Medication Management in Community Care: Using Hierarchical Task Analysis to describe complex systems

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Abstract. This paper presents an investigation into medication management at a UK Community Healthcare Trust. Data were collected at two community in-patient facilities to review practice at the two sites against the Standard Operating Procedures for
(1) Medicines Management and (2) Controlled Drugs Management for four key tasks: ordering, transportation, receipt and storage of medicines. The variances in practice were discussed with senior management with the recommendation to simplify the system with a single SOP and provision of in-house pharmacy services at both sites.

Keywords. Medicine safety; Patient safety, Human Factors, Community care

1. Introduction

Medicines are the most frequent healthcare intervention with the National Health Service (NHS) spending £13.8 billion per year (NHS, 2014). Bridgewater Community Healthcare NHS Foundation Trust provides community and specialist health services in North West England to 831,270 people across a wide geographical area. This includes care provision at community hospitals with and without in-house pharmacy services. This mixed model of care creates a complex system for the procurement (ordering), transportation, receipt and storage of the medication. The Royal Pharmaceutical Society (2005) gives procedural guidance for medication transportation including the equipment and processes, and receipt of medication.

In 2015 an internal audit found that despite quality improvement projects to address operational variations, transportation and storage were particularly problematic in one geographic region. An in-depth analysis of working activities was recommended to understand challenges for improvement. This service evaluation aimed to evaluate and identify causes of errors in medication management (ordering, transportation, receipt and storage) and propose interventions to improve safety.

2. Methods

Hierarchical Task Analysis (HTA) describes a task as a higher-level goal e.g. safe transportation of medicine, with a hierarchy of subordinate task steps. At each level of the subtasks a plan directs the sequence and possible variance of task steps (Shepherd, 2001). It has been used to describe system dynamics and human-system interfaces (Stanton, 2006). Lane et al (2006) used HTA to model medicine administration and suggested that errors could be predicted using a systematic human error prediction approach. Miller and Vicente (2001) compared HTA with abstraction hierarchy methods and summarised that HTA offered benefits for '*capturing the procedural knowledge of operators and highlighting what information will be needed by the operator at particular stages of an expected task'*.

Data were collected by shadowing 10 staff at two care locations to observe ward rounds and the order, arrival and storage of medication. The locations were chosen by author EK to explore previously identified variance in practice. The Care Quality Commission (CQC) carried out an unannounced inspection of site 2 in 2015 to check compliance with legal requirements and regulations and determine an overall rating for the service. They reported that the correct policies and procedures for administration of medicines were being followed. The CQC visited site 1 in 2014, giving a mostly positive report but identifying a problem with risk and quality reporting. It was suggested this might be linked to the long-term (changing) purpose of the hospital.

Site 1 was a community hospital providing in-patient care including an in-house pharmacy. Site 2 provided in-patient services as intermediate care with medication managed by nurses with the assistance of GPs using an independent (non-Trust) pharmacy service. The services were mapped as HTAs both to compare practices at the two sites and also against the Trust Standard Operating Procedures (SOPs) for (1) Medicines Management and (2) Controlled Drugs Management for the four key tasks of ordering, transporting, receiving and storing medicines.

3. Results

Six HTAs were produced for the SOPS (ordering, transportation, receipt and storage) and observed practices at the two sites. A high level generic HTA was developed using these data with the overall goal of patients receiving the correct medication (Figure 1).

On arrival at both sites a patient received a medical review. Their current medication could be cancelled, changed and/or new-prescribed by a doctor through GP services at both sites. At site 1, the patient chart was then reviewed by a Pharmacist with any problems notified to the prescribing GP. A Pharmacy Technician then checked the patient chart and Patients Own Drugs (POD) compartment (located in the patient's room) for current stock and ordered the new or additional medication. The order was taken by the Pharmacy Technician to the hospital pharmacy. At site 2 the order was sent to an independent (contract) pharmacy. Both pharmacies follow the same medication dispensing process with double checking, bagging of medication and securing with cable tie or padlock (for controlled drugs). Differences were observed in transportation between the sites (Figure 1, steps 5 and 6) for the level of medication security (open box, cable tie or padlock). After completing the HTA a list of questions were developed for the Trust.

The two SOPs were mapped using the HTA framework to allow direct comparison with practice for ordering, transportation, receipt and storage. It was expected that the SOPs would be very similar, with perhaps more detail for Controlled Drugs Management. However, the analysis identified both accessibility challenges (to follow the processes) and discrepancies for very similar procedures e.g. in retention of delivery note documentation, checking expiry dates for stock, requirements for design of transportation and storage containers such as wall fixing.

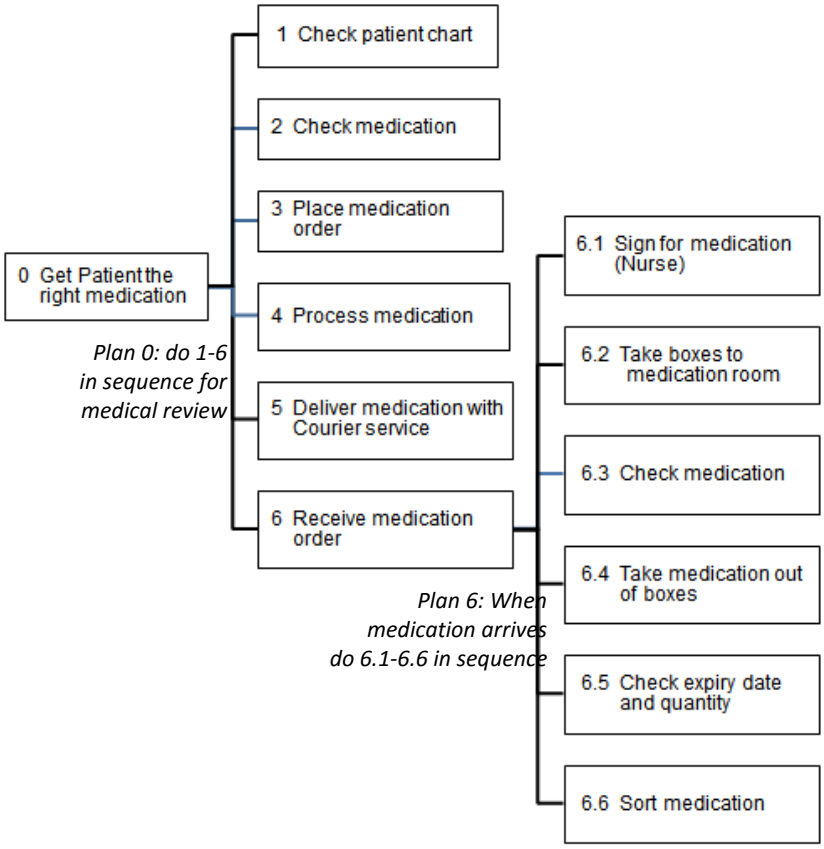

Figure 1. Observed medication management process (high level generic HTA)

The HTAs were reviewed with senior managers, pharmacists and members of the Medication Management Group. The differences between the in-house (site 1) and independent pharmacy (site 2) transportation were discussed. It was not clear if transportation guidelines required non-controlled medicines to be placed in sealed containers and this may have accounted for the variance between service providers. The discrepancies between the two SOPs (Medicines Management and Controlled Drugs Management) were also discussed. The duplication and conflicts identified, including differences in layout, detail and display, were attributed in part to the different authors and timing of the policy development and review. However, as the purpose of the SOPs was to guide and support practice, these differences may present a challenge for staff in understanding which steps to undertake for specific parts of the medication management process.

4. Discussion

Medication management is a perennial challenge and despite being at the '*forefront of national patient safety efforts for nearly a decade, ... health care institutions remain challenged with implementation'* (Vogelsmeier et al, 2013). This service evaluation identified differences in practice at the two community care sites and in the two SOPs.

Possible service improvements were discussed, including introducing an in-house (or visiting) pharmacist at site 2. The introduction of a pharmacist into the multi-

disciplinary team for community services is one of the recommendations from the Royal Pharmaceutical Society (2016) in a review of medication management for care homes.

Lim et al (2016) included medication supply (transportation, storage and dispensing) as one of the main functions to be coordinated across the work system. They identified several methods of supply for care homes including *'ordered directly from the GP or via the community pharmacy and collected or delivered by the community pharmacy or the dispensing GP'*. They highlighted the '*challenge of organising and co-ordinating different healthcare staff …. to ensure that information is communicated accurately and promptly between staff with different roles and disciplinary backgrounds to accomplish any of these functions safely and in time'*.

The requirements for two SOPs were discussed and it was recommended that combining them into one would help simplify the system both for policy maintenance and staff guidance. A combined SOP would need to be developed with, and applicable for, all of the sites. In their concluding remarks, Vogelsmeier et al, (2013) also recommended the redesign of '*clinical documentation systems and existing work processes'*. They warn against automation and complexity with advice to address system design, saying that '*technology systems will still fall short if common challenges related to health literacy, integrated decision support, team planning and coordination, and medication adherence are not considered within the context of medication reconciliation and the larger process of medication management'*.

5. Conclusion

This project has added to the increasing body of literature on healthcare from the Human Factors & Ergonomics professional discipline. It has addressed questions of system design (multiple SOPs) and staff adherence when the SOPs are applied in slightly different care pathways, with and without in-house pharmacy services. The results were discussed with senior management and recommendations made to simplify the system with a single SOP and provision of in-house pharmacy services at both sites.

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