

The Evolution of Family Medicine: A Focused Review

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Abstract

This focused review will trace the evolution of family medicine from an early orientation towards “general practice” to a broader and more comprehensive approach to delivering safe and effective medical services to individuals, families and communities over the lifespan. Beyond the initial focus on infectious disease, family medicine attempts to integrate relevant scientific findings from other medical fields as well as psychosocial and information science. Using such concepts as complex adaptive systems, a more mature and comprehensive synthesis may be achieved, allowing family medicine to be a leader in the ongoing efforts to improve medical care.

Keywords: *Family medicine; Infectious Disease; Public Health; Health Psychology; Complex Adaptive Systems; Phase Transitions; Emergence; Self-Organization*

INTRODUCTION

The practice of medicine as a profession emerged from a combination of physical, personal, cultural and spiritual practices over at least the last several hundred years. Surgery emerged from barbering while medication and psychosocial intervention arose from shamanism and other religious or spiritual healing arts. Considered by some as the oldest medical specialty, family medicine was known originally as general practice and attempted to provide comprehensive care throughout the lifespan, with a focus on families and their related dynamics. Child health, maternal care and minor surgery were original areas of focus, but as the 1966 Folsom Report stated “each American should have a personal physician to ensure the integration and continuity of all medical services.” Since this lofty goal was enunciated, family medicine has evolved to encompass a wide variety of important innovations. This article will review these developments focusing on the most potent synthesis of available scientific conceptual and technological resources. It will conclude with a proposed Family Medicine App which incorporates this synthesis.

While the discovery of the role of microbes in infectious disease was a landmark that allowed targeting specific

pathogens, it also had an unintended consequence of reinforcing a very reductionistic approach to medicine; the search for “silver bullets” that could stop specific pathogens. This ignored the role of public health as the major cause of decreased morbidity and mortality, as exemplified by John Snow’s removing the Broad Street pump handle and drastically reducing the London cholera epidemic. Further, reductionism limited the salience of psychosocial factors by emphasizing pills and surgery as defining medical practice. Family medicine, allied with health psychology and related behavioral sciences, countered this trend by bringing training in psychosocial concepts and interventions into family medicine residency training programs. This made clear the role of psychosocial variables in the genesis and maintenance of disease and suggested relevant interventions. George Engel (1977) was influential in establishing a more comprehensive approach to health care by introducing the term “biopsychosocial model” as a “new medical model” which was adopted by many leaders in the family medicine field.

MATERIALS AND METHODS

This review will focus on the development of family medicine with attention to key inflection points

where family medicine defined crucial conceptual elements, beginning with the infectious disease model and including the public health, psychosocial, and emerging technologies. Selective literature will be cited and discussed to provide an integrative synthesis of these developments with a view of the future of family medicine.

DISCUSSION

As the fields of clinical and health psychology grew in importance, a great variety of concepts and techniques were developed that became integral to progressive family medicine. Some examples include the recognition of the role of stress and coping in health and illness (McEwen, 2018), the importance of social support and inclusion (Cacioppo and Associates, 2013), the significance of attachment as a determinant of lifelong physical and mental health status (Bowlby, 2010; Johnson 2011), and the scientific study of resilience (Spira and Drury, 2012; Southwick and Charney, 2012). Many psychological and self management interventions were applied in family medicine settings both by clinical health psychologists and family practitioners themselves. Obvious examples are cognitive-behavioral therapy (Hollon and Beck, 2013), motivational interviewing (Miller and Rollnick, 2012), mindfulness (Kabat-Zinn, 2013) and other meditative practices, and the self-management of diet, physical activity and addictive substances such as alcohol and other drugs and activities. The social sciences have also continued to make important discoveries in the areas of group functioning, social cognition (Kahneman, 2013), bounded rationality (Gigerenzer and Selten, 2001), and racial and other forms of bias and discrimination. Such findings have lead family physicians allied with psychologists and other behavioral scientists to take active advocacy and social policy positions to impact political decision making which bears on health and well-being issues. These issues include not only the effects of conditions such as poverty, income inequality and discrimination on health status but structural issues within the healthcare field, such as costs of pharmaceuticals, the costs/risks/benefits of medical treatments and the shifting focus towards the outcome of treatments.

Technology's exponential growth has not only given medicine a plethora of medical devices which improve patient care, but a set of conceptual tools that are

unparalleled. As information science has used solid state technology in both computation and networking applications, the nature of medicine is changing. Previously bulky and expensive technology useful in both

assessment and intervention has now been miniaturized and the cost reduced so that procedures once requiring hospitalization may now be done on an outpatient basis and in some cases, in the patient's own natural environment. Additionally, new approaches to imaging, such as computerized axial tomography, functional magnetic resonance imaging and positron emission tomography have given much greater insight into the structure and functioning of living organisms. These tools have been particularly valuable in the related fields of cognitive, affective and social neuroscience. Information science has also facilitated the study of such developments as artificial intelligence, machine learning, bioinformatics and digital health mature.

All the above innovations have been in existence for some time and have generally gained wide acceptance in family medicine. Currently, however, the study of complex adaptive systems (CAS) has emerged as a powerful potential contributor to our understanding and management of human suffering(Capra and Luisi, 2015). Systems thinking developed originally in physics and biology, with major attention deriving from scientific cosmology (Gell-Mann, 2010; Kaufmann, 2012), along with popular interest in complexity (Mitchell, 2009) and chaos (Gleick, 1987). One of the first elements of this approach was the observation of phase states and phase transitions, which are easily observed in water's transition from gas to liquid to solid; but characterize many complex systems. Also of great interest to those in health and well-being fields is the study of emergence in which new forms of organization manifest as phase transitions without apparent external intervention. While well documented in recent physics and biology research, such phenomena sometimes seem counterintuitive or acausal, and represent the overwhelmingly non-linear nature of most living systems, rather than the linear cause and effect paradigm which has historically characterized physical science. A related phenomenon is self-organization, which occurs when a system composed of agents which follow specific rules is perturbed and a new entity "creates itself" without any central control and command function. Although CAS

describe various hierarchical organization structures, it also devotes significant attention to the “bottom-up” nature of system dynamics, in contrast to the traditional scientific “top-down” conceptualization. Most relevant to this review is the work of Sturmberg (2013), who describes health as a personal complex-adaptive state and Drury (2017a), who unravels health as an emergent property of a larger CAS. They both note that the nonlinear system dynamics characteristics which typify living organisms helps explicate the emergence of states of disease and health states as the result of an ongoing interactive pattern of multiple system elements which only infrequently seem to mimic a simple cause and effect pattern. This area of inquiry is in a relatively nascent state and much research and conceptual realignment is necessary to integrate CAS into medical practice.

As an example of the proposed integration which is currently being developed into a health care and well-being app, a miniaturized biosensor system which can acquire and transmit biomedical data to an algorithmic analytic engine which can provide both both assessment and treatment functions will be described (Drury, 2014). We have developed a small and inexpensive wearable microelectronic device which unobtrusively collects continuous ECG, 3 dimensional activity and respiration data, using Bluetooth technology to transmit that data to a laptop computer. This data can be processed to derive heart rate variability, a sensitive measure of the functioning of the vagus nerve and a continuous predictive indicator of health status (Campos, 2017; Drury et al, 2017b; Thayer et al, 2012; Porges, 2007). Such a system could be used in family medicine to inexpensively and continuously monitor patients who need surveillance and may also need prompted intervention, using either self-control techniques or professional intervention. This approach has been demonstrated to effectively differentiate chronic heart failure patients from normals, using IBM’s Watson Analytics (Giudi, 2016). This proof of concept may facilitate its use not only in clinical family medicine applications, but also in digital epidemiology and population health, healthcare system reform and even policy formation. Since heart rate variability is also a measure of positive functions such as executive cognitive processing, it’s applications may extend to a variety of other, non-medical uses. But clearly, this is only one example of the potential continuing evolution

of family medicine, which may increasingly realize the goal of truly safe and effective personalized medical treatment, health promotion and disease prevention.

CONCLUSION

Family Medicine has developed from an early emphasis on general practice focusing primarily on child and maternal care and minor surgery, to an increasingly sophisticated effort to provide integrated continuity of medical care for individuals, families and communities across the lifespan. It has benefitted from allying itself with the psychosocial and information sciences and is a vehicle for the continuing evolution of medical care. Particularly important are the inclusion of organizational means for delivering safe and effective health outcomes and attending to population health, as well as individual health status. This will include translational research to more adroitly specify personalized health care, beyond just genetics and changes to the professional education of family medicine practitioners. The current synthesis of traditional medical and innovative psychosocial and information science concepts and practices will catalyze such an outcome.

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