Complexity Theory: An Introduction

NURS 602 – Assignment #1

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Introduction and Context for Seeking an Understanding of Complexity Theory

While researching for a paper on philosophical terms in nursing, I learned about complexity theory and realized this theory helped to explain what I had observed and experienced in the context of my work with older adults in residential care. The ninety residents who lived in this complex care home had some form of dementia in addition to other health issues, and came to our facility with their own physician providing their care and of course everyone had their own family. In other words each resident was a complex system themselves. In order to carry out the clockwork activities that occurred (meals, cleaning, medication administrations etc.), the departments including nursing, housekeeping, dietary, administration and maintenance had to run efficiently and in harmony with each other. In addition this, our facility worked alongside other agencies such as the health authority which provided our funding and monitored resident and health and safety. In this multi-system, complicated environment, I understood and witnessed the fact that any change resulted in many effects, at times, effects that were random and unexpected. An example was the implementation of the “No Smoking Policy” from the Ministry of Health that created issues of staff smoking on the road and neighbours writing letters of complaint to our Administrator. When I learned about complexity theory, it felt as though I had stumbled upon something that described what I had experienced – a form of inductive discovery. I am curious to learn how complexity theory can inform practice and the process of change within healthcare where the needs of the residents or patients remain the central focus of these complex systems. This paper offers a basic understanding of complexity theory that will develop with further exploration and thought.
Defining Complexity Theory

Complexity theory describes complex adaptive systems (CAS). “A complex adaptive system is a collection of individual agents with freedom to act in ways that are not always predictable, and whose actions are not always totally predictable, and whose actions are interconnected so that one agent’s actions changes the context for other agents” (Plsek & Greenhalgh, 2001, p. 625). Complexity theory originates from the sciences of physics, mathematics and biology (Holden, 2005) however it has been taken up in many disciplines including education, business and health care (Paley & Eva, 2011). It has received a significant amount of attention over the last decade, particularly, in how it relates to health care (Dattée & Barlow, 2010). This makes sense as Plesk (2001) notes that “across all disciplines, at all levels, and throughout the world, health care is becoming more complex” (p. 625). I imagine that most health care professionals would agree with this claim. Wilson (2009) notes that complexity theory aptly describes health care as “patients present with extremely complex issues including physiological, cultural, lifestyle, behaviours, political” (p. 19). What is intriguing about complexity theory is that even though it looks at the system or systems as whole, it “does not deny the scientific theory of the past and the enormous contribution of Newton and others, but looks beyond individual systems and sub-systems and acknowledges the importance of inter-relationships and context” (Wilson, 2009, p. 18). It is this inter-relationship lens that provides a more global way of viewing organizations and health care. It is important to note that systems thinking has been present in nursing for some time including Imogene M.King’s ‘Theory of General Systems Framework’; Martha Rogers ‘Science of Unitary Human Beings’; Sister Callista Roy’s ‘Adaptation Model’ (Holden, 2005). However, “complexity science merely represents the next stage in understanding how systems operate” (Holden, 2005, p.656) and...
offers insights into problems experienced in health care systems such as long wait times for services or admissions, nursing home resident outcomes – real issues that face our very complex health care system.

Characteristics of Complexity Theory

While complexity theory, the scientific study of dynamic systems, is difficult to define (Doll & Trueit, 2010), there are principles that help to explain it. Complex systems:

- Are dynamic and change constantly and are comprised of parts or elements that interact – it is the interaction of these elements that creates the system. The processes that occur in complex systems are non-linear (Doll & Trueit, 2010) and interaction leads to new behaviour (Plsek & Greenhalgh, 2001).

- Have self organizing agents- within each system agents follow their own rules (internalized) which in human systems are those values and beliefs that we hold (Plsek & Greenhalgh, 2001).

- Have “fuzzy boundaries” for example “memberships can change, and agents can simultaneously be members of several systems” (Plsek & Greenhalgh, 2001, p.625).

- Exhibit the butterfly effect: In order to understand complexity theory, one has to appreciate that a change in one area of an integrated, non-linear system will affect other areas and the fact that “small changes in one area can occasionally have large effects across the whole system” (Kernick, 2003, p.24).
Limitations to Complexity Theory

While complexity theory is a model that is intuitive to many, including myself, there is scepticism about its practical application and ability to be a full theoretical explanation. Paley and Eva (2011) note that they are cautious or ‘deflatory’ about complexity theory and refer to it as a ‘fad’ in health care. Their principle concern about the theory seems to be the lack of definition around the terms of complex adaptive systems and lack of well defined boundaries of the system. While it is healthy to be critical and evaluative of a theory the irony is that the very nature of this theory is to avoid reductionary thinking such as this. It is difficult therefore prove this criticism wrong as the very ontology of complexity theory is to remain irreducible.

Application of Complexity Theory to Leadership in Nursing

Complexity theory has the potential to inform practice for nurse leaders in a variety of areas including leading and implementing change in an organization particularly in areas where change is occurring across systems or departments. “Incorporating complexity science principles into nursing leadership practice promotes new ways of thinking about organizations and is a natural paradigm for the values and intended outcomes of professional work” (James, 2010, p. 139). Kernick (2003) notes that complexity theory can inform leaders about the presence and use of ‘power’ in an organization. “Power does not exist in agencies or structures but resides in the relationships that people have with each other as they try to understand who they are and construct their identities with each other” (Kernick, 2003, p.28). Kernick highlights the importance of relationships in complex system such as health care. This, in itself is often taken for granted and ignored in an attempt to force a change but in reality, I believe that it is the lynchpin as to whether a change will be successfully implemented or not. Plesk and Greenhalgh
(2001) provide insights into methodology for change in health care when they suggest to attempt “multiple approaches and let direction arise by gradually shifting time and attention towards those things that seem to be working best” (p.627). They suggest that practitioners use methods that explore new outcomes through “experimentation, autonomy, and working at the edge of knowledge and experience” (Plesk & Greenhalgh, 2001, p.627).

Conclusion

In a health care environment that is undoubtedly complex, there is pressure to provide care that is ‘person centred’, cost effective and ‘integrated’ (Dattée & Barlow, 2010). Complexity theory provides insights into change methods, power dynamics, and encourages us to watch for the unanticipated butterfly effects of change. While complexity theory may not be the answer to every problem or concern in healthcare I believe, at this point in my understanding and knowing, that it is a legitimate way to look at systems differently. It is a paradigm shift for many who believe that problems are understood by analyzing the parts. Complexity theory informs us to look at the big picture, follow through on the outcomes, anticipate changes and adapt along the way. It also emphasizes the presence of relationships within organizations and suggests we pay attention to the human elements in systems. I believe that the lens of complexity theory fits health care very well and I look forward to learning more about this theory. If we can view complexity theory as yet as another tool, with the belief that we all need a variety of tools for different jobs, I predict that complexity theory will be useful in the work that lies ahead.
References


