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# Comparing apples with apples: hierarchical task analysis as a simple systems framework to improve patient safety.

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# Comparing Apples with Apples: Hierarchical Task Analysis as a simple systems framework to improve patient safety

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**ABSTRACT:** Changing healthcare culture to improve patient safety is the goal of healthcare systems across the world. However the proliferation of Human Factors/Ergonomics (HFE) systems methods may be limiting the embedding of improvements as well-established methods from other safety critical industries are modified. This paper explores how the basic HFE method of Hierarchical Task Analysis (HTA) could be used to compare ‘apples with apples’ by looking at national guidance and local hospital guidance for the care of women and their babies during labour and child birth. It is concluded that HTA could offer a simple framework to visualize operational systems as shared mental models which are accessible within and between multi-disciplinary teams, as part of process improvement projects (including Plan-Do-Study-Act; PDSA) and as the foundation for HFE in healthcare education to ensure the consistency of messages throughout the patient journey.

**Keywords:** Process mapping, mental model, hierarchical task analysis, obstetrics, standards

**Presentation Preference:** Oral

## 1. INTRODUCTION

Every year ‘around 500 patients in the UK are suffering unnecessary harm’ from ‘Never Events .. that are believed to be wholly preventable by the implementation of the appropriate safety protocols’. A recent report from the UK Care Quality Commission (CQC) highlights that in other high risk industries ‘Safety alerts are implemented effectively and consistently; an understanding of team dynamics, situational awareness, and human factors and ergonomics are central to how they work ... There is no hesitation in stopping operational processes if safety is thought to be in any way compromised’ (CQC, 2018). It recommends that ‘clinical processes and other elements, such as equipment and governance processes, ...should be standardised’. But, what could this mean for national guidance from the National Institute for Health and Care Excellence (NICE)?

At present NICE guidelines are used to develop local hospital policies and procedures with other sources e.g. professional and regulator recommendations. This results in a

plethora of ‘*confused safety-related messages from multiple agencies*’ (CQC, 2018).

This paper describes using the HFE method of Hierarchical Task Analysis (HTA) by comparing a NICE guideline (CG190, 2014) with operational policies from two hospitals (combined to enhance anonymity) to explore the use of HTA as a framework for standardising operational policies.

## 2. METHOD

The starting point for standardization is to create a macro representation using a systems mapping approach within which meso (team) and micro (human-product) interactions can be located. For Quality Improvement-HFE integration (Hignett et al, 2015) this would be **Step 1: Explore (Plan/Anticipate)** using HFE Task/Systems Analysis and Statistical Process Control (SPC) to explore required performance and potential variability.

There have been many academic papers discussing the merits of different mapping systems (for example, Jun et al, 2009; Lyons, 2009; Weir et al, 2018). There are precedents

for using HTAs for mapping complex systems in healthcare (Phipps et al. 2008; Sarker et al. 2008; O'Donnell et al. 2012).

HTA is used to map systems by describing a task as a higher-level goal with a hierarchy of superordinate and subordinate tasks. At each level of subtasks a plan directs the sequence and possible variance of task steps as statements of the conditions necessary to undertake the operation(s) (Shepherd, 2001).

Colligan et al (2007) compared HTA with a sequential flow diagram - a very common process mapping approach in healthcare. They reported advantages and disadvantages with both methods. Some of the key advantages for HTA were:

- easier to 'produce graphically and review as the mapping progressed',
- easier 'to develop to a further level of detail',
- mechanism for boundary (end) of task description using stopping rules,
- flexibility 'representing important goals which did not correspond to specific acts at specific times but which represented ongoing issues that could be triggered at any time' e.g. seeking help or cognitive tasks,
- preferred for working with a colleague to discuss safety problems,
- similar layout despite the same process being carried out differently,
- better inclusion for unpredictability of healthcare activities and different professional autonomy of practitioners with 'focus on goal to achieved rather than the precise method used'.

### 3. RESULTS

This exploratory study created HTAs from the NICE (2014) guidelines (supraordinate goals, Figure 1) and hospital documents (3<sup>rd</sup> stage of labour, Table 1). Many differences were found between the national guidance and the hospital policies; mostly with more task detail in the hospital documents.

For each stage of child birth, activities are informed by professional consensus e.g. Royal College of Midwifery, Royal College of Obstetrics and Gynecology. These (and other)

inputs are used to develop (and revise) local hospital policies. This local iterative revision introduces the potential for women to receive different treatment and care experiences.

**Table 1. HTA for combined hospital policies**

| 4               | Support 3rd stage of labour (from birth to expulsion of placenta and membranes)   |
|-----------------|---|
| <i>Plan 4</i>   | <i>Do in Sequence</i>   |
| 4.1             | Observe woman's physical health (colour) and blood loss   |
| 4.2             | Do physiological management (push) to cut and clamp cord  |
| <i>Plan 4.2</i> | <i>Do in Sequence</i><br><i>If placenta retained for &gt;60 minutes post birth, follow Retained Placenta guideline</i>  |
| 4.2.1           | Encourage woman breast feeding  |
| 4.2.2           | Encourage sitting/standing (use gravity)  |
| 4.2.3           | Clamp cord when pulsation has ceased  |
| 4.2.4           | Support delivery of placenta and membranes (maternal effort)  |
| 4.3             | Do active management (pull) to cut and clamp cord   |
| <i>Plan 4.3</i> | <i>Do 4.3.1, then one of 4.3.2, 4.3.3, 4.3.4, Do 4.3.5 if signs of separation Do 4.3.6.</i>   |
| 4.3.1           | Give oxytocin or syntometrine I.M.  |
| 4.3.2           | Clamp immediately if baby or mother requires immediate resuscitation  |
| 4.3.3           | Clamp after 1-3 minutes following delivery (pulsation ceased)   |
| 4.3.4           | Delay on request of woman   |
| 4.3.5           | Perform controlled cord traction and inform woman of benefits   |
| 4.3.6           | Record time of cord clamping  |
| 4.4             | Do proactive management for high risk women   |
| <i>Plan 4.4</i> | <i>Do 4.4.1 if: - Morbidly obese (BMI&gt;40); - Previous post-partum haemorrhage; Multiple pregnancy; Prolonged labour; Para 5; Pre-eclampsia this pregnancy; APH this pregnancy; Mid cavity rotational birth; Caesarian section; AFI &gt;25 for polyhydramnios</i> |
| 4.4.1           | Commence 40 units oxytocin infusion immediately after birth of baby   |
| 4.5             | Refer to Obstetrician for manual removal of placenta (theatres)   |

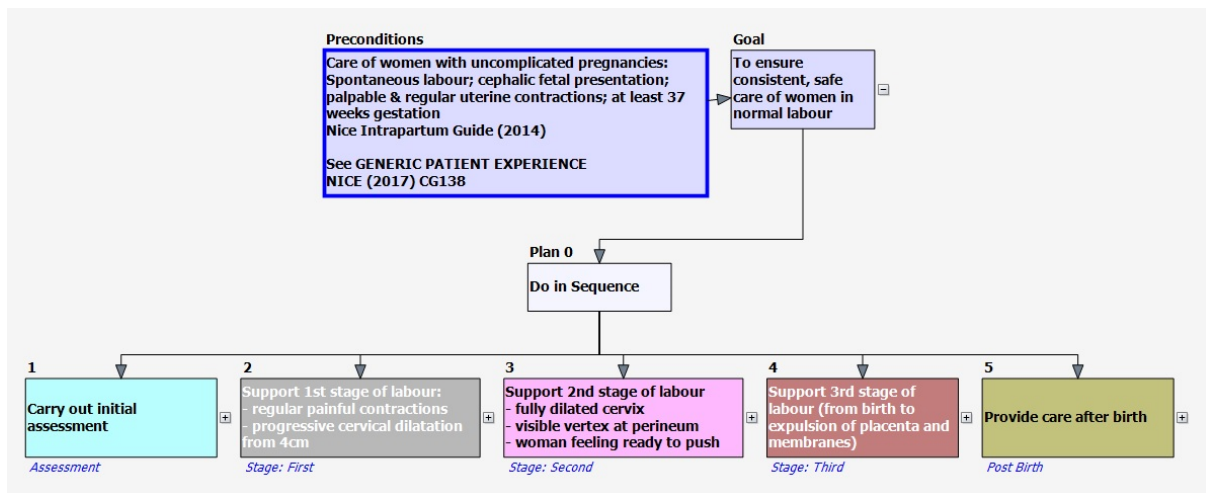


Figure 1 – HTA for NICE (2014) ‘Care of women and their babies during labour and childbirth’

#### 4. DISCUSSION

The use of HTA in this study confirmed the findings of Colligan et al (2007), with different levels of detail being visualised using a similar layout despite different subordinate goals (tasks). This included the ability to represent tasks which did not correspond to specific acts at specific times (e.g. referral for complex tasks). Overall HTAs allowed for the unpredictability of healthcare activities and different professional autonomy of practitioners with ‘focus on goal to achieved rather than the precise method used’ (Colligan et al, 2007).

#### 5. CONCLUSION

The CQC report (2018) found that the system complexity creates confusion for staff when seeking appropriate support. This is compounded by the lack of consistency that staff experience in local systems and processes when trying to implement safety guidance.

Culture change takes many years (decades) and consistent underpinning messaging is vital to keep the industry moving in the right direction (improved patient safety). One of the key challenges is to effect change at both the NHS national policy level (including Royal Colleges, Health Education England and other bodies) as well as individual hospital levels. This integrated approach needs to be based on a simple framework (comparing ‘apples with apples’) which is accessible across multi-disciplinary healthcare education to ensure the

consistency of messaging throughout the patient journey.

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