
1. Managing complex healthcare organizations

James W. Begun and Marcus Thygeson

MANAGING COMPLEX HEALTHCARE ORGANIZATIONS

It is well established that healthcare organizations are among the most complex in society. It also is well established that effective management practice in any organization or setting is context-specific; that is, what works in one context may not work in another. Healthcare management theory built around the assumption that healthcare organizations are distinctively complex, therefore, is likely to be more useful in management practice.

We review several guidelines for managing complex healthcare organizations that emanate from the theoretical assumption that healthcare organizations are complex. Some guidelines derive from what is referred to as “complexity science” or “complexity theory”; most come from observers who “simply” appreciate, implicitly or explicitly, that healthcare organizations are complex. (There is much similarity between guidelines that derive from the two sources, as one might hope.) We then make recommendations for taking more seriously the complexity of healthcare management in the education and research arenas.

WHAT IS COMPLEX ABOUT HEALTHCARE MANAGEMENT?

There are many ways to describe the complexity of healthcare management in the United States. A starting point for identifying complexity is the presence of multiple, diverse, interdependent agents. Interdependence among multiple, diverse agents produces novel outcomes, particularly when the agents and forces affecting the system are changing over time. Multiple, diverse, interdependent agents are present in healthcare organizations, most pointedly in the form of hundreds of specialized clinical healthcare professions and the administrators who attempt to help organize them into effective care delivery teams and units. The agents often

2 *Handbook of healthcare management*

diverge in their reporting and incentive structures. The specialized support and technical service workers add to the diversity of the delivery setting.

Putting a system of multiple, diverse, interdependent agents into motion, interacting to deliver healthcare, creates a vast level of complexity. In addition the agents themselves adapt and change over time, due to self-learning and development, or new requirements from regulatory, advisory, or legal sources, or other causes, and complexity is accelerated geometrically. Several authors have aptly summarized the resulting complexity of healthcare management in ways that help us comprehend and manage it.

The archetypal healthcare organization, the hospital, was labeled schizophrenic in its organizational structure by economist Jeffrey Harris (1977). Harris was referring to the formal administrative hierarchy versus the medical staff organization. The two personalities or sides of the hospital – administration and medical staff – are respectively characterized by formal hierarchy versus peer review, allegiance to the organization versus allegiance to the profession, and control versus autonomy. Complicating management decision-making is the fact that both sides of the hospital report separately to the governing board, and the medical staff often has more power than the administration, as the primary source of revenues and the arbiter of clinical quality.

A case can be made that nursing forms a powerful and semi-independent segment of the hospital as well. Nursing staffs have their own self-governance mechanisms and may be unionized, with significant power to force closure of the hospital during strikes. State laws may regulate the staffing requirements for different units in the hospital.

Members of the large number of other highly specialized clinical professions demand respect, a voice in decisions, and some degree of autonomy in setting quality standards. Most clinical professions, with pharmacy, physical therapy, and laboratory science being but three examples, have proud histories and strong socialization processes into the profession. The professionals typically are licensed and regulated by state boards rather than their employer organization. A consequence is that healthcare administrators generally shy away from interference in the clinical affairs of clinical health professionals (Mosser and Begun, 2013).

The concept of the professional bureaucracy nicely summarizes the challenge of managing in healthcare delivery (Mintzberg, 1983). Mintzberg's organizational archetype contains five parts: a strategic apex, middle management, support staff, technical staff, and an operating core. Managing an operating core comprised of clinical professionals and managing highly specialized support staff are quite different than managing workers in a production line and the relevant support staff

(Mintzberg's machine bureaucracy). The professional bureaucracy relies for coordination on standardization of skills, training, and socialization within each of the professions. Control over work is largely entrusted to those professions. For example, clinicians familiar with the latest technology make requests for new equipment and supplies, rather than such requests coming from administration. Best practices for clinical care are developed by groups of clinical professionals, rather than by administration. On many dimensions, administrators can effectively facilitate; they can rarely direct.

Glouberman and Mintzberg (2001) usefully convey the complexity of healthcare delivery by describing hospitals as consisting of four different worlds (or activities, ways of organizing, or mindsets): care (represented by the delivery team, particularly nurses); cure (represented by physicians and other medical professionals); control (represented by administrators); and community (represented by the governing board). All four are necessary but are "unnecessarily disconnected – by unreconciled values, incompatible structures, intransigent attitudes" (Glouberman and Mintzberg, 2001, p. 65). The "community" mindset of healthcare certainly adds to its complexity. The adage that "all healthcare is local" reflects the importance of meeting the needs of individuals and communities on their own terms and in geographic proximity. Governing boards are charged with representing such interests, particularly in not-for-profit healthcare organizations.

The above description refers to the hospital as a single, independent organization. Complexity is added when hospitals are linked to other hospitals and other types of delivery organizations, such as clinics and rehabilitation centers, in healthcare systems. The actions of one administrator then inevitably must take into account and feed back to other organizations within the system.

The above description of hospitals applies to varying degrees to other delivery organizations, such as nursing homes and clinics. The description also still largely applies in the face of growing physician employment by hospitals, which strengthens some powers of administrators to "direct" and "control" (Baker and Denis, 2011; Begun et al., 2011). But the fundamental need for administrators to facilitate autonomous practice by highly specialized professionals remains, as do the other sources of complexity in the structure and culture of healthcare organizations.

In addition to internal organizational complexity, a major source of complexity in healthcare management is the scope and diversity of what is typically called the "external environment." (The "external environment" is often difficult to classify as strictly "external," because linkages bring the external agents inside the boundaries of the organization.) A host of

different agents are operating in the healthcare organization's external environment, including government organizations, suppliers of pharmaceuticals and medical technologies, professional and trade associations, research organizations, and educational organizations (Shi and Singh, 2014, p.3). Payers like Medicare and Medicaid and health insurance organizations are a key part of the environment of delivery organizations. One or more insurance organizations may be incorporated in a delivery organization's larger health system corporate structure, though most are external to the system. The existence of multiple payers, each with its own, usually different, way of doing business, means that hospitals deal with varying sets of payer-generated incentives and requirements. For instance, in many locations different insurance companies use different measures and incentive structures for promoting quality improvement. Also, with the recent increase in payer-mediated experimentation with care delivery structures like accountable care organizations, hospitals may be faced with varying and often conflicting financial incentives for how they deliver care.

Healthcare delivery organizations are a vital piece of the social and cultural fabric of societies, and thus are subject to social and cultural pressures from a variety of sources. Alexander and D'Aunno (2003) catalogue the diverse and often conflicting institutional and technical forces impinging on healthcare delivery organizations, ranging from the power of the professions, public regulators, voluntary and philanthropic supporters, and societal beliefs in healthcare as a right in the case of institutional forces to managed care, cost containment, and corporate ideology in the case of market or technical forces.

To convey complexity, many practitioners and scholars also find useful a further distinction of complex systems: they are characterized by causal ambiguity. One version of this distinction identifies two dimensions of decisions: consensus on the nature of the problem (the "what") and confidence in understanding cause and effect in solving the problem (the "how") (Stacey, 1996; Zimmerman et al., 1998). Snowden and Boone's (2007) framework, for example, distinguishes simple, complicated, complex, and chaotic contexts for decision-making. Simple contexts comprise repeated-pattern, clear cause-and-effect relationships that are evident to everyone, and fact-based or "rational" management. Complicated contexts are those where expert diagnosis is required. Cause-and-effect relationships are discoverable, but are not immediately apparent to everyone. It is a world of "known unknowns," and fact-based management is still possible. Complicated contexts call for analysis of several alternatives, some of which may be equally "good," and choice among them.

Many of the critical decisions in healthcare organizations can be

BOX 1.1 COMPLEX FEATURES OF HEALTHCARE MANAGEMENT

- Multiple, diverse, interdependent agents.
- Dynamic system: agents change over time.
- Complex internal organizational structure:
 - two personalities: administrative and medical;
 - professional bureaucracy;
 - four mindsets: care, cure, control, community.
- Scope and diversity of “external environment”:
 - conflicting institutional and technical forces.
- Low consensus on the nature of problems or understanding of cause and effect in solving problems.

characterized as occurring in a complex context. In complex contexts, flux and unpredictability are common; there are many competing ideas and no right answers, but instructive patterns do emerge. It is a world of “unknown unknowns.” Complexities require that managers use dialectical inquiry, intuition, muddling-through, agenda building, and other “messier” decision-making means. Finally, chaotic contexts are largely “unknowable” and require many decisions and little time to think. Learning occurs largely by acting first, then learning from feedback.

Summary of Complexity in Healthcare Management

Box 1.1 summarizes features of healthcare management that help convey its complexity. An extensive analysis by Welton (2004, p.411) concludes: “Healthcare delivery organizations are complex systems that operate within the highly complex healthcare system.” It is worth noting that this degree of complexity in both organizations and the overall system was not always the case. Scott (2003), for one, chronicles the growing dynamism and complexity in healthcare delivery. He characterizes healthcare delivery in the era from 1920 to 1960 as “the least changeable, most highly institutionalized sector” in US society, with healthcare delivery dominated by the power of physicians (Scott, 2003, p.24). The sector has since moved to one in which the “systems involved are complex and varied, the forces at work manifold and intricately interrelated, the speed of change alarmingly swift” (Scott, 2003, p.23). In summary, the work of healthcare managers today is rarely simple, straightforward, and predictable. How do managers work effectively in these circumstances?

EFFECTIVELY MANAGING COMPLEX HEALTHCARE WORK

A number of authors offer guidelines for effectively managing in complex circumstances in general and in healthcare work specifically. Before discussing those guidelines, a brief note on the distinction between leadership and management is needed.

Leadership or Management?

The two concepts, leadership and management, have much in common, because both refer to ways to get things done in organizations (and elsewhere). But for some purposes, such as describing work in simple or complicated settings versus work in complex settings, it is useful to separate the two (Kotter, 2013). To get things done, leadership works through mobilizing others by utilizing tools not necessarily possessed by managers (Begun and Malcolm, 2014, pp. 22–23). Managers largely rely on authority in order to mobilize others; leaders inspire others through discovering common purpose and passion. Authority “works” better in simple and complicated settings. An obvious problem with solely applying authority in healthcare organizations is that the power of authority held by managers is constrained by the power of professions held by those who deliver care. Clinical professions need to be “led” in addition to being “managed.” In a complex organization setting, leadership tasks (for example, finding direction, building commitment, and overcoming challenges) are accomplished by emergent, relational dialogue among diverse individuals (Begun and White, 2008). Leadership becomes the responsibility of everyone in the organization (Heifetz et al., 2009).

Other distinctions between management and leadership include the notion that managers focus on efficiency (doing the most with the least), while leaders focus on effectiveness (goal attainment). This distinction relates to the shorter-term and operational focus of management compared to the longer-term and strategic focus of leadership. Management works better when there is agreement on goals and how to achieve them, which is more likely to be the case in the short term than the long term; leadership is needed when consensus on the “what” and knowledge about the “how” are relatively low, which again is more likely to be the case in the longer run.

Add to that the fact that change is ubiquitous in most healthcare delivery settings, and what worked in the past may not work in the future. This limits the effectiveness of a focus on efficiency, the bailiwick of managers. Healthcare delivery organizations are not only complex,

but complex adaptive systems. This requires that managers “take off the blinders” and encourage change and innovation, relative to stability and control; more leadership, less management.

In summary, managers in complex organizations need the competencies of leaders. While we retain the terms “healthcare management” and “managing complex organizations” in this chapter, we see little difference in the terms “manage” and “lead” as they are applied to those individuals charged with managing or leading in complex healthcare organizations. We use the term “healthcare management” in the broadest sense, encompassing leadership activities.

GUIDELINES FOR MANAGING (AND LEADING) IN COMPLEX ORGANIZATIONS

Scholars of complexity science draw conclusions about managing complex organizations largely from metaphor or extension of findings from complex system behavior in mathematics, biology, physics, and other physical and natural sciences. Choices regarding the exact content and wording of guidelines are fairly subjective; they depend on judgments by experts on what exactly is most important and relevant to management. An example of such conclusions comes from Snowden and Boone (2007), who offer five general guidelines for making decisions in complex contexts: (1) open up the discussion; (2) set simple rules; (3) stimulate attractors; (4) encourage dissent and diversity; and (5) manage initial conditions and monitor for emergence. Their guidelines 2, 3 and 5 flow directly from complexity science; the other two are consistent with a variety of theoretical traditions (as well as complexity science) and with experience. McDaniel and Driebe (2001, p.24), positing that “Traditional views of health care managerial theory have been focused on organizational control,” delineate six managerial strategies for managing complex systems: making sense, remembering (and forgetting) history, thinking about the future, dealing with surprise, taking action, and developing mindfulness. Again, their conclusions are interpretations of lessons drawn from the behavior of complex systems, particularly complex adaptive systems, as observed in the natural and physical sciences, tempered by their own view of experience with organizations. In a similar vein, Zimmerman et al. (1998) list such principles as: build a good-enough vision and provide minimum specifications; uncover and work with paradox and tension; and go for multiple actions at the fringes, letting direction arise.

Useful guidelines for managing complexity can derive from theoretical traditions other than complexity science, because many different theories

and concepts in some way wrestle with complexity. For example, Drath (2001, 2004a, 2004b) focuses on three activities that are critical to successful action in complex organizations: shared sense-making, exploration, and connecting. All three concepts are familiar in the organizational literature, complexity science aside.

As theoretical guidelines (guidelines largely deduced from theory), such advice as the above may come across as too abstract and jargon-filled to many practitioners. Importantly, however, management practitioners induce from experience many of the same principles. White and Griffith (2010), for example, argue that the culture of healthcare organizations is the critical factor driving their performance. Excellent managers spend time promoting shared values, listening to their associates, and responding to their needs in ways that model the organization's values. The perspective is reflected in the common saying in healthcare that "Culture eats strategy for lunch." This perspective is quite consistent with complexity principles promoting the importance of underlying initial conditions in systems and the capacity of a few simple rules (reflected in an organization's culture) to guide complex behavior.

The popularity of the Studer Group philosophy (Studer, 2003, 2008) in healthcare organizations is another example of practice-driven guidelines that are consistent with a complexity viewpoint. Studer's philosophy emphasizes the important of human relationships – connections – in producing effective management and satisfied customers. His work devotes extensive attention to developing organizational culture to support patient or customer service. Again, organizational performance is built on the foundation of a strong culture that prioritizes a few key values.

Next we elaborate five guidelines that in our own view represent the wide breadth of knowledge about managing complex organizations, deriving from both theory and practice. Box 1.2 lists the guidelines. We emphasize guidelines that fit the management of complexity, rather than management guidelines that apply as well in simple and complicated

BOX 1.2 FIVE GUIDELINES FOR MANAGING COMPLEX HEALTHCARE ORGANIZATIONS

1. Encourage exploration.
2. Manage and reap the benefits of diversity.
3. Build connections.
4. Conduct shared sense-making.
5. Use simple rules.

settings. That is, these guidelines build on and around guidelines that apply in simple and complicated settings; they do not contradict or reject them.

First, encourage exploration. Exploration involves searching for new possibilities through experimentation, discovery, and innovation. It requires refining and extending existing products and services. Organizational scientist James March noted that organizations commonly tend to exploit known alternatives rather than explore unknown ones, resulting in stable and suboptimal equilibria in changing environments (March, 1991).

Managing in a complex environment means almost by definition that the organization is trying to find its way. There is insufficient clarity about what to do, and how to get it done. Learning about the world requires taking action and learning from those actions. This requires a level of comfort with decision-making under uncertainty. In such an environment, managers and leaders need to realize that they are in essence exploring a “solution space” or “fitness landscape,” looking for adaptive next steps that move their organizations in the direction of higher performance. Like climbing an uncharted mountain, they are looking for the right path to the “fitness” summit for their organization. To get a better sense of what will work, managers and teams need to try out different approaches and methods, and see what works. Systematic “fail fast and learn” approaches to innovation, including user-centered design, rapid-cycle prototyping, and good-enough evaluation methods, enable modern organizations to maximize their chances of success when operating under conditions of complexity. Thus, a key principle of managing in a complex environment is to explore. Doing the same thing over again is likely to get you the same results; so try something new and see what happens.

Second, manage and reap the benefits of diversity. Complexity science teaches us that when properly used, diversity of thought and point of view helps teams and organizations explore their “solution space” with greater success and efficiency. Diversity does not just mean racial, ethnic, or gender diversity. It also applies to diversity in experience, knowledge, training, role, and perspective. Diverse groups of people working on a problem have a broader range of knowledge about the organization, its environment, and the challenges it faces than more homogeneous groups. Broader thinking engendered by diversity increases the probability that a good-enough solution will be found by the group. However, to harness the potential value of diversity, managers must enable two other capabilities. They must ensure that communication processes are such that all members of the group are able to speak up and be heard by the other members of the group. Diversity of knowledge and point of view serves little purpose if it remains silent or unheard. In addition, there must be a process of

“curating” the work of the group, to ensure that quality standards are adhered to, and that dialogue, evaluation, and decision-making processes are high-quality. Diverse groups with good communication, respect, and trust that use best practices for collecting and evaluating evidence will be most successful at exploring their “fitness landscape” and identifying new approaches that improve performance.

Third, build connections. Connections among individuals, groups, teams, functional areas, departments, divisions, and agents outside the formal boundaries of the organizations are all necessary to provide the information flow necessary for organizational health. Network science provides insights here. The traditional organizational hierarchy, with its clear unidirectional reporting lines, generates highly clustered, centralized network structures that are characterized by slow information flow and decision-making. This is characteristic of bureaucracies, which do not generally perform well in response to complex challenges. Creation of “crosslinks” between agents in the organizational network, on the other hand, moves the organization in the direction of becoming a “small world network” characterized by rapid information flow and decision-making. Thus the organization is better positioned to leverage the “wisdom of the crowd” and to operate more effectively in complex environments.

More casual connections (what Granovetter, 1973, calls “weak ties”) also add value and should be fostered. They are frequent sources for new ideas, information, and resources (for instance, a new team member with novel skills).

Building connections is not just about reporting relationships and acquaintances. Organizations get work done, and respond to complex challenges, by the work people do together. No individual, or set of individuals working by themselves, can enable organizational success. They must work together to explore the fitness landscape if the organization is to succeed. Such collaboration requires not just connections, but also relationships based on trust and shared goals. Thus, managers seeking success in a complex environment should not only build relationships, but also tend those relationships so that they are strong enough to sustain the adaptive work required to succeed.

One way to build relationships is to follow the fourth guideline, conduct shared sense-making. Sense-making refers to “the process through which people work to understand issues or events that are novel, ambiguous, confusing, or in some other way violate expectations” (Maitlis and Christianson, 2014, p. 57). Sense-making is related to mindfulness, because the ability to pick up cues enhances sense-making. It allows enacting a more ordered environment from which further cues can be drawn. Taking action and seeing what happens next can improve sense-making. Sense-making

also can be a positive force for creativity and innovation, because it links employees to customers, patients, and the “external” world. The creation of novel understandings allows for new ways of doing business.

We emphasize the adjective “shared” in “shared sense-making.” This is where the skills of listening and soliciting information are critical. Drath (2004b, p.177) notes that complex challenges “cause confusion, ambiguity, conflict, and stress.” Constructing responses to challenges and preferred futures is a collaborative task, because no one person has the knowledge or vision to see all its parts. Shared sense-making allows participants to understand the nature of problems and opportunities and to propose innovative solutions as a collective rather than as isolated individual “experts.”

Finally, use simple rules. One of the fundamental teachings of complexity science is that all complex systems manifest emergent behavior that is the consequence of a small set of “rules” governing the behavior of the agents in the system (Plsek, 2001; Letiche, 2008). These rules are often described as “simple” because of the contrast between the simplicity of the rules and the complexity of the emergent behaviors. Examples of such rules in the organizational setting include incentives, culture, codes of conduct, and measurement systems. Typically, complex organizational systems have three types of simple rules: goal-setting rules, boundary-setting rules, and incentive rules. Goal-setting rules define the objectives of the organization, the pole star(s) with which the members of the organization align. Boundary-setting rules define the allowed behavioral norms to be followed in working to achieve the goals. Incentives define the rewards to the agents for making progress towards the goals while following allowable behaviors.

Organizations facing complex challenges often discover that the simple rules that previously enabled their success are no longer adaptive. Under these circumstances, stepping back, re-evaluating the organization’s simple rules, and doing the adaptive work to modify them (in an exploratory fashion) may facilitate a shift to a more adaptive set of simple rules. Healthcare organizations implementing cultures of safety or collaborative care, for example, find that successful change requires revisions to the simple rules guiding the organizations.

CHALLENGES FOR HEALTHCARE MANAGEMENT EDUCATION AND PRACTICE

We have recommended five guidelines for managing complex healthcare organizations: (1) encourage exploration; (2) manage and reap the benefits

of diversity; (3) build connections; (4) conduct shared sensemaking; and (5) use simple rules. We offer two caveats about following these guidelines: do not follow them slavishly; and acquiring the ability to master them is not simple.

Like any strength or tool, over-reliance on these guidelines, and in particular the mistaken application of these methods to simple or complicated challenges, may yield bad results for the individual leader, as well as the organization. The utility of exploration versus exploitation, for example, depends very much on the organizational context. Likewise, there is a time for sense-making, and there is a time for giving orders. Managers need to leverage good judgment and a well-developed sense of situational awareness in deciding when to properly apply these complexity-informed guidelines.

That judgment, and the ability to apply these guidelines in behaviors, requires a level of maturity and psychological development that is rare in new managers and leaders. Developmentally, newer managers typically are focused on mastering their role and demonstrating their ability to achieve results. They are building the interpersonal skills that the guideline behaviors require, but are often “not there yet.” Nevertheless, we think these skills can be learned.

How best can we develop managers who understand complex systems and use simple rules, shared sense-making, connections, diversity, and exploration to manage them? We identify two key approaches. First, give them experiences that enable them to learn. “Act your way to a new way of thinking” is a development adage that expresses this advice well. Second, support those experiences with feedback and coaching experiences that focus on and build insight into the skills required to successfully manage in a complex environment. Mentoring from more senior managers and leaders is also critical. It is a responsibility for more experienced leaders to bring their newer counterparts along on this developmental path as quickly as possible.

This combination of complexity experiences and coaching and mentoring can be extended to educational settings as well. New students are particularly driven to master technical skills that will help them attain and perform in entry-level jobs, and that is important, as is mastery of traditional management skills that work in simple and complicated systems. But at the same time, students can begin to experience and deal with complex challenges, through case studies and project work in “real-world” organizations, followed by mentored experiences in internships and residencies. Challenges involving longer-term issues (such as culture change) and interprofessional teams (requiring that students manage diversity) are particularly recommended.

In addition, complexity knowledge and related knowledge need to be a growing portion of the training and education curricula. Competency frameworks have become a common staple for guiding educational programs and development of employees in healthcare organizations. Accredited graduate education programs in healthcare administration are required to employ competency models as a basis for their curricula. Commonly used models include those developed by the National Center for Healthcare Leadership (NCHL) and the Health Leadership Alliance (HLA) (Calhoun et al., 2008; Healthcare Leadership Alliance, 2013; Stefl, 2008). As represented by those two educational program competency models, there is some appreciation for management of complexity, through competencies such as innovative thinking, information-seeking, collaboration, organizational awareness, interpersonal understanding, relationship-building, and self-development in the NCHL model and many of the competencies in the communication and relationship management domain and the organizational climate and culture cluster (in the leadership domain) in the HLA model. However, many of the more distinctive aspects of complexity, such as the concepts of simple rules and shared sense-making, are not directly represented. With growing recognition of healthcare as a complexity management field, more of the field's competencies for managers should reflect complexity content and practices.

Content areas related to complexity that may deserve more attention in curricula include innovation, change, and leadership, if those topics are approached with a complexity lens. For example, the change techniques of positive deviance, appreciative inquiry, and design thinking are consistent with complexity science (Bunker and Alban, 2006; Lockwood, 2009). The leadership approach known as adaptive leadership (Heifetz, 1994; Heifetz et al., 2009), among others, is quite consistent with complexity science (Begun and Thygeson, 2014; Thygeson et al., 2010). System dynamics is a systems thinking conceptual approach that provides a set of analytic tools including causal loop diagrams, system archetypes, and leverage point analysis, that can be used relatively intuitively for evaluating complex organizational problems and designing possible solutions (Begun and Thygeson, 2014; Meadows, 2008; Sterman, 2000).

CHALLENGES FOR HEALTHCARE MANAGEMENT RESEARCH

Appreciation of complexity means changing the nature of questions investigated as well as the methods for doing so. Several scholars, including

McDaniel and Driebe (2001) and Zimmerman (2011), have suggested issues that help explore aspects of the complexity of healthcare management. Taking our five management guidelines as a guide, examples of research topics that would illuminate management of complexity include the following:

1. **Exploration.** What is the relative balance of exploration and exploitation in the organization in different arenas? How and why has the balance changed over time? How does the exploration–exploitation balance in an organization affect performance?
2. **Diversity.** What are the differential performance effects of diverse input into decisions of different types? How are diversity and efficiency of decision-making related?
3. **Connections.** What key networks are underdeveloped in the organization? Overdeveloped? Where do new connections need to be made? How is team performance related to network structure and relationship function?
4. **Shared sense-making.** What parties are involved in shared sense-making, about what issues? In what different ways are organizations making sense of current healthcare reform efforts? Is there an optimum amount of sense-making? How is attention to sense-making influenced by contextual factors like organizational size, pace of change, and organizational network structure?
5. **Simple rules.** How are healthcare organizations distinguished by the simple rules they use? Under what circumstances are they altered (successfully or not)?

Studying complex processes requires appropriate research methods, as causality is more ambiguous, patterns are harder to discern, and variation is a prime source of knowledge rather than something to be eliminated (Begun et al., 2003; Byrne and Callaghan, 2013; McDaniel et al., 2009). Use of methods (and theories) that assume linear relationships and use of models with small numbers of variables can spawn misleading findings. In addition to system dynamics modeling and social network analysis, a third methodological tool that shows substantial recent promise and appears to be broadly applicable to studying or improving healthcare organizational performance is qualitative comparative analysis (Begun and Thygeson, 2014). Qualitative methods in general are well suited for complex organization research because rich and deep data are needed to truly understand variation. Tangled causal relations are difficult to discern quickly or with certainty. Qualitative comparative analysis (QCA) is a method based on set theory that is well suited to evaluating non-linear systems characterized

by causal complexity, and its fuzzy set version is particularly useful for studying the association between combinations (configurations) of conditions and outcomes of interest where there may be multiple paths to the same outcome (equifinality), and causation may be asymmetric (the cause of A is different from the cause of not-A) (Ragin, 2008). Familiarity with the concepts of QCA, even if no formal QCA analysis is performed, can enable a healthcare manager to reframe a challenge using set-theoretic concepts, which are asymmetric and non-linear, rather than correlations, which are symmetric and linear. Several recent studies have illustrated the application of QCA to organizational management and health services research (Baltzer et al., 2011; Dy et al., 2005; Thygeson et al., 2012).

CONCLUSIONS

As a result of their complexity, effective management in healthcare organizations requires different competencies than management in simple or complicated organizations. It requires more of what is typically called “leadership” than “management.” We presented five guidelines for managing complex healthcare organizations: encourage exploration, manage and reap the benefits of diversity, build connections, conduct shared sense-making, and use simple rules. Effective managers of complexity are best developed through knowledge and through learning experiences supported with coaching and feedback. Greater appreciation of complexity in healthcare management education, practice, and research will expand the contribution of healthcare management to improvements in healthcare delivery and the health of patients and populations.

REFERENCES

- Alexander, J.A. and D'Aunno, T.A. (2003). Alternative perspectives on institutional and market relationships in the US health care sector. In S.S. Mick and M.E. Wyttenback (eds), *Advances in Health Care Organization Theory* (pp. 45–77). San Francisco, CA: Jossey-Bass.
- Baker, G.R. and Denis, J. (2011). Medical leadership in health care systems: From professional authority to organizational leadership. *Public Money and Management*, 31: 355–362.
- Baltzer, M., Westerlund, H., Backhans, M., and Melinder, K. (2011). Involvement and structure: A qualitative study of organizational change and sickness absence among women in the public sector in Sweden. *BMC Public Health*, 11: 318–335.
- Begun, J.W. and Malcolm, J.K. (2014). *Leading Public Health: A Competency Framework*. New York: Springer Publishing.
- Begun, J.W. and Thygeson, M. (2014). Complexity and health care: Tools for engagement. In S.S.F. Mick and P. Shay (eds), *Advances in Health Care Organization Theory* (2nd edn) (pp. 259–282). San Francisco, CA: Jossey-Bass.

- Begun, J.W. and White, K.R. (2008). The challenge of change: Inspiring leadership. In C. Lindberg, S. Nash, and C. Lindberg (eds), *On the Edge: Nursing in the Age of Complexity* (pp. 239–262). Bordentown, NJ: PlexusPress.
- Begun, J.W., White, K.R., and Mosser, G. (2011). Interprofessional care teams: The role of the healthcare administrator. *Journal of Interprofessional Care*, 25: 119–123.
- Begun, J.W., Zimmerman, B., and Dooley, K.J. (2003). Health care organizations as complex adaptive systems. In S.S. Mick and M.E. Wyttenbach (eds), *Advances in Health Care Organization Theory* (pp. 253–288). San Francisco, CA: Jossey-Bass.
- Bunker, B.B. and Alban, B.T. (2006). *The Handbook of Large Group Methods: Creating Systemic Change in Organizations and Communities*. San Francisco, CA: Jossey-Bass.
- Byrne, D. and Callaghan, G. (2013). *Complexity Theory and the Social Sciences: The State of the Art*. New York: Routledge.
- Calhoun, J.G., Dollett, L., Sinioris, M.E., Wainio, J.A., Butler, P.W., et al. (2008). Development of an interprofessional competency model for healthcare leadership. *Journal of Healthcare Management*, 53: 375–389.
- Drath, W.H. (2001). *The Deep Blue Sea: Rethinking the Source of Leadership*. San Francisco, CA: Jossey-Bass.
- Drath, W.H. (2004a). Leading together: Complex challenges require a new approach. In M. Wilcox and S. Rush (eds), *The CCL Guide to Leadership in Action* (pp. 171–180). San Francisco, CA: Jossey-Bass.
- Drath, W.H. (2004b). The third way: A new source of leadership. In M. Wilcox and S. Rush (eds), *The CCL Guide to Leadership in Action* (pp. 153–163). San Francisco, CA: Jossey-Bass.
- Dy, S.M., Garg, P., Nyberg, D., Dawson, P.B., Pronovost, P.J., Morlock, L., Rubin, H., and Wu, A.W. (2005). Critical pathway effectiveness: Assessing the impact of patient, hospital care, and pathway characteristics using qualitative comparative analysis. *Health Services Research*, 40: 499–516.
- Glouberman, S. and Mintzberg, H. (2001). Managing the care of health and the cure of disease – Part I: Differentiation. *Health Care Management Review*, 26(1): 56–69.
- Granovetter, M.S. (1973). The strength of weak ties. *American Journal of Sociology*, 78: 1360–1380.
- Harris, J.E. (1977). The internal organization of hospitals: Some economic implications. *Bell Journal of Economics*, 8: 467–482.
- Healthcare Leadership Alliance (2013). Introducing the HLA Competency Directory, Version 2.0. Retrieved from <http://www.healthcareleadershipalliance.org/> (accessed 10 September 2014).
- Heifetz, R.A. (1994). *Leadership without Easy Answers*. Cambridge, MA: Harvard University Press.
- Heifetz, R.A., Grashow, A., and Linsky, M. (2009). *The Practice of Adaptive Leadership: Tools and Tactics for Changing your Organization and the World*. Boston, MA: Harvard Business Press.
- Kotter, J.P. (2013). Management is “still” not leadership. HBR Blog Network, January 9. Retrieved from <http://blogs.hbr.org/2013/01/management-is-still-not-leadership/> (accessed 10 September 2014).
- Letiche, H. (2008). *Making Healthcare Care: Managing via Simple Guiding Principles*. Charlotte, NC: Information Age Publishing.
- Lockwood, T. (2009). *Design Thinking: Integrating Innovation, Customer Experience and Brand Value*. New York: Allworth Press.
- Maitlis, S. and Christianson, M. (2014). Sensemaking in organizations. *Academy of Management Annals*, 8(1): 57–125.
- March, J.G. (1991). Exploration and exploitation in organizational learning. *Organization Science*, 2: 71–87.
- McDaniel, R.R., Jr. and Driebe, D.J. (2001). Complexity science and health care management. *Advances in Health Care Management*, 2: 11–36.
- McDaniel, R.R., Jr., Lanham, H.J., and Anderson, R.A. (2009). Implications of complex

- adaptive systems theory for the design of research on health care organizations. *Health Care Management Review*, 34: 191–199.
- Meadows, D. (2008). *Thinking in Systems: A Primer*. White River Junction, VT: Chelsea Green Publishing.
- Mintzberg, H. (1983). *Structure in Fives: Designing Effective Organizations*. Englewood Cliffs, NJ: Prentice-Hall.
- Mosser, G.M. and Begun, J.W. (2013). *Understanding Teamwork in Health Care*. New York: McGraw-Hill.
- Plsek, P. (2001). Appendix B: Redesigning health care with insights from the science of complex adaptive systems. In Institute of Medicine (ed.), *Crossing the Quality Chasm* (pp. 309–322). Washington, DC: National Academy Press.
- Ragin, C. (2008). *Redesigning Social Inquiry: Fuzzy Sets and Beyond*. Chicago, IL: University of Chicago Press.
- Scott, W.R. (2003). The old order changeth: The evolving world of health care organizations. In S.S. Mick and M.E. Wyttenback (eds), *Advances in Health Care Organization Theory* (pp. 23–43). San Francisco, CA: Jossey-Bass.
- Shi, L. and Singh, D.A. (2014). *Delivering Health Care in America: A Systems Approach* (6th edn). Burlington, MA: Jones & Bartlett Learning.
- Snowden, D.F. and Boone, M.E. (2007). A leader's framework for decision-making. *Harvard Business Review*, 85(11): 68–72.
- Stacey, R.D. (1996). *Strategic Management and Organisational Dynamics* (2nd edn). London: Financial Times.
- Steffl, M. (2008). Common competencies for all healthcare managers: The Healthcare Leadership Alliance model. *Journal of Healthcare Management*, 53: 360–373.
- Sterman, J.D. (2000). *Business Dynamics: Systems Thinking and Modeling for a Complex World*. Boston, MA: Irwin McGraw-Hill.
- Studer, Q. (2003). *Hardwiring Excellence*. Gulf Breeze, FL: Fire Starter Publishing.
- Studer, Q. (2008). *Results that Last: Hardwiring Behaviors that Will Take Your Company to the Top*. Hoboken, NJ: Wiley.
- Thygeson, M., Morrissey, L., and Ulstad, V. (2010). Adaptive leadership and the practice of medicine: A complexity-based approach to reframing the doctor–patient relationship. *Journal of Evaluation in Clinical Practice*, 16(5): 1009–1015.
- Thygeson, M., Solberg, L.I., Asche, S.E., Fontaine, P., Pawlson, L.G., and Scholle, S.H. (2012). Using fuzzy set qualitative comparative analysis (fs/QCA) to explore the relationship between medical “homeness” and quality. *Health Services Research*, 47(1 Pt 1): 22–45.
- Welton, W.E. (2004). Managing today's complex healthcare business enterprise: Reflections on distinctive requirements of healthcare management education. *Journal of Health Administration Education*, 21(4): 391–418.
- White, K.R. and Griffith, J.R. (2010). *The Well-Managed Healthcare Organization* (7th edn). Chicago, IL: Health Administration Press.
- Zimmerman, B. (2011). How complexity science is transforming healthcare. In P. Allen, S. Maguire, and B. McKelvey (eds), *The Sage Handbook of Complexity and Management* (pp. 617–635). Los Angeles, CA: Sage.
- Zimmerman, B., Lindberg, C., and Plsek, P. (1998). *Edgework: Insights from Complexity Science for Health Care Leaders*. Irving, TX: VHA.