Patient-Provider Reciprocity as Complex Adaptive System

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Abstract

Context: Patient-Provider reciprocation is the axiomatic doctrine for adherence to treatment and satisfaction. Conventionally these interactions were solicited to decipher by archetypal mechanical system theory culminating in barely convincing assimilations and interpretation.

Objective: We propose the patient provider synergy as a complex adaptive system conducive to explain the epistemic uncertainties and multi-dimensional equations

Method: Review of the published and gray literature on patient–provider interactions, Complex Adaptive System, System Theory, Approaches to health care through traditional system theory, Web2.0 and key papers.

Findings: Patient provider interface is of leading concern and more substantial than the system concerns. The fundamental architecture of the CAS philosophically may robustly rationalize the various dynamics of these interactions, moreover it does surmount over the traditional system theory in conjunctions with its proximity with living system and competency to take care of various conflicts and surprises.

Conclusion: Patients–provider interactions may be visualized/anticipated in the light of CAS in pursuance of annex and evoke the retorts for wavering affirmations
**Key words:** Interaction, patient-provider, complexity, system, conflicts

It must be possible for an empirical *system* to be refuted by experience.

_-Popper,Sir Karl Raimund_

_The Logic of Scientific Discovery._

‘Health is the fundamentally different from other thing that people want and the difference is routed in Biology.¹ Jonathan Millar says- “of the entire object in the world the human body has the particular status, it is not only possessed by the person who has it, it also possesses and constitutes him…” ² Absence of wellbeing is going to hamper all other critical and crucial events necessary for existence and survival. Indeed; all the efforts directed towards attain perfect health and offering of user-friendliness health services is been articulated as fundamental human right in the constitution of World Health Organization, as ‘being healthy’ is the nucleus of all other activities.³,⁴ This hypothesis is pertinent to each and every individual be inherent in this planet without any exemption and omission. Thus the conductance and instrumentation of health care services at such optimum, enormous and substantial level is achievable by only synchronized, rationalize approaches and efforts with the fullest involvement of each and one stakeholder (get in touch with any summit during the journey of individual destined to achieve the perfect health).⁵,⁶ By viewing it generically and communally this is what a system is anticipated to produce.⁷

**What is a system entity?**

System is a set of interacting or interdependent entities forming an integrated whole.⁸ While systems can be broken down into subsystems and further in individual units but the spirit of an system lies in the multidimensional interactions among its constituents and the interconnections to accomplish a quantity of intentions.⁹ (Figure 1)

**Complex Adaptive System-**

Complex Adaptive System (CAS) is a distinctive organizational entity made up by the various dynamic set of association among various agents acting constantly in parallel manner and action-reactions forces are the innate part of the system.¹⁰-¹² There is no perceptible control or command of the system and but intangible/tacit cooperation and competitions does exist in the system and the overall behaviour of the system is the sum assures of these interactions.¹² (Figure 2)
Does patient–provider interactions are as linear as it seems?

“trust is primordially related to the behaviour, expressing caring, understanding the patient experiences and secondary to external factor(structural or staffing issue)…….hence the patient’s initial sense of trust (or mistrust) upon entering the consultation room may be dramatically changed positively or negatively depending upon the doctor’s performance during the interaction…………. Patient satisfaction intersects with health outcome and the perennial concern about consultations interwoven with both patient satisfaction and health outcome.”

In a meta analysis conducted by Hall and Doman considering 12 different dimensions of patient satisfaction; concluded that the provider related issue such as humanness, quality of care was of prime importance compared to system related structural issues. In a study at primary care set up in Israel the strongest predictor of general satisfaction detected was contentment with physicians' services. Apart from client satisfaction this is a frequently practiced behavioral pattern to interrupt or self termination of the some long lasting treatment by client himself. Since the non compliance or non adherence is an unavoidable by product of collision between the clinical world and other competing worlds of work, play, friendship and family life, strategies to cop up with the issue must be a inherent and integral component of treatment policies.

Regimen, recommendations for treatment and emphasis for optimum duration and dosage frame a prominent module of the patient–provider interaction. As a result this patient provider interface and patient adherence to treatment regimen are sturdily interconnected. Studies in HIV, Diabetes, Psychiatric illnesses and Hypertension do call attention to a good patient provider interaction for a better adherence. An assortment of unified concerns pertaining to this facet is coupled with information exchange, common ground for concerning expectation patient’s active role in interaction and provider positive effect, empathy and encouragement.

An voyaging at psychological plane, gives the notion that patient–provider interaction is vital because of two reasons-firstly; while judging value of care, people habitually critic the satisfactoriness of their care by that are immaterial to its technical worth and secondly consumerism of the patients; he desires and necessitate to be involved in the judgment distressing their wellbeing. To scrutiny it at micro level, to persuade a patient to tag on a treatment regimen, one must have the full co-operation and involvement of the patient to the treatment .Another pertinent fact is that patients often have considerable expertise in relation to their illness in chronic diseases and he will do better if these proficiency is tapped and incorporated into treatment plan.
Patient-provider interface may swing the product often in ambidirectional mode. Capability of the physician to obtain disease information, synthesis and assemblage of this nonfigurative into evocative diagnosis and yet again convey of this comprehension in terms of patient healing relies on a lot on hale and hearty interaction. Concurrently the evolution course of the physician as a active apprentice and explorer also depend on the aptitude to unwind the complexity of patient psychology and attributes which another time depends on the vigorous and spirited interactions.

Is patient physician random interaction constitute a complex adaptive system?

Progressively with the passage of time through the explicit and implicit innate ability of any human being to rationally interpret (and through the process of synthesis and antithesis) all the pertinent random events are being structured into some logical sequences and these webs of sequences ultimately form a prototype conceptual framework. This framework decides the further course of action. Complex Dynamic System has some intrinsic characteristics. This as per our speculation should be also the element of physician-patient dynamics, let’s try to extrapolate some distinctiveness on this dynamics-

Emergence

The principle of emergence tells about the random interactions among agents culminating into some patterns. These patterns translate into the future behaviour of agent and the sum of these patterns settles on the behaviour of the whole system.

When a care seeker enters into the outer periphery of the system; his interaction with his care giver takes place usually at formal, verbal and in pre designed fashioned but gradually and even at first exposure a informal, nonverbal and random component also plays a roll based on cumulative perceptual bidirectional exploratory experiences. As the physician and patient travel together from ‘known to unknown’ the informal component (randomness) gradually become privileged over formal communication. As a upshot of this interaction the whole system behaves in constitutive and composite manner

Co-evolution
Physician–patient dynamics are closer to evolving rather than adaptive temperament. The castle of the medicine is constructed on the foundations of evidences, which themselves are amenable to restructuring as the spectrum of vision widened. Physician provides all kinds of preventive, promotive, curative and rehabilitative services based on wisdom, confirmation and substantiation received as external inputs from surrounding environment, so internal environment is categorically being influenced by external one. Concurrently in this journey physician as a self–directed learner; travels around and discovers some unexplored and poorly known domains earlier also (learning from care-seeker) and now acts as a output for his exterior environment; therefore both change in this process to ensure best fit.

**Sub optimal**

A complex adaptive system does not have to be ideal in order for it to succeed within its environment. The performance of the system is to be measure relative to surrounding system and not on the absolute scale.

Medicine is an empirical and pragmatic science. There is nothing like unconditional and all inclusive; even in perceived basic sciences they do have variations from normal indeed there is nothing like standard and customary in modern medicine. This vagueness and ambiguity ensures that no modus operandi/technique /skill is ideal in the all state of affairs; nevertheless it does also ensure the twitchy and inexhaustible consumption of energy in a proficient manner to diminish entropy of the system. A system (and underlying an assortment of subsystems) traveling with the quest to attain perfect health need to be constantly moving and evolving. In fact uncertainty and paradox flourish in physician-patient liaison which is also a critical and vital part of ant complex adaptive system use incongruity to craft innovative promises to restructure with their upbringings.

**Connectivity**

A very fundamental concept about the health is that while venturing to attain a perfect health (by patient/physician) multiple factors (social/economical/political/spiritual/mental …) operate and interact in a multifaceted and involved manner and the fate of patients and physician labors depend on the yield (output) of these webs of interactions. The associations in the midst of the driving forces (agents) are more crucial and imperative to a certain extent than agent itself. The ways in which the agents in a system connect and relate to one another is critical to the survival of the system, because it is from these connections that the patterns are formed and the feedback disseminated.
Simple Rules

Fundamental principles of any complex adaptive system are very straightforward and easily understood; although end output may be variegated multicolored but it is just the amalgamation of assorted proportion of basic colours. Health care deliverance philosophically is also been governed by some fundamental rules like-to listen, to inspect, to think, to differentiate, to integrate and most imperative to feel. Structure stand upon these cognitive, affective and psychomotor component may be thorny but underneath flow is smooth and streamline.

Iteration

A systematic small deviation in the process beginning or during the course of interaction may affect the outcome at significant level (analogues to bias in clinical observation). A breast cancer chemotherapy with misinterpretation of estrogen receptor block may affect the survival of the patient.

Self Organizing

A physician and a patient cooperate at a common podium for achieving some common minimum goals. The system acts in complete solidity, cohesion and synergy. There is no chain of command and control in such complex adaptive system. This has emerged from a common expedition with aspire to achieve perfect health. Approach to the journey is unstructured or semi-structured (some procedures do glimpse to behave in structured fashion but these structured ways also unwrap the bundle of individual uniqueness.) Decisions are taken on a shared basis and as a matter of standard before implementing any crucial procedure patient is being informed at every juncture; however concurrent steady appraisal also ensures to seek out the most advantageous way to deal with.

Edge of Chaos:

Kernel of the life is diversity at genomic, environmental and corporeal echelon. This assortment is being addressed by the medicine by some assembly of textual and factual approaches which facilitate an apprentice to cross the threshold and enter into the uncharted and unrefined provinces of medicine. By this hypothesis Internal Medicine gives the notion of after runner of basic sciences and submission to most indispensable essentials which smooth the progress of the learning. Concurrently medicine can be
depicted like a circle with centre point everywhere but periphery nowhere with infinite radius; because by our present comprehension whatsoever we know about the human body is very modest and human body itself is the most complex machine so anarchy, commotion, mystification and disorders does exist in medicine. Nevertheless thanks to unambiguous talent of human being to think and retort we have the weapons to take care of this insecurity.

Implications

In a study published from Ethiopia evaluated the HIV-AIDS clinical care and found that all the resources recommended by the National Antiretroviral Therapy implementation guideline were continuously available; even though important component of care and treatment recommended were not delivered to significant number of patients. The conclusion of the study is that availability of the resources alone does not ensure the quality of the care.25

Similarly in a retrospective medical record review of all hospitalizations for Medicare patients discharged with a principal diagnosis of AMI demonstrates that many Medicare patients may not be ideal candidates for standard therapies, but these treatments were under-used, even in the absence of discernible contraindications and these setting were well equipped consisting all acute care hospitals in Alabama, Connecticut, Iowa, and Wisconsin.26

If we visit virtually at US national Library of Medicine (PubMed) and access to » Health Services/Technology Assessment Text (HSTAT) Archive Collection » AHCPR Archived Clinical Practice Guidelines we obtain 19 guidelines on a range of ailment like pain, Cataract, Alzheimer, depression, sickle cell disease, post-stroke, smoking cessation and so on. These meticulously and comprehensively documents were written during 1990-2000 and today after a short span none of the document is viewed as a guidance for current medical practices.27

Above we discussed three scenario seemingly nowhere related to each other and they seem to be different facet of health care delivery system.

Begun in his paper argues that system word invokes the metaphor machine and that machine metaphor persuade to visualize health care event or interactions as a part of
machine rather than a living entity and this metaphor is more approximate to Complex Adaptive System.\textsuperscript{24}

Analyzing the above first two scenarios with traditional system theory all inputs, processes, standard guidelines, system specialist (authority/operator) were suffused in controlled environment and outcome should had been programmed, optimum, customary and consistent as per the mechanics nevertheless corresponding outcomes were very odd and anomalous so these might not be portray with established system theory.

In the scenario -3 we comprehend that how swiftly medical practice theories, assumptions are altering in light of state-of-the-art acquaintance with previously concealed domains and the velocity of transformation and revolution is very expeditious.

How a traditional input-output mechanics explain this world’s most complex scenario?

The different types of patient –provider models are being prescribed to understand this complex phenomenon-like Werbarian model consisting of paterlinistic, informative, interpretive and deliberative type Vetah’s model consisting of engineering model, collegial model and contractual models, Mays’s model consisting of code, contract and covenant Ozer’s model as commercial, guide and imperative model.\textsuperscript{28} The common theme in these all models are that they have various presumption beforehand; and trust that if a patient or provider inherit a specific trait he/she will perform in a speculative manner and the sum assure of the behaviour will be the reflection of the system so system acts in linier manner. While assuming so we forget to include the ‘conflicts’ emerging and settling during whole of the exercise .These conflicts may be metaphorize to a radioactive sub-atomic particle which randomly budge, craft bonds, emits, disintegrate and make new formations within the system so while visualizing from above system appear unwavering but within a lot of random communications and exchanges are there (and these interactions may be in any directions) so the behaviour of the element at a particular point of time diverse from another. Now similarly behaviour of the provider-patient relationship is also been influenced by outer and inner preferences(conflicts) and as these preferences are also depend on several other factors like socio-demography, politico-administrative, economy, structure of the society, patient –provider previous cumulative experiences during the journey( which may again acting in non-linear fashion), milieus and also on some unknown factors (these factor act in unpredictable fashion and interact randomly –situational dependence)

A mechanical system will rarely exhibit the surprising element as reductionism assumes the parts and interconnections among these part is fairly predictable while in reality they are not …………………………when the people default or do not adhere they are blamed for showing resistance.\textsuperscript{29} This reductionism model may be very much of significance in the mechanics but non adherence or user satisfaction may not be viewed as a sum assure of
mean total of certain factors. A mechanized coded preformed scored questionnaire may not predict outcome optimally.

After hypothesized the interactions among patient and provider are essentially either a component of larger macro CAS (health care delivery system) or itself a complex adaptive system (micro system) the consequences may be as under-

Study of conflict-issues like non-adherence, patient satisfaction, concurrent ambidirectional participatory learning may be addressed by adopting the principle and theories of CAS. The factors of uncertainty and unpredictable outcome may be nullified by discoveries regarding CAS that validate and peep through the interactions about human in conflict such as-

Nothing is like a neutral observer; alone observing is affecting the system

System in conflict can be described by a bunch of interacting objective realities and not a single one,

The so called system is arbitrary. Interconnectedness is omnipresent.

In a CAS absorvant capacity of the system or assimilation is much. This system is much receptive to the stimulations and the internalization of the stimulus is more. The only issue of concern is that it behaves in non-linearity and random manner so perceptible and predictable output is always not a reality.; but even though if the stimulus does not result in the reorganization of the system and there will be reshuffling in the elements resulting the reorganization within the system and at interface either entire system become adapted to theses changes or initiate the cascade of phase manner evaluation.

Conflict of Interest: None declared.

References


**Figure 1:** Interaction in a system; In a system various components arrange in hieratical manner wok in synergy to maintain homeostasis (when disturbed by the external factors) and in the absence of any convergence the process of entropy causes energy within the system to dissipate
Figure 2: Complex Adaptive System.; in a complex adaptive system, there are multiple interactions among stakeholders and system output is the sum assure of this. Sub-optimization and flexibility hence evolution (adaptation) are the characteristics of such system.