Chapter 5
The Potential of System Dynamics to Model Patient-Aided Healthcare

ABSTRACT

This chapter explores the potential of system dynamics (or SD), a computer-aided methodology for policy analysis and design, to investigate patient organizations' contribution to healthcare. The chapter starts by describing the complexity features of the healthcare sector. Then it illustrates SD building blocks. A literature review of previous system dynamics applications to healthcare care issues categorizes selected papers according to relevant criteria. It emerges that few models incorporate patients' characteristics and perspective, none of them specifically dealing with patients' organizations and patient co-created health. In conclusion, the chapter highlights how SD can be considered a suitable methodology to depict the outcome of patients and their organizations' participation to healthcare processes, filling a gap in literature about both qualitative and quantitative system dynamics.

BACKGROUND

Patients' organizations are actors belonging to the third sector and operating within healthcare. The latter is a system characterized by complexity, because of the relevant number of interrelated actors, variables and processes, involving many aspects, included organizational leadership, management and decision-

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making (Plsek & Greenhalgh, 2001). Thus, it is opinion of the chapter' author that studying these organizations cannot neglect the complexity of the health system (Bar-Yam, 2006; Patel & Cohen, 2008; Plsek & Greenhalgh, 2001) in which they are embedded.

Such complexity is exacerbated by new technologies and the increasing consumer expectations and awareness of health issues, which put pressure on practitioners of all disciplines and healthcare organizations to *accommodate innovation and simultaneously ensure that their current practices are effective, safe and efficient* (Forbes, & Griffith, 2002, p. 141). Notwithstanding, there can be registered failures to adopt innovations even when supported by sound evidence, or, at the contrary, the perseverance of ineffective practices (Sackett *et al*., 1998). In fact, evidence-based healthcare, although useful to ensure that medical practice is aligned with current best evidence, is affected by limitations, since it just focuses on evidence from randomized controlled trials, neglecting information generated by qualitative research or by the experience of practitioners themselves (Pawson, 2002). According to scholars, evidence-based medicine is not in contradiction with patient-centered practices (Epstein & Street, 2011) and with shared decision making (Hoffman *et al*., 2014). In this stream, evidence-based medicine and shared decision making are two essential and complementary aspects for the delivery of quality healthcare, albeit the processes of patient integration in the clinical choices are still poorly mapped and scarce attention is devoted to them (Hoffman *et al*., 2014). However, despite the today's sensibility to these themes, patients still result substantially excluded by the decisions regarding their health (Barry & Edgman-Levitan, 2012).

On the other side, medicine is traditionally founded on classical reductionism, where a certain problem is broken down into its smallest components, examined, and then the retained information used to draw conclusions about the nature of the larger reality (Tuffin, 2016). Such an approach is successful for linear systems, i.e. systems characterized by relatively low complexity and predictable and proportional behaviors in response to external influences (Plsek & Greenhalgh, 2001). Conversely, the complexity paradigm, based on systems theory, informatics and cybernetics, investigates the healthcare as a complex adaptive system (Fajardo-Ortiz *et al*., 2015). Far from the reductionist healthcare epistemology, it presents a broad conceptualization to understand complex systems (no matter if they are physical, biological or social), sharing the same characteristics. According to Kannampallil and colleagues (2011) interrelatedness, meaning that system components influence each other, is a key property defining complex systems and the level of their complexity.

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