



Constructing standards: a study of nurses negotiating with multiple modes of knowledge

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Abstract

Purpose – The aim of the paper is to explore how multiple modes of knowledge play out in the consolidation of nursing procedures in construction of “local universality”. The paper seeks to explore processes where nurses negotiate universal procedures that are to become local standards in a hospital.

Design/methodology/approach – The paper is based on a case study design. Working group sessions, where the activity was to consolidate different versions of nursing procedures were observed and videotaped. For this paper, transcribed videotaped observations, where tension-laden situations were identified, are subject to interaction analysis.

Findings – In the negotiations to construct standards, multiple modes of knowledge play out; personal experience, collective expertise and formalized knowledge. The paper demonstrates the contributions these modes of knowledge make in a process of standardization. This shows that standards, as such, do not stay universal for very long, but are constructed as “local universalities”.

Research limitations/implications – The study elaborates on discursive negotiations of procedures to illustrate how local universality plays out in processes to constitute standards. It is a limitation because how the local universality plays out in clinical work, or make claims about practice transformation, cannot be described.

Originality/value – The paper shows the necessity of confronting standardized procedures through multiple modes of knowledge. The paper exemplifies productive interactions in the construction of local universality, and how professionals account for practice when facing formal and standardized procedures.

Keywords Standards, Knowledge management, Nursing, Negotiating

Paper type Research paper



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Introduction

Health care practices are becoming increasingly sophisticated and complex with new treatments, care programs and health technologies. In this picture, policy makers and regulating institutions argue that standardization of guidelines and procedures, which formulate expected performance, is a valuable strategy. This can secure quality care; reduce uncertainty, ensure accountability and regulate performance (IOM, 2001, Sosial- og helsedirektoratet, 2005). Standards specify work to secure accountability, objectivity and uniformity (Timmermans and Berg, 2003). Procedures are standards for practical, everyday activities. The explication of work in a procedure can stabilize how work should be performed. As activities become complex, knowledge-laden, open-ended standards and procedures as stabilizing measures may be contradictory to application of professional judgment in situational problem solving. Knowledge is not a unified 'thing' transmitted from procedures to professionals. Research demonstrates that standards embed and are embedded in local practices, and therefore, standards do not remain strict standards for very long (Timmermans and Berg, 1997, 2003).

Standards and standardization are broad concepts, with multiple and diverse statuses in different professions (Feng, 2003). In a broad sense, standards can be defined as "any set of agreed-on rules for the production of (textual or material) objects" (Bowker and Star, 1999, p. 13). We understand them as material and discursive constructions that organize the world and our professional life. These constructions are not pre-fixed or stable. We argue that standards can be better understood based on empirical analysis on how standards inform and play out in the diversity of actions in clinical settings. In this paper we contribute to this perspective by exploring processes to discursively constitute standards, using empirical data from a process to construct and negotiate procedures for nurses' clinical practice. We frame the study within standardization literature, review the epistemology of standards, introducing the concepts of "local universalities" and "multi-voicedness" before presenting methodology and elaborating on the empirical findings. The analysis illustrates knowledge resources nurses draw on, what counts as knowledge when negotiating procedures and how this ends up in the construction of a new standard.

Standards and multiple modes of knowledge

Health care work is information rich and most often labour intensive. The challenges many professionals face are not due to lack of access to information but rather an overload of increasingly fragmented information (Nicolini *et al.*, 2008). Initiatives to establish standards have expanded quality improvement agendas, serving as a resource for best practice to express expectations of professional work and practice performance (IOM, 2001, Sosial- og helsedirektoratet, 2005). For example, policy documents set direction, e.g. Standards for Better Health in the UK (Department of Health, 2004), and standards clearing houses like the National Institute for Health and Clinical Excellence in the UK (see www.nice.org.uk/) and the AHRQ National Guideline Clearinghouse in the USA (see www.guideline.gov) accumulate and disseminate information. Comprehensive web-based resources like the BMJ Evidence Centre (<http://group.bmj.com/products/evidence-centre>) based in the UK, and Helsebiblioteket (www.helsebiblioteket.no) targeting a national audience, are available as resources to standardize for best practice.

Empirical studies demonstrate how policy and different knowledge domains stimulate standardization in practice (Timmermans and Berg, 2003; Bowker and Star, 1999). In practice standards are often invisible and omnipresent, and serve to stabilize and categorize the world. This highlights the stable dimensions of standards as agreed-on rules for the production of objects (textual or material). In this study we look at standards through the implementation of practical procedures, as they are to become standards in a hospital. By this, we also focus on another dimension of standards, as something fluid and in a process, “[...] standards do not remain standard for very long, and [...] one person’s standard is another’s confusion or mess” (Bowker and Star, 1999, p. 293).

Standards, or more specifically procedures in our case, are also seen as part of the drive to establish evidence-based practice (EBP). EBP is understood as “[...] the conscientious, explicit, and judicious use of current best evidence in making decisions about the care of individual patients (Sackett *et al.*, 1996, p. 71)”. Initially EBP emphasised knowledge from controlled trials and systematic reviews as resources for improvements (Timmermans and Berg, 2003). However, use of high quality knowledge in practice has not been straightforward. This has led to deliberations of what constitutes good evidence or what counts as knowledge when identifying the best available evidence to resolve a problem beneficial for the particular patient. EBP for nurses, in particular, concerns the incorporation of evidence from research, clinical expertise, and patient preferences to care for the individual patient (DiCenso and Cullum, 1998). Hence, EBP is about efforts to integrate available external evidence from systematic research and knowledge development, and is not restricted to randomized clinical trials, with clinical experience and accumulated expertise (Kitson, 2002). This has led to elaborations of the knowledge resources that inform practice, and pinpoint practitioners’ experiential knowledge and preference to consult informal and interactive resources (Estabrooks *et al.*, 2005; Spenceley *et al.*, 2008). Procedures are standards that blend EBP recommendations and explicated, experiential knowledge from historically situated, distributed, and evolving practice knowledge held by nurses. Practical procedures are therefore a contextualized resource, adding relative and dynamic elements to the standards discourse.

Hence, when emphasizing the fluid dimension of standards they can be analyzed as “boundary objects” (Star and Griesemer, 1989) where people from different spheres and practices meet, discuss or use standards in clinical work. Participants do not need to share understanding of the object to be able to coordinate and work collaboratively (Bowker and Star, 1999). Treating standards as boundary objects highlights the contribution of standards to making things work together, and coordinating them across spaces. In a comprehensive review of standardization and EBP in health care, Timmermans and Berg (2003) discuss various types of standards in health care. Consolidating procedures to construct standards are examples of efforts to establish “procedural standards”, understood as process specifications, explicating content of work and processes of clinical decision making. Standards can be treated as “technoscientific script”, which “specifies actions, settings, and actors who are defined with specific tastes, motives, aspirations, political prejudices, and a value system” (Timmermans and Berg, 1997, pp. 275-6). As such, “standards, rather than [being] stable and homogenous, are deeply political and dynamic entities that transform the way people work and live together in socio-material world” (Timmermans and

Almeling, 2009, p. 5). These observations point to social distribution of knowledge, and express the understanding that knowledge is re-contextualized when used in an actual work context. The use of standards rests on localized processes of negotiations and adjustments in real-time work, and pre-existing institutional, infrastructural, and material relations. In our case we will identify motives expressed in local standards by analyzing the discursive construction and negotiation of procedures.

Berg and Timmerman's concept "local universality" helps to elaborate the situated interpretation of procedures and the discursive construction of standards. In this line of work, universality; "is not a transcendent, a priori quality of a body of knowledge or a set of procedures. Rather, it is an acquired quality; it is the effect produced through binding heterogeneous elements together into a tightly coupled, widely extended network" (Berg and Timmermans, 1998, p. 31). Universality is an emergent property. The concept "local universality" emphasizes that standards are collective achievements, constructed in tensions between different trajectories of participation. They are the result of historical achievements and contribute to construction of "biomedical platforms" (Keating and Cambrosio, 2003). Therefore we can only speak about "local universality", and have to analyze the context and specificity of standards to understand how standards are constituted and re-contextualized.

The contributions by Bowker and Star and Timmermans and Berg may be seen as strands in the "sociology of science". This is deeply inspired by the work of Latour (1987), which emphasizes the importance of standards to make things work and coordinate across space, by "acting at a distance". Accordingly the focus is towards network construction and generation of alliances, not human cognition and construction of knowledge (Miettinen, 1999). Therefore, despite the deep insight on standards in their work, Bowker and Star and Timmermans and Berg do not deal, explicitly with a knowledge dimension. However, in our case we focus on different modes of knowledge to understand the complexity of standards, and how standards are constructed in practical settings.

The epistemology of standards

Without standards to categorize our world in practical settings we would only be capable to speak of local, situated knowledge. Thus the distinction of multiple modes of knowledge is highly important. The EBP movement has emphasized certain types of knowledge, proposing a hierarchy to rank findings from research studies and universal procedures over other types of evidence. Critical opponents have made a dichotomous argument that with EBP, nurses and doctors become "mindless cooks", where their judgments are regulated by standardized procedures (Berg, 1997). This has raised a debate of "counts as knowledge" and inspired studies of the plethora of information and knowledge resources used in clinical practice. For example, studies by Estabrooks and colleagues report that nurses have a preference for informal and interactive sources, frequently acquiring knowledge from interaction with peers or elevating experiential knowledge and documents to the status of evidence (Estabrooks *et al.*, 2005; Spenceley *et al.*, 2008). We relate this to epistemological stances that can be traced back to the dichotomous classification of knowledge held in technical rationality and headed by the positivistic philosophy (Cook and Seeley-Brown, 1999). To go beyond a too limited understanding of knowledge it is important to elaborate and distinguish between different modes of knowledge. Using the concept modes of knowledge refers

to knowledge as something that is experienced, expressed or done. By that, we do not differentiate knowledge from knowing, and draw attention to the multiple dimensions of knowledge (Guzman, 2008).

Knowledge is a dynamic resource evolving in contextual interplay, and not a thing or commodity (Cook and Seeley-Brown, 1999). Michael Eraut (2007, 2000) distinguishes between three different dimensions of knowledge that help to avoid a narrow understanding. “Codified/reified knowledge” is *per se* explicit, which means that knowledge is public and discussed in terms of truth and evidence. It is identified by its source and relates to scientific knowledge, and dominates in the field of medicine. Second, “personal knowledge” is every-day “know how” or knowledge individuals bring into a situation that enables the individual to perform actions and think. Thirdly, “cultural knowledge” plays a role in most working practices and is knowledge that has not been codified. This third type focuses on knowledge creation as a social process among practitioners, whereas the outcome may take a codified form or shared meaning and understanding. In professional work these perspectives make up what we may name expertise, combining codified and practical knowledge.

Following these insights of knowledge it is useful to approach knowledge from a perspective of use, and as part of an activity. Cultural historical activity theory (CHAT) is based on dialectical theory of knowledge where human cognition and the creative potential of humans is the core (Engeström, 1987). It contributes conceptual tools to understand multiple and interrelated activity systems. Activity systems are diverse, complex, and multi-voiced, disturbance-producing systems that are engines for change, expansion and transformation within or between systems (Engeström, 2001). Knowledge is transformed by tensions in the system, and spread through interrelated nodes rather than represented as a separate category (Blackler, 1995).

Nonetheless, stating “knowledge is what you do” and grounding knowledge in social practices has led to an unclear concept of knowledge in activity theory. In activity theory knowledge work is not analyzed as knowledge of individual workers but as “expertise” defined as “effective activity” (Blackler, 1993). This stance points to the process dimensions of knowledge, also labelled “knowing”. Blackler (1995) defined five characteristics of knowing.

- (1) Knowing is mediated by tools and artefacts, and not transmitted. This points to the dynamics of change in activity systems.
- (2) Knowing is situated in social action, pointing to the significance of interpretations and developing complexity embedded in a local context.
- (3) Knowing is provisional, constantly evolving and transforming, e.g. it is seen as a process providing new opportunities for expert-dependent, knowledge-routinized work.
- (4) Knowing is a pragmatic, and unfolding process of interrelated, complex approaches and complex demands in human, object-driven activity.
- (5) Knowing is contested, interrelated with power.

Thus knowledge, is neither universal, or abstract, but constituted in a process of construction, embedded in and depending on context (Nicolini *et al.*, 2003). Following this line of argument, knowledge-mediating procedures, like practical procedures for nursing, are results of historically situated and distributed work. They communicate

socially and professionally validated knowledge, clinical experience and accumulated expertise (Adler, 2006).

In activity theory, standards may also be understood as “stabilization knowledge”, “constructed to freeze and simplify a constantly shifting or otherwise bewildering reality” as well as “possibility knowledge”, “which destabilizes knowledge, and contributes to movement and opens up for possibilities” (Engeström, 2007, p. 271). Here, the concept of “multi-voicedness” (Engeström, 2001) captures diverse, complex points of views in the negotiation and construction of knowledge. Multi-voicedness is embedded as speech, thought and/or actions (Måseide, 2006). For our analysis, multi-voicedness surfaces in tensions related to division of labour, artefacts, rules and conventions. Approaching the processes to construct standards using “multi-voicedness” opens up for identification resources that are mobilized in the observed negotiations. These processes include opportunities for learning in the workplace, since what counts as knowledge, is a product of interaction, and knowledge construction in the diversity of voices (Daniels and Warmington, 2007).

Material and methods

A case study design was used to investigate the complex social phenomenon of nurses negotiating standards (Yin, 2003). The article seeks to understand how professionals’ knowledge is used and constructed in the making of new procedures. The empirical material is from participatory observation of the course of action undertaken to streamline work processes at a large University Hospital. The hospital had, at the time of our study, approximately 600 beds: 53,000 patients were admitted for in-patient stays and 150,000 were seen in the outpatient clinics annually. The total number of workers was about 4,300 at the hospital, of which 1,200 were registered nurses. The hospital was in the process of moving to a new building. As part of this process, the hospital set out to re-engineer and transform their practice to ensure comparable, patient-centred, evidence-based treatment trajectories. Important enablers for their transition included staff mobility and a platform of advanced technological tools including ICT-based knowledge infrastructure. We specifically studied the process of instituting procedures for nursing practice in this ICT-based knowledge infrastructure. To illustrate the multi-voicedness in this process, the in-house nursing procedures and standardized procedures in the repository “Practical Procedures for the nursing Service (PPS)” were the starting points for our study of how they constructed standards.

The artefact – procedures

In the hospital there was a pool of paper-based nursing procedures. Multiple versions existed for similar work processes; some procedures had scribbled additions, and some were written more than ten years prior to the study, contributing to a picture of the repository as a chaotic, ambiguous composite. In an effort to change their practice when moving into new buildings, the management decided to buy the PPS. PPS is a commercially ICT-based repository containing a set of basic, standardized nursing procedures that adhere to legal regulations, national standards, professional guidelines and research-based knowledge (Akribe, 2006).

PPS has around 270 standardized, clinical procedures. Each procedure has step-by-step descriptions; “how to”, “devices/equipment” and “observations”, and illustrations, animations, photos or video to complement the explanations. Since 2003,

PPS has been a resource for training nurses with clinical skills across the country. The hospital where this study takes place was the first hospital to integrate PPS into their ICT-enabled knowledge infrastructure.

The consolidation process

In 2006 and 2007 the hospital organized processes to consolidate the procedures for two reasons:

- (1) The content of PPS was initially prepared for skills training for nursing students.
- (2) There existed a large, local pool of procedures.

For each clinical area, working groups with two to four well experienced nurses and project leaders reviewed the in-house and PPS procedures. The hospital management had identified these nurses as key personnel and experts within the organization. They were all knowledgeable and experienced nurses representing departments that regularly used the procedures that were up for negotiation in the meetings. Consolidating the procedures for a single clinical area required three to six meetings, and each meeting lasted about two hours. The group aimed to reach consensus on a consolidated procedure from their evaluations of the plethora of versions with local adjustments. Two guidelines were set for the process. The team should coordinate their actions to suggest the “red space” text in the header of the procedure. Second, if possible, the hospital wanted to discontinue local version(s) if an acceptable procedure were available in PPS, which does not support site-specific annotation or selection of material. The “red space” text is therefore a consensus-based text that communicates local adaptation and acceptability. The working group suggested three alternatives:

- (1) PPS procedure is approved as is.
- (2) PPS procedure is annotated with the local information added to the ‘red space’ or a hyperlinked separate document.
- (3) PPS procedure is unacceptable, and a new, alternative procedure to be used in the hospital is hyperlinked.

A reference group, where senior nurses assigned responsibility for professional development, representing each hospital department took part, reviewed the recommendations from the working groups. The reference group reviewed all the suggestions, and secured consensus about the procedures across all the departments at the hospital. The CEO authorizes the conclusion from the reference groups. Then the conclusion is added to the PPS-procedure as text in a “red space” in the header of the procedure. This “red space” communicates if the procedure can be used as is, under certain conditions or not at all. With the red space, the consolidated procedures become standard throughout the institution.

We collected empirical material from the consolidation process. The data corpus consists of video recordings, observational notes (approximately 23.5 hours of video and ten hours of observational notes from participation in 23 meetings) and interviews (approximately ten hours with 13 informants). The data were organized using the software VideoPaper (www.vpb.concord.org/). Across the data corpus, negotiations always start from participants’ interpretations of differences in the versions of the procedures and how the work is carried out locally. From the data corpus we identified episodes where procedures seen as controversial were negotiated in the groups. Common

to these episodes were different interpretations of the PPS procedures and local practices, which led to disapproval being communicated in the “red space”. For this paper, we present six transcribed and analyzed episodes to understand how professional knowledge were introduced, used and constructed when negotiating standards. These micro level activities were analyzed as interaction to make a detailed understanding of the negotiation of standards (Jordan and Henderson, 1995), and point out how participants’ diverse voices introduce knowledge or evidence into the consolidation process.

The working group meetings provided an arena where multi-voicedness plays out, and allowed us to explore negotiations where procedures were adapted for local settings. As representatives of different, interacting activity systems, the participants contribute norms, beliefs, and rules from their specific area of expertise when they meet for joint discussion. Continuing from the activity theoretical perspective that “knowledge is what you do”, complex interactions of individuals with the environment and culture is our unit of analysis. In the analysis, the concept “multi-voicedness” will frame our discussions, where different modes of knowledge play out as resources in the negotiation to consolidate a procedure into a hospital-wide standard.

The nurses that took part in the consolidating process were given written or oral information about our research project, and all participants in the meetings we observed gave written consent to participate in the study. We were collaborating closely with the nurses in charge of the consolidation process. They gave notice of our presence to the participants at the beginning of the meetings. No patient sensitive data were discussed in the meetings and all personal information was made anonymous when transcribed.

Empirical findings – negotiations and consolidation

To illustrate different knowledge perspectives surfacing in negotiations and discussions to consolidate the procedures, we have chosen a typical example from the data corpus. The example shows negotiations to consolidate the procedure “Stain disinfection”. The picture (see Figure 1) shows participants, resources and artefacts in use related to the excerpt we presented.

The participants are representatives from different departments; Nurse1 is from the infection control department, Nurse2 and Nurse3 are from the operating theatres, and Group leader1 and Group leader2 are from the competence department. The Group leaders chair the meetings and oversee the entire consolidation process.

The starting point for the chosen excerpt was that the hospital’s practice and local procedure for stain disinfection deviate from PPS’s explanations. The working group interacts to clarify if the guiding principle for stain disinfection should be “disinfect first, then wash” or “wash first, then disinfect”. According to Nurse1, PPS says, “wash first, then disinfect”. This is in her interpretation contradictory to the national guideline for infection control, and the local procedure, both of which say, “disinfect first, then wash”. When the transcript starts, their discussion has been going on for 20 minutes. Even though Group leader1 attempts to move on, suggesting a postponement, the discussion re-opens through interaction between Nurse1 and Group leader2.

Excerpt 1

1. *Group leader1*: Postpone . . . the case is postponed.
2. *Nurse1*: . . . the case is postponed and then [he he], but anyway . . . our opinion about the procedure is still the same.

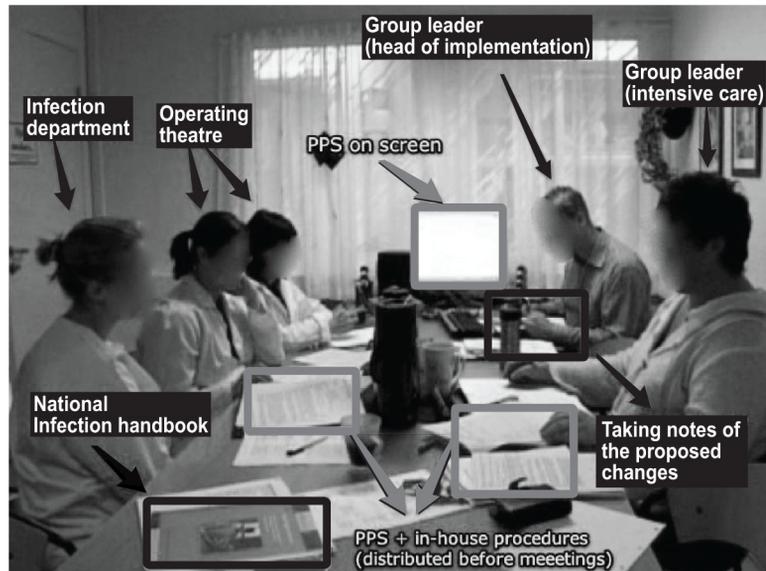


Figure 1.
Working group gathered
for negotiations

3. *Group leader2*: yes?

4. *Nurse1*: The procedure is not valid because our policy is “disinfect first then wash” . . . we [infection prevention dept] cannot approve a procedure that exposes both the hospital environment and the staff to infected material.

5. *Group leader2*: . . . if it’s right, what it says here [in PPS]? [that] you actually can wipe off... in the case of massive amounts of waste . . . in fact you can soak up first and disinfect afterwards . . . if they [PPS] say that, you diverge . . .

6. *Nurse1*: Then . . . no, then we have to define what is massive amounts of cleaning . . . massive amount of waste?

7. *Group leader2*: Yes [hesitating].

In passage 2, Nurse1 maintains that the principle for stain disinfection is not up for negotiation, stating “but anyway . . . our opinion about the procedure is still the same”. After Group leader2 questions this stance, Nurse1 in passage 4 makes an account of her position by referring to the collective expertise of the infection control department, expressing “we mean disinfect first” and “we cannot approve” the exposure to infected material. However, in passage 5, Nurse1 has to make an additional account as Group leader2 states that according to her reading of PPS, “wash first, then disinfect” is acceptable with massive amount of waste, and asks if this is a question of judgment and interpretation (passage 5). The tension leads to a new turn in their interaction where variations, different circumstances and local situations are brought into the negotiations. They set out to clarify “massive amounts of waste”, and the condition(s) for the principle becomes the object for negotiation.

Excerpt 2

8. *Nurse1*: And massive amount of waste is not a little bloodstain on the floor.
9. *Group leader2*: Yes [skeptical]
10. *Nurse1*: So ...
11. *Nurse2*: It's a difference though ... if you're in a situation with infection in the operating theatre, in a way, ... you act a little differently than if you have an ordinary spot of blood.
12. *Group leader2*: mmm [confirming]
13. *Nurse2*: ... because you ... then you have gloves on and you put it in "risk-garbage" and that's ...
14. *Nurse1*: But you shouldn't do it anyway ...
15. *Nurse2*: But I'm thinking if you have a major puddle, then it [disinfecting agent – VIRKON] will never go through all the infected material
16. *Nurse1*: Yes, well that depends how much ... [unclear]
17. *Nurse2*: ... yes that's how I see it. That's what I'm thinking ..., logically it's less risk for spreading it as long as you put it in waste-garbage ... [because] that's what you do.

Nurse1 says that "massive amount of waste" is certainly not a "little bloodstain on the floor" (passage 8). Nurse2 points out that they have to "act a little differently", making further reference to extreme cases where they do not deal with "an ordinary spot of blood". Nurse2 introduces examples from her own practice, and explains how they solve everyday problems according to "wash first, then disinfect". As she orients herself, she relies on personal experience from the operation theatre rather than universal standards. This creates additional tensions in the negotiations and leads to another turn in the discussion as we see in passages 12 to 17.

The discussion moves forward with examples of how particular instances of "stain disinfection" have been handled in the past. Here Nurse2, in a quite detailed manner, explains how to solve a practical problem. Nurse2 contests the interpretation of the overall principles for stain disinfection from her practice position and local activity system, and challenges the universality of the procedure. By introducing everyday practice, collective expertise and examples of personal experience, the entire department gets a voice to exemplify "local universalities", which may call for changes to the procedure. The personal experiences are challenged but not rejected, and are difficult for Nurse1 to ignore. First Nurse1 notes in passage 14: "you shouldn't do it anyway". Then she shifts in passage 16: "Yes, well that depends on how much ... [unclear]", after Nurse2 has given a more detailed account of the practice situation.

Excerpt 3

18. *Nurse1*: But anyway you should coat first ... And some times you also should ...
19. *Nurse2*: Why actually? In a way, you coat where it has been lying.
20. *Nurse1*: Because you shall protect yourself and the surroundings.
21. *Nurse2*: But you do that [protect yourself] with the gloves and ...

22. *Nurse1*: But you don't necessarily protect the surroundings.

23. *Nurse2*: But you're in an infection room that is about to be washed.

In passages 18 to 23 we can see how "stain disinfection" is being further established as a dilemma that has to be resolved, which the cluster of "buts" demonstrates (Engeström, 2001). The two perspectives are clearly negotiated and they are working towards consensus. Procedures should be followed, but the professionals may also modify actions if a particular situation requires deviations.

Excerpt 4

24. *Nurse1*: Yes if it's empty.

25. *Nurse2*: Empty?

26. *Nurse1*: If the patient has left and ...

27. *Nurse2*: If the patient's there, what are you then thinking of? That you are stirring it up or?

28. *Nurse1*: Yes, and touches ... well it's something about disinfect first, to prevent infection ...

29. *Nurse2*: ... just thinking ... if there's a lot, ... a whole mound of, like a puddle, which is the case in our department sometimes.

30. *Nurse1*: Then you have to consider doing both. That you spray disinfect ...

31. *Nurse2*: ... first and then once more? [unclear].

In the sequence of passages 25 to 31, Nurse1 maintains a general, universal position that emphasizes how to disinfect in line with the interpretation of the national standard. She is arguing for rejecting the PPS procedure and making a new local procedure. This is only part of the objective for Nurse2 because she adds a number of contingencies and practical constraints exemplifying modifications and careful judgments. The negotiation takes a turn as Nurse1 acknowledges Nurse2's position in the negotiation. In passage 30 Nurse1 opens for a broader understanding of the practice, stating: "Then you have to consider doing both".

Excerpt 5

32. *Nurse1*: ... as we did at unit C [hospital department] ... we spray first with disinfection, and then wipe up.

33. *Nurse2*: ... yes and then you wipe up ...

34. *Nurse1*: ... then we saw that there were such [large] amounts, that you may actually think that they [disinfection agent] have not managed to penetrate ...

35. *Nurse2*: Yes and then you spray again ...

36. *Nurse1*: ... yes then you spray again ... then I think we are talking about massive amount of waste ... but I'll check with them [national guidelines], and get a definition of massive amount of waste and what they actually are meaning.

Passage 32 to 36 is an example of "gap closing" with reference to the different views and voices, where they follow up on Nurse1's willingness to recognize the practical

situation of Nurse2. This opens up interpretation and situation adaptations and modifications. Nurse1 maintains her department's perspective, but she also includes personal experience in passage 32 "... as we did at unit C", making reference to a recent episode of dealing with massive waste when the plumbing failed. When mobilizing this extreme case Nurse1's orientation changes from treating the procedures in a universal way to include contingencies of local practice that actually allow for deviation from the universal description. Nurse1's changed orientation supports Nurse2's position. In passage 36, their exchange reaches a temporary solution of "seeking additional advice"; Nurse1 will check the interpretation of what constitutes a 'massive amount of waste', and thus is calling for deliberations and consulting formalized knowledge. This allows them time to consult experts to elicit advice, and seek interpretation from external sources and experienced peers before the final recommendation is made.

This illustrates that the working group postpones the decision, and allows a second iteration about procedures before they reach consensus about content of the "red space". The collective expertise Nurse1 represents is given a strong voice since she represents the infection control, but the personal experience from Nurse2 is not something they can ignore. Extreme cases have to be taken into consideration as the procedure is to be used across departments. Therefore they decide to elicit more information and consult experts before the final decision.

Eight days later the working group meets to resolve the issues in this discussion. Nurse1 explains the position the infection control recommended:

Excerpt 6

1. And then stain disinfection, eh, and for PPS this also applies to the procedures called 'stain disinfection' and "chemical disinfection remedies".
2. We had some very heated discussions, related to what is really said from the Norwegian Medicines Agency ... we made contact with them, and I do not think they really know what they have written either ...
3. We contacted the National Hospital and [Naming four other Norwegian University hospitals]
4. And in addition we checked CDC – "Center for Disease Control" and Johns Hopkins and what is available from the Norwegian Institute of Public Health; there are only suggested recommendations and no requirements, but they are also quite vague.
5. We have discussed a lot back and forth in our team – specialists in infectious diseases, epidemiology, public health nurses – that what we work for is one universal, non-ambiguous procedure that makes everyone do it the same way, whether the stain is spilled on a wall or on the floor, on some of the equipment or ... whatever it is
6. The conclusion we reached, ... we called it [alternative procedure] stain disinfection, it is really disinfection of everything, yes ... which adds ... if you find the PPS-procedure [referring to the group leader to put the procedures up on the computer screen] ... the one about stain disinfection. Say nothing about the protection, for the [risk?] to personnel that should remove, what you actually should do with massive contamination.
7. So our conclusion is that this one [pointing at the PPS-procedure at the screen] is invalidated. This one and the chemical disinfection and be replaced with our alternative [pointing at the local procedure lying in front of her], – we just need to find a more

appropriate name. Regarding disinfection of massive amounts of waste – which we have to protect the personnel. That's our rationale.

In passage 2 the tension between recommendations from the perspective of the local department and the PPS-procedure have expanded further. Nurse1 explains that they have discussed how to interpret written sources (passage 2), made inquiries about practice at a number of Norwegian university hospitals (passage 3), referred to two leading international medical research institutions, and the Norwegian Institute of Public Health (passage 4). Taking these pieces together culminates in a proposal for writing a new, alternative procedure combining research-based knowledge, information about other hospitals' procedures, and their local standards (passage 6). Concluding, in passage 7, Nurse1 emphasizes a standard procedure with universal, non-ambiguous descriptions will ensure "everyone does it the same way". The group reaches consensus and concludes that a new procedure for stain disinfection in the hospital will need to be written.

This points to an expansion in their pool of procedures. In this case they decide not to approve and follow the PPS-procedure and they also acknowledge that the current local procedures are not complete either, therefore they have to make a new procedure available. This illustrates that the working group allowed for iterations about procedures when they did not easily reach consensus about text for the "red space". The reference group endorsed the recommendation for a new procedure, taking into consideration the PPS procedure and local conditions, and the CEO approved this. The outcome of this construction is a hyperlink in the PPS-procedure "Stain disinfection" where the "red space" says:

"SHOULD NOT BE USED AT [hospital name]. Use stain disinfection [hyperlinked] see also "Waste handling" [hyperlinked] from the Infection handbook.

Discussion and conclusion

The selected excerpts demonstrate how different modes of knowledge were mobilized in the negotiations of procedures, surfacing as tensions between interpretation of standardized procedures and local practice. Drawing from this empirical example, we will discuss discursive construction of standards by exploring how different modes of knowledge serve as resources in the negotiation of local universality, and what kind of work the modes of knowledge do in the negotiation. Our claim is that exploiting these modes of knowledge enhances the understanding of how standards are constructed and the professional complexity that is built into them.

When confronting standards with the concept of "local universality" one may assume that standards are fundamentally transformed when employed in local practices. However, in the study reported here, the negotiations illustrate only micro-level modifications of the procedures related to the appropriateness for local practice. These changes are, however, significant and of considerable importance to the practitioners.

The discursive construction of standards – negotiation of local universality

Mobilized knowledge resources in the empirical example demonstrate how different activity systems interpret procedures, and also act on similar types of problems in systematic, diverse ways. There are some notions of relatively stable routines and

experiences in the multiple perspectives or multi-voicedness provided by the nurses from different units. In the analysis we see how the procedure has become a boundary object in the group (Star and Griesemer, 1989; Bowker and Star, 1999). Boundary objects are “flexible epistemic artefacts” that are capable of adapting to the local needs and constraints of several parties employing them, yet robust enough to maintain a common identity across sites. When implementing procedures as standards into practice, the procedures have to be sufficiently situated and constituted by provisional knowledge, i.e. flexible, and at the same time keep their position as universal and evidence-based, i.e. robust. The empirical example demonstrates how the object of negotiation is expanded as the nurses contribute multiple and historical aspects of practice to the consolidation process. Differences between the new tool (PPS) and “rules” in medical practice, exemplified by the voice of Nurse1, and the local hospital community (Nurse2), leads to the creation of a new procedure. The knowledge-resources create further tensions between group members and are a source for negotiating the procedures from different viewpoints. We identify this as a negotiation of “local universality”, where the modes of knowledge play a great role in balancing and harmonizing between flexibility and robustness.

As “local universality” consists of multiple trajectories (Timmermans and Berg, 1997), we have identified trajectories that interact through the modes of knowledge. The multiple, interacting trajectories include historical practices at the hospital that communicate collective expertise, personal trajectories that communicate multiple experiences, the trajectory of EBP that aligns with the trajectories of outside hospitals and national standards expressing external requirements. The crystallization of such a wide range of trajectories demonstrates the complexities of how standards can reflect different perspectives, but not necessarily shared understandings. This construction of the procedures has great potential for learning at work, as the expansion and construction of a new procedure takes account of pragmatic, institutional and formalized relations. The standardized procedure, as local universality, is constructed between tensions in the modes of knowledge or professional knowing. Noticeably, the intentions of standards are both to stabilize *and* change practice at the same time. The multiple modes of knowledge are balanced between these two poles, where knowledge is a collective construction. Insights that had a tacit appearance now become highly explicit and formal in the negotiations, and are mediated both as facts and narratives that contest scientific knowledge. This construction of local universality may include what Engeström (2007) describes as stabilization and possibility knowledge, and be seen as “creatively accounting” (Suchman, 2007), tinkering with formal and stabilized procedures. In this picture, knowledge and what status the different modes of knowledge represent, and are assigned in practical settings, is of most importance.

What counts as knowledge?

The analysis presented here demonstrates that local and personal knowledge makes a significant contribution to the construction of a new procedure, making it applicable to local practices. The multiple modes of knowledge are, as we shall see, interdependent of each other and makes up “local universality”. In line with Spenceley *et al.* (2008) we found that the participants mobilized different resources, and also upgraded their collective experience to best evidence. The empirical example illustrates that pragmatic and local experience adds to formal rules as a foundation for constructing

local universality in standards. What counts as knowledge in the negotiation can be seen as a product of interaction, and is discursively generated by multi-voicedness (Måseide, 2006). To adhere to these local and uncodified modes of knowledge the ownership of the voices presenting the accounts is of most importance. Where the voice is “located” and the historical status of the knowledge is critical. This points to the professional integrity of the nurses, and is situated in pragmatic knowing. A standard can be redefined, re-constructed or even rejected, but our observations show that significant changes in procedures actively take formalized knowledge into account. When operations and actions are formally written as a procedure, the procedure’s accountability is sought through scientific knowledge and expertise. This illustrates that in construction of standards one cannot discount any form of knowing. Therefore, a procedure relates to, and informs, local practice, and express at the same time acceptable and accountable health care practice.

Drawn from our theoretical reflections that knowledge is situated in its use and doing (Blackler, 1995), we identify and distinguish three different modes of knowledge through the analysis of the professionals’ negotiations. Adding to the discussion of knowledge as a resource for the observed negotiations and making accounts of practice, we look at multiple modes of knowledge as a way to understand how context and social practices are reflected in the standards. We label these modes collective expertise, personal experience and formalized knowledge.

Collective expertise is often expressed in historical practice, practical knowing or common-sense statements at the hospital. Collective expertise is ‘knowing’ developed and situated in particular contexts, and is mediated through social relationships. It is distributed through a collective of people where it is articulated and reflects local practices’ systemic routines. As shown in this study, different expressions of collective expertise repeatedly serve as a starting point for the negotiation, especially if the procedures have serious impact on practice at the hospital. In the interactions and discourse this is presented in a collective voice representing in-house departments as fairly stabilized knowledge. For such reasons collective expertise expresses an authority in the negotiation, where the nurses describe local practices in order to suggest changes in the standardized procedures. Thus this knowledge manifests as highly object-driven and motivated by the collective activity system (Blackler, 1995, Gherardi, 2006).

Personal experiences complement collective expertise as a driving force in the negotiation, creating tensions between local practice and the standardized procedures. Personal experiences may be distributed and shared through a collective of people, but are not formalized. Thus this kind of knowledge reflects more a habit than a formal routine, in practice. It is noticeable that as the professionals introduce personal experiences, their interactions constitute examples of accountability in “local universality”. Distinguished from collective expertise, this is situated knowing based on remarkable events; concrete episodes, extreme cases or “war stories” (Orr, 1990). It is mediated through subjective, rather than collective, past experiences (Gherardi, 2006). In the empirical example, various experiences are presented as possible scenarios of how to do the work, or mobilized as remarkable events related to specific work. Practical examples about commonly performed activities are highly pragmatic and hard to ignore when negotiating practices (Blackler, 1995).

Formalized knowledge is codified, “know that” knowledge, which is easy to distinguish as it is developed through scientific proof and regulates professional work at multiple levels of practice. This type of knowledge is often highly provisional, and there is an overload of medical information that regulates professionals. As professionals, nurses construct new knowledge that shifts back and forth between differentiated practice of individualized care, and adapt routine procedures according to the particular problem at hand. While informal and interactive sources acquired from interaction with peers is given a preference as collective expertise (Estabrooks *et al.*, 2005; Spenceley *et al.*, 2008) and authority, formalized knowledge is necessary to assemble closure. Formalized knowledge is mediated through standardized procedures, scientific institutions, national guidelines, local research departments etc. In health care this knowledge is very often treated as the significant truth.

These three modes of knowledge should not be treated as final, as other aspects and modes could have been included, depending on context. In our study of standards in nursing practice these particular modes are crucial in the use of standards for consolidation of procedures. It has been previously pointed out that nurses prefer informal and interactive sources and interaction with peers to provide guidance for practical doing (Estabrooks *et al.*, 2005; Spenceley *et al.*, 2008). The findings in this study indicate that local practice and multiple voices are important when constructing standards. This challenges and presents difficulties to construction of universal and regulating procedures.

Although our analysis shows diversity of knowledge in a single hospital, it is also a limitation from the perspective of national or even global standards. External requirements put forward through standards can be seen as threats to professional autonomy. When integrating and constructing “local universality” for clinical procedures, and being accountable for health care practice, the complexities of standards require us to consider, confront and negotiate the perspectives held by the multiple modes of knowledge. When constructing standards one cannot discount any form of knowing. A procedure should relate to and inform local practice, and at the same time be acceptable and accountable to health care practice as a whole.

To sum up, in this article we have demonstrated how standards challenge local expertise and create tensions leading to expansion and construction of a new standard. Although standardized procedures are evidence-based and in adherence with formal regulations, they are equally grounded in professional expertise and experiences, reflecting multiple modes of knowledge. We have shown how consolidation of work descriptions can assist workplaces to evaluate and reflect on “local universalities” of standards. The construction of local standards is an ongoing process that may never obtain closure. Hence construction of standards and their “local universality” relies on a committed, involved community, as standards are not separable from the workplace.

References

- Adler, P.S. (2006), “Beyond hacker idiocy: the changing nature of software community and identity”, in Heckscher, C.C. and Adler, P.S. (Eds), *The Corporation as a Collaborative Community: Organization in the Knowledge-based Economy*, Oxford University Press, Oxford.
- Akribe (2006), “PPS, Praktiske Prosedyrer i Sykepleietjenesten”, available at: www.akribe.no

- Berg, M. (1997), *Rationalizing Medical Work: Decision Support Techniques and Medical Practices*, MIT Press, Cambridge, MA.
- Berg, M. and Timmermans, S. (1998), "Order(s) and disorder(s): of protocols and medical practices", in Berg, M. and Mol, A. (Eds), *Differences in Medicine. Unraveling Practices, Techniques, and Bodies*, Duke University Press, Durham, NC, and London.
- Blackler, F. (1993), "Knowledge and the theory of organizations: organizations as activity systems and the reframing of management", *Journal of Management Studies*, Vol. 30, pp. 863-84.
- Blackler, F. (1995), "Interpretation knowledge", *Knowledge Work and Organizations: An Overview and Organization Studies*, Vol. 16, pp. 1021-46.
- Bowker, G.C. and Star, S.L. (1999), *Sorting Things out. Classification and its Consequences*, MIT Press, Cambridge, MA.
- Cook, S.D.N. and Seeley-Brown, J. (1999), "Bridging epistemologies: the generative dance between organizational knowledge and organizational knowing", *Organization Science*, Vol. 10, pp. 381-400.
- Daniels, H. and Warmington, P. (2007), "Analysing third generation activity systems: labour-power, subject position and personal transformation", *Journal of Workplace Learning*, Vol. 19, pp. 377-91.
- Department of Health (2004), *Standards for Better Health*, Department of Health, London.
- DiCenso, A. and Cullum, N. (1998), "Implementing evidence-based nursing: some misconceptions", *Evidence-based Nursing*, Vol. 1, pp. 38-40.
- Engeström, Y. (1987), *Learning by Expanding: An Activity Theoretical Approach to Developmental Research*, Orienta Konsultit, Helsinki.
- Engeström, Y. (2001), "Expansive learning at work: toward an activity theoretical reconceptualization", *Journal of Education*, Vol. 14, pp. 133-56.
- Engeström, Y. (2007), "From stabilization knowledge to possibility knowledge in organizational learning", *Management Learning*, Vol. 38, pp. 271-5.
- Eraut, M. (2000), "Non-formal learning and tacit knowledge in professional work", *British Journal of Educational Psychology*, Vol. 70, pp. 113-36.
- Eraut, M. (2007), "Learning from other people in the workplace", *Oxford Review of Education*, Vol. 33, pp. 403-22.
- Estabrooks, C.A., Rutakumwa, W., O'Leary, K.A., Profetto-McGrath, J., Milner, M., Levers, M.J. and Scott-Findlay, S. (2005), "Sources of practice knowledge among nurses", *Qualitative Health Care Research*, Vol. 15, pp. 460-76.
- Feng, P. (2003), "Studying standardization: a review of the literature", *Proceedings of the 3rd IEEE Conference on Standardization and Innovation in Information Technology, Delft*.
- Gherardi, S. (2006), *Organizational Knowledge: The Texture of Workplace Learning*, Blackwell Publishing, Oxford.
- Guzman, G. (2008), "Sharing practical knowledge in hostile environments: a case study", *Journal of Workplace Learning*, Vol. 20, pp. 195-212.
- IOM (2001), *Crossing the Quality Chasm. A New Health System for the Twenty-first Century*, Institute of Medicine, Washington, DC.
- Jordan, B. and Henderson, A. (1995), "Interaction analysis: foundation and practice", *The Journal of the Learning Sciences*, Vol. 4, pp. 39-103.
- Keating, P. and Cambrosio, A. (2003), *Biomedical Platforms. Realigning the Normal and the Pathological in Late-twentieth-century Medicine*, The MIT Press, Cambridge, MA.

- Kitson, A. (2002), "Recognising relationships: reflections on evidence-based practice", *Nursing Inquiry*, Vol. 9, pp. 170-86.
- Latour, B. (1987), *Science in Action. How to Follow Scientists and Engineers through Society*, Harvard University Press, Cambridge, MA.
- Måseide, P. (2006), "The deep play of medicine: discursive and collaborative processing of evidence in medical problem solving", *Communication and Medicine*, Vol. 3, pp. 43-54.
- Miettinen, R. (1999), "The riddle of things: activity theory and actor-network theory as approaches to studying innovations", *Mind, Culture and Activity*, Vol. 6, pp. 170-95.
- Nicolini, D., Yanow, D. and Gherardi, S. (2003), *Knowing in Organizations: A Practice-based Approach*, M.E. Sharpe, Armonk, NY.
- Nicolini, D., Powell, J., Conville, P. and Martinez-Solano, L. (2008), "Managing knowledge in the health care sector", *A review, International Journal of Management Reviews*, Vol. 10, pp. 245-63.
- Orr, J.E. (1990), *Talking About Machines: an Ethnography of a Modern Job*, Cornell University Press, Ithaca, NY.
- Sackett, D.L., Rosenberg, W.M.C., Muir Gray, J.A., Haynes, R.B. and Richardson, W.S. (1996), "Evidence based medicine: what it is and what it isn't", *BMJ*, Vol. 312, pp. 71-2.
- Sosial- og helsedirektoratet (2005), *And It's Going to Get Better!*, National Strategy for Quality Improvement in Health and Social Services (2005-2015), Sosial- og helsedirektoratet, Oslo.
- Spenceley, S.M., O'Leary, K.A., Chizawsky, L.L.K., Ross, A.J. and Estabrooks, C.A. (2008), "Sources of information used by nurses to inform practice: an integrative review", *International Journal of Nursing Practice*, Vol. 45, pp. 954-70.
- Star, S.L. and Griesemer, J.R. (1989), "Institutional ecology, 'translations' and boundary objects: amateurs and professionals in Berkeley's Museum of Vertebrate Zoology, 1907-1939", *Social Studies of Science*, Vol. 19, pp. 387-420.
- Suchman, L. (2007), *Human-Machine Reconfigurations. Plans and Situated Actions*, 2nd ed., Cambridge University Press, Cambridge.
- Timmermans, S. and Almeling, R. (2009), "Objectification, standardization, and commodification in health care: a conceptual readjustment", *Social Science and Medicine*, Vol. 69, pp. 21-7.
- Timmermans, S. and Berg, M. (1997), "Standardization in action: achieving local universality through medical protocols", *Social Studies of Science*, Vol. 27, pp. 273-305.
- Timmermans, S. and Berg, M. (2003), *The Gold Standard. The Challenge of Evidence-based Medicine and Standardization in Health Care*, Temple University Press, Philadelphia, PA.
- Yin, R.K. (2003), *Case Study Research: Design and Method*, Sage, Thousand Oaks, CA.

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