Essential drugs policy in three rural counties in China: What does a complexity lens add?

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ABSTRACT

In 2009 the government of China identified an essential drugs policy as one of five priority areas for health system reform. Since then, a national essential drugs policy has been defined, along with plans to implement it. As a large scale social intervention, the policy will have a significant impact on various local health actors. This paper uses the lens of complex adaptive systems to examine how the policy has been implemented in three rural Chinese counties. Using material gathered from interviews with key actors in county health bureaus and township health centers, we illustrate how a single policy can lead to multiple unanticipated outcomes. The complexity lens applied to the material gathered in interviews helps to identify relevant actors, their different relationships and policy responses and a new framework to better understand heterogeneous pathways and outcomes. Decision-makers and policy implementers are advised to embrace the complex and dynamic realities of policy implementation. This involves developing mechanisms to monitor different behaviors of key actors as well as the intended outcomes and unintended consequences of the policy.

Introduction

In April 2009, the State Council of China released the guidance and plan for a new round of health reform (Xinhua, 2009). This was the launch of the most radical and comprehensive health reform in Chinese history. Chinese policy-makers regard the essential drugs policy as a leverage point for changing the whole health system. They hope that it will make essential drugs available, control drug costs and reduce the irrational overuse of drugs, such as steroids and antibiotics.

In 2009, a plan was issued defining key actors, their responsibilities, and targets for implementation of the essential drugs policy reform (Ministry of Health and Other Eight Ministries, 2009). It outlines that: 1) the National Joint Committee on Essential Drugs (composed of representatives from the nine ministries and coordinated by the Ministry of Health) will compile the essential drug list and issue policies regarding drug pricing, quality assurance, and compensation of health providers; 2) provincial governments will be in charge of centralized drug tendering, procurement and

pricing; and 3) all basic public health facilities at or below county level should purchase and use essential drugs and implement a policy of zero markup of retail drug prices above cost.

According to Health Minister Chen Zhu, the policy framework of the national essential drugs system is like a piece of "complex system engineering", which is composed of seven interconnected parts (CCTV, 2009): 1) essential drug list selection and management of future adjustment; 2) production and supply of essential drugs; 3) pricing and sale with "zero markup"; 4) rational delivery and use; 5) proper compensation mechanism; 6) safety and quality assurance; and 7) performance evaluation of the operation of the system itself. Under each system part, a set of procedures need to be formed to guide proper implementation. The seven parts combine together to form the institutional framework for the essential drugs system in the country.

The World Health Organization (WHO, 2011) defines essential drugs as drugs that can meet the basic needs of the people. The selection of essential drugs must be based on public health relevance, evidence on efficacy and safety, and comparative cost-effectiveness. Essential drugs should be available and affordable to communities and their quality and safety must be assured. The Chinese health system has many actors at different levels, such as health providers, hospital managers, county and provincial officials,

manufacturers, insurance agents, regulators, and patients. These actors may respond to the essential drugs policy by changing their behaviors in ways that produce positive or negative effects. The new policy adds complexity to the healthcare system by changing the rules and relationships between these actors, and emphasizing certain outcomes such as cost containment and proper drug use.

After initial implementation of the essential drugs policy, experiences and problems from local implementation need to be collected. A team of evaluators from the China National Health Development Research Center (CNHDRC) was commissioned by the Ministry of Health to do an initial evaluation of the implementation of the essential drugs policy. This paper documents their attempts to interpret findings from a study they conducted in three rural counties in the Western region of China.

The authors explored recurrent themes or problems in the different contexts of the three counties, to find out coping mechanisms of main actors and their potential impact on the policy implementation and come up with rapid feedback to policy makers and implementers. They found that conventional program evaluation designs were not applicable to the diverse and complex contexts. They applied complexity theory to better understand initial implementation of the policy in the Western rural settings, in the hope of framing the issues faced in policy design and implementation and preparing a model for evaluating policy implementation.

Conceptualizing implementation of the essential drugs policy as a complex adaptive system

Complex adaptive systems and its use in healthcare system analysis

Complexity science, or study of complex adaptive systems, originated from running agent-based models on computers which attempted to model complex natural or artificial behaviors, or more recently complex social phenomena such as health interventions and reforms (Paina & Peters, 2012; Rouse, 2008). In recent years, analysts have used complex adaptive systems to better understand health systems and their reforms (Atun & Menabde, 2008; Beverly, Glasgow, & Longstaff, 2004; McDaniel & Driebe, 2001; Plsek, 2003; Plsek & Greenhalgh, 2001; Paina & Peters, 2012; Rouse, 2008; Savigny & Adam, 2009). Many regard it as a helpful modeling framework to conceptualize complex health systems issues (Gatrell, 2005; Haggis, 2008, 2010; Lessard, 2007; McDaniel & Driebe, 2001; Plsek & Greenhalgh, 2001).

Complex adaptive systems consist of numerous interacting parts capable of self-organizing activities, adapting to outside environments and learning from experiences (McDaniel & Driebe, 2001; Paina & Peters, 2012; Plsek, 2003; Plsek & Greenhalgh, 2001; Rouse, 2008). In a health system, the interacting parts or agents can be comprised of individuals such as clinicians and patients or collectives of individuals such as clinics and hospitals, with agents fulfilling particular roles in the system, comprising processes such as the provision of medical services.

Complex adaptive systems are also nested and open, meaning that there are systems within systems, and that agents can exchange information and interact freely (Anderson & McDaniel, 2000; Gatrell, 2005). The self-revising movement of information, or feedback, may help the systems to change or stabilize (McDaniel & Driebe, 2001). A system may experience positive feedback loops that accentuate a change, or negative feedback loops that moderate a change (Gatrell, 2005). Co-evolution is also observed as systems not only change themselves but the world around them (Beverly et al., 2004).

With rich connections and interactions, agents are dynamic and produce nonlinear responses that often have system-wide impact (Gatrell, 2005; Paina & Peters, 2012; Plsek & Greenhalgh, 2001; Rouse, 2008). One agent's behavior may change environments of other agents, because boundaries between agents within or between systems are open and fuzzy (Gatrell, 2005; Plsek & Greenhalgh, 2001). Yet behaviors of apparently independent agents in social systems are based on internalized psychological and social rules, or by external policies and regulations (Rouse, 2008). Because agents' needs or desires reflected are not homogeneous, their behaviors may conflict with each other or with policy and system objectives.

Agents learn and adapt in response to behaviors of other agents or changes in rules, often in ways that produce self-organization (Gatrell, 2005; Plsek & Greenhalgh, 2001; Rouse, 2008). Self-organizing activities of agents enable the systems to change structures and adapt to changes in internal and external environments (Anderson & McDaniel, 2000; Gatrell, 2005). These behavior patterns emerge rather than being designed into the system. The nature of such emergent behaviors may range from valuable innovations to unfortunate accidents. Due to emergence, the whole system may be greater than the sum of the system parts (Lessard, 2007). As a result, one cannot predict system response by "summing" or "averaging" components (Gatrell, 2005). Outcomes of complex adaptive systems are shaped by adaptations and interactions of agents and components, rather than by central control or predetermined design (Anderson & McDaniel, 2000; Gatrell, 2005). Therefore, it is impossible to make exact predictions of system behavior.

Understanding complex adaptive systems provides us with a different perspective for analyzing complex healthcare organizations and systems in terms of the policy development, health management and evaluation (Beverly et al., 2004). Economic evaluation approaches have long dominated health policy evaluation (Lessard, 2007). Recently some authors suggest that complexity theory may help to conceptualize evaluation in healthcare, for notions such as self-organizing, emergence and nonlinearity may make up for what are missing from the current economic evaluation approaches (Gatrell, 2005; Lessard, 2007).

Some authors move one step further to use complexity theory in the evaluation of complex policy initiatives. In the past evaluation has mostly depended on linear logic models to examine a project's theory of change, while the recent decade has seen an emerging trend that use the complexity lens in evaluation (Barnes, Matka, & Sullivan, 2003; Patton, 2011; William & Iman, 2007). The new trend, named the developmental evaluation approach, shows some distinguished features. First, by looking at the system as a whole and exploring the interconnections or dividing lines (boundaries), the evaluator can have a more realistic view of the world in which his or her evaluation will take place. Second, a real-world policy or program is viewed as a complex adaptive system, with many systems entangled together and influencing each other. Third, the developmental evaluation method is more helpful in the context of social innovation where there exist no fixed models.

Local implementation of the essential drugs policy is a large-scale social intervention. We believe that a complexity lens can help to recognize uncertainty and the changing nature of policy implementation and discover recurrent issues or themes for further evaluation, which will be the key contribution of our study to health policy evaluation in China.

Implementation of the essential drugs policy as a complex adaptive system

In over three decades of health reforms in China, it has been observed that most reform is implemented incrementally (Liu & Bloom, 2010). Chinese policy makers appear to believe that