Special Section Commentary

Emergent properties define the subjective nature of health and dis-ease

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Abstract *Health* and *dis-ease* by their etymological origins refer to an evaluative, not objective, state. Health is an adaptive state, constantly reestablishing itself through interactions between the many biological, social, emotional, and cognitive factors in a person's life. Such adaptive processes define health as an emergent state. Outcomes of emergent phenomena are not precisely predictable and reside in a phase space that contains all possible states ranging from perfect to poor health states, the latter reflecting dis-ease. However, we have seen a migration of meaning from the subjective, dis-ease, to the objective, disease, referring to uniquely identifiable biomedical change. Clinical reality though teaches us that many experiences of dis-ease are not associated with any objective abnormality, an insight with important implications for clinical care and health policy.
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Introduction

> Health, hmm, I'm not sure, but I know when I don't have it. (Patient view)

Defining *health* can be seen as a kind of Holy Grail – philosophers of health, academics, clinicians, and policy makers all search for an objective definition that can be implemented in practice. Bircher and Kuruvilla's[1] paper in this edition of the journal offers another proposition:

> Health is a dynamic state of wellbeing that occurs, when biologically given and personally acquired potentials together fulfil the demands of life. In order to achieve health throughout life the two

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> potentials and the demands of life are continuously reconstituted by transactions between individuals, societies and environments commensurate with age, gender, personal and societal responsibilities, culture, and other factors. If in any situation the two potentials are insufficient to satisfy life's demands, the state is disease.

Their definition of health hinges on the interaction of three variables: "biologically given potential", "personally acquired potential", and "demands of life".

The Meaning of Terms

The etymological origin of health, meaning whole, describes an evaluative state. So, too, does disease, meaning *dis-ease* or discomfort. Pathology, on the other hand, has an objective meaning: the unbiased findings underlying the state of *dis-ease* (detailed descriptions are attached in the appendix). We clearly see a migration of meaning for health and disease from their original evaluative thus subjective meaning to an objective one.

If health and disease are objective they should be fully knowable. However, if they cannot be fully knowable but only appreciable then they cannot be uniquely definable. The issue of knowing has been studied in depth by Polanyi[2] who pointed out that most knowledge is personal and cannot be precisely defined – and I content that this is true for understanding health and dis-ease – whereas only explicit knowledge – like pathology – can be objectively defined and described. However, even explicit knowledge consists of many different facets, is socially constructed and thus open to interpretation and debate – any object can be experienced through many different lenses (Think about the story of the three blind men who explore an elephant by touching different parts of it and afterwards have an argument what an elephant does look like), although it remains the same object[3,4] (for detailed discussion see references: complexities of knowledge[5] and complexity of knowledge in medicine[6]).

The Many Different Facets of Health – Embracing Complexity

Previous work exposed many different definitions of health that highlighted subjective (for example, Husserl, Parson, Dubos, Tissue, Kehlman, Antonovsky) and functional aspects (Seedhouse, WHO Ottawa

Charter for Health) as well as systemic dimensions (interconnected and interdependent) (Plato, Huserl, Dubos, Illich, Antonovsky, Reid, Sturmberg).[7–9] Bircher and Kuruvilla's definition has taken account of the multifaceted nature of health, and rightly emphasised the "complex adaptive nature of health"[9,10] resulting from interactions of the "personal" and "acquired potentials" and the "demands of life" – an existential proposition for the survival of the kind.

Embracing complexity principles, Bircher and Kuruvilla allude to three important concepts regarding health – *context, interdependence, and emergence*.[11] Health requires continuous "reconstitution of the two potentials and the demands of life", that is, health is an emergent phenomenon. Importantly though, emergence leads to outcomes that show new properties that are not present in or predictable from understanding the properties of the interacting components. In addition, the initial conditions at the start of the process explain the *deterministic behaviour* (also referred to as deterministic chaos) resulting from such interactions. Although adaptation indeed is a process to meet the changing, that is, emerging demands of life, the outcomes of this adaptation – the health of the person – cannot be precisely depicted.[9,10,12] Their outcomes reside in a *phase space* where the phase space represents all possible outcomes of the adaptive process.

Since the phase space represents all possible states of health over time, health at a particular point in time can only be described in approximate (or qualitative) terms. One such – implicit – approach is the global health rating scale used in the various 'short form' questionnaires – "how do you rate your health on a scale of excellent, very good, good, fair or poor".[13]

Can There Be a 'Non-Health State' Called Disease?

The basic proposition that health is the emergent product of a dynamic nonlinear interaction between the "biological potentials", "acquired potentials", and the "demands of life" is a useful model to conceptualise the nature of health. However, Bircher and Kuruvilla do not take the complexity insights to their full conclusion; they correctly identify that health is a *state* but miss that this state is one of many possible states in the phase space (of health) and does include states of poor(er) health, suboptimal to meeting the "demands of life". It still is a state within the same phase space, but not a 'new state' called 'disease'.

Two important and interrelated questions arise at this point: Can health be objectively defined? and Can there be a non-health state? or more precisely: Can we call a non-health state 'disease'? Both from an etymological as complex adaptive perspective the answer to both questions would be 'no'.

Health defines a subjective experiential state, as does dis-ease. Health and dis-ease as subjective states[9,10] need to be distinguished from the migratory notion to *objective disease*, the colloquial understanding of identifiable biomedical abnormalities of medical conditions (one needs to emphasise that these are all socially constructed and change over time, for example, chronic fatigue syndrome). To illustrate: a person whose "biological potentials", "acquired potentials", and "demands of life" are met and thus fulfils Bircher and Kuruvilla's criteria of being in health still can experience worries or concerns that put him at dis-ease. Unfortunately the notion of dis-ease is emphasised in the paper only in regards to physical complaints – "the Meikirch Model includes the possibility for a person to be healthy despite physical complaints (i.e. dis-ease)" – and should have equally highlighted emotional and cognitive sources.

The Need for Progress

Despite these critical comments Bircher and Kuruvilla's work is important as it aims to find a definition of health that can be pragmatically implemented in clinical practice. It is time to acknowledge the subjective nature of health and dis-ease and distinguish it from the biomedical notion of discrete visualisable (be it anatomical or biochemical) changes.

It appears more useful to focus on the implication of the subjective nature of health and dis-ease as experienced by our patients to guide our practice of medical care and health policy so that it truly meets the needs of our patients (as expressed by William J. Mayo in 1910 in his speech to the graduating class of Rush Medical College[14]).

About the Author

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Appendix

health (n.) Old English *hælþ* 'wholeness, a being whole, sound or well', from Proto-Germanic **hailitho*, from PIE **kailo-* 'whole, uninjured, of good omen' (cf. Old English *hal* 'hale, whole'; Old Norse *heill* 'healthy'; Old English *halig*, Old Norse *helge* 'holy, sacred'; Old English *hælan* 'to heal'). With Proto-Germanic abstract noun suffix **-itho*. Of physical health in Middle English, but also 'prosperity, happiness, welfare; preservation, safety'.

disease (n.) early 14 c., 'discomfort, inconvenience', from Old French *desaise* 'lack, want; discomfort, distress; trouble, misfortune; disease, sickness', from *des-* 'without, away' +*aise* 'ease'. Sense of 'sickness, illness' in English first recorded late 14 c.; the word still sometimes was used in its literal sense early 17 c.

pathology (n.) 'science of diseases', 1610s, from French *pathologie* (16 c.), from medical Latin *pathologia* 'study of disease', from Greek *pathos* 'suffering'+-*logia* 'study'. In reference to the study of abnormal mental conditions from 1842. Ancient Greek *pathologia* was 'study of the passions'; the Greek word for 'science of diseases' was *pathologike* ('pathologics').

(Online Etymology Dictionary)