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MEDICAL WORK IN TRANSITION
Towards collaborative and transformative expertise

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This chapter is dedicated to the memory of my sister Anne Piira (1947–2018).

Introduction

Forces and demands from multiple directions mould medical work and expertise. A foundational change is going on in the overall object of medicine: the growth of chronic illnesses that bundle together into complex forms of multi-morbidity (DeVol et al. 2007; Bodenheimer, Chen and Bennett, 2009; Afshar et al. 2015; Milani and Lavie 2015; Moffat and Mercer 2015; Pefoyo et al. 2015). Whereas this would seem to require longer time perspectives as well as broader collaborative and interdisciplinary approaches from practitioners and their organisations, two other forces are often experienced as pulling in quite different, if not conflicting, directions. The rules of medicine are increasingly penetrated by market-oriented business calculations and managerialism that tend to favour rapid turnover and relatively short-term profits (Pollock 2004; Giaimo 2009; Hunter 2013; Beck and Melo 2014; Gilbert, Clarke and Leaver 2014). And the instruments of medicine are increasingly framed in terms of rationalisation and standardisation, again notions that tend to favour relatively linear and pre-packaged processes and procedures rather than horizontally co-constructed care trajectories and long-term impact (Timmermans and Berg 2010; Martin et al. 2017). Thus, we may tentatively identify systemic contradictions between the major force of change in the object on the one hand and the dominant tendencies in the rules and instruments on the other. These contradictions are marked with double-headed arrows in Figure 3.1. The components of community and division of labour in Figure 3.1 are left open, with question marks indicating widespread uncertainty in the search for optimal organisation of health care services.

In this chapter, I will argue that this contradictory state of affairs calls for deliberate and persistent efforts to redefine medical expertise so that practitioners, their organisations and society at large may begin to see and pursue expansive ways out of the seemingly uncontrollable situation. My argument is not aimed at proposing specific policies and models of health care. My aim is to chart a zone of proximal development for building the kind of medical expertise that will allow the creation and implementation of robust emancipatory solutions, not as policy dictates from above but as evolving practices generated and appropriated from below.
To construct a zone of proximal development for medical work and expertise, we need to depict a field of identifiable historical types of this activity. In Figure 3.2, the vertical dimension represents movement from individual expertise towards collective expertise; the horizontal dimension represents movement from learning for stability towards learning for change. The historical starting point in the lower-left quadrant is professional craft medicine conducted by an individual expert and strongly bound to the expectation of stability. The two dominant forms of medical work today (in the upper-left and lower-right quadrants, respectively) are hierarchically organised medicine and market-driven medicine.

Various relatively weakly conceptualised forms of collaborative community are emerging in the upper-right quadrant, as if through the cracks that open up between and within the two dominant types (Engeström et al. 2010). Movement from one type to another is not linear or automatic. There are clashes, retreats and detours, and all four types continue to influence medical practice today. Yet I argue that the emerging collaborative and transformative expertise is a real historical possibility and an avenue towards expansive resolution of the contradictions summarised in Figure 3.1.

Moving towards collaborative and transformative expertise can be facilitated by means of appropriate conceptual instruments. Such instruments should pave the way for theoretical understanding and practical construction of new forms of expert work. They may be seen as spearheads into the zone of proximal development of medical expertise. I suggest three such spearheads: (1) object-oriented and contradiction-driven activity systems as locus of expertise, (2) knotworking as emerging forms of collaborative expertise and (3) expansive learning as emerging modes of transformative expertise. In the next sections of this chapter, I will examine each of these spearheads in turn.
Much of the empirical and interventionist research I have conducted in different arenas of medical practice over some 30 years is brought together in my book *Expertise in Transition: Expansive Learning in Medical Work* (Engeström 2018). Taking a step forward from that body of research, in this chapter I will illuminate the three spearheads by briefly reviewing recent activity-theoretical studies published by others, pertinent to each of the spearheads in turn. I will further concretise the spearheads by discussing findings obtained by my own research group in a series of studies on home care in the city of Helsinki. Although home care is not at the core of traditional medicine, I will show that it is relevant for the emergence of new forms of collaborative and transformative expertise. New patterns of activity often take shape in the margins of a complex field of activities, such as health care.

**Expertise as object-oriented activity systems**

In activity theory, a collective, artefact-mediated and object-oriented activity system, seen in its network relations to other activity systems, is taken as the prime unit of analysis. Goal-directed individual and group actions and action clusters, as well as automatic operations, are relatively independent but subordinate units of analysis, eventually understandable only when interpreted against the background of entire activity systems. Activity systems realise

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*Figure 3.2* The zone of proximal development of medical expertise (Engeström 2018: 256)
and reproduce themselves by generating actions and operations. Figure 3.1 above is built on a general model of the structure of an activity system (Engeström 2015: 63).

The object of activity is always under construction, interpreted and moulded by the actors involved in the activity. Object-oriented actions are, explicitly or implicitly, characterised by ambiguity, surprise, interpretation, sense making and potential for change. There are multiple mediations in an activity system. Instruments mediate the subject and the object, or the actor and the environment, including material tools as well as signs, symbols and representations of various kinds. The less visible social mediators of activity—rules, community and division of labour—are depicted at the bottom of the model. Between the components of the system, there are continuous transitions and transformations. The activity system incessantly reconstructs itself.

Contradictions are the prime source of change and development in activity systems. Contradictions are not the same as problems or conflicts. Contradictions are historically accumulating structural tensions within and between activity systems. An activity system is constantly working through tensions and contradictions within and between its elements. Contradictions cannot be directly observed. They must be inferred from historical analysis and from empirical analysis of their mundane manifestations, such as dilemmas, conflicts and double binds (Engeström and Sannino 2011). Thus, the identification of contradictions in activity systems is always a working hypothesis, to be tested and elaborated on. Expertise resides in object-oriented collective activity systems mediated by cultural instruments and cannot be meaningfully reduced to individual competency. Expertise is inherently heterogeneous and increasingly dependent on crossing boundaries, generating hybrids and forming alliances across contexts and domains.

In medical work, a natural starting point for an activity-theoretical analysis of expertise is to examine the interplay of the activity system of the physician and the activity system of the patient. The constellation becomes more complex when we analyse the interplay between the activity systems of a primary care health centre, a hospital and a patient, for example. An activity-theoretical framework for the study of expertise implies a shift in emphasis from what goes on inside the head of the subject to what goes on in the object. Therefore, the study of expertise should re-focus on the objects of expert work. A trajectory of care that transcends institutional and professional boundaries is a promising way to conceptualise and operationalise the object of medical work.

Several studies of medical activity systems, their objects and their contradictions have been published in the past 10 years or so. De Feijter et al. (2011) analysed the experiences of final-year undergraduate medical students concerning patient safety. They found that the simultaneous occurrence of two activities, namely learning to be a doctor and delivering safe patient care, generated contradictions that could be approached as potential learning opportunities. Focusing on contradictions in the object of the activity, Greig, Entwistle and Beech (2012) published an ethnographic study of primary health care teams responding to a policy aim of reducing inappropriate hospital admissions of older people by the “best practice” of rapid response teams. Teodorczuk et al. (2015: 757) analysed what they called “practice gaps” in hospital care of dementia and delirium. They found that “the primary object of activity in relation to managing successfully the confused older patient is improving the care of the confused patient through learning about the patient,” and identified a number of systemic contradictions behind the practice gaps.

In recent years my own research group has conducted a series of longitudinal intervention studies on the home care of elderly clients with multiple illnesses in the city of Helsinki (Nummijoki and Engeström 2010; Engeström, Nummijoki and Sannino 2012; Engeström, Kajamaa and Nummijoki 2015; Nummijoki, Engeström and Sannino 2018). We focused our work on the implementation of the Mobility Agreement, a new practice and artefact aimed at
facilitating the physical mobility of elderly clients by means of regular exercises embedded in everyday chores at home. On the basis of our studies, we modelled the activity systems of the client and the caregiver, as well as their mobility-related contradictions, as depicted in Figure 3.3.

The tension between the need for safety and the craving for autonomy, or more concretely between a fear of falling and a desire for movement, is a persistent primary contradiction in the life activities of frail, elderly home care clients. Correspondingly, the primary contradiction in the activity of home care workers appears as tensions between the desire to stick to the prescribed standard tasks of hygiene, nutrition and medication and the desire to respond to the client’s needs in a more proactive way, activating the client by working with rather than doing chores for him or her. These primary contradictions are depicted within the objects of the respective activity systems in Figure 3.3. Put together, they can be translated into the persistent institutional contradiction between the immediate cost efficiency and long-term effectiveness of home care. In Figure 3.3, the Mobility Agreement appears as a new instrument that aggravates the latent primary contradictions, generating secondary contradictions between the new instrument and old rules and division of labour in the two interacting activity systems. These secondary contradictions are marked with lightning-shaped, double-headed arrows in Figure 3.3.

**Expertise as knotworking**

The notion of ‘knot’ refers to rapidly pulsating, distributed and partially improvised orchestration of collaborative performance between otherwise loosely connected actors and activity systems. In other words, knotworking is characterised by a pulsating movement of tying, untying and retying together otherwise separate threads of activity. The tying and dissolution of a knot of collaborative work is not reducible to any specific individual or fixed organisational entity as the centre of control. The centre does not hold. The locus of initiative changes from moment to moment within a knotworking sequence. Thus, knotworking cannot be adequately analysed from the point of view of an assumed centre of coordination and control, or as an additive sum of the separate perspectives of individuals or institutions contributing to it. The unstable knot itself needs to be made the focus of analysis.

Primarily due to the emergence of new types of objects, expert work is undergoing a historical transformation from various forms of craft, standardised mass production and mass customisation towards co-configuration, the interactional core of which is negotiated knotworking (Engeström 2008). In health care, this transition is driven by the increasing prevalence and importance of chronic illnesses and co-morbidity, the appearance of multiple simultaneous illnesses in a patient.

Knotworking is a concept in the making. It needs to be made concrete by enacting it. Knotworking cannot be easily formalised and stabilised with the help of rules and regulations. The very idea of knotworking is based on the dialectics of improvisation and long-term planning. In a divided terrain of multiple activity systems, knotworking is facilitated by certain conditions. First of all, the potentially shared object and the consequences of its fragmentation need to be made visible and analysable. Knotworking can only be accomplished by focusing on and expanding the object. In health care this means, above all, making the patient’s care experiences visible. This is a demanding condition as critical visibilisation may threaten the dominant rhetorics of competence, quality and responsible professionalism.

Therefore, a second condition is needed, namely the establishment of relatively safe spaces and times of collective reflection, debate and analysis. These may take the shape of relatively permanent “trading zones” between organisational units and professional groups (Gorman 2010),
Instruments: Mobility Agreement calls for autonomy and risky movement

Subject: Home care client

Object: Safety vs. autonomy

Object: Routine tasks vs. activation of client

Subject: Home care worker

Rules: Stay passive and safe

Division of labor: Let the home care worker do the chores for me

Division of labor: Do the standard chores for the client

Community

Potentially shared object

Figure 3.3  The activity systems and mobility-related contradictions of home care encounters (Nummijoki, Engeström and Sannino, 2018: 230)
or more intensive “microcosms” for practising knotworking, such as the Change Laboratory interventions (Sannino, Engeström and Lemos 2016). The purpose of such spaces is not to reach full agreement or unanimity:

At root, the relevant aspect of exchange is this: what an object means to me when I give it to you may very well not be what you, as the recipient, understand that object to connote. What matters is coordination, not a full fledged agreement about signification.

(Galison 2010: 35)

To reach coordination, the participants need to negotiate. To negotiate successfully, they need a minimal common language. This is the third condition of knotworking. A common language between different kinds of expertise and different positions can emerge out of an interplay between a conceptual framework such as the activity-theoretical apparatus used in this chapter and the specific repertoires of the participating domains or traditions of expertise.

Varpio et al. (2008: S79) used the lens of knotworking in their analysis of the role of interprofessional communication in medical errors. The authors pointed out that when rotating members of interprofessional teams share patient information across multiple communication tools, confusion or errors generated in communication tools can easily become sources of latent medical errors:

To avoid the generation of such errors [. . .] professionals must take more complexity into account. They need to consider the distributed knots of activity involved in the patient’s care and construct solutions that extend across multiple knots of team membership and activity.

Bleakley (2013, 2014) published careful in-depth analyses of the potentials and limitations of knotworking in the changing landscape of ‘liquid’ health care. He concluded that knotworking is contrasted with networking “not to oppose the two but to draw a distinction between forms of work that actively strive for stability and forms that show high tolerance of ambiguity and high levels of improvisation where conditions demand this” (Bleakley 2013: 25).

Informed by activity theory and the idea of knotworking, Lingard et al. (2012) conducted an ethnographic study of teamwork in a solid organ transplant unit in a tertiary care hospital. Focusing on detailed analysis of the care of one patient, Mr Hearn, the authors concluded:

The fluidity of roles, and the shifting and overlapping of the locus of authority are among the factors that create complexity and give rise to the need for extensive knotworking in the Mr Hearn case. Although the fluidity and overlap in roles create conflict among the team, this conflict is not ‘avoidable’ per se; it is the sine qua non of collaboration and knotworking strategies allow the team to work through the conflict productively.

(ibid.: 876)

Larsen et al. (2017) used the concept of knotworking in their analysis of the role of learning goals in clinical education. They found that learning goals are potentially powerful tools to mediate interactions between students, supervisors and patients, and to reconcile contradictions that arose when the desired outcomes of student skill development, grading and patient care were not aligned. However, for new collaborations to take place, both students and supervisors had to engage with the goals, and the necessary patients needed to be present.
In our own work on home care encounters, we have further developed the concept of knotworking by identifying four qualitatively different modes of collaboration that may occur within knotworking efforts, namely coordination, cooperation, communication and carnivalisation (Figure 3.4). In coordination, each participant typically has his or her own object; thus the object is heterogeneous to begin with, but the prescribed script followed by the participants conceals the heterogeneity. In cooperation, the participants cohere around a shared object, temporarily abandoning or going beyond the prescribed script—but the effort is limited to relatively well-bounded tasks or problems. In communication, the participants, focusing on a shared object, engage in questioning and revising the entire script of their collaboration. In carnivalisation, as the script falls apart, the concealed or suspended heterogeneity of objects becomes visible and is playfully developed by means of some open-ended and fluid instrumentality, such as photography and pictures in the home care encounters we analysed (Engeström et al. 2015; Kajamaa and Lahtinen 2016).

**Expertise as expansive learning**

The theory of expansive learning is aimed at understanding and fostering learning processes that go beyond the information given and generate new solutions, models and concepts for the
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activity in which the learning occurs (Engeström 2015; see also Engeström and Sannino 2010). In this sense, expansive learning is “learning what is not yet there” (Engeström 2016).

Expansive learning follows the dialectical movement of ascending from the abstract to the concrete. This is a movement of grasping the essence of an object by tracing and reproducing the logic of its development—its historical formation through the emergence and resolution of its inner contradictions. 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 a new theoretical concept— theoretically grasped practice—concrete in systemic richness and multiplicity of manifestations.

In this framework, abstract refers to partial, separated from the concrete whole. In empirical thinking based on comparisons and classifications, abstractions capture arbitrary, only formally interconnected properties. In dialectical-theoretical thinking, based on ascending from the abstract to the concrete, an abstraction captures the smallest and simplest, genetically primary unit of the whole functionally interconnected system.

The expansive cycle begins with individual subjects questioning the accepted practice, and it gradually expands into a collective movement or institution. The cycle consists of expansive learning actions. In an ideal-typical expansive learning cycle, the following seven learning actions (Table 3.1) may be identified:

The expansive transformation of the object of medical work proceeds in multiple dimensions. In the socio-spatial dimension, it typically means shifting the focus from an individual patient’s specific symptom or illness towards the complex webs of life and care of the patient. In the temporal dimension, it means moving the focus from the singular care episode or visit towards a longitudinal trajectory of illness and care. A trajectory encompasses both the object’s movement in time, and the interconnections and actions in space, between the participating activity systems that make the movement happen. In other words, the concept of trajectory is spatio-temporal to begin with. The two foundational dimensions of space and time need to be complemented with two additional dimensions of expansion: the moral-ideological and the systemic-developmental. When a patient’s entire care trajectory is taken as the object, physicians

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<th>Table 3.1 The key seven learning actions in an ideal–typical expansive learning cycle</th>
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<tr>
<td>1 Questioning, criticising, or rejecting some aspects of the accepted practice and existing wisdom.</td>
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<td>2 Analysing the situation. Analysis involves mental, discursive or practical transformation of the situation to find out causes or explanatory mechanisms. One type of analysis is historical-genetic; it seeks to explain the situation by tracing its origins and evolution. Another type of analysis is actual-empirical; it seeks to explain the situation by constructing a picture of its inner systemic relations.</td>
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<td>3 Modelling the newly found explanatory relationship through some publicly observable and transmittable medium. This involves constructing an explicit, simplified model of the new idea that explains and offers a solution to the problematic situation.</td>
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<td>4 Examining the model—running, operating and experimenting on it to fully grasp its dynamics, potential and limitations.</td>
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<td>5 Implementing the model by means of practical applications, enrichments and conceptual extensions.</td>
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<td>6 Reflecting on, and evaluating, the process.</td>
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<td>7 Consolidating and generalising the outcomes into a new and stable form of practice.</td>
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and nurses from different specialties, levels and organisations of medicine begin to interfere with each other. Fixed hierarchies and turf boundaries are shaken. Power and responsibility need to be re-negotiated and re-defined. Similarly, far-reaching consequences of mundane care-related decisions are made visible. When daily work routines are negotiated and debated, their systemic-developmental reasons and implications are articulated.

Expansive learning is two-faced. On the one hand, it is a conceptual framework for describing and analysing unusually radical processes of collective learning in which patterns of practices are qualitatively changed as new theoretical concepts are created and implemented. On the other hand, it is a conceptual toolkit for intentional formative interventions aimed at revealing potentials for such radical learning and reorganisation of practices. The Change Laboratory (Engeström 2011; Sannino, Engeström and Lemos 2016) is a well-known formative intervention method that my research group has used in multiple health care settings.

Bleakley (2006) introduced the notion of expansive learning to the community of medical education scholars. O’Keefe et al. (2016) used the framework of expansive learning to examine and assess extended collective learning efforts in a dental clinic, a community aged care facility and a rural hospital. The authors found that two of the three sites could not develop a successful implementation plan for their ideas. The expansive learning actions of modelling and testing new solutions were not achieved and the participants were unable, collectively, to reassess and reinterpret the object of their activities.

Skipper, Musaeus and Nœhr (2016) conducted a Change Laboratory intervention aimed at analysing and redesigning the outpatient clinic in a paediatric department of a hospital. The study was a collaborative effort with the doctors of the department, motivated by a perceived failure to integrate the activities of the outpatient clinic, patient care and training of residents. The ultimate goal of the intervention was to create improved care for patients through resident learning and development. The Change Laboratory sessions resulted in a joint action plan for the outpatient clinic structured around three themes: (1). Before: Preparation, expectations and introduction; (2). During: Structural context and resources; and (3). After: Follow-up and feedback. The authors pointed out that the participating doctors must be motivated to uncover inherent contradictions in their medical activity systems of which care and learning are both part.

In our research on home care, we conducted a Change Laboratory intervention among the home care managers of the city of Helsinki, aimed at generating a service palette that could facilitate movement towards more proactive and collaborative care practices (Engeström and Sannino 2011). A key new component in the service palette was the Mobility Agreement mentioned earlier. We applied the theory of expansive learning in ascending from the abstract to the concrete in compact mini-cycles of learning that took place in home care encounters. Here, the new Mobility Agreement was introduced and implemented in practice.

In a detailed analysis of the expansive mini-cycle of an elderly patient called ‘Anne’ we identified **standing up from the chair** as the germ cell of sustainable mobility for the elderly home care client (Figure 3.5). This is both a simple physical movement and a verbalised idea. Such an expansive germ cell is an internally contradictory unity of opposites; in this case, a contradictory unity of safety and autonomy, or fear of falling and need to move.

In the case of Anne, the discovery and conscious implementation of the germ cell led to multiple trails of enrichment and expansion in the life of the client, ranging from improved posture to regular walks, purposeful setting of the table in a way that required repeated standing up from the chair and even teaching one’s relatives to conduct mobility exercises (Figure 3.6). Such trails signify ascending to the concrete and the stabilisation of a lived concept of sustainable mobility.
SAFETY
- FEAR OF FALLING
- USE OF FURNITURE OR OTHER PERSONS AS SUPPORT
- EASY AND SAFE
- BUT MAKES YOU DEPENDENT

AUTONOMY
- NEED TO MOVE
- USE OF ONE’S OWN MUSCLES
- HARD AND RISKY
- BUT MAKES YOU AUTONOMOUS

STANDING UP FROM THE CHAIR

We observed also a number of home care encounters in which expansive learning was blocked or did not take place. To understand these encounters, we needed to analyse both the learning cycle of the client and the learning cycle of the home care nurse in the interplay.

Figure 3.5 Standing up from the chair as the germ cell of sustainable mobility (Engeström, Nummijoki and Sannino 2012: 293)

REFLECTING:
PROCESS AND OUTCOMES

EXAMINING:
LIMITS OF THE MODEL

TRAIL 1: THE BACK GETS STRAIGHTER, THE POSTURE IS IMPROVED
TRAIL 6: IMPROVED MOOD, TAKING CARE OF ONE’S HAIR, CLOTHING, MAKING THE BED
TRAIL 5: SETTING THE TABLE BY STANDING UP FROM THE CHAIR
TRAIL 2: REGULAR WALKS ARE TAKEN
TRAIL 3: DIZZINESS, SHORTNESS OF BREATH, PAIN etc. ARE NOTICED
TRAIL 4: THE CLIENT MAY TEACH HER RELATIVES TO DO MOBILITY EXERCISES

Figure 3.6 Ascending from the abstract to the concrete in the formation of the concept of sustainable physical mobility in home care for the elderly (Engeström, Nummijoki and Sannino, 2012: 304)
This led to the identification of defensive learning actions and cycles that could be analysed by translating the expansive learning actions into their opposites (Nummijoki, Engeström and Sannino 2018).

The fact that both the home care nurse and the elderly client may engage either in a predominantly defensive, or a predominantly expansive, learning cycle should alert us to the fact that in many learning processes it is not at all simple to determine who is teaching, leading or guiding whom. Even though home care encounters have an in-built asymmetry between the potentially powerful practitioner and potentially powerless elderly client, when the learning challenge requires reorientation from both parties, the power relations seem to become much more open-ended and mutable. For example, we saw instances of the client pushing or pulling the practitioner into expansive learning actions in spite of the overall defensive orientation of the latter. This study indicates that more research is needed to deepen our understanding of the dynamics of interacting cycles of learning in multi-learner settings. Expertise is not the sole property of the professional practitioner; it resides in collaborative forms of activity in which lay clients and patients play indispensable roles.

**Conclusion**

Collaborative and transformative expertise emerges through mundane daily decisions and actions taken by practitioners and their patients and clients. Such a transformation involves facing difficult contradictions and building coalitions from the ground up. It is a process of traversing a collective zone of proximal development, with few ready-made signposts and lots of uncertainties and struggles.

I began this chapter by pointing out crucial contradictions in today’s medical work (Figure 3.1). The arguments presented above indicate that we need to generate powerful alternatives to the instruments and rules currently dominating the field of medicine. Instruments of rationalisation and standardisation are not enough and can become outright destructive. We need to complement them with instrumentalities such as negotiated agreements and representations of illness and care that allow competent dialogue across divides between specialties and between professionals and patients. Similarly, the rules of managerialism and marketisation need to be complemented, if not replaced, with rules of common good, participation and reciprocity.

**References**


