

# Editorial

*Tony Townsend has been a general practitioner for 30 years. Although he has dabbled in medical politics, medical ethics, community-based teaching, university-based teaching, quality improvement and assessment, his passion remains clinical general practice. He is currently a full-time general practitioner in Whangamata.*



One of the most highly developed skills in contemporary Western civilisation is dissection: the split-up of problems into their smallest possible components. We are good at it. So good, we often forget to put the pieces back together again.

This skill is perhaps most finely honed in science. There we not only routinely break problems down into bite-sized chunks and mini-chunks, we then very often isolate each one from its environment by means of a useful trick. We say *ceteris paribus* – all other things being equal. In this way we can ignore the complex interactions between our problem and the rest of the universe.<sup>1</sup>

Doctors are particularly skilful at dissection as it is what we were taught from our earliest days at medical school. I am not referring simply to our attempts to discover the structure of the human body by carving one up in the dissection room. Much more than this; it is the foundation of clinical method. It is what we do – finding a cause (diagnosis) in order to do something to fix the problem (treatment). However, we all know that the practice of medicine is far more complex than was ever revealed to us at medical school. Iona Heath provides us with a good example of the complexity of illness in the first paragraph of her paper in this issue of the journal.<sup>2</sup>

The organisers of this year's College Conference are challenging us to look beyond what we were taught and to rethink the way in which we grap-

ple with the problems that confront us in the practice of medicine. Iona, Tom Love and Chris Burton<sup>3</sup> introduce us to some of the concepts of complexity theory and illustrate how these ideas are useful for us to more completely understand what is happening in our patients' lives, and how we might more usefully help them to regain stability and control. Ben Gray draws on his own experience of general practice to illustrate the complexity of medical practice<sup>4</sup> and Ngaire Kerse uses complexity theory to discuss the management of health care problems in older people.<sup>5</sup>

Complexity science is not new. It originated in physics at the beginning of last century as a theoretical basis for studying complex adaptive systems. However, the application of complexity theory to medical practice is relatively new and is being promoted internationally by some of the authors of the papers in this issue and by their medical colleagues.

We are all familiar with self-organising, non-linear systems. The cybernetic (self-organising) nature of biochemical cycles (non-linear systems) and hormonal regulation are familiar to us from our study of biochemistry and physiology. The introduction of systems theory to medicine by George Engel in 1977<sup>6</sup> and the relevance of this to family medicine in particular, so well elaborated by Ian McWhinney in his Textbook of Family Medicine,<sup>7</sup> are part of the history of the growth of our discipline. It is really not such a large

step to take on board the concepts of complexity theory and apply these to our everyday practice.

I was called out at 11.00pm a few nights ago to a young woman who had abdominal pain and bleeding in early pregnancy. I had already seen her twice that day. The first time was after she had had a little spotting and we discussed the possibility that this might be an early miscarriage. She was about six to eight weeks pregnant and had a young child about a year old with her during the consultation. Her pregnancy test was equivocal having been strongly positive a few days before. She returned a few hours later having had more severe abdominal pain but still not much bleeding. Although she had a soft abdomen I thought that she should have a scan to exclude an ectopic and sent her to hospital (a two hour journey) having discussed with her that she could be kept in overnight and that she would need to make arrangements to have her child looked after. No problem as she had parents living in the same town as the hospital. It was thus disconcerting and somewhat annoying to be called out late at night by the St John volunteers to see her again. She said that the hospital could not do her scan until the following morning and that she had not been able to get someone to look after her baby. She returned to hospital (a four to five hour long return trip for the St John volunteers). A simple problem? Well, not really, the issues involved in this short scenario were actually quite complex. The systems and the system failures were at multiple levels – pregnancy, psychological, family, environment (hospital). Understanding this deterred

---

It is really not such a large step to take on board the concepts of complexity theory and apply these to our everyday practice

---

me from making an inappropriate response. I believe that it helped.

However, the application of complexity theory is not only relevant to our day-to-day interactions with patients. There are much wider implications that might help us to understand some aspects of health care management, the regulation of medical practice, medical research and medical education.

I will very briefly suggest some possibilities.

Health care management can be seen as a 'hierarchy' of inter-connected systems at varying levels from international to national to regional to community to the hospital and the consulting room and the relationship between a health care provider and a patient, or vice versa. These systems are more or less self-regulating but they are not necessarily stable, to use chaos theory vocabulary, they are from time to time in 'far-from-equilibrium' conditions. In such circumstances, the theory states, very small disruptions or fluctuations can become amplified into gigantic, structure-breaking waves. The outcome may be extraordinarily disproportionate to the event that initiated it. Reflect on the impact on the provision of primary care maternity services resulting from a relatively small change to the funding stream, or the potential impact on patient care resulting from the exclusion of the category 'New Zealander' from ethnicity data. Or consider the flow-on effect created by Herb Green fail-

ing to fully inform his patients about his research into cervical cancer. Ben Gray provides us with further examples of small changes that have major impacts such as the change to three monthly prescribing.<sup>4</sup>

There is no doubt that we need laws, rules and regulations to define the parameters of medical care. In this issue Ian St George continues his series on assessing performance and we also introduce a new series from the Health and Disability Commissioner, Ron Paterson, called 'Commissioner's Comment'. These papers are about regulations and standards. We need to know

---

The outcome may be extraordinarily disproportionate to the event that initiated it

---

about these things. However, there is a potential downside. The tighter we screw down a system with rules and protocols the less scope there is within the system for variation to accommodate situations that are at either end of the 'norm'. Consider our involvement as general practitioners in end-of-life care or, at the other end of the spectrum (or the same end depending on your perspective), our involvement with women who have an unwanted pregnancy. Or the acceptance into general practice of what were once considered 'alternative' treatments - acupuncture, manual therapy, Evening Primrose oil or glucosamine. How tightly do we want to be regulated? Are highly regulated systems more likely to stagnate than those that are characterised by self-regulated freedom and variability? We need to be cautious in using complexity theory in human and social situations. Prigogine and Stengers stated, 'Obviously here we have to be careful; human beings

are not dynamic objects, and the transition to thermodynamics cannot be formulated as a selection principle maintained by dynamics'.<sup>8</sup> But the parallels are enticing.

Trisha Greenhalgh and her co-authors have explored the transferability of principles of evidence-based medicine to education.<sup>9</sup> They point out that evidence-based medicine advocates a structured and systematic approach to clinical decision making and that these same principles, linked to audit and performance review, have been used extensively in policy making and quality improvement initiatives in health care. They also state that these same principles have been advocated as an approach to improve medical education. They concluded that 'the linear and formulaic link between evidence and practice implicit in evidence based medicine proved inadequate for the complexity of educational research. Conceptual models designed for multifaceted problems, which may be more appropriate, include cognitive restructuring theory, complexity (non-linearity) theory, activity theory and the sharing of tacit knowledge in informal communities of practice'. It may also be, for similar reasons, that this is why evidence based medicine needs to be accepted as a component of our day to day medical practice and should be incorporated into our health care system but not be regarded as the force that drives it.

I am sure that participants in this year's Conference will find the presentations stimulating and thought-provoking. I hope that this issue of the NZFP generates some interest in those who are not able to be there and stimulate others to attend.

---

## References

1. Toffler A. In foreword to Prigogine I, Stengers I. Order out of Chaos. Boulder, Colorado: New Science library; 1984.
2. Heath I. Complexity and uncertainty as the links between science and the humanities in general practice. NZFP 2004; 31:136-138
3. Love T, Burton C. Complexity - not as complicated as it looks. NZFP 2004; 31:139-141
4. Gray B. The complexity of perfection. NZFP 2004; 31:142-144
5. Kerse N. Shades of grey: complexity in health care of older people. NZFP 2004; 31:146-148
6. Engel GL. The need for a new medical model: A challenge for biomedicine. Science 1977; 196:129-136.
7. McWhinney IR. A textbook of family medicine. New York: OUP; 1989. p.43-71.
8. Prigogine I, Stengers I. Order out of Chaos. Boulder, Colorado: New Science library; 1984. p298.
9. Greenhalgh T, Toon P, Russell J, Wong G, Plumb L, Macfarlane F. Transferability of principles of evidence based medicine to improve educational quality: a systematic review and case study of an online course in primary health care. BMJ 2003; 326:142-145.