

Learning to doctor: tinkering with visibility in residency training

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Abstract Medical doctors in teaching hospitals aim to serve the two central goals of patient care and medical training. Whereas patient care asks for experience, expertise and close supervision, medical training requires space to practise and the ‘invisibility’ of medical residents. Yet current reforms in postgraduate medical training point to an increasing emphasis on the measurable visibility of residents. Drawing on an ethnographic study of gynaecology training in The Netherlands, this article demonstrates that in daily clinical routines multiple practices of residents’ visibility (visibilities) coexist. The article lists four visibilities: staging residents, negotiating supervision, playing the invisibility game and filming surgical operations. The article shows how attending physicians and medical residents tinker with these visibilities in daily clinical work to provide good care while enacting learning space, highlighting the increasing importance of visualising technologies in clinical work. Moreover, the article contributes to traditional sociological accounts on medical education, shifting the focus from medical education as a social institution to the practices of medical training itself. Such a focus on practice helps to gain an understanding of how the current reform challenges clinicians’ educational activities.

Keywords: medical training, visibility, multiplicity, medical technology

Introduction

Medical education has been of distinct concern in medical sociology since the late 1950s with the publication of *The Student Physician* (Merton *et al.* 1957) and *Boys in White* (Becker *et al.* 1961). Both studies set the scene for later sociological accounts on medical education by addressing topics such as student socialisation and dealing with clinical uncertainty (see Hafferty 2000, Light 1980, Sinclair 1997). After a pause of about a decade, in which sociological attention was devoted to the issue of professional dominance through the influential work of Eliot Freidson, medical education received renewed sociological attention in the 1970s and 1980s (Fox 1979). Drawing on the highly deliberate topic of professionalism of that time, these studies focused on the socialisation of (junior) doctors in the medical community (Miller 1970), and, in particular, the construction of the medical identity

(Hafferty 1991, Light 1980). Although the latter studies differed in their analysis of how the construction of the medical identity is done, they shared an interest in the tacit practices that medical residents come to embody when becoming members of the medical professional community (see also Prentice 2007). In this body of literature the socialisation of novices is seen as part of the surveillance of junior doctors who practise the medical conduct in everyday clinical settings (Bosk 1979).

In the last decade, however, there has been a shift towards more formalised and structured models of supervising and assessing residents. Due to increasing outside pressure to open up medical training to outside scrutiny, medical authoritative bodies across the West (such as Canada, the UK, the USA and The Netherlands) have redesigned residency training programmes in outcome and competency-based curricula to enhance the standardisation of training programmes and to increase transparency of training practices (Lurie *et al.* 2009). Following the new requirements, residents have to act under the close supervision of physician supervisors ('attending physicians' or 'attendings') and are only allowed to perform clinical procedures on real patients when they have proved they are capable of doing so (ten Cate and Scheele 2007, Johnson 2007). The shift to an externally validated training model potentially has significant implications for the training of medical residents (doctors-in-training) and their (future) conduct.

Yet the reforms of medical residency training have remained largely unaddressed in the medical sociological literature on medical education (for some exceptions, see Chamberlain 2009, Johnson 2007, Wallenburg *et al.* 2010). In this article we aim to contribute to the understanding of how contemporary reforms in postgraduate medical education are incorporated in residency training by focusing on a core element of the reforms: the surveillance of residents in everyday clinical training practice. Drawing on an ethnographic study of gynaecology residency in The Netherlands, we explore how attending physicians and medical residents make residents' performance visible and hence evaluable in everyday clinical practice. We will argue that visibility is not a single or one-dimensional aim (Struhkamp *et al.* 2009) in residency training but that, instead, multiple visibility practices (or, as we term it, visibilities) coexist in everyday clinical training practice, serving different goals (Mol 2002). The central questions we address in the article are: how is the visibility of medical residents enacted in everyday clinical work and what aims do these visibilities serve? And how are the visibilities coordinated in everyday clinical work?

The study

The article builds on a large-scale evaluation project of medical residency training reform in The Netherlands (2006–2012). The project focused on the implementation of the redesigned programmes of paediatrics and gynaecology and obstetrics residency training, incorporating the new standards of outcome-based and competency-based education. Three authors of this article (IW, AB and PM) were appointed external evaluators of the project. The research project entailed a multi-sited study of reform enactments. As practising gynaecologists, the third and fourth authors (MH and FS) were directly involved in the reforms. Our close collaboration helped to generate insider and outside perspectives on the reforms, enabling an in-depth insight into the evolvment and possible consequences of the reforms for (traditional) residency training practices (see also Dixon-Woods *et al.* 2011).

In this article we narrow the focus to the clinical workplace, drawing on an ethnographic study conducted in two gynaecology and obstetric wards in hospitals located in the western part of The Netherlands. Fieldwork was conducted between November 2007 and September

2010. The first clinic, referred to as 'Hospital K', is a university hospital. For four months the first author (IW) shadowed gynaecology residents during their daily activities. The second hospital ('Hospital L') is a non-university teaching hospital. Here the same author followed gynaecology residents in their daily routines for two months. During the first observation period more general observations were made of residents' work and supervision. Based on this, more specific observations were conducted in the second period. Although we shadowed residents and not attending gynaecologists, we had many opportunities to observe and interview attendings as well.

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. The patients were notified of the role of the researcher and could refuse her presence, which happened twice. Pseudonyms have been used for all participants. No ethical approval for this study was needed as the institutional review board of Hospital K determined the research to be exempt.

Notes taken during periods of observation were worked up into detailed descriptions shortly afterwards. During the first observation period five audiotape recordings made of clinical teaching activities were transcribed verbatim. Additionally, we conducted in-depth interviews with 17 attending physicians (12 gynaecologists and five paediatricians) and 12 medical residents (five gynaecology residents and seven paediatrician residents). The interviews were semi-structured following a topic list focused on clinical supervision and resident evaluation. Interviews were electronically recorded and transcribed verbatim. Data analyses proceeded in a sequence that started with a 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). Before we describe the study's findings, let us first turn to the theoretical background of resident surveillance and the multiplicity of care practices.

Multiple visibilities in residency training

Surveillance through socialisation

In the sociological literature on medical education the surveillance of medical residents is intrinsically connected to the socialisation of junior doctors (Apker and Eggly 2004, Arluke 1978). Socialisation involves the moral and symbolic transformation of a lay person into an individual who can take on the special role and status claimed by the profession (Haas and Shaffir 1982). Out of this body of literature two main elements emerge: case presentation and (learning to deal with) clinical uncertainty.

Firstly, case presentation points at the practice of junior doctors presenting a patient case in front of an audience of superiors (such as attending physicians and senior residents). Case presentation has been described as a vehicle for professional socialisation as juniors learn to embody medical conduct by presenting cases effectively and persuasively (Erickson 1999, Lingard *et al.* 2003). Because case presentations are self-presentations, Anspach argues, residents employ a set of strategies to protect their own credibility, like using the language of their superiors and imitating their focus. Consequently, juniors increasingly concentrate on the professional culture instead of patients (Anspach 1988).

Secondly, Fox has pointed out that medical knowledge is inherently uncertain as it is riddled with gaps and unknowns and the quantity of medical facts is impossible to completely master (Fox 1957). Fox describes how medical students gradually become socialised in medical confidence; instead of blaming themselves for clinical mistakes, aspiring doctors learn to successfully manage the limitations of medicine. Drawing on Fox, Light

states that training for uncertainty actually means training for control, arguing that medical doctors run the danger of becoming insensitive to complexities in diagnosis, treatment and client relations (Light 1979). Similar to the literature on case presentation, the studies on clinical uncertainty argue that juniors increasingly identify with and commit themselves to the profession and a professional career, developing greater loyalty to colleagues than to patients (Apker and Eggly 2004, Light 1979).

Multiplying visibility

Although these sociological accounts on medical socialisation have contributed greatly to the understanding of how novices become real physicians, embodying and disseminating medical professional skills and values, medical sociologists' focus on medical doctors as a social group and the wider social implications of this group's training practices has been firmly criticised in the realm of science and technology studies (STS). STS scholars have criticised medical sociologists for neglecting what is being done in medicine by focusing on the social environment of medicine or the social implications of medical work (that is, the focus of doctors on their own profession instead of on clients or the distribution of power in the relationship between an attending and a resident).

In response, STS scholars have proposed to turn to clinical practices themselves to examine how medicine is performed (Timmermans and Haas 2008). Stefan Timmermans defines practice as 'the actual contingent, situated process of performing tasks, doing work together, and transforming something into something different' (Timmermans 2006: 28). An analysis of practice, he argues, concerns questions of who does what, when, where, and with what consequences.

A second point of criticism that STS scholars have raised is the 'normative universalism' (Timmermans 2006: 28) that is expressed in sociological accounts on medical work. Instead of worrying about the implications of medical socialisation for the doctor–patient relationship, for instance, STS scholars take normativity as a starting point and address the different purposes and values that are embedded in daily clinical practices. So, instead of knowing what good care or good training is beforehand (as a solid or settled practice), each situation involves different purposes and values (goods) that relate in different ways (Mol *et al.* 2010, Pols and Willems 2011). This can be illustrated by the work of Jeannette Pols on 'good washing' in long-term psychiatry. Each situation, Pols argues, involves different valued purposes that relate in flexible ways and thus different ways of washing patients to provide good care. For instance, good care may also mean not washing dirty patients if individual autonomy is found to be more important than personal hygiene. Yet this value is not stable either, as someone's 'dirtiness' may not only bother the patients themselves but also bother the other patients around them. So situations of care (here, washing patients) are highly situated and can only be analysed as a consequence of specific patterns or traditions, values, knowledge and routines used.

Relating the principle of multiplicity to our interest of surveillance in medical residency training, we argue that what resident surveillance is and what it does multiplies across the many practices of residency training and its enactment of technologies as well as across space. The surveillance of residents is thus situated, contingent and variable, incorporating different (and sometimes conflicting) goods and reflecting the different values and realities that are enacted in daily practices. In short, there is not a single aim or way of making residents' work visible but there are multiple visibilities.

In daily work these visibilities are entangled and need to be dealt with together. This connectedness implies a number of questions about similarity and difference between practices (and goods) as well as how these practices are brought together. This bringing together has been described as ‘tinkering’ (see Struhkamp *et al.* 2009, Mol *et al.* 2010). Tinkering thus points at the situated practices in which different goods are juxtaposed despite their mutual conflicts and tensions (Law 2010).

In this article we describe an approach to studying the multiplicity of practices in the surveillance of medical residents. That is, by addressing the multiple forms of residents’ visibility, we seek to unravel the various ‘goods’ embedded in medical residency training and examine how these are brought together in everyday clinical work.

Gynaecology residency training in everyday clinical work

Residency training is apprenticeship-based learning, meaning that residents get their training primarily by working on patients alongside other physicians rather than through lectures and skills in laboratory work, although simulators and skills laboratories are increasingly part of regular residency training (see Johnson 2007). During their training residents rotate through various services and departmental clinics, gradually taking on increasing levels of responsibility. Where they work and what they do depends on the learning stage, but also, in practice, on the workload of the particular clinical department. In The Netherlands residents not only rotate between different services but usually also between university and non-university teaching hospital sites.

During a working day residents are assigned to a particular service (that is, the outpatient clinic, nursing ward, delivery rooms and operating theatre) where they work under the supervision of an attending gynaecologist handling the particular ward. At other times residents may be on call, meaning that they have to take care of all the patients assigned to the gynaecology department during an evening, night or weekend shift. During a shift a resident is usually assisted by a supervising gynaecologist, who may be in the hospital or may be at home. Although a resident usually is the first to encounter a patient, the attending physician bears the (legal) responsibility for treatment.

In the next sections we analyse four practices of residents’ visibility in everyday clinical practice. By ‘visibility’ we mean the ways residents’ work and performances are rendered visible and hence evaluable to attending physicians. We focus on the three clinical situations where medical training is enacted: the morning report, the outpatient clinic and the operating theatre.

First visibility: staging residents

The morning report

The first important dimension of visibility in medical training is staging residents, meaning that attending physicians put residents on stage by watching and challenging them when they are performing clinical activities in order to gain insight into their capabilities. Earlier studies, such as the work by Stelling and Bucher (1972) and, more recently, Prentice (2007) describe how the amount of supervision and control that residents are subjected to is decided upon during the process of staging. An explicit practice of staging is the morning report. In Hospital K and Hospital L attending physicians, residents, midwives, house staff and medical students gathered each morning at 8 AM to discuss events of the evening and night before (for

example, night deliveries and surgery and patients seen in the emergency room or admitted to hospital). During the presentations patients' data (including their personal details, the results of clinical tests and digital pictures of X-rays) were projected with a beamer (video projector) on a big screen. Usually the resident of the night shift took the lead in presenting patients' cases, following a strict (and almost ritualised) routine of giving the patient's name, year of birth, obstetric history, medical history, current medical problems, possible diagnoses and proposed medical treatment. During the presentations, the residents were often interrupted by questions from attendings requesting further information, suggesting alternative diagnoses or treatments or criticising resident's presentation:

'How do you feel about your presentation? Haven't you missed some important information here?' The resident does not answer immediately, keeps her gaze on the screen. The attending continues, speaking sharply: 'I want to know the position of the baby. Just telling me the number of tractions¹ doesn't give me a clue'. The resident answers that it all happened without her present. The attending doesn't take this explanation for an answer and becomes even more annoyed: 'You were there when they reported on this, weren't you? You *should* know'. (Field notes, Hospital L)

The morning report is more than a handover from the night to the day shift. It is the place where residents are tested, clinical knowledge is discussed and shared and lessons are taught. In the excerpt above the resident is publicly staged for not having full knowledge of the patient on whom she is reporting. Erickson has pointed out that the formality of case presentations displays the lack of equal footing between residents and their superiors and teaches juniors about status differences (Erickson 1999). Although this hierarchy is also clearly present in the excerpt above, there is more to say. The resident's shortcomings (that is, not knowing the position of the baby) enables the attending gynaecologist to teach the residents and house staff a lesson about medical work. The lesson is twofold: firstly, it is about performing a clinical activity. The attending explains what is technically important to check upon (and later, report on) when performing a ventouse delivery. Secondly, and this lesson parallels Bosk's concept of moral mistakes in medical training (Bosk 1979), it is about clinical responsibility. Residents need to know exactly what is going on when they are on duty, whether or not they take part in the action. Being informed about patients for whom one is responsible is a clinical moral obligation. The morning report thus has a disciplining effect on residents by generating a shared view of good clinical habits and, more broadly, what constitutes good care. Yet it is also practical: residents learn how 'things go around here' and what is expected of them.

The role of technology

The screen, beamer and the computer play an important role in the morning report. These technologies enable searches through patient records collectively, or the display and discussion of an X-ray or a cardiotocography (CTG) scan.² However, showing these materials not only provides insight into the clinical case, it also renders residents' work visible and hence evaluable to the audience:

An attending gynaecologist asks the resident on duty to show the CTG of a delivery. The resident nods, clicks through the menu to open the patient record. Within seconds the CTG is visible on the screen. 'So, when did you do the FBS [foetal blood sampling]?' The resident scrolls to the point when the test was performed. Pointing to the CTG, the

attending then asks whether it was essential to do the test. He says it was not, going on to explain, 'We do them [FBSs] too often. If you get a result of 7.30 or higher, it's not necessary. I think it is okay if it happens once, but if you get this result three times out of ten, then it is not'. (Field notes, Hospital L)

The FBS is a common clinical procedure to objectify a baby's health during a delivery. It involves making a tiny scratch on the top of the (unborn) baby's head to determine the acidity of the baby's blood. The test result shows whether the baby is in need, meaning that a caesarean operation is indicated, or whether they can go on with a 'natural' delivery. The FBS is popular with residents as it provides objective insight in an uncertain clinical situation. This is especially true for less experienced residents. Junior doctors usually start their rotation on the delivery ward. When introducing them to the ward, senior residents often advise juniors to do an FBS if they cannot get good insight into the baby's condition: 'You can always do an FBS, then you know whether you've still got time or need to call the supervisor' (Field notes, Hospital L). Yet since the test causes discomfort to mother and child, it should not be done unnecessarily, as the attending gynaecologist quoted above points out.

Moreover, the FBS example underscores the role of technologies. It shows how digital patient records render resident's work visible and assessable to an audience of attendings, residents, house staff and medical students. By comparing the clinical decision ('performing an FBS') to the digital excerpt of the CTG, for example, those present can determine whether the particular resident was right to do the test. Also, it shows if particular residents are doing the test often, when there is no urgency to do so, revealing their clinical uncertainty. Visualising technologies thus make it difficult for residents to cover up their mistakes so as to make a good impression on the attendings to protect or enlarge their clinical autonomy, as has been described in other accounts on case presentation (Anspach 1988, Apker and Eggly 2004).

In short, the use of digital devices such as the computer and beamer not only provides detailed insight into the patient's case but also makes the residents work and performance increasingly transparent and, in principle, contestable. We elaborate further on the role of technologies in the surveillance of medical residents when discussing the topic of filming surgical procedures.

Second visibility: negotiated supervision

Surveillance through the records

From the morning report let us turn to the gynaecology outpatient clinic, where patients come to consult a gynaecologist without being admitted to hospital. The main question we deal with in this section is how attending physicians keep track of residents' performance when they are not directly visible to them and how residents seek to create this autonomous space while at the same time trying to present themselves as reliable doctors.

In both Hospital K and Hospital L the outpatient clinics are situated in a separate part of the building. The outpatient clinic contains a central desk where patients check in and physicians meet their patients before taking them to one of the small consulting rooms. Behind the central desk a whiteboard displays who is on service, as well as the name and beeper number of the supervising attending physician. In both hospitals

patients are assigned to a resident's service on the basis of prior clinical diagnoses or articulated health problems. Although the attending physician is usually nearby (seeing their own patients or doing administrative work), residents work mainly autonomously. They see their own patients and consult an attending only when encountering unfamiliar clinical situations or problems.

This does not mean, however, that residents are not checked upon. Their work at the outpatient clinic becomes visible – and thus controllable – to attending physicians through activities that may be described as 'surveillance through the records'. Attending physicians regularly read through patients' records to evaluate what has been done and whether anything important has been missed. This may be done intentionally to evaluate a resident's work or (most commonly) when seeing the patient concerned at another time. Residents are aware of this control mechanism, as one of them pointed out. 'If I do something unusual I always explain why in the patient's record; for example, that the patient wanted to do it this way' (Resident, Hospital L).

Surveillance through the records is another example of disciplining residents. Similar to the morning report reprimand discussed above, the knowledge that patients' records may be controlled disciplines residents into working in accordance with agreed local practices or clinical guidelines (Foucault 1977). Moreover, this disciplining effect enables the supervising attending to stay at some distance from the serving resident.

Tinkering with supervision

In the interviews (and during observations) residents pointed out that they usually ask for supervision based on what they need and when they think they are expected to do so. When starting work in a new department, residents usually consult their supervisors more often than later on. They say they do this because they lack clinical knowledge (especially when it comes to unwritten local habits) but also because they think that consulting the supervising attending, and thus making yourself visible, is appropriate when you are a novice. Later, when they have gained experience and know 'how things go here' they act more autonomously.

Moreover, residents stress that the degree of supervision mainly depends on the personal preferences of a supervisor: 'Some attendings want to be more in control than others, you just know that. So you call them more often' (Resident, Hospital K). Yet other attendings seem to leave the work largely to the resident. During our fieldwork we often encountered residents who believed that they had to look after patients by themselves as the attendings were busy elsewhere. Yet, attending physicians emphasise that they are fully aware of what is going on and say that their supervising activities are consciously planned:

You work so closely together, you know how they [residents] work and whether you can rely on them to contact you when needed ... The most dangerous residents are the ones who just go ahead and don't realise when they need to call you for a decision. If someone like that serves on my shift and I'm at home, I'm inclined to call in more often to check if everything is okay. (Attending gynaecologist, Hospital K)

The amounts of autonomy residents receive depend on their assessed competence. As their skills and knowledge increase during the residency they are allowed to carry out more procedures independently. Yet, as the attending above points out, it is not only a question of clinical competence but also one of reliability. Attending physicians bear the legal responsibility for a patient's health and thus need to know whether they can rely upon a resident, meaning that the particular resident will call for assistance when needed and will

obey the orders of their superiors. 'Docility' is often mentioned as an important criterion for trust – proving opportunities to the resident to act autonomously. However, trusting a resident is also based upon their not calling too often:

Paula, an attending gynaecologist, attends the morning round on the maternity ward when her beeper goes off again. She exclaims. 'Will it go on like this the whole day!' She grabs the phone and listens to who is calling her this time. 'Well, this is your fourth call this morning, but no matter, all your questions have been relevant'. (Observation, Hospital L)

Residents face an ambiguous task. On the one hand they are expected to make themselves visible and consult their supervisor, thus showing their docility. On the other hand they are expected to work independently and 'not call too often' to show their clinical autonomy and present themselves as confident physicians. Residents tinker with supervision and patient care. They constantly try to figure out what is expected of them, and try to live up to the (assumed) expectations, while also seeking to provide good medical care to patients in their charge.

In an interview, an attending gynaecologist described supervision as a continuous play between residents and the attending in which residents try to show off their clinical knowledge and skills to earn more space to practise. Moreover, as residents grow in seniority an element of choice is added to the play:

'One gynaecologist is better than another', Suzy [a resident] says. 'Some questions you just don't want to ask the appointed supervisor but you would want to put them to another gynaecologist'. She explains that it is about having confidence in someone's knowledge and skills. I (IW) ask Suzy what she does when she is appointed to a supervisor she does not trust. Suzy answers that she sometimes tries to slip into another gynaecologist's office. 'Or, if there is no rush, I ask the patient to make a follow-up appointment. But if it's an emergency, you can't escape your supervisor'. (Resident, Hospital K)

Residents also make assessments of those who supervise them. During a residency they increasingly develop their own clinical preferences and routines and try to act accordingly. They may feel that the scheduled supervisor is not the most suitable physician to turn to because they think the particular clinician is less experienced in a specific problem or simply because the resident prefers the more aggressive approach of one attending or the more careful approach of another. Although bypassing your supervisor is not allowed, as one physician stressed when we discussed this topic, everyone knows that it is done and more or less seems to accept it.

Here our analysis resonates with earlier accounts on medical education, showing how junior doctors seek to create their own learning opportunities (Miller 1970) and aim to enlarge their space to act autonomously while their superiors elaborate a set of countermeasures to keep control (Bosk 1979). Yet, we want to add that this interaction is a negotiated order. During a residency residents gradually seek to obtain more freedom, and, by doing so, demonstrate their readiness to taking on a more senior role with accompanying tasks and responsibilities. Attendings respond to this by providing them with more space to act. Although this may be done very implicitly (for instance, by not punishing the bypassing of supervisors) it points to an important transformation of the resident into a more mature clinician.

Third visibility: playing with invisibility

The importance of independent practice

Residents need space to practise medicine to be trained as independent physicians (Smith *et al.* 2003). Whereas sufficient space is negotiable at some locations, at others the room to practise is far more limited due to clinical risk and patient vulnerability, as in operating theatres. In these cases, other practices need to be put in place to create learning space. In this section we turn to the operating room (OR) and highlight the practice of enacting invisibility to provide the space for residents to assume the clinical responsibilities of an attending physician.

It depends on the situation, and luck as well, that they come across a complication when I'm not there ... During my training, I was really proud when I handled things well on my own. You know, in obstetrics things can get acute, and if you solve a problem then everyone says you've done a good job. That gives you confidence. I try to give them [residents] the opportunity to have such experiences. (Attending gynaecologist, Hospital K)

The gynaecologist quoted here underscores the importance of encountering clinical problems to experience clinical responsibility. If things go well, confidence increases for both resident (self-confidence) and the attending physician (confidence in the resident's capabilities).

Susan (senior resident) and Matt (junior resident) are on duty in the OR. Nick, the attending gynaecologist, asks if he should supervise the next caesarean operation or does Susan want to do it. Susan agrees to do it. Matt smiles at me. 'See how it goes around here, we just send our supervisors away!'

Half an hour later, while Matt and Susan are in the middle of the operation, Nick walks in to check the printed operation schedule in the corner of the OR. In passing he looks over Matt's shoulder to see how things are going and leaves without a word. When the operation is finished Matt and Susan join Nick in another room to prepare for the next surgery. Nick is sitting at a desk and announces that another caesarean section is coming up. Susan and Matt return to the OR.

Nick arrives a few minutes later wheeling in the patient and her husband. He warns Susan and Matt to be careful. The woman has had contractions for the past 9 hours and her uterine wall might be weakened. Susan nods; she has just explained this to Matt. Again Nick leaves, returning only when Susan and Matt are closing the wound (following the birth of a healthy baby). 'How far along are you?' Nick asks. 'Just finishing', Susan answers. Nick disagrees. 'You are only starting to close the belly. And don't forget the operation schedule'. Now he stays in the OR, watching as Susan and Nick finish the operation. (Field notes, Hospital L)

In this case the attending is not really invisible but regularly pops in. With his leaving the OR, both residents experience something akin to clinical autonomy. Nick provides space for Susan to practise the role of supervising attending, although he still bears the final responsibility for the patients on the operation table and for the operation schedule. To accomplish this responsibility Nick employs several kinds of dispersed surveillance, such as

regularly entering the room to check on the residents and patients and speeding up the operation programme by bringing in patients or by just being around.

Pretending invisibility

Another practice we encountered is ‘playing the invisibility game’:

We walk from the delivery room to the nursing post. Ruben, a gynaecology resident, tells me about an important lesson he learnt in a surgery rotation. He had to do a caesarean together with his supervisor. The attending asked who Ruben wanted him to be: the collaborating chief, the assisting chief, the collaborating medical student or the hindering medical student? The attending often played this ‘invisibility game’.

Ruben chose the hindering medical student. During the operation the patient had a fluxus (non-stop bleeding after delivery) which Ruben did not manage to stop. Ruben tells me [IW] how the patient was losing more and more blood and all the while the supervisor did nothing. This made Ruben nervous. Finally he asked the attending to take over, which the attending immediately did. Ruben says he thinks the attending went too far [at pretending to be invisible] but, at the same time, he was also annoyed with himself that he had not managed to fix the problem. (Field notes, Hospital K)

In the story of Ruben the attending gynaecologist plays a game to teach the lesson of clinical responsibility. This lesson is twofold. Firstly, by pretending invisibility (placed in a lower position relative to the resident) a supervisor creates space for the resident to experience clinical responsibility for the patient on the operation table. This allows residents to demonstrate their ability to manage clinical issues on their own, also when complications show up. Secondly, it is about being accountable to a vulnerable patient, both from the perspective of the residents and the attending. The attending does not really leave the room but is present all the time, ready to intervene (for the sake of the patient) when this is urgently needed. However, intervening will probably hamper the self-confidence of the resident. Therefore, the attending will intervene only when there is no other way. By waiting, the attending also challenges the resident: what is the appropriate moment to give up?

And here comes the ambiguity again; a resident should not give up too early (as this shows uncertainty and dependency) but not too late either (revealing disrespect for the patient’s wellbeing). In other words, the test is to choose the right moment. Although these different accountabilities do not fit readily together and may sometimes even be in opposition, playing with invisibility seems to be a creative tinkering practice that holds together flexibly both the goals of good patient care and of good resident learning.

Fourth visibility: filming surgical procedures

The mediating role of technologies

Technological innovations have changed clinical practice considerably in the last few decades (Clarke *et al.* 2003). What role do medical technologies play in the surveillance of residents?

The gynaecology operating room has recently been rebuilt to make it suitable for endoscopic surgery. Three big flat screens hang above the operating table, displaying the inside of the patient’s body and the instruments the surgeon is manipulating during an

endoscopic procedure. A small camera built into the operating lamp records the entire operation. Now medical students (and researchers!) should no longer need to stand on footstools, peering over clinicians' shoulders, hoping to see what is happening on the operation table, moving cautiously (or not daring to move) to prevent contamination of the sterile operation field. (Field notes, Hospital L)

In Hospital L the new filming capacity is closely linked to the introduction and rise of endoscopic surgery. This type of surgery typically involves laparoscopic devices that are inserted through the skin into a body cavity or anatomical opening, with operating clinicians looking at a screen instead of the patient's body while performing the procedure.

An anaesthetised patient suffering from a myoma that needs to be removed lies on the operating table, with her legs supported by padded leg rests. Liz (senior resident) sits on a stool in front of the patient with Mark (attending gynaecologist) standing right behind her. Liz inserts an endoscope, keeping her gaze on the screen behind the patient. She moves the scope around and flushes liquid into the womb (to generate internal pressure). She starts to remove the myoma, slicing off small sections while moving the endoscope backwards and forwards. The procedure is complex and physically burdening as Liz constantly needs to alter the quantity of liquid while taking care to cut into the myoma and avoid perforating the womb.

Focusing on the screen, Marks says Liz should cut off small pieces from left to right. After 20 minutes Liz proposes stopping even though the removal is incomplete since the patient has already been advised to have the procedure done in two operations. Yet Mark disagrees and says they can still do some more cutting now. They change positions. Mark inserts the endoscope and works on for another 20 minutes. Liz says she probably could have done more, but she needs to become more skilled in using the instrument. Mark does not answer immediately but asks whether the procedure is taped: 'This is an instructive case'.

(Field notes, Hospital L)

The technologies making up endoscopic surgery (the scope, the camera, the screen) coordinate the care and teaching aspects of the operation described above. By checking the screen as well as the resident's movements the supervising physician can see and respond to what is being done inside and outside the patient's body. Moreover, the use of the scope enlarges the skills of the residents, as each movement is blown up on the screen. Furthermore, the videotaping of the procedure enables the resident and supervising attending to watch the surgical procedure again, giving them more time to spend on evaluating the resident's skills.

Making performance transportable

Videotaping enables others to watch the procedure as well:

Susan, one of the junior residents, explains that the recordings are used for group teaching in a particular surgical procedure or disease. 'Some residents also save their recordings in electronic portfolios so they can demonstrate their surgical skills when applying for a gynaecologist post in another clinic'. (Resident, Hospital L)

Recording technologies reconstitute the training of junior doctors in various ways. Firstly, videotaping allows individual performances to be transportable and hence, visible to and

assessable by other physicians, residents and medical students, and even their potential colleagues. Learning is thus no longer restricted to a closed and situated activity from which others can learn only when the people involved are willing to share their experiences. Secondly, residents' competencies can be evaluated more precisely by focusing on specific aspects since the filming technique enables viewers to 'slow things down' (Mesman 2011) and discuss specific elements. Although we did not specifically study this, it could be the case that visualising technologies shift attention from the construction of the medical identity ('judging a resident as a future physician') to technical skills, as these are enlarged and increasingly focused upon through the new technologies.

Thirdly, and this is a relatively new phenomenon, the recording technique renders the surgical and teaching qualities of the attending physician visible and hence evaluable to a broader public. Interestingly, this may mean that in the (near) future attending physicians have to account more for their skills and training methods – and may become more careful and remote in enacting educational strategies like the enactment of invisibility.

Discussion

Current reforms in postgraduate medical training point to an increasing emphasis on the measurable visibility of medical residents. The reform incorporates structured models for the supervision and assessment of medical residents. Following new requirements, residents are allowed to perform clinical procedures on real patients only when they have proved they are capable of doing so. Yet this article has shown that in everyday clinical work multiple practices of residents' visibility coexist. We have described four of these: staging residents, negotiating supervision, playing the invisibility game and filming surgical procedures. These visibilities are flexibly brought together in daily clinical work to serve the two central goals of good patient care and good education.

The article has shown how both attending physicians and residents tinker with visibility to serve both of these aims. The staging of residents during the morning report, for instance, helps to discipline residents in their work, allowing them more space to practise independently at other moments or locations (for example, in the outpatient clinic). Moreover, the enactment of invisibility games in the operating theatre provides residents with the experience of clinical autonomy but also enables attendings to test residents' technical skills, as well as their reliability – which is important information for an attending when on call (do the residents ask for the attending's assistance when this is appropriate or will they muddle through at the risk of a patient's health?).

However, the article has also demonstrated that the balance between these visibilities is currently shifting towards greater visibility. The incorporation of technological devices in clinical work plays a crucial role in this. The use of the beamer and the laptop displaying patients' clinical information (such as laboratory results and CTG scans) to the audience during the morning report, for example, render residents' work and performance increasingly visible and contestable. Moreover, the teaching capacities and habits of attendings are increasingly made visible by the use of new technologies. The introduction and rise of endoscopic surgery, for instance, allows operations to be videotaped and to be transported. The videotaping technique thus transports attending–resident interaction away from the intimate zone of the OR, allowing others to watch and evaluate their activities as well. We suggest that this shift to visible work may make attending physicians (and residents) more reluctant to enact strategic training activities like the game of playing invisibility.

Moreover, this article has contributed to the traditional medical sociological debate on medical education by shifting the focus from medical education as a social institution for junior socialisation to the practices of medical residency training itself. A practice-oriented study not only focuses on the social implications of medicine but highlights the practices and contingencies of everyday clinical work and the (sometimes conflicting) values and purposes that emerge, as well as the way in which medical practitioners deal with these to serve different aims. Moreover, such approach helps to get a better understanding of how current reforms in medical education challenge clinicians' educational activities.

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Acknowledgements

The authors would like to thank all gynaecologists and gynaecology residents whom we were allowed to observe and 'act with' during the research. Special thanks to Dick Bekedam for making part of this study possible. Earlier drafts of this article were presented at The Netherlands Graduate Research School of Science, Technology and Modern Culture Dissertation Day (April 2010), the seminar 'Re-imagining supervision' at Lancaster University (Mesman 2011) and a healthcare governance seminar at the Institute of Health Policy and Management. We would like to thank the audiences for their comments. Special thanks to Katharina Paul, Jessica Mesman and Jeannette Pols for their critical reading and helpful comments. We also thank the anonymous reviewers of the manuscript who helped us to improve the article.

Notes

- 1 Number of pulls during a ventouse delivery.
- 2 A technique for recording foetal heartbeat and uterine contractions during pregnancy and delivery.

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