Improving Theatre Efficiency
What have we learned from The Productive Operating Theatre?

Hugh Rogers – Associate Medical Director, Innovation and Service Transformation
-- Formerly Senior Associate, NHS Institute for Innovation & Improvement
The Productive Operating Theatre
Building teams for safer care

What did we do?

What impact did it have?

- Benefits
- Critical success factors

What have we learned since?

- What did we miss
The improvement aims:

To improve 4 key dimensions of quality:

- Team performance and staff wellbeing
- Patient’s experience and outcomes
- Safety and reliability of care
- Value and efficiency
What is ‘The Productive Operating Theatre’?

- Modular improvement programme
- Systematic approach
- Based on Lean and Human Factors
- Concentrates on HOW not WHAT
We built the TPOT ‘house’  (Echoes of the Lean ‘temple’)
The Box Set

The Productive Operating Theatre

Foundation module box set

Executive Leaders' Guide
Programme Leaders' Guide
Preparing How We Are Doing
Well Organised Theatre
Operational Skills at a Glance
DVD

The Box Set

Theatre

Preparation
The Productive Operating Theatre

Process
- Session Start-up
- Patient Preparation
- Patient Turnaround
- Handover
- Consumables and Equipment
- Recovery

Enablers
- Team-working
- Scheduling

Foundation
- Knowing How we are Doing
- Well Organised Theatre
- Operational Status at a Glance

Toolkit

Programme Leaders’ Guide
Executive Leaders’ Guide
Programme leaders guide: Purpose of Visioning workshop

To identify a shared vision/tribal alignment

To identify potential barriers

To identify champions

To prove you are listening to frontline staff
Barriers and Frustrations

1. What would make the perfect operating list?

2. What are your current issues that prevent you achieving the ‘perfect operating list?’

<table>
<thead>
<tr>
<th>Issue</th>
<th>Count</th>
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<tbody>
<tr>
<td>START/finish</td>
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<tr>
<td>Team working</td>
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<tr>
<td>Breaks</td>
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<td>Documentation</td>
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<td>Equipment</td>
<td>18</td>
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<td>Communication</td>
<td>22</td>
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<td>Patient experience</td>
<td>15</td>
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<tr>
<td>Profit</td>
<td>1</td>
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<tr>
<td>Cancellations</td>
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</table>
The role of the Executive Leader

Create the programme team

Identify resources

Establish the steering group

Continue to monitor and support

Enable the Board workshop
Knowing How We Are Doing

Measures Workshop

Background on measurement and data

Group work to generate possible measures
  • related to outputs of visioning session

Dot voting to decide which measures to use first
Session Start-up Module

Aim: To start list at planned start time every morning

Improvement Target 1: to achieve a 10% increase in the % of morning lists that start within 15 minutes of planned start time within 6 months

30.08.09 - PD3A 1: Following process mapping session with ward staff - New system introduced: theatre to phone ward 8:15Am and check patient ready

06.11.09 - PD3A 2: Following Senior Leadership Walk Round - patient to get on trolley in anaesthetic room

28.01.10 - PD3A 3: Following a scheduling meeting, Christine Marland reminded ward of agreed actions

27.04.10 - PD3A 4: Mr Rick Clayton reviewed late start data by consultant and disseminated to all surgeons
Foundations: Well Organised Theatre

‘5S’

Sort
Simplify/Set in order
Sweep & Shine
Standardise
Sustain

BEFORE 5S

AFTER 5S

Anaesthetic store after 5S
Time to find needed drug (emergency)

Reduced from 49 seconds to 10 seconds

Efficient restocking of cupboards

Identifying missing drugs from 180 seconds to 40 seconds

Saving resources

188 packs overstocked, 15 expired, 23 needlessly in fridge

Building a new defence barrier against drug error

Standard procedures for IV drugs and local anaesthetic agents

Chekairi A, Johnson J  Royal College of Anaesthetists Bulletin 59, Jan 2010
Foundations:
Operational Status at a Glance
Building teams for safer care

Team-working and human factors
Who is the leader?
The complexity of disasters

Examples:

Wrong Engine Kegworth
Jan 1989

Wrong Kidney Llanelli
Feb 2000
‘Let’s wake up to human factors – let’s make a difference.’

Martin Bromley - airline pilot, widower
Team-working
Implementing the ‘five step model’

1. Briefing

WHO surgical safety checklist:

2. Sign in
3. Time out
4. Sign out
5. De-briefing

Five Steps to Safer Surgery

Step one: Briefing
Step two: Sign in
Step three: Time out
Step four: Sign out
Step five: Debriefing

December 2010
Using the model for improvement

What are we trying to accomplish?

How will we know that a change is an improvement?

What changes can we make that will result in improvement?

Act

Plan

Study

Do
Process mapping

How is a patient scheduled?

Process mapping backwards from end

Usually poorly monitored
6 – 4 – 2  What the scheduling process looks like

Upon notification of leave/absence uncovered sessions are recycled within the directorate.

Yes

Directorate contacts the theatre management system administrator to confirm which consultant is covering the list.

2 weeks prior to session date, session permanently deactivated and staff redeployed

Session goes ahead

No

Directorate contacts the theatre management system administrator to inactivate the list. Inactivated lists are available on HISS for any directorate to use.

No

Session goes ahead

Yes

Requesting directorates contact theatre management system administrator to reactivate session.

No session

Session goes ahead
Using procedure times

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Allocated time (mins)</th>
<th>Av measured time (mins)</th>
<th>Time difference (mins)</th>
<th>% difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>T &amp; O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knee arthroscopy</td>
<td>40</td>
<td>53</td>
<td>-13</td>
<td>-33</td>
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<tr>
<td>Caudal Epidural</td>
<td>30</td>
<td>23</td>
<td>7</td>
<td>23</td>
</tr>
<tr>
<td>Total Knee Replacement</td>
<td>120</td>
<td>160</td>
<td>-40</td>
<td>-33</td>
</tr>
<tr>
<td>R/O Metalwork</td>
<td>40</td>
<td>44</td>
<td>-4</td>
<td>-10</td>
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<tr>
<td>Carpal Tunnel Decompression</td>
<td>30</td>
<td>29</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total Hip Repl (Cemented)</td>
<td>120</td>
<td>183</td>
<td>-63</td>
<td>-53</td>
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<tr>
<td>ACL recon</td>
<td>130</td>
<td>147</td>
<td>-17</td>
<td>-13</td>
</tr>
<tr>
<td>Ganglion excision</td>
<td>xx</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Hip Repl (Hybrid)</td>
<td>120</td>
<td>167</td>
<td>-47</td>
<td>-39</td>
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<tr>
<td>Hip Resurfacing</td>
<td>150</td>
<td>169</td>
<td>-19</td>
<td>-13</td>
</tr>
<tr>
<td>Bilat vasectomy</td>
<td>25</td>
<td>27</td>
<td>-2</td>
<td>-8</td>
</tr>
<tr>
<td>Cystoscopy</td>
<td>30</td>
<td>44</td>
<td>-14</td>
<td>-47</td>
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<tr>
<td>TURP</td>
<td>75</td>
<td>86</td>
<td>-11</td>
<td>-15</td>
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<tr>
<td>Circumcision</td>
<td>xx</td>
<td>51</td>
<td></td>
<td></td>
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<tr>
<td>Endosc resec bladder lesion</td>
<td>45</td>
<td>56</td>
<td>-11</td>
<td>-24</td>
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<tr>
<td>Urethral dilatation</td>
<td>30</td>
<td>38</td>
<td>-8</td>
<td>-27</td>
</tr>
<tr>
<td>Orchidectomy</td>
<td>xx</td>
<td>56</td>
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<td></td>
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<tr>
<td>Cystodiathermy</td>
<td>40</td>
<td>50</td>
<td>-10</td>
<td>-25</td>
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<tr>
<td>Excision hydrocoele</td>
<td>40</td>
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<td>Optical urethrotomy</td>
<td>30</td>
<td>49</td>
<td>-19</td>
<td>-63</td>
</tr>
<tr>
<td>Frenuloplasty</td>
<td>30</td>
<td>27</td>
<td>3</td>
<td>10</td>
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</table>
## Session start-up

<table>
<thead>
<tr>
<th><strong>Patient Preparation Timeline</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Time</strong></td>
</tr>
<tr>
<td><strong>Tasks &amp; activities</strong></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
</tr>
</tbody>
</table>

### Surgeon & Anaesthetist

| **Time** | **0745hrs** | **0800hrs** | **0810hrs** | **0815hrs** | **0830hrs** | **0845hrs** | **0850hrs** | **0855hrs** | **0900hrs** |
|-------------------------------|
| **Tasks & activities** | N/A | Locate patients & documentation | See 1st patient | Seeing rest of patients on the list | Doctors arrive in theatres | Pre session briefing | Sign in (WHO 1) | Start of list - commencement of anaesthetic |
| **Notes** | | | | | | | | | |

### Theatre Team Set-up

| **Time** | **0745hrs** | **0800hrs** | **0810hrs** | **0815hrs** | **0830hrs** | **0845hrs** | **0850hrs** | **0855hrs** | **0900hrs** |
|-------------------------------|
| **Tasks & activities** | Coordinator on duty. Check lists & staffing | Theatre teams start shift. Team start setting up theatres | Confirm all OK for 1st case 1st patient sent for by theatres by default unless message from doctors | Team leader confirms safety checks and all ready. Gather for briefing | Pre session briefing | Sign in (WHO 1) | Start of list - commencement of anaesthetic |
| **Notes** | | | | | | | | | |

*Refer to Team-working module for details of pre-session briefing*
Patient preparation: West Mid: “DOSA” (Day of Surgery Admission unit)
Roll-out

NHS England

• 10 cohorts
  • Training
  • Implementation support
• Human factors workshops for theatre staff
  • On site, team of clinician and psychologist
• 90 of 174 acute trusts in NHS England

International uptake ‘Master training’

➤ Scotland
➤ Ireland
➤ Wales
➤ Australia
➤ New Zealand
➤ Ontario (Canada)
➤ Qatar
Benefits achieved
Team-working

Impact on culture (safety attitudes questionnaire)

Mean Score from SAQ before and after introduction of briefing and debriefing

- Team Work Climate
- Safety Climate
- Job Satisfaction
- Perceptions of Management
- Working Conditions
- Stress Recognition

$p<0.05$
Scheduling

Session Utilisation

Mean – 90%
Mean – 98%

Number of waiting list initiative sessions

Over 8 weeks:
Cost of unused sessions £31,746
Cost of extra sessions £81,664
Potential saving in 1 year £510,400
Improved session start times

RSUB 9am start: Oct08-Mar09 vs Jun-Sep09

- UCL=10:13
- UCL=09:29
- LCL=08:35
- \( \bar{x} = 09:02 \)
- \( \bar{x} = 09:08 \)

Chelsea and Westminster Hospital
NHS Foundation Trust
Summary of benefits

Safety & team working
Measurable increase in job satisfaction, team working climate and safety climate
Improved reliability of correct VTE and surgical site infection prophylaxis
Recovery: improved pain scores < 6 to 88%, normothermia to 98

Consumables and equipment
£12K one off stock reduction per theatre
£9K annual saving per theatre on consumables

Session and list utilisation
Improved session utilisation from 90% to 99% with abolition of extra sessions
16% increase in touch time

Overall potential gain from full roll-out (estimated)
At least £3 million per annum
(for an average trust with 16 theatres)
‘Making the finance director a quality champion is one of the best strategies for achieving quality improvement results... Why? Because when we start to think about the relationship between cost and quality in a different way, magic happens.’

Helen Bevan - director service transformation, NHS Institute for Innovation and Improvement

Example
Contact time was increased as a percentage of total scheduled time by 10%. The baseline number of contact hours was 1600 hours per annum¹ for an average trust. Total contact time progressively improved over a two year period by 2,640 hours:

<table>
<thead>
<tr>
<th>Year</th>
<th>% Increase</th>
<th>Contact Hours</th>
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<tbody>
<tr>
<td>Year 1</td>
<td>2.5%</td>
<td>660</td>
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<tr>
<td>Year 2</td>
<td>5%</td>
<td>1,320</td>
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<tr>
<td>Year 3</td>
<td>10%</td>
<td>2,640</td>
</tr>
</tbody>
</table>

An annual efficiency saving of £3,168,000

‘Theatres represent one of the single biggest productivity opportunities in any acute trust. Even if you think your theatres are working well, the productivity benefits of The Productive Operating Theatre, very quickly add up.’

Matthew Lowry – deputy chief executive and chief finance officer, The Rotherham NHS Foundation Trust

¹Contact hours increased by 10% from a baseline of 1600 hours per annum.
The evaluation has presented a range of examples which demonstrate that the programme has significantly contributed to a range of health organisations delivering improvements in terms of safety and reliability of care, team working and value and efficiency.

- Better organised, standardised theatre equipment: significant financial savings
- Improvements in data collection: more robust outcome data
- Efficiency gains with regards to start times, patient pathway, cancellations
- Team culture, behaviours and empowerment as a result of team working

Has it enhanced quality improvement knowledge and skills?

- Use of data presented in visual ways? (SPC)
- Regular staff engagement in workshops?
- Commitment of senior staff *(executive) to QI?
What was missing?

Enhanced recovery pathway

Emergency surgery pathways

Role of IT

Innovation
Enhanced Recovery Pathway—“Getting Better Sooner”

Referral from Primary Care
- Optimising pre operative haemoglobin levels
- Managing pre existing co morbidities e.g. diabetes

Pre-Operative

Admission
- Admission on day
- Optimised Fluid Hydration
- CHO Loading
- Reduced starvation
- No / reduced oral bowel preparation (bowel surgery)

Intra-Operative
- Minimally invasive surgery
- Use of transverse incisions (abdominal)
- No NG tube (bowel surgery)
- Use of regional / LA with sedation
- Epidural management (inc thoracic)
- Optimised fluid management Individualised goal directed fluid therapy

Post-Operative
- DX when criteria met
- Therapy support (stoma, physio)
- 24hr telephone follow up

Follow Up
- Planned mobilisation
- Rapid hydration & nourishment
- Appropriate IV therapy
- No wound drains
- No NG (bowel surgery)
- Catheters removed early
- Regular oral analgesia
- Paracetamol and NSAIDS
- Avoidance of systemic opiate-based analgesia where possible or administered topically
What was missing?

Enhanced recovery pathway

Emergency surgery pathways

Role of IT

Innovation
Process Mapping (to create task specific interventions)

Staff map out 'current state' of the process.

Staff briefed on aim of mapping event.
Potential Solutions

• Free up middle grade doctors and consultants when on-call

• Emergency Surgeon of the week

• Surgical Assessment Unit
  see if it is effective for improving the emergency surgical pathway

• Hot clinics & surgical ambulatory emergency care unit (SAEC)
What was missing?

Enhanced recovery pathway
Emergency pathways
Role of IT
Innovation
Foundations:
Operational Status at a Glance
The EPR development journey
What was missing?

Enhanced recovery pathway

Emergency pathways

Role of IT

Innovation - the transfer of an idea from one context to another
Limitations of Incremental change
(Model for Improvement)

Incremental change

<table>
<thead>
<tr>
<th>Month 1</th>
<th>Month 2</th>
<th>Month 3</th>
<th>Month 4</th>
<th>Month 5</th>
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Innovation

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<th>Month 7</th>
<th>Month 9</th>
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# Healthcare methods

## Clinical systems improvement

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<th>Transformation</th>
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<tr>
<td>(First order change)</td>
<td>(Second order change)</td>
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<tr>
<td>Small tests of change</td>
<td>We have to question our implicit design rules</td>
</tr>
<tr>
<td>Charts of quality measures</td>
<td>We have to look at every assumption</td>
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<tr>
<td>Scale up successes</td>
<td>We need to go back to our principles and values</td>
</tr>
<tr>
<td>Continuous learning</td>
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</tbody>
</table>

We have to question our implicit design rules

We have to look at every assumption

We need to go back to our principles and values
Fail fast, fail early and fail often,
only then will you succeed