assessment and management, arrangement of direct CT brain before admission
  - Radiology Dept: early CT brain and other neuro-imaging
  - Neurological Team, M&G Dept
  - Neurosurgery Dept, KWH

**Patient attends AED and preliminary diagnosis of cerebrovascular disease made**

Symptoms onset within 7 days

Symptoms onset >7 days, poor function state, terminal malignancies

**AED order direct CT brain if onset < 24 hours**

Hemorrhagic ICH

Ischemic stroke, CT brain not a/v within 2hrs

**Consult KWH NS**

If indicated for surgical intervention

**Take over to KWH NS**

**ASU M&G Dept**

ASU beds not available

**Acute general beds**

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# ARRANGEMENT OF CT BRAIN IN AED

- Neurological symptoms with onset within 24 hours when assessed by AED doctor (at least Cat. 3)
- CT brain would be arranged according to the patient's information e.g. conscious level, vital signs
- Admit to ASU/ general medical ward first if expected time-to-CT exceeds 2 hours, e.g. when radiographer and/or CT engaged

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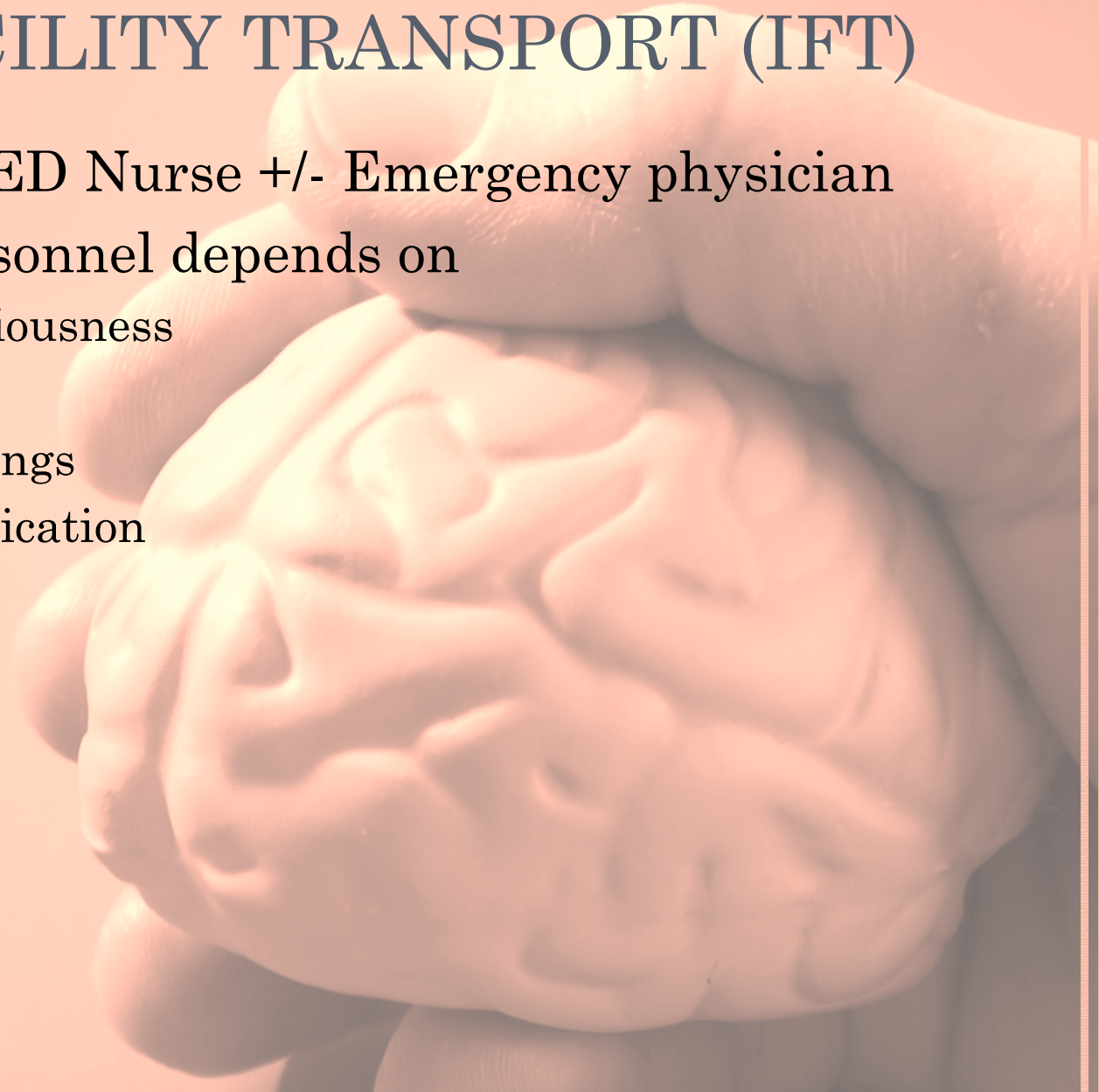
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# INTER-FACILITY TRANSPORT (IFT)

- Escorted by AED Nurse +/- Emergency physician
- Transport personnel depends on
  - Level of consciousness
  - Vital signs
  - CT brain findings
  - Disease complication



# METHODOLOGY

- To analyse the impact of the protocol on the patients transferred to KWH NS unit
- Two 26-month period of data were retrieved from HA via CDARS and ePR system
- Exclusion criteria
  - Managed not following the protocol
  - CT break down
- Compared patients' demographics between 2 periods
- Primary outcomes
  - The time from A&E registration to CT brain and to NS unit
  - Adverse transfer incident
- Secondary outcomes
  - Patient outcomes including LOS, 3-month mortality, A&E reattendance, readmission

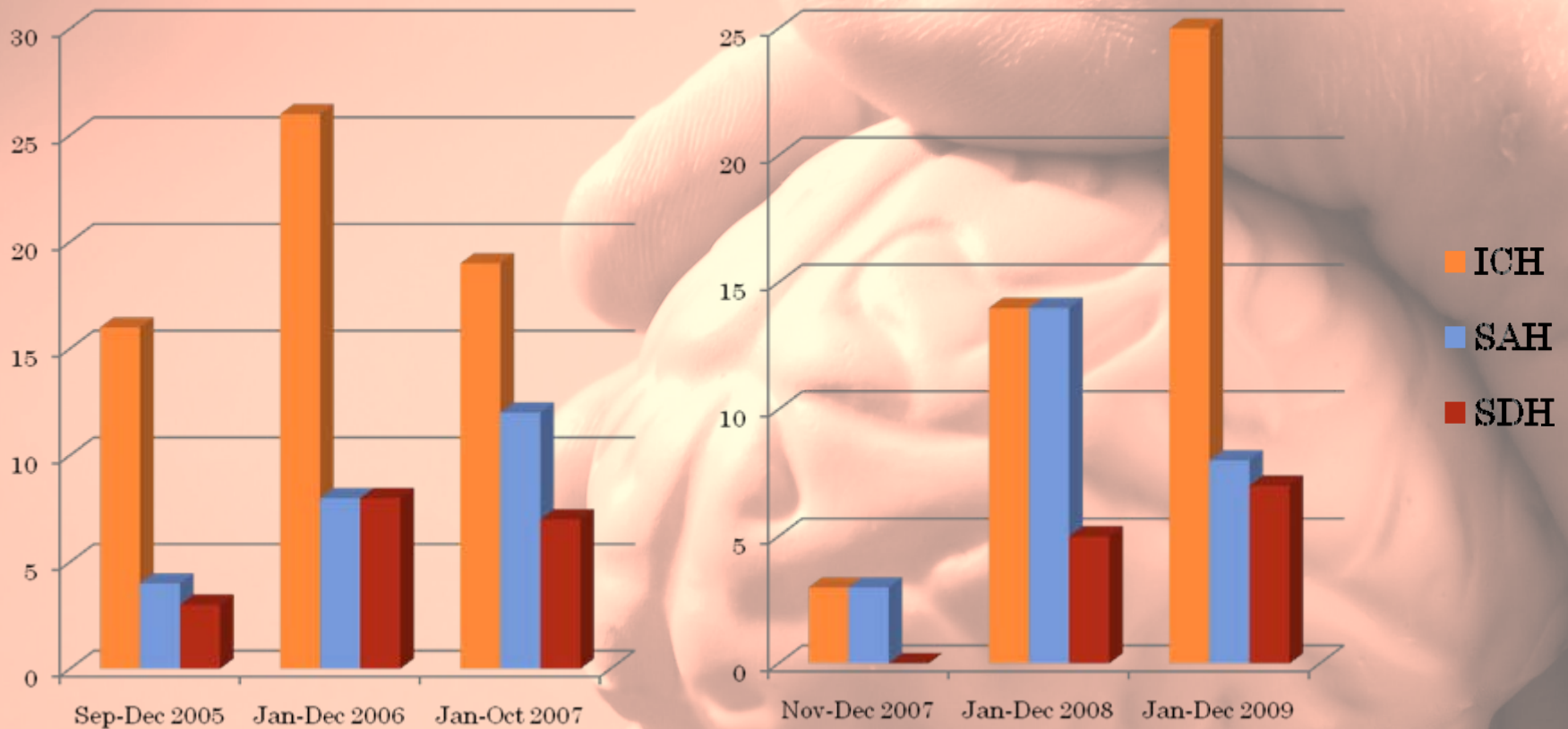
# RESULTS

- From *9/05 to 10/07*, before introduction of protocol:
  - Total non-traumatic ICH patients to KWH NS: **103**
  - M to F ratio **70:33**
- From *11/07 to 12/09*, after introduction of protocol:
  - Total non-traumatic ICH patients to KWH NS: **79**
  - M to F ratio **48:31**
  - AED directly transfer to KWH NS: **61**

# DEMOGRAPHIC DATA OF PATIENTS IN 2 PERIODS

| Variable            |            | 2005-2007 (n=103) | 2007-2009 (n=79) | p value |
|---------------------|------------|-------------------|------------------|---------|
| <b>Age</b>          | Median     | 69                | 60               |         |
|                     | Mean +/-SD | 64.4±16.1         | 62.4±13.9        | 0.363   |
| <b>Sex</b>          | Male       | 70 (68.0%)        | 48 (60.1%)       |         |
|                     | Female     | 33 (32.0%)        | 31 (39.9%)       | 0.313   |
| <b>GCS</b>          | ≥13        | 66 (64.1%)        | 48 (60.1%)       |         |
|                     | <13        | 37 (35.9%)        | 31 (39.9%)       | 0.647   |
| <b>Co-morbidity</b> | Yes        | 52 (50.4%)        | 46 (58.2%)       |         |
|                     | No         | 51 (49.6%)        | 33 (41.8%)       | 0.299   |

# NON-TRAUMATIC ICH PATIENTS IN 2 PERIODS



# STUDY RESULTS (I)

| Variable                  | 2005-2007 (n=103) | 2007-2009 (n=79) | p value          |
|---------------------------|-------------------|------------------|------------------|
| <b>Door to CT (mins)</b>  |                   |                  |                  |
| Median                    | 72                | 33.5             |                  |
| Mean (range)              | 201.1 (8-1382)    | 77.1 (11-1141)   | <b>0.001</b>     |
| <b>Door to NS (hours)</b> |                   |                  |                  |
| Median                    | 4.8               | 2.3              |                  |
| Mean (range)              | 9.2 (1.2-72.4)    | 3.9 (1.3-23.2)   | <b>&lt;0.001</b> |
| <b>LOS (days)</b>         |                   |                  |                  |
| Median                    | 17.7              | 21               |                  |
| Mean (range)              | 22.0 (1-150.8)    | 30.0 (1-176.5)   | 0.081            |

## STUDY RESULTS (II)

| Variable                         |     | 2005-2007   | 2007-2009  | Total | p value |
|----------------------------------|-----|-------------|------------|-------|---------|
| <b>Adverse Transfer Incident</b> | No  | 102 (99.0%) | 78 (99.0%) | 180   | 0.850   |
|                                  | Yes | 1 (1.0%)    | 1 (1.0%)   | 2     |         |
| <b>3-month Mortality</b>         | No  | 79 (76.7%)  | 62 (78.5%) | 141   | 0.775   |
|                                  | Yes | 24 (23.3%)  | 17 (21.5%) | 41    |         |
| <b>3-month AED Reattendance</b>  | No  | 68 (86.1%)  | 51 (80.1%) | 119   | 0.630   |
|                                  | Yes | 11 (13.9%)  | 12 (19.9%) | 23    |         |
| <b>3-month Readmission</b>       | No  | 69 (87.3%)  | 55 (87.3%) | 124   | 0.886   |
|                                  | Yes | 10 (12.7%)  | 8 (12.7%)  | 18    |         |



# DISCUSSION

- A significant improvement in Door to CT time
  - Immediate CT arrangement after AED doctor assessment
- Reduction in Door to NS unit time
  - Direct early IFT from CMC AED to KWH NS
- Problems on the protocol
  - Wait for CT brain  $\geq 1$  hr
    - Unconscious patient in resuscitation room
    - Impaired conscious patient in night shift

# CONCLUSION

- New protocol successfully reduced waiting time of CT and achieved early specialist neurosurgical inpatient care for non-traumatic ICH patients without compromising the quality of care
- Reduce administrative workload for the on-call medical doctor
- Avoid potential delay in neurosurgical intervention

# FUTURE DIRECTIONS & RECOMMENDATION (I)

- Fast-tracking care and early radiological intervention
  - Prepare for thrombolysis for hyperacute stroke
  - Aim to meet NINDS-Recommended time target
    - Door to Doctor                      10 mins                      **46 patients ( $\leq$  Cat. 2)**
    - Door to CT brain                      25 mins                      **33 mins**
    - Door to CT read                      45 mins
    - Door to Treatment                      60 mins

# FUTURE DIRECTIONS & RECOMMENDATION (II)

- Early and safe IFT to designated unit
  - Similar program should be considered on
    - Cardiothoracic injury
    - Burn injury
    - Infection control...
  - Need to assess manpower, training and equipment supports in AED
  - Collaborate and discuss logistics between AED, related departments and receiving unit





**THANK YOU**

**Question and Answer session**

**Photo credit**

“Hand on brain” by Julia Freeman-Woolpert

“The brain” by Jason Antony