

Chapter 8

Establishing Patient Safety Nets: How Actor-Network-Theory Can Inform Clinical Education Research

Alan Bleakley

In V. Cook, C. Daly, M. Newman (Eds.), *Work-based learning in Medical Education*. Oxford: Radcliffe Medical, 2011.

Prologue

Imagine: you are sitting in the bath reading this chapter. Normally, you look forward to this relaxing moment, this mini-holiday, an opportunity for time out in a hectic day when you can also fully concentrate without distraction. However, it is late, you are over-tired, the bath is neither hot nor full enough, you cannot settle into a comfortable position to read, and you are now irritated that you have not got the hang of the paragraph you have just read. Nevertheless, from the late evening's ruins a nascent idea dawns, and you want to get it down before it evaporates - but you do not have a notebook and pen handy! You go back to the paragraph and read it again, but find yourself drifting and nodding with tiredness so that you nearly let the book fall out of your hands and come back to reality with a jolt, the edge of your expensive and once pristine book now stained with bathwater. The book suddenly feels very heavy and awkward to hold.

Your idea, in the absence of notebook and pen, has already dissolved along with your patience, and now your book is close to following the same course as your concentration is shot. This lost learning scenario is ripe for analysis through Actor-Network-Theory. There was no Archimedes' 'Eureka!' moment. Rather, the glimmer of an idea dissolved where a network failed to form. The initiation of a network offers a potential transformation, but you are dead in the water. Your body was tired and your concentration poor and this was aggravated by having to hold up what felt like an increasingly heavy book. There was no paper or pen at hand.

And what is the point of this depressing little story? First, context matters where learning is concerned. Second, context centrally involves objects - artefacts such as the contours of your bath, the temperature of the bathwater, and the shape and weight of the book you are reading. These are, in Actor-Network-Theory, all significant 'actors' in the drama of learning. I am introducing them early in this chapter so that their significance will not be forgotten. On another day, the context may not have bitten back, but rather acted to promote learning as a network was formed in a stream of connections between hot bathwater, engaging book, relaxed body and buzzing brain.

Part I: The Architecture of Actor-Network-Theory

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Part I: The Architecture of Actor-Network-Theory

Introduction

1

Actor-Network-Theory (hereafter 'ANT') resists reduction to a concise description. Bruno Latour's (2007) so-called 'Introduction' to ANT is a closely argued text of 300 pages. However, Akrich, Callon and Latour (Akrich *et al*, 2002, p.205) offer a concise account of ANT as a research method where they say that 'Innovation is the art of interesting an increasing number of allies who will make you stronger and stronger'. Where ANT-inspired clinical education research makes claims for promoting innovation, knowledge production and transformation of practices, this can be summarised as *the formation, and subsequent widening and strengthening, of a learning network*. What, however, is a 'network'? And who or what are the 'allies' that must be increased or enrolled to make a network stronger? We have already seen that such 'allies' can include the temperature of your bathwater.

ANT offers an apology

ANT has acquired a potentially unhelpful mystique as a left-field approach, offering 'a body of unsettling and rather audacious work' that operates 'around the edges of educational research' and sets out to 'rupture central assumptions' within educational theory (Fenwick and Edwards, 2010, p.viii). The rhetoric is clear and the supporting metaphors powerful: 'unsettling' and 'audacious', 'edges' and 'ruptures'. We expect to find ourselves at our limits, the ground taken from under our feet.

We would feel that we were on reasonably safe ground if someone explained that Actor-Network-Theory involved 'actors', 'networks' and 'theory', and, as the hyphens suggest, that these are linked in some way. It was therefore disconcerting when Latour (1999a) - the single most influential voice in ANT - famously announced that there are four things wrong with ANT - 'actor', 'network', 'theory' and the hyphen! Latour's tongue was not in his cheek - rather, he feared that ANT would be reduced to a formulaic approach and misinterpreted in the process, the acronym coming to act as an aphorism or an old saw - a pithy statement supposedly embodying wisdom, but paradoxically disemboweling wisdom.

In a later overview of ANT, however, Latour (2007) offers an apology for his earlier rather grumpy decision, recognizing that where use of the acronym is widespread, he may as well turn it into a virtue. 'ANT', suggests Latour (2007, p.9), is 'so awkward, so confusing, so meaningless that it deserves to be kept', on the basis that it is a good descriptor for a 'myopic, workaholic, trail-sniffing, and collective traveler'. For good measure, Latour added another hyphen (from the convention of 'Actor-Network Theory' to 'Actor-Network-Theory') to further emphasise linkage between the components. In this chapter, I follow Latour's sentiment and prefer to keep my own nose close to the ground, mainly for the rich research detail that this posture affords. I also retain Latour's usage of the double hyphen, to stress that Actor-Network-Theory is a linked whole, a worldview and way of being, exceeding the limitations of an applied technique. Later in the chapter, however, I will point out some key objections to ANT, signifying limitations to its use within clinical education and its research arm.

The second hyphen in Actor-Network-Theory also serves to repair the

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historical separation of theory and practice. ANT can be taken as an example of what Schatzki *et al* (2001) describe as 'the practice turn in contemporary theory', where theory is *performed*. Mind and knowledge are constituted and social life is organized and transformed through action and interaction, or activity. ANT is not an analytical apparatus but 'more like a sensibility, an interruption or intervention, a way to sense and draw nearer to a phenomenon' (Fenwick and Edwards, 2010, p.ix). Medicine is often characterized as an Aristotelian *phronesis* - a 'practical wisdom' (Bleakley *et al* 2011) - and medical education and its research arm are consequently infected with such pragmatism. With its emphasis upon educating sensibility rather than analytical reasoning, ANT would seem to afford a readymade pragmatic research approach for medical education, and it is puzzling that its uptake has not been more vigorous within this field of inquiry.

What are actors and networks and how do they link?

In ANT, 'actor' refers to any phenomenon - human, material object (artefact), or concept (the imaginary, ideas). Phenomena in self-presentation are irreducible to any other expression - such as higher order categories - so ANT researchers resist drawing, first, on grand theoretical frames (such as Marxism or Psychoanalysis) that shape or pre-judge data collection; and, second, on the use of themes in data analysis, typically employed to order otherwise disorderly data. Fenwick and Edwards (2010, p.146) suggest that 'What ANT brings to its ethnographic methodological approaches is a sensibility for mess and it attempts to suspend a priori assumptions'. The ground-rule is to stick with (and to) the mess in closely following the actors.

Because 'actor' is associated with persons in the English language, ANT also uses 'actant'. Throughout this chapter, I will refer to actors. Actors interact in meaningful and non-meaningful ways. For ANT, a meaningful interaction is where one actor has an effect upon another (for example, a mobile 'phone ringtone captures the attention of somebody who is daydreaming) to realise a *transformation*, a change of state, an innovation, or a production of knowledge. This linkage is dynamic, moving through time. ANT calls this a 'translation', because the actors involved are now no longer the same as before.

The actors are mediators of this process of translation, or are affected by the movement of translation. For example, the person answers the mobile 'phone to discover that her best friend has just died in a car accident, at which point a potential, and emotionally painful, network is initiated. If the actors are linked but no translation occurs, then a network fails to form. In the example above, the person may have missed the call. Where actors interact without transformation (such as automatically deleting spam mail), they act as 'intermediaries' rather than 'mediators'. Educational activity for ANT is a mediated network effect - a series of mutual translations between actors leading to transformation such as adoption of a new work practice. ANT is a way of accounting for how persons, material objects and ideas become linked as fluid networks through tracing effects generated by the 'work' that is the assembling and strengthening of the network. ANT's concerns are inevitably 'work-based'.

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Symmetry between humans, material objects and immaterial languages

ANT's key philosophical contribution is the radical notion of *generalised symmetry* - where all phenomena, whether human, material or semiotic, are afforded equal ontological status within a network effect (Harman, 2009). This notion separates ANT from other approaches to clinical education, where both objects and concepts are often given secondary ontological status to persons; or only the talk and activities of persons are recorded, as if the world of material objects that these persons interact with is of little consequence. Where the human is figured as having equal ontological status with MRI scanners, libraries, cutlery, and ocean currents, ANT is often referred to as a 'posthuman' outlook (Schatzki *et al*, 2001).

This radical idea of generalized symmetry has important consequences for clinical education. For example, in studies of practices of 'care', Annemarie Mol (Mol, 2008; Mol *et al*, 2010, pp.7-26) challenges the habitual opposition of 'cold' technologies and 'warm' humans, to demonstrate that health 'care' is usually a product of interaction between the warmth of technologies (for example giving oxygen) and the warmth of persons (the nurse adjusting the oxygen mask). To this we can add the potential warmth of the symbol, such as the reassurance signified by the nurse's uniform.

Shifting focus away from just persons (as actors) affords the opportunity to appreciate both the complex and multiple appearances and translations of objects, as they interact with persons through codes and languages, as an ontological effect. The notion of multiple ontologies - states of being - is illustrated by the instability of complex objects of research across contexts. In studying the management of alcoholic liver disease, Law and Singleton (2005) report that keeping this object (the 'illness') to a single meaning is impossible as it comes in and out of focus according to the context in which it appears. Rather than seeing this as a methodological failure, the authors suggest that research methods are ill equipped to study messy objects. Mol (1999) offers a multiple ontological reading of anaemia, where the condition is 'performed' in at least three different ways: clinically (through medical diagnosis and treatment), pathophysiologically (through laboratory routines), and statistically (through epidemiological analysis).

In a later extensive study, Mol (2002) tracks the diagnosis and treatment of atherosclerosis by a variety of practitioners in a Dutch University hospital. Her ethnography reveals that what is described to patients in information leaflets as 'the gradual obstruction of the arteries' is conceived differently by doctors, vascular surgeons and nurses, and is further modulated by differing professional and lay languages, and through varieties of imaging artefacts such as microscopes, X-rays and ultrasound. Mol problematises the study of the illness by, for example, taking the perspective not only of the human, but also of the blood as this is configured in contexts such as the haematology laboratory. Here, 'atherosclerosis is enacted as deviance that involves the blood clotting mechanism', and where the patient's blood now flows across a variety of investigative sites, its 'anatomical location is completely lost' (Mol, 2002, p.109).

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ANT is drawn to suspect and problematic research contexts, from failures and fault lines to 'black boxes' - habitual or routine activities that disguise complexities such as multiple ontologies. ANT wrestles with the contents of the black box, typically 'tokens' or 'quasi-objects' that are reifications. Examples in clinical education research include terms such as 'teams' (Engeström, 2008) and clinical 'guidelines' (Gabbay and LeMay, 2011), used as if they were transparent and had commonly agreed meanings but are actually problematic, concealing more than they reveal.

Without entertaining the radically democratic notion of generalised symmetry, the practices of ANT will never be properly understood. Indeed, as the main philosophical position, generalised symmetry can be taken as the 'theory', conceptual architecture, or organising framework, shaping, informing and developing the practices of ANT, bringing actors into significant relationships as network effects. Generalised symmetry can be equated with the hyphens in actor-network-theory, which act not only as links to turn the individual components into a whole, but also as mediators or translators (actors form networks and afford theory); and, finally, as levelers, or signifiers of democracy, where actors (persons, artefacts and languages), the networks they form, and the theory they produce to explain and further strengthen such networks, *potentially* have equal power or potency.

What are networks?

As one actor acts upon or mobilises another as a work of translation (so that the actors are both now transformed, as mediators) a network is initiated. Further translations expand the network through alliances. However, 'network' is neither a tangible structure nor a diagrammatic representation. It is a metaphor through which we give meaning to the series of translations that occur as actors work transformatively on other actors.

Networks involve things but are not things themselves, or resist reification. As unpredictable processes, networks cannot be studied like blood samples under the microscope, yet everything *realised by the network effect* can be treated as concrete and sensible - as things that happen, present themselves to the senses or mind, or can be measured by instrumentation, including floating concepts and intuitive leaps, as well as cold steel and congealing blood. As a dynamic net effect of a series of actor translations and transformations that the researcher attempts to partially re-trace, a network is then a net *working* whose echo we closely observe through fieldwork and re-member through research reports.

'Network' as ANT understands it, is unfortunately overshadowed by the black box of the 'Internet', that does not usually act as a dynamic network. When I visit a website for information, buy from an online catalogue or send an email, neither myself nor the website is necessarily transformed in the process. I am usually an intermediary in a predictable consumer exchange and reproduction of knowledge and values, rather than a mediator effecting change, innovation or knowledge and values production. What has occurred is transaction rather than

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translation. For ANT, a network goes beyond transaction, as a traceable 'set of relations defined as so many translations' (Latour, 2007, p.129).

Latour (2007) now prefers to call the problematic tracing of the translations across phenomena a *work-net* rather than a network. The emphasis turns from a passive network waiting to be used (a telephone, electricity or sewage system; pipelines; the Internet as a web of computers and exchange sites) to an active web permanently in construction, requiring 'work' both to maintain its momentum (search) and to record its traces (re-search). Latour (2007, p.132) then makes a distinction between the work-net as 'active mediator' and the network as a 'stabilized set of intermediaries'. In ANT research, one must work on and at the fluid net to apprehend the 'trace left behind by some moving agent'. ANT research, as applied to clinical education, is necessarily concerned with 'work'-based learning, where labour can be material (re-locating a dislocated shoulder) or immaterial (puzzling out a dislocated sentence uttered by a confused patient).

If a formula for ANT research work were to be proposed, it would be to dramatically increase the relative proportion of mediators to intermediaries, going against the grain of the usual state of affairs where intermediaries will far outweigh mediators. Another way of putting this is that life is mainly a series of *events* (equivalent to 'intermediaries') that fail to promote innovation. Where events turn to *experiences* (equivalent to 'mediators') something deep happens in the way of learning. Often, a mediator is troublesome or irksome, already getting under the skin, to turn an event into an experience. Here, ANT reformulates Harold Garfinkel's (1967) ethnomethodology, that explicitly sets out to problematise the social contexts it researches. Ethnomethodologists deliberately breach social rules and conventions through planned interventions, such as cheating at board games, or acting as a stranger in one's own home, to record reactions.

Rather than intervening in terms of the researcher breaching a convention (which may also have ethical implications), ANT researchers seize upon social phenomena that are already inverted, divisive, or calamitous. For example, Latour (1996) studied the conception, but ultimate failure, of a project in Paris for a rapid public transport system - Aramis - showing how a potential network could be initiated but not maintained, so that the project was abandoned as sterile. The frustration of possible translations across actors may cause a potential network to falter. In Aramis' case this was an economic-technological-political hitch - complicated engineered couplings proved too expensive to produce, and there was a parallel failure of coupling in lack of political support for the project despite a public will.

Feasibility

In such a re-tracing of the work-net, and having decided that its focus will be inclusive, how does an ANT approach make such a study manageable? Surely, any social phenomenon under investigation is always too complex and its manifestations too numerous to offer any kind of comprehensive account? ANT does not seek a comprehensive account but a close description of a slice of

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activity, getting so close to the ground that an overview is impossible. ANT research prides itself on its radical localism, suggesting that 'generalisability' in research is a convenient fiction, where all research projects are necessarily local and situated. Will an ANT study then either miss the point completely by its self-inflicted myopia, or will it get lost, indeed suffocate, in excessive detail?

Fortunately, ANT has addressed such questions of scale. To achieve focus, as mentioned earlier, ANT places two primary restrictions upon the study of the initiation, development and future of a work-net/network or a series of interacting networks. First, ANT research focuses upon the work of actors as mediators rather than intermediaries. It is interested in transformations promising innovation, rather than the maintenance of the status quo. Second, ANT chooses to research what is already showing symptom, signs of wear and tear, instability, or a fault line. ANT feeds off controversies, even fiascos. ANT is then selective of the slice of activity for study, but this may be the only explicit marker you will find of its research 'design'.

Where ANT research focuses upon the apparently unremarkable or routine, such as Mol's interest in anaemia, it is because a black box has been opened to expose complexities and contradictions. ANT is sceptical of linear, problem-solving approaches and the hunt for final solutions that together constitute a genre of research typified by the hero's journey - where monsters, riddles and labyrinths are rendered unproblematic and the Grail is revealed or the Minotaur slain.

Part II: Let's go to work! Actor-network-theory as a research methodology

Introduction

In this section, I describe how an ongoing collaborative inquiry focused upon improving teamwork across operating theatres in one UK teaching hospital has been informed and shaped by an ANT sensibility (Bleakley *et al*, 2004; Hobbs and Bleakley, 2005; Hobbs, 2005; Bleakley *et al*, 2006; Bleakley, 2006a; Bleakley, 2006b; Allard *et al*, 2007; Henderson *et al*, 2007). The inquiry - the Theatre Team Resource Management (hereafter 'TTRM') project - was conceived in 2001-2002 and initiated in December 2002 to progressively assemble a patient safety work-net/network through strategic alliances focused on a common object: incremental sophistication of communication between team members within the operating theatre (hereafter 'OT') and across peri-operative environments.

TTRM has been gathered as an open-access website (www.ttrm.co.uk). The website will be updated to include interactive elements, continuing to strengthen the network through a technological ally; and has been adopted by the hospital trust concerned as a platform for developing a rolling in-house staff development programme. This offers an opportunity to develop stronger strategic alliances, particular with trust management, in supporting practice development and innovation. However, strengthening the work-net/network has

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opportunity to develop stronger strategic alliances, particular with trust management, in supporting practice development and innovation. However, strengthening the work-net/network has

inevitably invited resistances threatening ruptures, detailed below along with successful alliances.

Research projects tend to be reported as if they were discrete, a-historical events. A project of course has a life cycle. There are initial grant applications to be made (including unsuccessful bids, where potential networks remain unrealised), grant obligations to be fulfilled, steering committees to be set up and dissolved, interim and final reports to be submitted, researchers to be appointed to short-term posts, PhD theses to be completed and examined, journal papers, conference presentations, and so forth. All projects are necessarily punctuations in a bigger narrative.

Further, as practice changes are adopted and absorbed by the clinical community involved, they become hybrids, locally adapted and mutable. For example, while we modeled, early in the study, an ideal pre-list team-building briefing, at least five local hybrids evolved including nurses leading the brief in the Day Case Unit and one surgeon developing a 'horizon' brief a week before lists, scanning potential issues. These hybrids have now been eclipsed by the introduction of a mandatory briefing protocol - the World Health Organisation's Surgical Safety Checklist (Gawande, 2009), which itself is destined to be locally adapted and sometimes resisted.

The TTRM project tracks the cumulative impact of a number of collaborative changes in activity on the ethos of the OT as a basis to improving patient safety. The 'interruption' to habitual work practices promises a culture change in communication style, from autocratic and hierarchical patterns to democratic, participatory and dialogical patterns (Bleakley *et al*, 2011). While ANT's approach is less interventionist and more about interruption, it readily aligns with the values of collaborative inquiry, to research *with* and not *on* practitioners. Practices researched in this context include collaborative briefing and debriefing, before and after a surgical list.

Problematisation

ANT is drawn to conundrums, including practices that are historically crystallized, lacking innovation. Cultural-Historical Activity Theory (CHAT) (see Clare Morris' chapter 2) is a close companion of ANT. CHAT's major proponent, Yrjö Engeström (1999), describes how in activity research:

'A new theoretical idea or concept is initially produced in the form of an abstract, simple explanatory relationship, a "germ cell". This initial abstraction is step-by-step enriched and transformed into a concrete system of multiple, constantly developing manifestations. In an expansive learning cycle, the initial simple idea is transformed into a complex object, into a new form of practice. At the same time, the cycle produces new theoretical concepts' (p.5).

An example of this process in action can be drawn from the TTRM project. The core research team argued that the assumption amongst surgical teams that only the lead surgeon could initiate a team briefing should be challenged on the basis that briefing was centrally about establishing team morale, and mutual situational awareness (where each member of the team comes to understand

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other members' roles in a mini-rehearsal of the day's work ahead). This is Engeström's 'germ cell'. As this abstraction was turned into practice, where, for example, nurses led briefings, this challenged assumptions about autocracy as the default political position for the surgical team, to be replaced by participative democracy. As this was further tested, for example with nurses progressively leading briefing as the norm in day case surgery, so objections to such a model from surgeons were challenged and dismissed.

The initial idea is now established through expansion of the learning cycle as anaesthetists and surgeons begin to see the value of the nurse leading a briefing, where the nurse is already the centre for information exchange and the first stop for patients in the Day Case Unit's extended team. As the practice is developed, so nurses reformulate identities as team leaders, transforming the initial idea into a complex practice that has the immediate effect of collectively raising morale amongst nurses, but also implies the need for parallel, tailored professional development. Theoretical gain emerges from the process of expansion of the activity of briefing, where surgical teams can now be seen to be experimenting with new forms of work-based democracy, and the identity construction of the nurse is positively and radically reformulated.

The activity cycles of expansive learning in CHAT and the strengthening of networks in ANT act as neither sponges nor cookers - respectively cleaning up and processing raw data. ANT likes its data rare, challenging research studies that draw on a variety of tactics and rhetorical devices to disguise the messy in research that is, after all, a slice of messy life. By 'rare' I mean data that are not overly analysed or processed ('cooked' would be an alternative here, but not in the sense of manipulating data unethically, to purposefully mislead). A model for this kind of research account is Mol's account of the relationships between people living with diabetes and those professionals who care for them (Mol, 2008). Mol derives an argument that critically addresses the logic of 'patient choice' by showing how such logic, in the cases of the diabetics she follows, often frustrates rather than facilitates good care practices. The argument is derived elegantly from the fieldwork - that exposes multiple ontologies - without the mediation of an overwrought epistemology, or predisposing framework, that may provide a fog to obscure the objects of the research.

Latour (2007, pp.146-7) notes that approaching research analytically is premature: 'we are in the business of descriptions. ... we go, we listen, we learn ... it's called inquiries. Good inquiries always produce a lot of new descriptions', where 'if your description needs an explanation, it's not a good description'. Conventional research texts often deliberately bracket out context, such as the political, historical, and organizational. ANT texts lean towards thick descriptions and baroque detail.

The design of the TTRM project has its origin in an ethical dilemma. While sometimes high-risk, surgery has an unacceptably high rate of error, and this is grounded not in technical mistakes but in poor communication. An estimated 70% of medical errors result from miscommunications within and between teams and 50% of this is thought to be remediable through improving communication (Kohn *et al*, 1999; Pronovost and Vohr, 2010). Better clinical

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teamwork in hospitals correlates with lower morbidity and mortality rates and high levels of work morale (West and Borrill, 2002). Improving communication and teamwork in the OT should ultimately benefit patient safety and challenges work practices that jeopardise patient safety. Engeström (2009) suggests that:

‘The expansive cycle begins with individual subjects questioning the accepted practice, and it gradually expands into a collective movement or institution. The theory of expansive learning is related to Latour’s actor-network theory in that both regard innovations as stepwise construction of new forms of collaborative practice, or technoeconomic networks’ (p.5).

On a first round of surveys of 300+ OT staff in 2003 as part of the wider TTRM research that included elements of inquiry other than ANT, we found that perceptions concerning quality of communication differed across professional groups. For example, where 90% of consultant surgeons said that they have good communication with their surgical colleagues, only 50% of consultant anaesthetists, 40% of nurses, and 25% of trainee anaesthetists reported that they had good communication with consultant surgeons. When asked how often a pre-list briefing occurs, 10% of surgeons said ‘never’, 50% ‘occasionally’, and 40% ‘always’. When anaesthetists were asked, however, 70% said ‘never’, 20% ‘occasionally’ and 10% ‘always’. So what model of ‘briefing’ did those surgeons hold and with whom did they imagine they were briefing? We meticulously followed this fault line.

When we carried out an intensive audit on briefing practices soon after this survey, we found no OT teams who held a properly structured whole team brief, where ‘briefing’ was often configured as, literally, a brief conversation between the surgeon and anaesthetist, and not a team meeting. Five years after introducing our ANT-inspired ‘interruption’ with OT allies, an audit showed that 20% of surgical teams were regularly briefing and 15% debriefing, but that 50% of individual practitioners reported having been part of a brief that week, and 30% part of a debrief that week. Given what we know about the pace of practice change in conservative surgical environments, this was relatively good news.

In terms of initiating and strengthening a work-net/network through strategic alliances, we knew how problematic this could be in the face of a surgical culture grounded in hierarchy and meritocracy focused on technical ability and knowledge, rather than in participative democracy focused on shared capabilities in communication. In 2004 we videotaped orthopaedic surgical teams. Analysis revealed a clear and consistent pattern that favoured one-way communication (telling, informing, confronting) over dialogue (asking questions, inviting participation), working against ‘assembly’ democracy (Keane, 2009).

Co-ordination of care across clinical teams is greatly enhanced by participative democratic structures (Iedema, 2007), sometimes facilitated by objects (artefacts) such as protocols (Gawande, 2009). However, autocratic structures retain a strong, historically contingent presence in medicine and, particularly, surgery. While there is a solid base of evidence suggesting that expanding out

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