



The art of medicine

Thinking across disciplinary boundaries in a time of crisis

The COVID-19 pandemic forced clinicians and researchers to look beyond traditional professional boundaries, working at a speed that would have previously been unthinkable. A widespread shortage of essential equipment in the early stages of the pandemic prompted health-care staff to search outside their clinical domains for new solutions. Reports from the UK and beyond showed clinicians, engineers, and racing car teams collaborating to design and produce respiratory support apparatus such as ventilators and continuous positive airway pressure machines for treating seriously ill patients. At the same time, a shortage of personal protective equipment prompted tailors and textile workers to come up with new ways of producing gowns and face masks. Such collaborations depend on effective communication between clinicians, scientists, engineers, and those from the creative and craft industries.

The novelty and challenge of such collaborations highlight the pigeon-holed nature of much medical education. As clinician educators we believe that collaboration beyond the world of medicine is essential, not only in times of crisis but also as part of normal training. Yet a widely held assumption that everything a learner needs to know about a field can be gained from those already working within it holds powerful sway. We challenge that assumption, proposing that clinicians can learn from experts outside medicine whose ways of doing resonate with medical practice but whose expertise often goes unrecognised.

While the value of collaborating with engineers and non-clinical scientists is easy to see, there is great scope too for collaboration with those in the visual and performing arts. For example, one consequence of the COVID-19 pandemic has been a radical shift from face-to-face to remote consultation. Clinicians and patients have developed unfamiliar ways of interacting. We suggest there is much for health professionals to learn from creative performers, such as musicians, actors, and close-up magicians. These performers can be adept at capturing and shaping each audience member's attention via remote technology, sustaining engagement throughout the performance, and ensuring that all participants perceive the experience as worthwhile. Yet experts in such disciplines have different "languages", and clinical learners are often ill-equipped to communicate effectively across disciplinary boundaries. The sociologist Harry Collins distinguishes between contributory expertise (being able to do something yourself) and interactional expertise (fluency in the technical language of a specialism without being expert in it yourself). Medical training focuses on the former, sometimes at the expense of the latter.

Of course there is a huge corpus of domain-specific knowledge and skills that medical students and other clinicians in training need to master. In the early phases this entails a necessary funnelling into scientific and clinical study, elbowing out perspectives from beyond medicine and science. In the UK educational system in particular, there is a danger that the languages of the arts, social sciences, and engineering will be overlooked in that process. Becoming a skilled, safe, knowledgeable, and compassionate clinician involves an ontological transformation, an internal journey that often takes years. Developing one's professional identity—what it is to be a medical doctor as well as to master what a medical doctor must know and be able to do—is a complex process whose maturation may not fit with assessments of knowledge and component competencies. Each clinician's professional identity requires the integration of many kinds of knowing, not least the ability to recognise the impact of one's own physical and mental state when caring for patients and how this may be affected by extraordinary circumstances such as war, natural disasters, or pandemics.

Awareness is growing of the value of study that transcends disciplinary boundaries—of finding ways to broaden out the funnel of medical learning. Many programmes bring medicine, science, and engineering together, encouraging students to develop solutions to practical challenges. Medical humanities programmes invite students to connect with the worlds of literature, poetry, and the visual and performing arts, among other fields, acknowledging that valuable insights into clinical practice come from this humanist perspective. Yet such programmes are typically dominated by words and images, with much less emphasis on physicality and doing.



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Trainees are seldom invited to move outside the world of medicine to gain practical insights from other kinds of experts as they enter postgraduate medical education. For example, craftspeople in wood, stone, glass, textiles, and metal have an understanding of the material world that reaches back centuries. Performers—whether in safety-critical industries such as aviation or offshore drilling, or in music, dance, theatre, or sport—offer insights into how people work together under pressure. Based on their own apprenticeships and subsequent experiences, these experts, like those in medicine and nursing, understand the value of repetitive work which can seem boring at the time but lays the groundwork for eventual mastery. Through practice and performance they develop an understanding of their work that defies verbal description. Experts in such fields are skilled at recognising how their skills can degrade when they are tired, irritated, fearful, or unwell. We argue for creating perforations in the funnel of learning so that exposure to such insights can become part of mainstream medical education.

Many such experts gain their mastery through prolonged exposure to materials, tools, and techniques. They develop a capacity for attentiveness on the basis of close observation and sensory awareness. These qualities are crucial in medicine too, although often overshadowed by a focus on factual knowledge or outsourced to imaging and other technologies. Conceptual knowledge and embodied knowledge develop at different rates. Theoretical understanding and factual grasp can take place rapidly, one stage leading quickly to the next. The knowledge of the hand takes much longer. Time and again, the craftspeople in our studies described how their understanding of what they were attempting to do outstripped their ability to do it. Whether you're learning to make a jacket, shape a vase, repair an engine, engrave a piece of glass, or perform close-up magic, there's no substitute for sustained and repetitive work in the workplace—and this applies to the operating theatre, the ward, and the consulting room too.

Our exploratory work over several years has brought together clinicians, scientists, craftspeople, and leaders in the visual and performing arts to identify common themes. These have included small-scale working, working with precious materials, and time-critical performance. Subsequent work in small groups has investigated promising themes in more detail. For example, an exploration of risk, error, and recovery brought together an upper gastrointestinal cancer surgeon, a polar explorer, a combat pilot, and a classical guitarist. Despite their different domains of expertise, all described recognising when "something feels wrong", reaching a state of provisional safety before spending time in analysing the cause. The combat pilot described how he once sensed before touchdown that something "wasn't right". Rather than trying to work out why, his immediate response was to put on power, gain

height and "go round again" while he reviewed the situation and considered his options from a place of temporary safety. On this occasion, he realised that despite going through his pre-landing checklist he had not actually pulled the lever that would lower the aircraft's undercarriage. Continuing to land would have been fatal. The other experts all described strategies for reaching a safe space in their fields—whether repositioning abdominal organs and "starting again" when confronted by unexpected problems in complex cancer surgery; building a temporary ice shelter when becoming lost and exhausted in the Arctic; or "reverting to tempo" with other players in a musical performance to allow a breathing space before resuming solo display. For each expert this temporary refuge allowed them to rethink, review, and restart. This was especially relevant in the case of low-probability, high-severity events that most professionals are unlikely to have experienced before. Awareness that one is entering a risky state and knowing how to achieve a temporary state of safety is a characteristic of expert medical performance. Similar experiences characterise many branches of medicine and nursing.

Though these broader aspects of clinical practice are widely understood by individual clinicians, they are seldom systematically addressed within institutions or curricula. Recognising the expertise that lies outside medicine is a means of perforating the funnel within which medical doctors tend to learn. Unless we pay attention to the craftsmanship and performance of medicine as well as its science, we overlook essential aspects of clinical practice. We owe it to our patients, our students, and ourselves to ensure this does not happen. Yet we should not need a worldwide crisis such as COVID-19 to trigger such collaboration. Invaluable expertise is all around us, hiding in plain sight. We have a responsibility to our students to ensure they develop the awareness and skills to engage with experts outside medicine, recognising complementary skills and ways of thinking. The challenge is to bring such expertise into our educational programmes and working lives so patients and clinicians can profit from it together. Although COVID-19 has disclosed fault lines in our educational system, the pandemic has also provided inspiring examples of how we might continue to do things differently once this crisis is over.

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Further reading

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