Irish Medical Journal
Established 1867

Issue: Ir Med J; Vol 114; No. 4; P332

The Irish Healthcare System as a Complex Adaptive System

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Abstract

Globally, health systems are struggling to adequately meet the needs of citizens. Improvement efforts have yet to result in meaningful sustained improvement. Appreciating the inherent complexity of human systems is crucial if we are to solve the crisis in health and care. Preiser and colleagues in 2018 proposed six organizing principles that allows a discernment of complex adaptive systems: (1) Are constituted relationally; (2) Are radically open, (3) Are context dependent, (4) Have adaptive capacities, (5) Are dynamic; and (6) Complex causality. In this piece, I make the case for the Irish healthcare system to be viewed as a complex adaptive system. This understanding is of immense importance as it changes how we should envisage, design and deliver health and care.

Introduction

Globally, healthcare systems are struggling to adequately meet the needs of citizens. Inequity of access, fragmented inefficient and poor-quality services remain pernicious. Improvement efforts have yet to result in meaningful sustained improvement [1]. Appreciating the inherent complexity of human systems is crucial if we are to solve the crisis in health and care.

Complexity theory and Healthcare

Complexity theory emerged in the mid-1980s at the Santa Fe Institute in New Mexico. A useful unifying definition is "*the study of phenomena which emerge from a collection of interacting objects"* (Johnson 2009, Pg. 1)[2]. It is increasingly being embraced in healthcare although as Greenhalgh notes "*we embrace the theme of complexity in name only and fail to engage with its underlying logic*" (Greenhagh and Patpoutsi 2018 Pg. 1)[3].

Complex adaptive systems (CAS)

Holland describes CAS as "*systems that have a large numbers of components, often called agents, that interact and adapt or learn*" (Holland 2006 p 24)[4]. Plsek and Greenhalgh define a CAS as "*a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's actions changes the context for other agents*". (Plsek and Greenhalgh 2001 Pg 625)[5]. Clarity around typology is important if we are to properly evaluate the utility of complexity informed approaches in healthcare [6]. Preiser and colleagues have proposed a typology of six organizing principles that allows a discernment of complex systems[7]. The six principles are; that CAS: (1) Are constituted relationally; (2) Are radically open, (3) Are context dependent, (4) Have adaptive capacities, (5) Are dynamic; and (6) Novel qualities emerge through complex causality. These principles can be subdivided into structure related features and process related features.

Organising principles of CAS applied to the Irish Healthcare System

Structure related Features:

Principle 1: CAS are constituted relationally

CAS are defined more by the interactions between their constituent parts (agents) rather than by the parts themselves.

The Irish healthcare system consists of a diverse range of agents including patients and families/carers, health and social care professionals, managers and policy makers. These agents exist in a variety of organisations (government departments, hospitals, general practices, community organisations, mental health organisations, home care organisations etc.) and each of these organisations are made up of subgroups such as professional groupings, multi/interdisciplinary teams, management teams and policy groups. Each individual agent can act autonomously but their actions impact other agents and vice versa, through their interactions with one another. These interactions allow self-organization producing adaptive, dynamic, and emergent behavioural patterns [8, 9].

Principle 2: CAS are radically open

In a CAS, each system comprises sub-systems and every system is a subsystem of a larger system. Just as agents interact, so too do systems and subsystems, resulting in effects that have impacts across scales and domains.

In healthcare, boundaries between systems are often indistinct as agents work across organisations and teams. Although agents and subgroups may have strong professional and/or organisational identities, there is interdependence and co-operation across boundaries, allowing flow of information, people and learning.

Roles such as care coordinators are "boundary spanners" with agents exerting influence in multiple systems (primary care team, older persons MDT, social care). Social prescribing (SP) is an example of this principle and in Ireland there is a vibrant network. In SP, traditional clinical practice connects and interdigitates with activities and support services within the community. GPs, nurses and other primary care professionals refer people to a range of local, non-clinical services which are typically provided by voluntary and community-based organisations [10].

Principle 3: CAS are determined contextually

In a CAS, identity and function is defined by the context in which it exists. The function of a system can be restricted or enhanced by changing the environment in which it is embedded [11]. In the Irish healthcare system, different agents interact, communicate, share information, boundary span and navigate the system. This occurs continuously shaped by dynamic interactions within the environment. This environment can be internal or external. There are internal rules set by professional training, codes of practice or organisational values, but also organisational structures and processes that are interpreted by agents in real time and decisions taken. Such decisions may also be influenced by external factors such as resource availability. If a decision has been taken, for example, that home care packages are no longer available, then the decision taken (such as home discharge) may change (to discharge to nursing home) which may have negative consequences for the patient, family and team. Our national context is currently changing as a result of Sláintecare. As the context changes, the system will change, and components of the system may take on a different role or function.

Process Related Features:

Principle 4: CAS have adaptive capacities

CAS have self-organising capacities and can adjust their behaviour as a response to change in their environment.

In the Irish healthcare system, each agent has the capability to change and adapt in response to changes in their surroundings, situations and experiences. Clinicians regularly change/adapt their practice in response to new evidence, models of care, protocols and procedures as evidenced by the changes in practice effected through the HSE National Clinical Programmes and NCEC guidelines. Changes may also come about as a result of an adverse outcome or complaint as seen with Cervical Screening. Whether at micro meso or macro levels, subgroups can learn, adapt and change when confronted with new information or situations.

Principle 5: CAS behaviour comes about as a result of dynamic processes.

In a CAS, there are non-linear dynamic processes that bring about the behavioural patterns.

In the Irish healthcare system, agents such as healthcare professionals are constantly interacting with colleagues with whom they have interdependencies, receiving feedback, within, between and across systems.

These constant interactions result in changes in behaviour of individual agents or groups of agents resulting in co-evolutionary adaptation. These interactions tend to be non-linear i.e., the outputs are greater than the sum of the inputs. Examples in Ireland would be the work of the HSE Clinical programmes. These programmes continue to evolve and adapt in response to new developments and evidence.

Principle 6: Novel qualities emerge through complex causality (Emergence).

Through the interaction of agents, novel qualities and phenomena emerge. This may result in the emergence of system outcomes that were not directly intended and are greater than the sum of the individual agent behaviours. From a health and care perspective, providing person-centred, co-ordinated care may have a positive impact on the health and wellbeing of the patient which will positively impact on family and staff experience which may improve recruitment and retention. This is not directly attributable to, or predictable from, the actions or behaviours of the individual agents. In the Irish Integrated care programme for Older People, a 10-step framework was co-designed which set simple rules. All agents involved had a shared understanding of what 'good' looks like and were empowered to interpret it to their local context. Through the development of networks and continuous feedback, the programme has emerged and from small beginnings is now being implemented system wide.

Discussion

In this piece, I have, I hope, convincingly made the case for the Irish healthcare system to be viewed as a complex adaptive system. This understanding is important as it changes how we should envisage, design and deliver health and care. Too often we seek to find and fix rather than 'learning to dance' with our complex system [12]. We require, as Greenhalgh states, '*rich theorising, generative learning, and pragmatic adaptation to changing contexts*' (Greenhalgh and Papoutsi 2018 Pg 1)[3]. A step in that direction is the adoption of Preiser's organising principles. As the late Donella Meadows said "*We can't control systems or figure them out. But we can dance with them*" [12].

Acknowledgements:
The author would like to thank Dr. Rika Preiser, Senior Researcher, Centre for Complex Systems in Transition, School of Public Leadership Stellenbosch University, for her advice and also Prof Claire Collins and Prof. Jane McKenzie, Henley Business School, Henley-on-Thames Oxfordshire for their helpful review and suggestions.

Declaration of Conflicts of Interest:
The author has no relevant conflicts of interest to declare.

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