Door-to-needle time

• Context
• Review of evidence
• Data and audit
• Detailed approach – process mapping
• Stress testing
Other delays

• Door to needle isn’t everything
  – Light bulb time
  – Cup-of-tea time
  – Unavoidable delays
    • Inability to call for help
  – Ambulance in-home problems
  – Transport delays
Evidence

- Oslo
- Redesign of hospital pathway
- DTN time dropped from 88 to 50 minutes

S. Korea

Before & after pre-hospital notification system

- t-PA use increased from 6.5% to 14.3%
- DTN time dropped from 48 to 29 minutes
  - 20 mins saving with one major change
• Fonarow G et al. Circulation 2011;123:750-758
• USA ‘Get with the guidelines’ programme
• Retrospective analysis of 25,504 lysed pts
• Pts with DTN <60 mins had
  – Lower in hospital mortality
  – Less sICH
• Factors associated with low DTN
  – Young age, white race, male, no prior stroke
  – Hospitals with large no of strokes
DTN time SSNAP 2015 Q2

mins
DTN over time, all SSNAP centres

<table>
<thead>
<tr>
<th>Period</th>
<th>Median DTN (mins)</th>
<th>Range (mins)</th>
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</thead>
<tbody>
<tr>
<td>2013 Q3</td>
<td>61</td>
<td>20 - 246</td>
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<tr>
<td>2014 Q2</td>
<td>62</td>
<td>27 - 157</td>
</tr>
<tr>
<td>2015 Q2</td>
<td>55</td>
<td>25 - 132</td>
</tr>
</tbody>
</table>
“If you always do what you’ve always done, you’ll always get what you’ve always got.”

Henry Ford
Measures to reduce DTN - Oslo

- Pre-hospital notification
- Pre-acquisition of history
- Pre-ordering of bloods and scans
- Rapid neurological evaluation
- Point-of-care INR
- CT near A&E
- CT priority and rapid transfer
- Reduced imaging
- Rapid reporting
- Pre-mixing of tPA
- Giving tPA in scanner
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Process mapping 1

• pre-arrival
  – How do you know a stroke is going to arrive?
  – Who will meet the patient?

• assessment
  – establishing diagnosis
  – establishing eligibility for Alteplase
  – contraindications
Process mapping 2

• imaging
  – internal pre-alert
  – reducing encumbrances
  – multi-tasking by staff
  – clearing the scanner
  – reporting

• decision
  – contacting the decision maker
  – verifying history
  – verifying imaging
Process mapping 3

• giving the drug
  – dosing
  – pre-bolus checks
  – infusion
  – monitoring

• admission to stroke unit
  – transfer
  – safety
Audit

• audit critical to check every stage
• full team participation required
• core SSNAP data collected on every patient
• monthly MDT meetings with
  – decision makers
  – medical trainees
  – nurses
  – radiologists
Audit (contd)

- routine review of all cases, discussion if:
  - haemorrhage or any other complication
  - DTN > 30 mins
  - pts of infrequent consultants
- enables:
  - protocol deviations to be identified
  - training of inexperienced staff
  - elimination of off-protocol practices
  - rapid dissemination of current thinking
# September Thrombolysis Clinical Audit

<table>
<thead>
<tr>
<th>Total Patients Thrombolysed</th>
<th>22</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assessable</td>
<td>14</td>
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<tr>
<td>SSNAP Exclusions</td>
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<tr>
<td>Clinical Exclusions</td>
<td>6</td>
</tr>
<tr>
<td>Not Stroke</td>
<td>4</td>
</tr>
<tr>
<td>Age ≥80</td>
<td>6</td>
</tr>
<tr>
<td>DTN ≤30 mins assessable</td>
<td>6/14 (43%)</td>
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<tr>
<td>with exclusions</td>
<td>6/8 (75%)</td>
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<tr>
<td>DTN ≤45 mins assessable</td>
<td>12/14 (86%)</td>
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<tr>
<td>with exclusions</td>
<td>11/12 (92%)</td>
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<tr>
<td>Mean</td>
<td>38</td>
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<tr>
<td>Median</td>
<td>33</td>
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<tr>
<td>Mean after exclusions</td>
<td>37</td>
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<tr>
<td>Median after exclusions</td>
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<table>
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<tr>
<th>Patient ID</th>
<th>DOB</th>
<th>Date</th>
<th>Onset</th>
<th>Arrival Time</th>
<th>CT Time</th>
<th>Pre NIHSS</th>
<th>Post NIHSS</th>
<th>Bolus Time</th>
<th>DTN Time</th>
<th>Wt Kg Est</th>
<th>Wt Kg Actual</th>
<th>Cons</th>
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<tr>
<td>5192850</td>
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<td>8</td>
<td>10</td>
<td>05:45</td>
<td>132</td>
<td>90</td>
<td>93</td>
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<td>19/01/50</td>
<td>05/09/14</td>
<td>14:30</td>
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<td>2</td>
<td>2</td>
<td>17:40</td>
<td>106</td>
<td>66</td>
<td>59</td>
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<tr>
<td>M2227058</td>
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<td>14/09/14</td>
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<td>05:17</td>
<td>06:04</td>
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<td>2</td>
<td>07:00</td>
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<td>91</td>
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<tr>
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<td>02/09/14</td>
<td>unknown</td>
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<td>17:23</td>
<td>7</td>
<td>2</td>
<td>18:13</td>
<td>56</td>
<td>76</td>
<td>70</td>
<td>RB/Nabeela, France/ Sarah</td>
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<tr>
<td>5194281</td>
<td>06/12/50</td>
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<td>16:30</td>
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<td>15</td>
<td>11</td>
<td>18:40</td>
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<td>82</td>
<td>81</td>
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<tr>
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<td>17/09/14</td>
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<td>4</td>
<td>20</td>
<td>17:00</td>
<td>40</td>
<td>70</td>
<td>59</td>
<td>RB/Zuzana, Modupe</td>
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</tbody>
</table>

**Delays, Complications and Notes**

- **5192850**: Wake up stroke. Delay as patient came in via private transport, seen initially by A&E doctor and referred to stroke team 102 minutes after arrival to A&E. No ASPECTS.
- **P1159889**: Delay as patient not blue-lighted as stroke, seen initially by A&E doctor and referred to stroke team 51 minutes after arrival to A&E. No ASPECTS. No MRI brain, definite stroke.
- **M2227058**: Not a stroke; stress-related presentation. Delay as patient not blue-lighted and was seen initially by A&E doctor and referred to stroke team 43 minutes after arrival to A&E. No ASPECTS. MRI brain confirmed the non-stroke diagnosis.
- **H381233**: Unknown onset. Delay as patient difficult to communicate and both CT scanners were busy.
- **5194281**: Delay as patient vomited in CT scanner and due to prolonged family discussion regarding decision to thrombolysed with ASPECT score 5.
- **4626897**: Delay due to unclear collateral history-stroke team had to ring wife, and both scanners were busy.
- **M2310484**: Onset-Bolus: Decision not to thrombolysed made initially due to haemoptysis, stroke symptoms were minor and rapidly resolving. Inpatient in Haldane ward when stroke symptoms recurred at 00:30. Extensive discussion between stroke clinical fellow and thrombolysing consultant.
- **M2906057**: Alteplase infusion aborted when symptoms worsened, total infused: 29 mg.
<table>
<thead>
<tr>
<th>Patient</th>
<th>DOB</th>
<th>Date</th>
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<th>Arrival Time</th>
<th>CT Time</th>
<th>PreNIHSS</th>
<th>PostNIHSS</th>
<th>Bolus Time</th>
<th>DTN Time</th>
<th>Wt Kg Est</th>
<th>Wt Kg Actual</th>
<th>Cons</th>
<th>Delays, Complications and Notes</th>
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<td>05/11/31</td>
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<td>19:12</td>
<td>2</td>
<td>15</td>
<td>19:40</td>
<td>38</td>
<td>86</td>
<td>92</td>
<td>GP/Eyad, Ursula</td>
<td>Age ≥80; Delay as stroke team were in CT with another patient who was being scanned.</td>
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<td>18</td>
<td>01:25</td>
<td>38</td>
<td>50</td>
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<td>GP/Tom, Karim</td>
<td>Clinical Exclusion: Patient blood pressure was 212/132. Labetalol given. Age ≥80</td>
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<td>M2794911</td>
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<td>11.00</td>
<td>12.25</td>
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<td>26</td>
<td>13.00</td>
<td>35</td>
<td>100</td>
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<td>Delay as there was another patient in the Scanner.</td>
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<tr>
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<td>19.40</td>
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<td>4</td>
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<td>58</td>
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<td>JD/Mulkeen, Manju</td>
<td>Delay as 3 Blue lights arrived within 40 mins.</td>
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<td>85</td>
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<td>12</td>
<td>0</td>
<td>09:04</td>
<td>26</td>
<td>50</td>
<td>41</td>
<td>Eyad, Manju</td>
<td>Could not get hold of the Stroke Dr on-call. Age ≥80</td>
</tr>
</tbody>
</table>
Audits published nationally

• **Impact of estimating weight:**
  

• **Comparison of consultant ICH rate**
  
  Do thrombolysis haemorrhage rates vary according to the specialty of the thrombolysing consultant? Foster LDE, Devine J, Dzvene M, Bathula R, Cohen DL. Int J Stroke. 2013:8:2

• **Comparison of consultant DTN times**
  

• **Comparison of in- v out-of-hours**
  
  Analysis of the influence of service-related factors on symptomatic intracranial haemorrhages post-thrombolysis. Lee TWJ, Coombes ND, Ubalde D, Basset P, Devine J. Being presented tomorrow
Acceptable delays

- telephone history
- stabilisation of pt eg vomiting, airway
- BP control
- cannulation difficulties
- consent
Unacceptable delays

- undressing
- monitor / ECG
- porters
- prolonged consent
- blood results (unless particular reason)
- neurological improvement
- CT report
Informed consent can take time: what to do?

- brief verbal consent
- written consent
- assent from NOK

We also use

- ‘increased risks’ consent
- translated info sheets
पता चलेगा की आपने Alteplase अपनाई अथवा न अपनाई गूंढ़ था?

वोट करेंः
- उम्रिना गठन में बोली घुम-घम नहीं होती है।
- ऋतुवार गया है परंतु घुम-घम रिएं तंदुरस्त अने रस्सियां नहीं ते बोली घुम-घम।
- पूर्ण रीति-रिहायों अन्य तंदुरस्त अवस्था बनाना तंदुरस्त रह गया जीव ते बोली घुम-घम।

With Alteplase

| 17 |
| 33 |
| 50 |

Without Alteplase

| 21 |
| 41 |
| 38 |

अल्ट्प्ले से पस्तवता कुम्हा मातें अंक सारखार हे। तेही हो मातें भली भली:

आ पक्ष्यमाएँ Alteplase-मध्ये भली मातें हे जे पहले विमान ते अंक सारखार माते तथा पस्तवता कुम्हा मातें विषयमार हे, आ पश्चिमाने विविधाने हे।

1) जने अल्ट्प्ले सुंग पृथ्वी आपवामां आवृती हे?
2) Alteplase सुंग हे जने ते टेही रीते प्राप्त करिये?
3) Alteplase-मध्यें उपयोग न करने ते ठोक्को जीवन हे?
4) Alteplase-नियंसार कृती अपार हे?
5) सहक रंगमारो अने अपसारो कृती-हृदय हे?

आ पाख बार्या पक्क तपासे कृती प्रथा होप ते डेकर रो रंगपूरी संपूर्ण करीये।

1. जने अल्ट्प्ले सुंग पृथ्वी आपवामां आवृती हे?

आ पश्चिमाने आपव्यापी भली भली जने रीते महादुरप बारी कहे।
(1) डेकरे आपव्यापी ड्रा आपव्यापी जालकारी बाखरी कुम्हा महादुरप निवास जने। (विभाग 1 वीं प)
(2) आ उपर्युक्त बासर आ पर्याय आणि बाधावी के नहीं ते पहा आ पाख वारा नीती करवाव्यां महादुरप बारी कहे। (विभाग 6)

2. Alteplase सुंग हे जने ते टेही रीते प्राप्त करीये?

बोलीना तके जाहै ते विविधां बोलीना परिचय अट्ठाणे जने जाहै अल्ट्प्ले-नियंसार मातें अंक सारखार हे। हकरेरीतिमाना कुम्हा बाखर आ सारखार पस्तवता उपयोग जने हे।
वहे अपार भलीं जीवनी हे हे नक्कासा समस्याकां आंदोलन पस्तवता कुम्हा जाने आ सारखार हे महादुरप लक्षण हे।

- Alteplase-मध्ये बोलीना चोट नाहीणे ओळखणे च्या तरा नाहीणे निर्देशन.
- अद्यान्त मूल रूपाती बोलीना नाहीणे पृथ्वी-हृदय का अने नीती करते।
Alteplase-नियंसार पस्तवता कुम्हा बाखर आ औरंगाबाद अंक सारखार जने हे जीवनी हे।
- Alteplase-मध्ये बालाकांटी जागरूक बुद्ध तेंदूपी पस्तवता कुम्हा पतीती गैंगसरी किंवा तंत्रपथ.
Big wins

• pre alert
• nurse meets ambulance
• stretcher to CT
• immediate report
• treatment in / close to CT
• INR
Small but significant wins

• not undressing pt
• no monitor or ECG
• not waiting for blood results
• drawing up bolus dose
• detailed protocols for
  – contacting people
  – scanner unavailability
Stress testing

• Inability to contact decision-maker
  – telephone protocol: mobile, call dropout, home
  – next available d-m

• multiple simultaneous arrivals
  – during day enlist support from HASU, consultant
  – out-of-hours: anyone available, rapid triage

• CT unavailability – 5 mins to main dept

• equipment failure – know of other options
Telephone script

“Hello”

“This is a thrombolysis call”

“I am the Specialist Stroke Nurse and I am with a patient in A&E” or expecting a patient in A&E

“The patient is a ___ year old man / woman”

“The onset of their symptoms was at ____” (time to the nearest minute)

“Their symptoms are ____  ____  ____”

“They have had a CT scan” or “I am arranging the CT scan now”

“Here is the doctor who has seen the patient to speak with you”
Looking forward

• Close to shortest possible DTN time
• Reducing onset to door
  – 1\textsuperscript{st} responder of ambulance?
  – ‘scoop & run’ -v- ‘stay & play’
  – stratify patients beyond FAST?
Thanks to:

<table>
<thead>
<tr>
<th>Raj Bathula</th>
<th>Joe Devine</th>
<th>John Knottenbelt</th>
<th>Gill Park</th>
<th>Williams</th>
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<tbody>
<tr>
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<td>Raksha Jina</td>
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