Dynamic Chiropractic

CHIROPRACTIC (GENERAL)

System Dynamics Modeling and Utilization of Chiropractic Care

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Some physicians complain about the nature and extent of potential overlap of services provided by nonmedical health care providers. The medical establishment has been asking policy-makers whether the different groups are working in a complementary way. In other words, are health care providers delivering the same or similar service to different patients? Or are they collaborating by providing altogether different service to the same patients? Or are they competing by offering the same service to a subset of shared patients?

The original argument for expanded privileges of nonmedical health care providers was to cost-effectively provide much-needed acute care for disadvantaged populations, in addition to self-help education and preventative advice to those patients in underserviced rural areas. Both doctors of chiropractic and patients welcomed this initiative.

Recent trends whereby patients receive health care from multiple providers, the so-called multidisciplinary model, has revealed evidence of greater integration and superior outcomes when transdisciplinary communication works to facilitate coordination and collaboration. However, fragmentation and a lack of continuity in care occur when the providers are discovered to be competing with each other.[1]

Conventional forms of problem-solving, action planning and evaluation often exclude or ignore precisely those features of dynamic complexity that make health care challenges so formidable and good policy responses elusive. Recognizing health as a system of structured relationships adds value to diverse methodologies, like chiropractic care, and provides learning opportunities for policy analysts that demonstrate how such systems are organized, how they behave over time and how they can be better governed in dynamic and democratic contexts.[2]

The modeling methodology of system dynamics is well-suited to address the dynamic complexity that accompanies increased utilization of chiropractic services in the hope of mitigating some of the economic stressors challenging the mainstream health care environment. The system dynamics approach was developed by Jay W. Forrester at the Massachusetts Institute of Technology and involves the development of computer simulation models that portray processes of accumulation and feedback that may be tested systematically to find effective policies for overcoming policy resistance.

System dynamics modeling of chronic disease prevention should seek to incorporate all the basic elements of a modern bio-ecological approach including disease outcomes, health and risk behaviors, psychosocial factors as well as health-related resources and delivery systems.

Conventional analytic methods are generally unable to satisfactorily address situations in which population needs change over time and in which risk factors, diseases and health resources are in a continuous state of interaction and flux. Dynamically complex problems are often characterized by long delays between causes and effects and by multiple goals and interests that may in some ways

conflict with one another. In such situations, it is difficult to know how, where and when to intervene because most interventions will have unintended consequences and will tend to be resisted or undermined by opposing interests or as a result of limited resources and capacities.[3]

Process modeling has demonstrated success in effective quality improvement from a patient-centered perspective through the use of flowcharts; visually effective activity diagrams for describing individual or group roles and responsibilities; and communication diagrams to better understand the interactions between different complex processes.[4]

System dynamics is a methodology for mapping and then modeling the forces of change in any dynamically complex system so that their influences on one another can be better understood and the overall direction of the system can be better governed. The methodology enables planners and policy-makers to assemble their knowledge of a problematic situation into a single, visible, dynamic hypothesis and then, using computer simulations, formally compare various scenarios and competently navigate change.[5] Dynamic models of proposed health care change address the following:

- specific aspects of a the system's behavior that is of concern (e.g., chiropractic utilization);
- features that change over time;
- the direction that the system is headed if no new action is taken;
- other directions and systemic behaviors if different decisions are made; and
- the prime movers that can change a system's behavior and direction.

System dynamics modeling does not forecast the future, but rather identifies action steps that can trigger plausible reactions, sooner than later. Unlike time series models, which describe trends in observed events, or multivariate statistical models, which clarify patterns by identifying drivers and correlates of historical trends, system dynamics models focus on the causal structure out of which events and patterns emerge. Such models enable analysts to anticipate new trends, learn how various policies can play out over time and set justifiable goals for the future. Dynamics models do demand deeper causal theory, implying a greater degree of uncertainty. But they are also more robust for long-term foresight and a more valuable source of policy guidance.

System dynamics is designed to capture the dynamic complexity inherent in feedback systems and highlight forces that are under individual control. Modeling is an iterative process of scope selection, hypothesis generation, causal diagramming, quantification, reliability testing and policy analysis.6 The refinement process continues until the model is able to satisfy requirements concerning its realism, robustness, flexibility, clarity, ability to reproduce historical patterns and ability to generate new insights.

Research on the utilization of health services suggests that there are important manipulable (policy) dependent variables (such as health care manpower distribution, insurance coverage) and non-manipulable (control) independent variables (age, sex, race and residency) that might be incorporated into a framework for the study of access to health care. "Access" implies entry to the health care system. Characteristics of the system and of the population may influence whether entry is gained; but the proof of access, per se, is not the availability of services and resources, but whether they are actually utilized by the people who need them.

Health service utilization research provides a framework to describe those factors that inhibit or facilitate entrance to the health care delivery system as well as measurements of where, how often and for what purposes entry is gained and how these inhibiting (or facilitating) factors operate to affect admittance.

The outcome indicators such as chiropractic utilization and patient satisfaction reflect the end products of health policy regarding "access." Utilization would specify the type of service used (chiropractic versus conventional medicine), the type of facility, the purpose of the care received (acute care, prevention, long-term care), the time interval (to first treatment and return to normal function) and continuity in terms of the number of different providers utilized for a given episode of care. Satisfaction considers convenience, cost, coordination, courtesy, medical information and overall quality of care, as well as the percentage of those who wanted care but did not get it and why.

System dynamics modeling is a powerful tool and should include consideration of increased chiropractic utilization when health care policies are under review/revision.

References

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