

“You need to bond with the ones you train”. Mixing epistemic cultures in medical residency training.

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Introduction

On 30 June, the day before the horrific Tuesday, when all start their medical training, a new group of interns gathers to hear the Fish (chief resident), the Leggo (chief of medicine), Dr. Frank (the house psychiatrist who has warned the group about the hard life of an intern, suggesting that some may commit suicide before the end of the year) talking about the rules and values of the House of God. In the following weeks the interns quickly learn the Laws of the House of God (e.g., “Law #1: Gomersⁱ don’t die”) produced by the Fat Man (senior resident). These laws help interns survive both their patients and chiefs, and care for the sick who do die (Shem, 1995).

First published in 1978, Shem’s novel ‘The House of God’ describes the life, loves and horrors of a group of junior doctors undergoing training. Many medical students and medical residents (physicians-in-training to become a medical specialist) from all around the world have read the book, a satire on “real” residency training practice. The closed world of juniors learning to doctor that Shem portrays has also been described in many sociological accounts of medical education (e.g., Fox 1957, Becker et al, 1961; Bosk, 2003[1979]; Prentice, 2007). These studies usually focus on the socialisation of junior doctors in the medical community and the construction of the medical identity. This construction of the medical identity is not a straightforward process of replacing one value system by another, but rather an ongoing and tension-ridden series of encounters during which lay values and attitudes become labeled as “suspect,” “dysfunctional,” and ultimately “inferior,” while newly encountered medical “ways of seeing and feeling” become internalised as “desirable,” “functional,” and “superior” (Hafferty, 2000: 241-42). In addition, and cynically articulated in Shem’s excerpt above, medical training operates as a selection mechanism for

future members of the medical professional community (Bosk, 2003[1979]). The emphasis on socialisation and its inherent mechanisms of member selection underscore the community-oriented character of medical training in which professional judgment based on experience and embodied professional values are core elements.

The strong internal focus in postgraduate medical education (that is, the training to become a medical specialist, which follows on university-based undergraduate medical educationⁱⁱ) and its reliance on implicit professional judgment has been increasingly criticised in the past two decades, both by external regulators (Ham and Alberti 2002) and among medical professionals themselves (e.g. ten Cate and Scheele 2007). Critic focused on residents' long working hours, lack of transparency of training practice and medicine's neglect of the importance of acquiring generic competences (e.g., communication, organisation, collaboration) next to medical technical skills (Frank and Danoff, 2007; Fitzgibbons et al., 2006). In response to the critic, medical professional associations have redesigned their residency training programs to come to a more standardised way of resident training and performance evaluation in various Western countries (Lurie et al., 2009; Wallenburg et al. 2010). Modern scientific educational insights, such as competency-based training, have been introduced to facilitate the shift to what is termed 'modern residency training'. With the incorporation of educational science a new non-medical scientific discipline in medicine has emerged, bringing in new types of expertise (e.g., learning how to provide structured feedback to facilitate effective learning) and instruments (e.g., clinical assessment tools to measure and compare residents' competences). In this paper, we perceive educational science as a new epistemic culture (Knorr Cetina, 1999) in residency training, creating new knowledge types and bringing in new notions of 'good' residency training.

We build on an extensive evaluation project of postgraduate medical education reform in the Netherlands (Wallenburg 2012). Drawing on sociological literature on standardisation of medical work and Knorr Cetina's theoretical notions of epistemic culture and epistemic object, we explore how educational scientific knowledge, and in particular clinical assessment tools as key element of the reform, have been incorporated in medical residency training. More in general,

we examine how the changes going on affect the governance of medical residency training. The research question this paper addresses is: *How can the interweaving of the epistemic cultures of professional authority-based training and educational science explain the standardisation of medical residency training?*

Standardisation of Medical Residency Training

Contemporary shifts in medical training are linked with structural and epistemic alterations in contemporary health care systems, placing more emphasis on issues of transparency and accountability (e.g., Nettleton et al., 2008; Wallenburg et al. 2013). Reforms are taking place in various Western countries. In all countries, reform takes place along three lines: a reduction and formalisation of resident duty hours, the introduction of competency-based training, and the introduction of standardised performance assessment. However, measures and accents differ between countries (Ringsted et al., 2006; Ludmerer and Johns, 2005; Lurie et al., 2009). This paper particularly focuses upon the standardisation of performance assessment. In this section, we explain the other two aspects to sketch the broader background of contemporary reform

In both the US and Europe resident duty hours (RDH) have been sharply limited in the past decade to increase both patient safety and work life for residents (Kellogg 2009; Szymczak et al., 2010). RDH have been brought back to 80 hours and 48 hours per week on average in the US and Europe respectively. In the Netherlands, as in several other countries, the Canadian Medical Education Directives for Specialists (CanMEDS) competency framework has been adopted (Ringsted et al., 2006). This shift to competency based training aims to expand the competences of medical residents by including generic competences next to medical technical skills. It has been argued that demographic shifts as well as developments in health services require other, more generic roles of physicians. The framework lists seven “roles” that residents must learn to fulfill, including Medical Expert, Communicator, Collaborator, Manager, Professional, Scholar and Health Advocate (Frank and Danoff, 2007).

In the Netherlands, where this study is based, residency training is organised in eight “training and educational regions,” all consisting of one university hospital and several affiliated district teaching hospitals. Depending on the training

schedule, residents switch between the university hospital and one or two district hospitals. Residents rotate through various services and departments, gradually taking on increasing levels of autonomy and responsibility. The format and content of the training program is structured in accordance with national requirements set by the Central College of Medical Specialists of the Dutch Royal Medical Association (CCMSⁱⁱⁱ) who is responsible for accrediting residency training programs. In 2004, driven by both external pressure for reform and increasing 'internal' professional dissatisfaction with the traditional master-apprentice system (Commissie Meyboom 2002, Commissie Legrand 2003), the CCMS announced far-reaching reforms. From 2011 onwards all residency training programs had to be competency-based, with structured time-capped internships, and predefined and measurable end terms. Workplace-based assessment, by the use of a variety of clinical assessment tools, was a core element of the reform (Scheele et al., 2008; Wallenburg et al. 2010).

Below, we describe how the changes described above were enacted in practice. First we will elaborate on our theoretical framework of shifting and interweaving epistemic cultures in medicine.

Shifting Epistemic Cultures in Medicine

The standardisation of residency training happened rather late compared to the standardisation and protocolarisation within medicine more broadly. Driven by the aim and development of evidence-based medicine, the number of guidelines and guideline-creating agencies has steadily increased in medicine from the late 1980s onwards (Moreira, 2005; van Loon et al., 2014). In their seminal book on 'The Gold Standard', Timmermans and Berg (2003) describe that what counts as good practice is increasingly tied to guidelines based upon scientific evidence derived from randomised clinical trials, leading to increasing standardisation of care. Although the aims and procedures of evidence-based medicine have become a vast objective in contemporary medical curricula (Timmermans and Chawla, 2009), medical residency training itself has largely remained 'hands on training' based on professional authority and judgment.

The sociological literature on medical education describes residency training as apprenticeship-based training based on "learning-by-doing" and role modeling

(Hafferty, 2000; Bosk, 2003[1979]; Prentice, 2007). During their training, residents become socialised in the local community of physicians, gradually extending their skills and knowledge while learning to act as 'real physicians'. Residents gradually change their position from the figurant zone (watching physicians performing clinical activities and holding retractors during surgery) to the core of actually conducting clinical work (Lave and Wenger, 1991; Wallenburg et al. 2013). In this transition process residents gradually expand their clinical autonomy and authority.

To enhance our understanding of how the two epistemic cultures of professional authority based training on the one hand, and educational science on the other, play out in practice, we develop a sociological frame in which we turn to social science research on health care standards and the notions of epistemic cultures and epistemic objects.

Social scientists, in particular from the field of science and technology studies (STS), have criticised the unproblematic nature of the mainstream literature on standardisation (e.g., Moreira, 2005). This mainstream literature, it is argued, leaves the privileged epistemological status of aggregated medical knowledge untouched, merely focusing on how practices of health care delivery can be made to 'adhere' with the 'forefront of medical knowledge', and how new kinds of treatment - or, in our case, new kinds of residency training - can be implemented in clinical work (Zuiderent-Jerak, 2007). STS scholars stress the highly contextualised nature of clinical guidelines and standardisation of clinical work, showing how standards and contexts are in continuous and emerging interactive relationship (Timmermans and Berg, 2003; Moreira, 2012). Timmermans and Berg (1997) point out that the universality guidelines and standards imply, actually is a local universality established on local and previously produced networks. Universality, they argue, always rests on real-time work, and emerges from localised processes of negotiations and pre-existing institutional, infrastructural and material relations. Hence, universality is contingently and collectively produced, and localisation and universality are inevitably intertwined. In this paper, we use this reflexive approach on guidelines and standardisation to studying the incorporation of new educational standards –

like the clinical assessment tools – to come to more objective and transparent ways of assessing and evaluating residents' competences.

However, such tools, we argue, are more than instruments that need to be incorporated in training programs and training practices. They also inhabit a sort of distributed cognition that coordinates and reconfigures existing training practices. To conceptualise this, we turn to the notion of epistemics.

Epistemics enable to explore how new knowledge cultures transform existing epistemic practices (Knorr Cetina, 2001). Epistemic cultures are groups that create and warrant knowledge (Knorr Cetina, 1999). Knorr Cetina points out that the expansion of expert systems in modern society has resulted in a massive increase in the technological and informational products. She argues that “a knowledge society is not simply a society of more experts (...), but it is a society permeated with knowledge cultures, the whole set of set of structures and mechanisms that serve knowledge and unfolds with its articulation” (Knorr Cetina, 1999: 8-9). She stresses the crucial importance of epistemic objects herein. Epistemic objects are objects of knowledge; the objects practitioners employ in their daily practices, be they models to create, instruments, or information systems to utilise. These objects are not stable or predefined, but are characterised by their lack of completeness of being as they continually acquire new properties and change the ones they have (Knorr Cetina, 2001). Moreover, epistemic objects are meaning-producing and practice-creating. According to Knorr Cetina, epistemic objects possess an “unfolding ontology”, meaning that they exist simultaneously in a variety of forms and have a meaning-generating connective force (Knorr Cetina, 2001). Furthermore, and crucial to our analysis, is the co-existence or diversity of epistemic cultures, revealing the fragmentation of contemporary science. Different architectures of empirical approaches, specific constructions of the referent, particular ontologies and different social machines co-exist and may interact in situated practices.

In this paper we adopt the notion of epistemic culture to studying how educational science has been incorporated as a new epistemic culture in medical residency training. We examine how educational science, and its related social machinery of training methods and assessment tools, has introduced a new

understanding and practice of “good” medical training. We study how the epistemic culture of educational science has interweaved with the far more tacit epistemic culture of authority-based medical training.

Methodology

Our study is based on two distinct yet related evaluation projects conducted in the Netherlands. First (2006–2010), the first and third author were the appointed external evaluators of a national project working on the implementation of revised training programs in pediatrics and gynecology training (IW, AdB). We conducted a process evaluation, investigating the reform at the different sites where the reform was enacted. We observed meetings of the project team facilitating the reform (35), national seminars and workshops on the reform (16) and meetings in local hospitals (8) to gain in-depth knowledge about the background and purposes of the reform. In addition, and central to the data from which this paper is drawn, we conducted an ethnographic research of gynecology training practice in two different hospitals: a university hospital in 2007 (four months of observation) and a general teaching hospital in 2009 (two months of observation). The two ethnographic research studies aimed to achieve in-depth understanding of how the new training structures and methods were enacted in daily practice. In both hospitals, we shadowed gynecology residents during their daily activities; we observed them during patient encounters at nursing wards and the outpatient clinic, at the operating theatre, during morning reports and during all other kinds of interactions with attending gynecologists. Moreover, by shadowing residents we were also able to observe and talk to their attending physicians. These informal interviews were worked up in the observation reports (see below). In addition, in both settings formal, semi-structured interviews were conducted with attending physicians, medical residents, educational scientists and hospital administrators (25 in total). Interviews were guided by a topic list on the reform. Moreover, the semi-structured format allowed to exploring new topics brought in by the interviewees.

Second, (2010–2012), we conducted a study of the reform of a surgical training program in which the new training methods were introduced and enacted^{iv}. The reform was similar to the reform in gynecology training as both training

programs had to live up to same national requirements (see below for more detail). We observed local clinical directors^v at meetings (7) discussing topical issues related to changes in surgery training. In addition, we interviewed attending surgeons (13) and surgical residents (14) about current training reforms in everyday residency training.

In total, we made over 135 hours of observation. Observational notes were made during the observations and worked up into detailed descriptions shortly after. All interviews were tape recorded after permission of the interviewees and transcribed verbatim.

All participants were informed about the research in a presentation given by the first author prior to the study, as well as in personal interactions during fieldwork. Patients were notified of the role of the researcher (first author) and could refuse her presence, which happened twice. No ethical approval for this study was needed as in both the gynecology study and the surgical study the applicable review boards determined the research to be exempt.

After an initial comparative data analysis in which we compared the data of the three ethnographic research projects to each other, we decided to proceed with a cross case analysis as no substantive differences between the research projects were found. Moreover, a cross case analysis, in which we brought the findings together perceiving them as one set of data, allowed for a richer set of data to achieve in-depth understanding of the reform (Sanders and Harrison 2008). Data analysis proceeded in a sequence that started with close reading of all transcripts and field notes, followed by open coding to label and categorise data elements. This was followed by axial coding to link emerging concepts and then selective coding to define key concepts (Strauss, 1987).

Results

The result section is divided in three parts. In part one we describe the traditional, professional authority-based epistemic culture of residency training. Here we elucidate the specificities of everyday residency training practice, focusing on how resident performance is evaluated in the course of everyday patient care and how residents negotiate their learning space in the

professionally lead clinic. In part two we shift focus to the introduction of educational science as a new epistemic culture in medical training. We describe how the emphasis on educational scientific knowledge has shifted attention to the quantifiable proof of skill acquisition. In part three we examine in more detail how attending physicians and medical residents employ the standardised clinical assessment tools and how these tools produce meaning to performance assessment and good medical training.

Professional authority-based epistemic culture

Residents learn medical conduct in real hospital settings by practicing medicine (i.e., performing physical examinations of patients, prescribing drugs, scheduling lab tests, managing clinics, attending clinical conferences and—in case of a surgical specialty—operating on patients) under the supervision of attending physicians who bear the clinical responsibility (e.g., Bosk, 2003[1979]; Sinclair, 1997). Room to practice is not a given, but must be negotiated by residents presenting themselves as competent and reliable clinicians:

Lisa, a senior resident, is serving on the obstetrics ward. A young woman is admitted to the ward suffering from serious pain in her belly. She is 20 weeks into a quadruplet pregnancy. A nurse enters the nursing post and announces that her pain has worsened. Lisa decides to perform an ultrasound right away and asks Dave, the attending gynecologist, to accompany her. She asks Nick, a junior resident who has just started his internship, to join them.

Lisa wheels in the ultrasound equipment and explains to the woman that they want to check the babies. She offers Nick the ultrasound scanner: “Do you wanna do it?” Nick nods, grabs a chair and smears gel over the woman’s belly, and then he starts moving the scanner over the huge belly rather clumsily. Lisa takes his hand: “Smoother, like this.” Covering Nick’s hand, she gently slides the ultrasound scanner over the belly. The babies become visible on the screen. Dave asks Nick to move downwards to render the cervix visible. Keeping his gaze on the screen, Dave notices that one of the babies has already moved into the cervix cavity. He tells the mother that this

baby will be born soon, and that they can only hope that the other three babies will stay inside.^{vi}

Back at the nursing post Dave tells Lisa to remove the cervical cerclage.^{vii} Lisa nods, explaining to Nick that contractions may cause a rupture of the womb if the cerclage is not removed in time. She asks Nick if he has ever removed a cervical cerclage before. Nick says no never, but he wants to learn how.

We go back inside. Lisa explains to the mother what they are going to do, and asks the nurse to give her some more pain medication. They put the woman's legs over the padded rests. Nick shifts a stool in front of the woman and sits. Lisa hands him a speculum. While explaining to the woman what he is doing Nick inserts the instrument. Standing close to Nick, Lisa bends to glance inside as well. She tells Nick where to cut the stitching, and watches closely as he removes the device. She then turns to the woman, saying that now they can only hope for the best and need to wait to see what will happen.^{viii}

(Field notes, University hospital, gynecology training).

The fragment above reflects the structure and mechanisms that serve clinical knowledge. In this epistemic culture the articulation of clinical knowledge is embedded in everyday clinical practice. Training is learning by doing (Smith et al., 2003; Prentice, 2007)^{ix}. While the day-to-day practice structures residency training, the main mechanisms to creating and articulating clinical knowledge are – in this epistemic culture – individual judgement and negotiation. The attending physician judges on both the patient condition and the resident's competences to decide upon what the resident can do, and thus what can be learned. Assessing a clinical training situation thus involves a lot of situated judgment (Thevenot and Boltanski, 2000) and 'diagnostic work' (Büscher et al., 2009). The attending must figure out what issues are at stake and determine the scope of action. This judgment is mediated by the technologies employed to examine the condition of the babies. The ultrasound scan, for example, reveals that one of the babies is about to be born and cannot be stopped. As no further treatment is possible until the baby is born, besides pain control and removing

the cervical cerclage, there is no immediate need for the attending to stay with the patient. However, the attending's judgment also expands the situated clinical situation as it is driven by the attending's former encounters with the senior resident in which the attending has familiarised with the capabilities of the resident, building a relationship of trust (Wallenburg et al. 2013, Prentice 2007).

The senior resident, in turn, negotiates learning space by demonstrating her clinical knowledge and technical skills by instructing the junior (e.g., informing him about the need to remove the cervical cerclage) and by guiding his smooth movements during the ultrasound scan. In doing this, the senior resident demonstrates the attending her capabilities of becoming a clinical teacher in the near future when she qualifies as a gynecologist. Her performance enlarges the junior resident's space to learn as well: he is the one allowed to conduct the ultrasound scan and to remove the cervical cerclage.

During the observations and interviews residents highlighted the importance of being familiar with the attending physicians, fellow residents, nurses as well as the building that make up the learning environment to be able to enact learning space:

If you're new in a hospital, and you don't know where the Emergency Room is, or you don't know if the nurse phoning you is someone who panics easily or not, or you can't find the nursing ward when they need you, then you're lost. And what about the surgeon? Will he let you operate on a patient if he doesn't know you, or will it take weeks before he lets you do anything?

(surgical resident, SR1)

Residents must become acquainted with their surroundings to be able to anticipate (acute) clinical situations. In other words, the culture of professional authority training is - in contrast to the epistemic culture of education a science as we explain later, connected to a local, closed and relatively small community of professionals. In order to learn, residents need to build a personal relationship with the attending physicians who must entrust them with the care for their patients:

(...) being around, sticking to the ward if you want to perform an operation... you need to be the first. It's always the same group of people who do most surgeries. This is an underestimated part of residency. You can't test or measure it, but the people at the front, who are willing to do a bit more are the ones who get rewarded; they are called more often to do something than the ones who don't do this. (surgical resident, SR10)

You need to bond with the ones you train. They [residents] must show a kind of eagerness. You're prepared to do a bit more for the ones that show this ambition. (surgeon, S12)

Showing ambition, for example by staying when others go home, is rewarded with participation in a late-night surgery, or being phoned “*when something interesting is going on at the operation room*” (attending surgeon, CA4). Residents have to present themselves as eager learners to be allowed to practice the medical conduct. They “need to bond” with the attending physicians. This takes time, situated practice, personal contact, and lots of effort. However, it is exactly this situatedness and its accompanied implicitness that has been increasingly criticised in the past few years. Below we turn to the shift to standardised training by discussing the introduction of educational science as a new epistemic culture in medical residency training.

Educational Science: A New Epistemic Culture in Residency Training

From the mid 2000s onwards, redesigned training programs have been introduced in the Netherlands. Educational scientists, who until then hardly were involved in residency training, were employed to facilitate the implementation of the new requirements in local training programs in hospitals. Educational scientists were convinced that modern educational insights would enhance the learning climate of residency training and improve training quality. With the introduction of educational scientist as experts in medical training, a whole set of structures and mechanism was introduced that served the standardisation of medical training and the articulation of acquired knowledge. For example, so-termed ‘teach-the-teacher’ programs were developed to instruct attending physicians and residents in using the new training standards and to

discuss and measure residents' competences. Providing structured feedback - meaning that an attending gives structured and constructive feedback to a resident on how to improve performance, articulating both positive aspects and elements that can be improved- was considered a key mechanism for residency training:

I think that's the most important part; that the professionals themselves want to enhance their work. That's most important. (...) [T]hey want to get feedback on what they do, and how they do it. That used to be unthinkable. [Medical doctors] want to have this feedback, and they want to know how to improve and how to do this. So, I think it's an important culture change among medical doctors. (Professor of medical educational science)

Educational scientists argued that attending physicians and residents should participate in the teach-the-teacher program together in order to render the new manner of resident training a shared practice. This 'togetherness' implied a form of equality that sharply contrasts with the traditional hierarchical master-apprentice relationship.

Alongside the reform, educational science was developed as an epistemic culture in residency training, articulating a new and unique perspective on postgraduate medical education. Educational scientists, supported by a group of physicians who was in favour of the use of educational insights in residency training, started to organise themselves in epistemic communities, gathering regularly to discuss the reform of residency training and finding practical solutions to enhance the use of educational insights. Parallel to this more practical approach, a scientific community on medical education was created. In academic medical centers and affiliated teaching hospitals, professors on medical education and PhD students were appointed. They developed new research programs on residency training. Research particularly focused on questions surrounding the cognitive processes of learning and the effectiveness of specific educational techniques. Evidence based research strategies, like randomised controlled trials, were adopted to create robust knowledge on the use of standards in training practice.

A crucial object in the reform of medical training was the clinical assessment tool. This tool aimed to make resident performance measurable, comparable and transferable. It had to enlarge residents' insight in, and enhance their grip on their own learning process while making them less dependent on the personal preferences of attending physicians. A prominent example is the Objective Structured Assessment of Technical Skills (OSATS), a validated clinical assessment tool designed to assess surgical procedures. The tool spans eight performance dimensions attending physicians must assess to measure a resident's performance. These dimensions are: treatment selection, feeling for tissue, time and motion, knowledge and handling of instruments, use of assistants, flow of operation, knowledge of a specific procedure and peri-operative care. Skills are scored on a scale from 4 (poor performance) to 10 (excellent performance); see Figure 1.

>> Insert figure 1 here

The OSATS aims to render the different dimensions of surgical work visible, addressing both technical skills (e.g., 'feeling for tissue') and socio-technical aspects ('use of assistants'). Yet, its main focus is on the operational procedure itself, "carving out" the operation from the context in which the operation is originally produced. As such, the instrument disentangles the operation from the contextual factors that influence a resident's capabilities to give a good performance, like the importance of being acquainted with the clinical surroundings that we have pointed out in the former paragraph. Following the educational scientific point of view, however, room to learn depends on measurable knowledge and skills. The clinical assessment tools reduce a resident's performance to a listed set of objectified skills on which the resident's capabilities – and, with that, the room to practice autonomously – can be decided upon and transferred to a larger group of attending physicians that may not yet have established a relationship of trust with the particular resident – something which, we pointed out above, is central to professional authority-based residency training.

Importantly, and revealing the unfolding and managing character of the clinical assessment tools as epistemic objects, the clinical assessment tools have been

incorporated in the CCMS criteria for the accreditation of residency training programs. Hence, the incorporation of clinical assessment tools in training programs and the actual use hereof at local training sites became obligatory. With this, a new notion of good residency training unfolded, based on elements as objectivity and transparency.

In short, the introduction of educational standards like the clinical assessment tools have introduced measurable performance as a mechanism to serve the articulation of clinical knowledge, shifting emphasis from implicit judgment based on the tacit knowledge of an attending in a closed professional community which is central to the professional authority-based epistemic culture, to structured feedback and objective performance assessment in a team of physicians. Moreover, the incorporation of the standards in formal accreditation criteria restructures the day -to-day practice in a learning environment and enforces local clinicians to adopt the new training methods and tools. In the following section we shift our focus to the use and meaning of educational standards in training practice: How did the training standards create new practices of medical education and produce new meanings of good residency training?

The enactment of educational standards in practice

In both gynecology and surgery training programs we noticed that the new training requirements were quickly adopted. Existing training programs were redesigned following the CCMS degree. Resident duty hours were brought back to 48 hours on average, and Teach-the-Teacher programs were organised to instruct both attending physicians and residents in the use of the new training standards. In daily practice, as well as during interviews, most attention was paid to the clinical assessment tools, such as the OSATS. The assessment tools were seen as a proxy for modern residency training.

It (using clinical assessment tools) forces an attending to interact and provide feedback. It's very useful talking with someone about your ways of doing things—and how to improve them. (surgical resident, SR8)

You can become a bit careless with residents you think are doing quite well, whereas formal assessment might reveal that on the whole they aren't doing that well. Now you have an instrument to observe this. It gives you better insight into bad performers. Not that everything is that bad, but you can pay more attention to this or that. That's a real improvement.
(gynecologist, G1)

Both the gynecologist and the surgical resident quoted above point out that the assessment tools focus attention on the competences of the resident. In the traditional master-apprentice relationship the attending acted as the standard of good practice: do I view him or her as a good doctor? The assessment tools, however, draw attention to the resident's individual skills and render these visible to a larger group of physicians:

They give you a tool for gathering information about badly performing residents. In the past it was very hard to make someone quit a residency, as we could seldom prove incompetence. But now we can show them the forms.
(gynecologist, G4)

Formally assessing residents enables clinical teachers to render bad performance visible. In the recent past, poor performers could usually only be "disarmed" through relegation to specialised, non-technical or non-emergency aspect of clinical work. Or, after finishing residency, such residents could find a job at second-class hospitals only (Bosk 2003[1979]). The enhanced visibility of poor evaluations forces residents to improve their performance, or, ultimately, quit residency.

Physicians however also stress that evaluation instruments cannot entirely replace the traditional model of providing feedback, as the instruments do not cover the whole picture of learning to doctor:

You have to make clear to a resident what can be improved, and that's not something you trust to paper but tell in person. Such feedback is far more important than circling a level of competence. I don't care about this level

(...) In the end you judge a resident by comparing him or her to yourself. Setting norms is pointless; it's all about trust. (Surgeon, S4)

This attending surgeon distinguishes giving feedback as an educational principle from feedback as a “privatised” and relational professional activity. Following the educational principle, residents’ competences are evaluated and reduced to numbers indicating a resident’s level of performance. The numbers allow comparisons between moments in the learning trajectory as well as between residents. In professional interaction, the surgeon in the excerpt above explains, scores are not important. Here, residents learn the “real” lessons about being a doctor. These lessons are role modeling; they are not trusted to paper but shared in private between a master and an apprentice, indicating the authority of the attending physician. Moreover, *how* the assessment tools are used, and what they *do*, is the result of the practices that enact the instruments:

When assessing residents I always make sure to point out something that has room for improvement. Scoring everything at the top level makes no sense. (surgeon, S12)

During an interview the surgeon quoted above pointed out that he often gave residents a bad mark to stimulate them to improve their performance. This practice was confirmed by other attendings. Interestingly, medical students do not usually get bad marks. During our fieldwork we regularly encountered medical students who were very frustrated by the marks they had received. These students often got a “6”, independently of whether they had done their very best, or had just coasted along. Attending physicians explained to us that a bad mark is accompanied by investing in more work, while a good mark gives the wrong impression that someone is already good enough. Giving a “6” is thus most convenient. However, talented residents do get bad marks. A bad mark given to a good performer demonstrates the commitment and willingness of the attending to put effort into the resident’s professional development and career.

The multiplicity of measuring performance questions the idea of an objectified and transferrable residency training program. To know whether a “4” (see Figure 1) refers to a poor or an excellent resident, it thus is important to be

familiar with an attending's habitual training and judging methods. These "specificities" of training practice not so much reflect the 'non-docility' of attending physicians, as an example of the often articulated 'resistance to change' among medical professionals (Power, 1997; Levay and Waks, 2009), but uncovers the "local universality" (Timmermans and Berg 1997) of standardised residency training. The educational methods and tools coordinate training activities and render these visible and transferrable, but they are also grounded in those practices. This contextualisation of assessment demonstrates the importance of personal interactions between the attending physicians and the residents they train:

Interviewer [IW]: *Would you let a resident operate on a patient if the resident has qualified for that procedure in another teaching hospital?*

Surgeon (S12): *No! That'll never happen! These are our patients, our reputation. Training residents is nice, but in the end they're only passers-by.*

Attending physicians bear the clinical responsibility for their patients. As this surgeon makes clear, inadequate care delivered under an attending's aegis not only harms the patient but also impedes the attending's reputation. Attending physicians let residents operate on their patients only if they have full confidence in the resident's skills, intelligibility and reliability. This confidence cannot only be transferred on an assessment form, but is built up over time during numerous personal interactions between an attending and a resident.

Learning moments and educational instruments are thus used and translated in the course of daily attending-resident interaction. On the one moment new educational insights are used to objectify performance evaluation, and on the other educational instruments are reshaped ('used differently') when it better fits the purpose of teaching specific clinical lessons. This "doublethink"^x not only underscores the situatedness of residency training, but also reveals the unfolding character of the clinical assessment tools as they give new meaning to residency training. Attending physicians and residents have embraced the new training methods, increasingly being convinced that residency training should no longer solely be based on tacit professional judgment and embodied professional norms, but must also be objective, universal and comparable.

Conclusions and Discussion

As Shem pointed out a few decades ago, medical training is an important social institution of the medical profession. During their training, junior doctors come to embody medical conduct by working with physicians and practicing on patients in real clinical settings. This paper has shown how educational science, as a new and non-medical epistemic culture has inserted itself in the traditional professional authority-based culture of medical residency training. It has shifted emphasis from apprenticeship-based training models of “learning-by-doing” and role modeling to formalised training programs based on educational insights of competency-based training and standardised performance assessment. This new epistemic culture has accompanied a new assemblage of (groups of) actors, empirical structures, mechanisms of knowledge and articulation, and epistemic objects. Professional-authority based medical education strongly relies on a personal and long-term relationship between an attending and a resident, and is embedded in the situatedness of the clinic. In the epistemic culture of educational science, educational scientists are central players next to attending physicians and residents. In addition, there is a shift from the individual relationship between the attending and the resident to the group of attending physicians and ‘team work’. Clinical knowledge and skills are, at least partly, disentangled from the contingency of the everyday clinical context through the application of streamlined training programs encompassing predefined internships and learning goals. In this epistemic culture, performance no longer is implicitly judged upon by performing more or less room to practice and thus to learn, as is central to the professional authority-based epistemic culture, but is made measureable and quantifiable through the application of clinical assessment tools that render individual competences and capabilities transferable and comparable. Hence, the epistemic culture of educational science has induced a resident-oriented training structure that conflicts with the traditional process of gradual integration in the medical professional community.

Yet, our study also shows that the epistemic culture of educational science has not replaced the traditional training culture. In the end, it is still the personal

assessment that is the obligatory point every resident has to pass. This is not to say that the reforms are “decoupled”, meaning that professionals fulfill the reporting demands only superficially as rituals while actual professional work and practices are sealed off. Nor is this to say that the reforms are ‘colonised’, meaning that organisations become infused with reforming processes at the expense of professional autonomy, as has often been described in the medical sociological literature (Power, 1997; Levay and Waks, 2009). Instead, this paper has shown how attending physicians translate the reforms by both embracing the newly offered instruments to objectify resident evaluation on the one hand, and re-linking them with clinical work on the other. Moreover, and indicating the unfolding and ‘fluid’ character of epistemic objects (Knorr Cetina, 2001), the research has demonstrated that the clinical assessment tools must be (partly) adapted to existing professional practices to render them legitimate and usable. This reveals how epistemic objects give shape and meaning to changing practices, and at the same time need to be adapted to the existing epistemic culture to become accepted and used. Hence, the epistemic cultures of professional authority-based medical training and educational science have interweaved, fabricating a new training culture that assembles both traditional and ‘new’ elements; formal structures and methods and informal local practices have ‘mixed up’, enlarging the training repertoires of attending physicians.

Our study has important policy implications for current reforms in medical training. It demonstrates that the training of doctors cannot be disconnected from hands-on care for patients, responsibility of the attending physician “on the spot” and embeddedness of the resident in concrete practices. Trust and individual assessment by attending physicians remains a crucial aspect of medical training. These “old school” individual judgments cannot be replaced by objectifying and generalising assessments.

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ⁱ Gomers, an acronym for ‘get out of my emergency room’, are old demented patients who, according to Shem’s Fat Man, “want to die but we don’t let them” (Shem 1995 p.38). These patients, Shem’s characters argue, can only be helped by turfing them out to the nursing home as soon as possible. Turfing refers to a fictional practice of transferring patients to another service to get rid of clinical responsibility for them. The term has been adopted by American physicians to point at the real practice of transferring patients to other clinical services to delegate clinical responsibility for them (Bosk 1992, p. 63).

ⁱⁱ In this paper we will use the terms ‘postgraduate medical education’, ‘medical residency training’ and ‘medical training’ interchangeably

ⁱⁱⁱ The CCMS has been replaced by the Registratiecommissie Geneeskundig Specialisten (RSG) in 2013. The CCMS and RSG fulfil similar tasks with regard to administering postgraduate medical education.

^{iv} This part of the research was conducted together with Niels Hopmans, Jan IJzermans (both from Erasmus University Medical Center Rotterdam) and Ted den Hoed (Ikazia Hospital Rotterdam).

^v Clinical directors are attending physicians who are appointed as managers of the local residency training program of a particular medical speciality within a hospital.

^{vi} In the Netherlands, as in other countries, babies born after 20 weeks pregnancy are not treated and may die during or shortly after delivery.

^{vii} Cervical cerclage, also known as a cervical stitch, is used when the cervix opens slightly and there is a risk of miscarriage because it may not remain closed throughout the pregnancy. It is often applied in multiple-birth pregnancies.

^{viii} Sad to say, all four babies were born that same day and died a few minutes after their birth.

^{ix} This does not mean that the attending really disappears from the scene. In this particular case, the attending stayed around doing administrative work and regularly asked about the condition of the patient. In other work we have explored how attending physicians and residents tinker with the (sometimes conflicting) central goals of providing good care and good medical training, see (Wallenburg et al. 2013).

^x The term “doublethink” is borrowed from the George Orwell’s seminal book ‘1984’ and indicates the act of people simultaneously accepting two mutually contradictory beliefs as correct social contexts. Thanks to Roland Bal for pointing this out.