

## Performance Improvement

# How Complexity Science Can Inform a Reflective Process for Improvement in Primary Care Practices

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Primary care practices typically are made up of hard-working, intelligent people who want to do the very best for patients. So why are practices struggling financially?<sup>1</sup> Why are the clinicians and staff overworked and often burnt out?<sup>2</sup> Why are practices' internal systems often complicated, tedious, and time-consuming? Why is there such turnover in the front office as well as among clinicians?<sup>3</sup> What goes wrong?

These are familiar questions. Although partial answers have been proposed,<sup>4,5</sup> we generally have difficulty seeing the whole picture. If we shine the light on one problem and it improves, what happens to all the other problems to which we temporarily didn't give as much attention?<sup>6</sup> To create hope for a better future for primary health care, as well as for patients and practices, we need a different way of thinking. New methods, approaches, and strategies are needed that will prepare us for whatever the future may hold.<sup>7,8</sup>

When we design or use an intervention for organizational improvement, we make assumptions about the nature of the system we are targeting. For example, the way we see the problem defines the solution, and the solutions we have define the problems we see.<sup>9</sup> We sometimes see the organization as a machine, sometimes as a culture, and sometimes as an organism.<sup>10-13</sup> Improvement strategies typically treat practices as something with many moving parts that can be independently isolated and "fixed," and as such, optimally

## Article-at-a-Glance

**Background:** Quality improvement processes have sometimes met with limited success in small, independent primary care settings. The theoretical framework for these processes uses an implied understanding of organizations as predictable with potentially controllable components. However, most organizations are not accurately described using this framework. Complexity science provides a better fit for understanding small primary care practices.

**Methods:** The Multimethod Assessment Process (MAP)/Reflective Adaptive Process (RAP) is informed by complexity science. This process was developed in a series of studies designed to understand and improve primary care practice. A case example illustrates the application and impact of the MAP/RAP process.

**Results:** Guiding principles for a reflective change process include the following: an understanding of practices' vision and mission is useful in guiding change, learning and reflection helps organizations adapt to and plan change, tension and discomfort are essential and normal during change, and diverse perspectives foster adaptability and new insights for positive change.

**Discussion:** A reflective change process that treats organizations as complex adaptive systems may help practices make sustainable improvements.

approach change through the implementation of sequential steps, or stages, to achieve a set objective.<sup>12,14,15</sup> Thus, practices are asked to understand and adhere to evidence-based guidelines, implement new technological innovations such as an electronic medical records, or change the check-in process, and also manage the interactions among different changes. However, some organizational change investigators are finding that describing organizations as complex adaptive systems provides a more accurate portrayal of organizational systems.<sup>16-19</sup>

This article describes an improvement process based on understanding primary care practices as complex adaptive systems (CASs). This way of knowing and facilitating positive change reflects the experience of practice participants and supports practices in achieving reflective, adaptive, and action-oriented approaches to managing the future.

## Perspectives on Change Processes

Continuous quality improvement (CQI) has been a particularly popular approach for stimulating and sustaining organizational change.<sup>14,20-22</sup> CQI employs well-articulated aims, methods, and tools designed to achieve documented and measurable outcomes. It uses multidisciplinary teams, participatory methods, and data to achieve its aims. It appeals to our sense of democracy, inclusion, use of objective data for decision making, and controlling things to make them better. It often shows effectiveness for single process improvement, but efforts to apply CQI to generalist clinical practice have sometimes been perceived to be less than successful, particularly in small primary care offices.<sup>23-27</sup>

We hypothesize that part of the reason for limited success is that our approaches often focus on enhancing the quality of the parts and fails to account for the complex interactions of the many interrelated parts. When change efforts are viewed from a complexity science perspective, the focus of the change process shifts and the processes of working to foster change are initiated differently.

## A Complexity Science Perspective

CASs are collections of diverse agents with the capacity to learn and the freedom to act in ways that are not totally predictable. Although agents are often individuals, they can also be teams, functional groups, social

institutions, computer programs, or organizational processes. These agents are interconnected in nonlinear ways, that is, one agent's actions changes the context for other agents in unpredictable ways.<sup>28,29</sup> Although the science of complex systems was initially applied to physical and biological systems,<sup>30,31</sup> its application to human organizations has become more widely recognized.<sup>7,32-34</sup> Using this framework, health care organizations, such as nursing homes and primary care practices, are CASs that dynamically evolve over time and exhibit the properties of self-organization, emergence, and co-evolution.<sup>17-19,35</sup>

*Self-organization* is the tendency of many systems to generate new structures and patterns over time on the basis of its own internal dynamics—order emerges from patterns of relationships among individuals. Thus, a primary care practice develops roles, policies, and procedures for managing clinical information (charts), communicating with specialists (referrals), or distributing drugs (prescribing). *Emergence* is the process by which new patterns result from the nonlinear interactions of agents within the system. For example, the referral processes within a practice evolve over time, as different individuals provide feedback, and adjustments are made to accommodate new insights. *Co-evolution* is the process of mutual transformation that takes place for both the agent and the environment in which it exists. In our referral process example, both the practice and the different referral practices are continually adjusting to each other over time. The example shows that both the environment and the individual agents change to match each other.<sup>36</sup> These properties describe some of the unique characteristics of CASs which have been described in detail.<sup>37-39</sup>

Understanding practices as CASs potentially equips practices to enhance their capacity to adapt to and manage an unknowable future and informs the design of change processes. When we use complexity science to view the problems and issues facing primary care practices, our attention is focused differently than when we use other, more traditional mental models.

Complexity science implies the following:<sup>12,19</sup>

- We pay more attention to the quality of the relationships among agents than to the quality of the individual agents. We are sensitive to the fact that relationships are nonlinear and dynamic, and therefore, often result in high levels of surprise and uncertainty.

- We are concerned about the development of agents' learning capacities and focus on agents' learning rather than what they know today. Knowing is seen as a platform for learning rather than an end in itself.
- We are interested in understanding the interdependence between the formal and informal organization instead of trying to figure out how to make everyone conform to the formal organization.
- We focus on the co-evolution of the system with the environment rather than how the system adapts to the environment.
- We encourage diversity among agents and leverage this diversity to foster learning and evolution instead of attempting to socialize it away or minimize its effect.
- We recognize that the system is a social entity. We try to use the social relationships to foster sense-making, learning, improvisation, and other functions that require interaction.
- We acknowledge that the system exists on a multi-dimensional fitness landscape and that the interactions among the dimensions will be an important factor in the system development over time.
- We acknowledge that any manager, facilitator, or researcher is a part of the system itself and not an external observer or manipulator of the system.

In summary, we begin to shift our thinking away from single events or processes toward thinking in terms of patterns, interrelated processes, and relationships.

## Multimethod Assessment Process and Reflective Adaptive Process

Multimethod Assessment Process (MAP)/Reflective Adaptive Process (RAP) is a change process that uses complexity science to guide and inform its methods and to understand the impact of changes. It suggests a path built on explicit opportunities for learning, reflection, and adaptation. MAP also emphasizes looking at practices as integrated systems rather than focusing on one part of the system at a time.<sup>40</sup> The MAP/RAP process described in this article is the most recent approach developed over a series of large descriptive and intervention studies of primary care practices funded by the National Institutes of Health and the Agency for Healthcare Research and Quality.<sup>40-43</sup> This approach, guided by a set of strategies rather than prescribed steps, has led to an in-depth

understanding of primary care practice,<sup>43-45</sup> with an earlier version leading to sustainable quality improvement.<sup>42,49</sup>

The MAP/RAP approach has taken advantage of these earlier insights and is currently being studied in the National Heart, Lung, and Blood Institute (NHLBI)-funded ULTRA study (R01 HL070800). ULTRA, which stands for Using Learning Teams for Reflective Adaptation, is a five-year group randomized clinic trial of 60 (30 intervention and 30 control) primary care practices in New Jersey and Pennsylvania that seeks to enhance the care delivery for multiple chronic conditions (diabetes, hypertension, hyperlipidemia, asthma, and smoking), as measured by guideline adherence, by facilitating healthy relationships and reflection in the practice using MAP/RAP. With this flexible approach, a practice team's patterns of interaction and process are allowed to emerge and fit its environment, thus avoiding sending an unintentional message that there is only one way to create change.

Understandings about complexity science have led to five principles that inform the MAP/RAP process (Table 1, page 441).

These principles serve to provide focus without prescribing specific actions. Depending on the needs of practices, we can encourage them in identifying ways these principles can be put into practice via the facilitator.

One of the MAP/RAP process's more important outcomes appears to be a change in the way information affects the practice. It affects the amount of information that stakeholders have and their ability to process that information effectively, but more importantly, it also changes the patterns of interpersonal relationships, particularly the level of trust among critical practice stakeholders. Both may improve the practice's ability to cope with uncertainty and surprise in an effective manner.<sup>29</sup>

Our experience suggests the following:

- The MAP/RAP change process can trigger practices to shift from a mechanistic understanding to understanding the practice as a complex adaptive system
- An external facilitator is helpful in guiding practices and beginning a reflective and adaptive process
- Change may be sustainable because the perspective accurately describes what happens in practices
- There are at least two kinds of tension in shifting to understanding practices as CASs. One tension is that of

**Table 1. Five Principles that Inform the Multimethod Assessment Process/Reflective Adaptive Process**

1. Because the culture of complex adaptive systems is an emergent property that evolves and at the same time provides stability to a system; because we are concerned about the development of agents' learning capacities and this learning needs guidance; because organizations are complex adaptive systems that are social entities with interdependence between the formal and informal organization; and because complex adaptive systems can operate effectively with simple rules—*vision, mission, and shared values are fundamental in guiding ongoing change processes*. Practices are engaged and focused by articulating a vision and mission, including having a discussion of how their current experience fits with their vision of what they want to be.
2. Because high-quality social relationships are necessary to foster sense-making, learning, and improvisation, and because the interdependencies between agents are local and nonlinear—*creating time and space for learning and reflection is necessary for practices to adapt to and plan change*. This includes scheduling regular team meetings and taking the time in these meetings to reflect on past learning and to analyze current processes.
3. Because interactions among agents and between complex adaptive systems are nonlinear and the dynamics of these interactions are unpredictable and uncertain; because agents have to respond in new ways that are not anticipated; because the incorporation of new behaviors into systems is difficult; and because diversity among agents is necessary for the creation of healthy interactions—*tension and discomfort are essential and normal during practice change*. Practice teams must set ground rules for encouraging differing opinions and handling resulting conflicts.
4. Because diverse perspectives foster adaptability, generate creative tension, and provide new insights for positive change; and because complex adaptive systems exist on an ever-changing fitness landscape—*improvement teams should include a variety of practice stakeholders with different perspectives of the practice and its environment, including representatives from multiple levels of the practice and patients*.
5. Because a key role in a complex adaptive system is to help the system prioritize its agenda items and to facilitate people getting together; and because the agents in complex adaptive systems are often networked—*practice change requires supportive leadership that is actively involved in the change process, ensuring full participation from all members and protecting time for reflection*.

giving up the old paradigm of the “well-run organization,” and another tension involves changing to different roles in a practice that is understood as a CAS.

We have found that primary care practices are small, relatively autonomous organizations that lack in-house expertise or experience to successfully initiate a systemic change without some initial guidance and facilitation. Unlike larger health care organizations, these small clinical offices do not have quality improvement departments and associated resources. They have not found sufficient time or interest among the competing demands of day-to-day practice to give significant attention to systemic change. Thus, an outside trained facilitator is a key element in enabling a reflective process. The facilitator is particularly helpful to individuals and organizations as they attempt to identify and test their assumptions.

The MAP consists of qualitative and quantitative data collection using multiple methods: observation, in-depth

interviews, key-informant interviews, collection of practice documents, patient pathways, patient surveys, chart review, practice genograms, and clinician and staff questionnaires.<sup>40,44</sup> The facilitator collects the data, spending about 20 hours during a two-week period in the practice. These data are analyzed using an iterative process, summarized in a report, previewed by practice leadership, and then delivered verbally and in writing to all practice members during an open meeting.

At this point, the RAP begins. A cross-functional team, including a patient, is formed and begins to meet weekly for one hour. The RAP team uses iterative cycles to identify priority improvement opportunities, discuss potential solutions, pilot several changes, and reflect on the impact of changes. Teams directly address issues of trust, communication, and conflict as they pilot clinical changes. Practices are assisted in recognizing the importance of their interactions and relationships in implementing

**Table 2. Unique Aspects of the Facilitator Role**

1. Modeling reflection-action cycles and encouraging the team to reflect on the impact of its changes and team members' learning
2. Using team building methods to shape the exchanges of the group to improve its self-organizing processes
3. Guiding the team to think in terms of adapting processes rather than focusing on fixed outcomes
4. Using diversity to transform exchanges and relationships within and outside the group
5. Facilitating the team in the creation of new "stories" or a different way of understanding the practice

changes. A facilitator guides the meetings initially until someone from within the practice emerges to take on the facilitator role.

The facilitator has a critical role in gathering information and stimulating self-reflection and action in MAP/RAP. Practices typically do not have the resources to train a staff member to carry out the functions of a facilitator.<sup>36,50</sup> The resources needed in terms of time, training, and personnel are not available to many practices; therefore, the facilitator supports the team in the initial stages of MAP/RAP. One of the facilitator's goals is to model desired behavior for facilitators and train team members to develop the capacity to carry out the facilitator function using their internal resources. The team's skill development in group process, conflict management, meeting management, team building, and reflection-action cycles is potentially an important factor in the sustainability of new behaviors for the team and practice.<sup>51-53</sup>

The facilitator's role is multifaceted and fluid. During the data collection phase, the facilitator functions primarily as an observer, interviewer, assessor, and reflector. As the practice forms its RAP team and begins to meet regularly and identify its priorities for change, the facilitator shifts into the roles of coach, advisor, trainer, reflector, and catalyst for change. The unique aspects of the facilitator's role in MAP/RAP are listed in Table 2 (above). Using the guiding principles and a trained facilitator lays the groundwork for practices to begin a reflective process for practice improvement.

## Comparison of MAP/RAP and CQI

Although MAP/RAP has many similarities to a CQI approach, the fundamental difference lies in the way that it focuses on the holistic aspects of practice change rather than attending to discrete elements of the system. With a CQI approach, creating change in practices involves following a sequence of steps in a change cycle. Typically, CQI focuses on one aspect of the system that needs improvement, "fixes" that part, studies the results, and then moves on to the next improvement.

We have learned a great deal from our experience with CQI, yet we now know conditions often change too quickly and primary care practices are usually too complex for this approach alone to be effective in practice-wide change. One must consider the whole practice and its internal as well as external relationships. It is easy to miss the full picture. If change processes are driven by a complexity view of the world, they can result in effective change strategies and relevant improvements. Reflective adaptive change processes, informed by complexity science, recognize the interdependence of people and systems and the continually changing environment. This approach prepares practices to understand their environment and the co-evolutionary nature of their relationship with that environment. The MAP/RAP process presents our current thinking on practice improvement.

The RAP process as a method for practice improvement emphasizes different aspects of the organizational development process than most commonly used CQI applications. For example, the leadership goal in a reflective process is to optimize the potential for practice agents and their environment to co-evolve in ways that increase organizational fitness. In other words, the RAP process creates a practice that pilots changes, reflects on and uses mistakes, encourages listening to diverse perspectives, and adapts to its environment.<sup>54</sup> These strategies seek to optimize the practice's capacity to learn, adapt, and co-evolve with its internal systems as well as external institutions, regulations, and its local community. Table 3 (page 443) contrasts the differing emphases and attempts to clarify where attention is focused with each approach, but is not an exhaustive list of the distinctions.

**Table 3. Difference in Emphasis Between Continuous Quality Improvement and Multimethod Assessment Process (MAP)/Reflective Adaptive Process (RAP)**

|                     | Continuous Quality Improvement  | MAP/RAP  |
|---------------------|---|--|
| Vision              | Improved components, improved measurement, improved patient outcomes  | Reflective, adaptive practices, increased capacity for learning, improved systems, richer connections and relationships, improved patient outcomes   |
| Leadership goals    | Create a better-run organization; increased efficiency and effectiveness, predictability, and control   | Optimize the potential to co-evolve in ways that increase organizational fitness   |
| Perspective         | <ul style="list-style-type: none"> <li>■ Emphasizes what agents know today</li> <li>■ Attempts to minimize effects of diversity</li> <li>■ Strives to reduce variation</li> <li>■ Frames the future by planning and forecasting</li> <li>■ Tries to get everyone to conform to the formal organization</li> <li>■ Does not focus on social relationships</li> </ul> | <ul style="list-style-type: none"> <li>■ Emphasizes developing agents learning capacity</li> <li>■ Leverages diversity</li> <li>■ Promotes some types of variation</li> <li>■ Frames the future by social interaction</li> <li>■ Recognizes and uses the interdependence of the formal and informal organization</li> <li>■ Uses social interaction for sense-making</li> <li>■ Uses multiple methods and perspectives to enhance learning capacity and identify priorities</li> </ul> |
| Teams               | <ul style="list-style-type: none"> <li>■ Views teams as the way to implement organizational change and solve problems</li> <li>■ Patients typically not members of team</li> <li>■ Facilitator sometimes viewed as external to the system</li> </ul>  | <ul style="list-style-type: none"> <li>■ Views teams as connected to the entire organization and a small complex adaptive system that may change the culture of the entire organization.</li> <li>■ Patient full team member</li> <li>■ Facilitator acknowledged as part of the system, not external to it</li> </ul>  |
| Typical orientation | <ul style="list-style-type: none"> <li>■ Improvement cycles to enhance one process at a time</li> </ul>   | <ul style="list-style-type: none"> <li>■ Enhance relationships and information sharing around a set of interrelated processes</li> </ul>   |

## Case Study

A case study example from the ULTRA study, which is shown in Sidebar 1 (page 444), describes the early development of an effective RAP team and transformation of the practice towards being a more reflective organization. This practice's experience illustrates the importance of diversity of the perspectives represented on the team, commitment and participation of practice leadership, and growth of the team with success in identifying and solving problems in an iterative, reflective process. The case study also demonstrates the importance of the RAP team's addressing initial problems that are perceived as problems that cut across the practice. An initial focus on purely clinical improvements is too easily seen as merely addressing the physicians' concerns and does not engender the enthusiasm and energy that were achieved in this example. Early success in enhancing communication and strengthening relationships empow-

ered the team and infused new energy which they subsequently directed to a range of patient care issues.

## Discussion

The literature has established that health care organizations and primary care practices are complex adaptive systems that are continually changing in nonlinear co-evolution with a constantly changing environment.<sup>7,18,28,35</sup> We have described MAP/RAP as a practical method for using complexity science principles as a theoretical framework for informing practice improvement. It should be noted that this same framework could easily be adapted for almost any organization and is not limited to primary care practice settings.

It is not our intention to pit MAP/RAP against CQI strategies. However, we believe that MAP/RAP offers a broader framework than CQI. This framework allows diverse practice stakeholders, with a broad range of

## Sidebar 1. One Family Practice's Experience

Able Family Practice (name is fictional) is a two-physician and one-nurse practitioner independent practice in the Northeast. Approached by a member of the ULTRA project, the practice leader decided to join in an attempt to improve practice functioning and patient care. A project facilitator collected data in the practice on office processes, relationships, communication patterns, clinical information flow, decision making, leadership, values, and culture during a two-week period. The research team, including the facilitator, summarized the data and presented a four-page report to the practice for its review and feedback. Whereas parts of the report presented basic descriptions of the practice demographics and organizational structure, some items, such as the following, highlighted issues the practice might want to consider in reflecting on the ways its members work together:

- The providers and staff communicate well around clinical issues, but there are gaps in communication when decisions are made about office operations.
- Staff meetings are held inconsistently—a source of frustration for some of the staff.
- The nurse practitioner has developed flow sheets to remind her of guidelines and track compliance. Similar flow sheets were not found in other practitioners' charts.

The practice agreed that the report was accurate and formed a RAP team consisting of members of the practice and a patient who brought a broad range of diverse perspectives on the practices' operation to the team. The RAP team agreed to meet with the facilitator for an hour a week during the next several months.

The physician leader was initially hesitant to set aside time for team meetings, and neither of the two physicians wanted to attend every meeting. The RAP team grappled with the leadership's ambiguous commitment during the first few meetings.

Through the team's open discussions, the physicians realized how important their commitment and active participation was and decided that at least one of them would attend every meeting. Over time both physicians attended most meetings.

As the team was setting priorities, the physician leader was concerned about the team's initial focus on improving communication within the practice rather than on a patient care issue. Yet both physicians supported the team's choice and participated in the weekly discussions.

After addressing internal communication among team members, including trust and willingness to both give and receive constructive feedback, the team then looked at relationships and communication among all practice members, including leadership and management. Early changes included the following:

- Establishing regular meetings for nurses and front-office staff
- Creating a communication log to help part-time employees fill in possible information gaps
- Identifying practice members to function as nurse manager and office manager.

The success of these early changes was obvious across the practice, and enthusiasm for the RAP process increased markedly. During this time the physician leader remarked, "I see now why we had to address our internal relationships as a part of doing a better job with our patients."

Over time the team continued to develop its capacity to communicate in new, more effective ways. The practice members recognized the strength of their team and the value of setting aside time for identifying and framing problems, discussing change options, and reflecting on the impact of changes made. They felt that the investment saved them time in other ways and that they were better prepared to address clinical issues and implement and sustain improvement changes.

perspectives, to focus on a continuing process of reflective adaptation. MAP/RAP facilitates the development of the trust and effective communication that enables practice members to recognize the potential impact of

one another's actions on their mutual objectives and allows them to develop shared understandings of these objectives. Implementation of MAP/RAP in the ULTRA project provides some early evidence that practices are

able to become more reflective and learn from the diverse perspectives of clinicians, staff, and patients. It also provides evidence of the feasibility and effectiveness of the approach across a spectrum of small, semi-autonomous practices.

In launching the ULTRA project, 60 practices—approximately half of the practices approached—agreed to participate in the study. Twenty-nine of the 30 practices that were randomly assigned to the MAP/RAP intervention completed the study. Among the first eight practices in which follow-up data has been gathered at 12 months, four (50%) are actively continuing the MAP/RAP process six months after the facilitator and research team support was withdrawn from the practice. Further follow-up of the ULTRA practices will also provide information about the effect on process of care measures for cardiovascular health.

To take full advantage of our emerging understanding of primary care practices as CASs,<sup>17,18</sup> we must accept the implications for a broad range of quality improvement activities. We continue to refine the MAP/RAP process to increase effectiveness and efficiency; for example, we are experimenting with variations on the MAP assessment and less resource-intensive approaches to developing the RAP team.

For the practices randomized into the control group in the ULTRA project, for example, we will adapt local improvement collaboratives<sup>55-57</sup> to address the challenge of helping practices establish effective RAP teams and sharing reflective insights across practices. Approaches such as appreciative inquiry<sup>58,59</sup> and sense-making<sup>9</sup> also seem compatible with a complexity science perspective. We believe that these kinds of approaches will

accelerate progress toward better primary care and a better health system. **1**

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