Tinker, tailor, deliberate. An ethnographic inquiry into the institutionalized practice of bar-coded medication administration technology by nurses

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ABSTRACT

Aim: Explore the practice of nurses working with bar-coded medication administration technology, to gain insight in the impact it has on their work.
Background: The widespread presumption of using Barcoded Medication Administration Technology (BCMA) is that it will effectively reduce the number of errors in the dispensing of medication to patients. However, it remains unclear whether this is the case in actual practice.
Method: Two distinct but overlapping research methodologies of Institutional Ethnography and Praxeology were combined as a means to uncover the highly complex practice of BCMA by nurses.
Results: The implementation of BCMA creates a series of problems leading to nurses constantly tinkering with the technology. At the same time they are continuously deliberating the best ways of tailoring the BCMA to each of their patients.
Conclusion: Although working with BCMA is often misconstrued as being mindless and automatic, conforming to the technology, this tinkering with BCMA in fact always entails thorough deliberation by nurses.

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1. Introduction

"There is a need to continue the examination of the relations between nursing and technology, not because technology is harmful – in fact it is often wonderful – but rather because total faith in technology to the exclusion of everything else is an idolatrous, dangerous, and misplaced faith." (Locsin, 2005).

This article aims to explore the practice of bar-coded medication administration (BCMA) technologies by nurses, in order to gain insight into how they might impact nursing work. BCMA is a point-of-care system which requires patient identification and electronic verification and is increasingly used in hospitals to distribute medication (Cescon & Etchells, 2008). One of the reasons it has become so popular is due to the idea that BCMA has the potential to effectively reduce medication errors without claiming (more) time from nurses (Hassink, Jansen, & Helmons, 2012).

2. Background

Whether BCMA actually always leads to more safety and less errors however, is uncertain. So far, the extant literature on the use of BCMA can be divided into three categories: i) research which shows that medication administration technologies lead to a reduction of errors

(Agrawal, 2009); ii) articles which simply state that these technologies have the potential to reduce errors (Young, Slebodnik, & Sands, 2010);

iii) articles which state that although the use of medication technologies might have a positive effect on medication errors, they can also introduce new (technical and human) problems and errors (Koppel, Wetterneck, Telles, & Karsh, 2008, Miller, Fortier, & Garrison, 2011, Sakowski, Newman, & Dozier, 2008).

At the same time, the (often top down) implementation of a BCMA faces nurses with a difficult task: how to integrate a highly linear system – BCMA presupposes only one given route for medication administration – successfully, in what are often complex, 'messy' care practices in which nurses have to work every day. As Holden, Rivera-Rodriguez, Faye, Scanlon, and Karsh (2013) point out: "Given that problem solving is a vital aspect of nursing work, it bears investigating what happens to nurses' problem-solving behavior following an organizational change. One of the most common and perhaps most impactful changes facing nurses today is new technology." (Holden et al., 2013: 284).

This paper tries to break new ground with regard to the idea, we found in literature, of new problems arising due to the use of BCMA. We wonder if new problems that arise are highly contextual and connected with the care-practice of the nurse as a whole, and by looking meticulously at the daily complex practices of nurses new insights may emerge. Institutional ethnographic and the praxeological approach, offers us the opportunity to closely follow nurses who worked with BCMA during their medicine rounds. Perhaps it will provide us with

an insight in 'how', nurses *tinker* with the medication system in order to *tailor* the medication to each individual patient.

Mol defines work as 'tinkering, involving complex ambivalence and shifting tensions' (Mol, Moser, & Pols, 2010: 84).

We hope to contribute to further deepening of Mol et al.'s, 2010' concept of tinkering, we advocate to be more precise as to what this tinkering consists of, i.e. to include a particular kind of reasoning. As Eisenhauer, Hurley, and Dolan (2007) have shown, the thinking process of nurses during the administration of medication extends beyond rules and procedures, as nurses (also) use patient data and interdisciplinary professional knowledge when providing safe and effective care (Eisenhauer et al., 2007). Nurses' tinkering with BCMA still underpins medication safety, tailoring to the patient as well as maintaining the flow of the caring process. Are there arguments that another type of reasoning also has to be actively used, in the form of deliberation – or 'deliberative tinkering' as we call it, which draws on all different kinds of knowledge- in order to achieve administration of medication through the use of BCMA successfully?

3. Methods

We carried out extensive qualitative empirical research between 2011 and 2012 and our aim was to explore practices of BCMA by nurses in a Dutch orthopedic hospital ward.

Institutional Ethnography (IE) has its roots in the feminist movement of the 1970s and 1980s and is founded on the ideas of Dorothy E. Smith. According to Smith the subject, in this case 'the nurse is a 'knower' and research must start from that 'standpoint' (Smith, 2005). Our broad endeavor of using IE is to discover how the knowledge of the nurses is socially organized. Often certain forms of (explicit) knowledge are pushed into the foreground (like knowledge of operating rules) while other (implicit or tacit) knowledge (institutional knowledge, experiential knowledge, knowing in practice) appears to be less visible (Smith, 2005, Greenhalgh & Stones, 2010, Sayer, 2011, Nicolini, 2011, Boonen, Vosman, & Niemeijer, 2015).

Next to IE, we have also made use of insights from praxeology. Praxeology is an approach which regards all acting – in our research the acting of nurses – as part of their practice. The practice is the comprehensive framework wherein people and groups but also technology (artefacts) and (division of) spaces 'act' (Schmidt, 2012).

In our analysis we use three distinctions described by Schmidt as lenses to look at our data. There is the lens of 'time' (which Schmidt calls it "temporality"): in this case entails nurses being educated and trained to be prepared for (future) situations they might encounter. They use this prior gained knowledge in the present. However the present might also demand modification of this knowledge. The second lens is that of the `skilled body´ of nurses ("*physicality*"): it is named so because over time it archives an implicit knowing of how to do things, such as how to move when inserting an IV, without hurting the patient.

The final lens is that of the material ("*materiality*"): for instance, the objects nurses have to work with or the manner in which the lay-out of the building and the ward is organized affects the way they work (e.g. having to navigate a heavy medication trolley through narrow automatic doors).

3.1. Sample and setting

Research was done on an orthopedic ward in a general hospital, with a capacity of 30 beds. There are 33 caregiving staff – five nurses with a four year baccalaureate degree; 26 nurses with three years of applied education; and two caregivers with approximately one year of training who are not qualified to distribute medication. Seventeen nurses who work with medications volunteered for the study. We therefore chose the design of 'extended case study', whereby data were collected by the first author through participant observation and the study of BCMA related documents, over a period of 9 months (2011 − 2012)

Our aim was to be as close as possible to the practice we were studying, i.e. of nurses in the hospital using BCMA.

3.2. Procedures

During seven shifts (three day shifts, two evening shifts, and two night shifts) the researcher shadowed fifteen nurses on the ward with particular attention on their use of BCMA. Most observations were audio recorded and transcribed verbatim. Four nurses were interviewed. The interviews focused on their experiences working with BCMA and were audio recorded. The documents used in the hospital regarding BCMA were also studied. During the observations nurses were asked to think out loud and to reflect on their actions and mediating the BCMA into their work. This is called "spect-acting", a method entailing both observation and reflexivity on the informants, with the goal of opening up emancipatory possibilities in the field (GILL, 2011).

Although generalized research outcomes often increases insight, with regard to nurse experiences they are not always directly applicable and most of the time these outcomes do not seem to ring true to nurses (Campbell & Gregor, 2004; Sayer, 2011). As Patton (2002) points out, you have to capture participants 'in their owns terms' and learn their categories for rendering explicable and coherent the flux of raw reality" (Patton, 2002).

3.3. Data analysis

Fig. 1 shows the framework and process of our analytical steps. First, we start off with describing scenes, Then we try to pinpoint where it 'chafes' in these scenes. Chafing is a key analytical concept here: it entails taking into account which problems occur when nurses work with a BCMA, but also what surprises nurses and what runs counter to expectations (Smith, 2005).

We subsequently describe how the institutional ruling manifests itself in the scenes whilst also taking the three distinctions of Schmidt (time, skilled body and the distinction of materiality). This has ultimately resulted in several emerging themes, which are presented in the results section below.

3.4. Rigour

The study included two intervals for responsive evaluation (Patton, 2002) where first author Boonen talked to different people to gather their responses to the analysis being developed from the data. Both evaluations were planned at the end of the day and prior to the meeting the group was informed about the subject, not about what researcher expected of them. The meetings started with a presentation of the research, method data analysis, findings and conclusion. During these evaluations we checked if our data analysis and findings were questioned and/or confirmed. The first responsive evaluation was conducted within a multi-disciplinary group including nurses involved in the research, pharmacists, information and communication technology (ICT) staff, a vendor, a manager and a physician. The multi-disciplinary evaluation broadly confirmed our findings. The second responsive
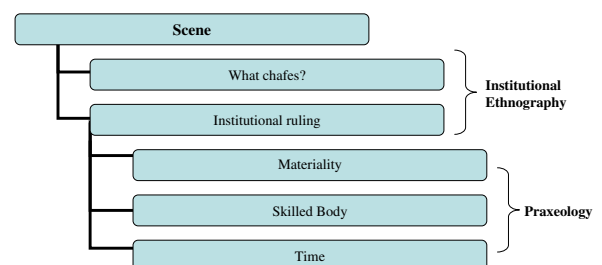

Fig. 1. Framework of analysis.