

Improving Quality in a Complex Primary Care System – An Example of Refugee Care and Literature Review

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Abstract

Rationale, aims and objectives. Applying traditional industrial Quality Improvement (QI) methodologies to primary care is often inappropriate because primary care is best thought of as a network of highly interconnected agents in a complex adaptive system (CAS) that is particularly responsive to bottom-up rather than top-down management approaches. We report on a demonstration case study of improvements made in the Family Health Center (FHC) of the JPS Health Network in a refugee patient population that illustrate features of QI in a CAS framework as opposed to a traditional QI approach. **Methods.** We report on changes in health system utilization by new refugee patients of the FHC from 2016-2017 and summarize relevant theoretical understandings of quality management in complex adaptive systems. **Results.** Applying CAS principles in the FHC, utilization of the Emergency Department and Urgent Care by newly arrived refugee patients before their first clinic visit was reduced by more than half (total visits decreased from 31% to 14% of the refugee patients). Our review of the literature demonstrates that traditional top-down QI processes are most often unsuccessful in improving even a few single-disease metrics, and increases clinician burnout and penalizes clinicians who care for vulnerable patients. Improvement in a CAS occurs when front-line clinicians identify care gaps and are given the flexibility to learn and self-organize to enable new care processes to emerge, which are created from bottom-up leadership that utilize existing interdependencies made more sustainable as front-line clinicians use sensemaking to improve care processes. **Conclusions and future directions.** Recent reforms announced in primary care in Scotland, a few examples in the medical literature, and statements from some healthcare system leaders are examples of early adapters who are applying the principles of CAS to their QI efforts. Such initiatives and our example provide models for others to follow.

Introduction

Increasingly, health systems have been challenged by producing suboptimal outcomes using traditional quality improvement (QI) management approaches, and complex adaptive system (CAS) approaches are emerging.¹ We report on a demonstration case study of improvements that were made in the Family Health Center of the JPS Health Network in a refugee patient population that illustrate features of QI in a CAS framework as opposed to a traditional QI approach.

Conceptual framework

Primary care is best thought of as a CAS network of highly interconnected agents in dynamical interconnected systems.²⁻⁴ What is a CAS approach to improving healthcare services in contrast with traditional management approaches? A CAS contains many interdependent interacting agents, connected across different levels through local dynamic networks. A CAS includes subsystems that operate on different levels within a larger system. While transfer of information within and between levels is essential to optimal functioning, local subsystems have innate capacity to identify and solve problems themselves. They can adapt

and self-organize solutions that are difficult (or impossible) to predict and improve from the top (or different) level.

Some key features of CAS approaches to QI in primary care settings include:

- Each primary care system is unique at their local level of service provision, history, and development. One size does not fit all. Individual clinicians and clinical teams are two levels of agents that will learn and adapt according to how free or constrained they are internally and externally.
- Unintended consequences commonly emerge in top-down interventions. Well-intentioned care may result in unnecessary and inappropriate service use.
- “Tipping points” – the impacts caused by small changes in a practice or organization in a timely manner – can make a large difference in processes and outcomes. Conversely, very large changes in top down policy can have little impact on the ground.

Martin and Sturmberg have outlined an indicative typology comparing and contrasting complex adaptive chronic care versus standardized chronic care using the Chronic Care Model (Table 1).⁵ There are major differences between the approaches on their core values (dynamic and adaptive networks vs. static protocols), agency (capacity of workers to act autonomously vs. constrained in activities), structure (bottom-up vs. top-down), improvement processes (self-organization in response to feedback loops), and outcomes (what is optimal often emerges from bottom-up initiatives rather than top-down control).

Primary Care and Management

CASs cannot be controlled by top-down approaches, but they may be nudged or influenced in certain directions.⁶ How might primary care and other health system organization leaders seek to improve care in a CAS? Ellis has proposed one model,⁷ which defines 5 levels of the degree of top-down control. The most top-heavy and least effective he calls *algorithmic top-down causation*, such as computers programmed to run a series of algorithms. An equivalent approach in healthcare systems include isolated services where checklist approaches have been shown to improve outcomes, such as elective spine surgery,⁸ ventilator associated pneumonia bundles,^{9,10} and central line bundles.^{11,12} However, early positive results of some of these linear algorithmic checklists used for single-issue improvements have not always been confirmed in subsequent studies,^{13,14} perhaps because they also contain elements of CASs. Ellis gives other examples of failed algorithmic top-down management, for example, the predictive stock pricing models that precipitated the global financial crisis of 2008-9 that did not recognize the characteristics of CASs, or even that international financial markets have features of CASs.

He identifies 3 models that are more consistent with the realities of CASs, the most advanced he calls *intelligent top-down causation*. It is “... the special case of feedback control with adaptive choice of goals ... [that] has the potential to enable quantitative as well as qualitative investigation of outcomes.”

Each of the CAS-appropriate models assumes there is a hierarchy within the system, but the hierarchies learn and evolve over time, with new sub-hierarchies emerging. CASs also interact with external influences, though systems with no boundaries are prone to devolve into chaos. Leaders who are responsible for facilitating the success of a CAS retain some influence, but they give up the most control in the most CAS-appropriate model.

CASE STUDY

Refugee Healthcare

Prior to departure for the U.S., refugee applicants receive a physical exam from a CDC-designated physician in their country of refuge. Vaccinations are initiated and basic healthcare needs are met. Patients with chronic medical illnesses usually receive a 1 – 2 month supply of medications prior to travel to the U.S.

The Dallas-Fort Worth metropolitan area is one of the largest refugee relocation sites in the U.S. The JPS Health Network is the tax-supported safety net hospital for Tarrant County (Fort Worth). Almost all legal refugees who are relocated to Tarrant County make at least one visit to the JPS Health Network (JPS)

at the Family Health Center (FHC), which is the larger of the 2 continuity clinics of the Family Medicine Residency Program.

On arrival in Tarrant County, refugees are assisted by caseworkers from 1 of 3 resettlement agencies, known as Voluntary Agencies (VOLAGs). The VOLAG caseworkers schedule an initial health screening for refugees at the Tarrant County Health Department (TCHD), usually a few weeks after arrival. The TCHD reviews the medical record that came with the refugee and completes an initial intake screening that consists of obtaining indicated labs, screening for communicable diseases, and catching up required vaccinations. Almost all refugees are then referred to the FHC to establish a medical home within the JPS system, which then schedules the refugee as a new patient.

The Need for Improvement

This sequence of steps from arrival in the U.S. to establishing care with a primary care clinician at the FHC clinic, under normal conditions, was taking 3-4 months or more. This delay resulted in many refugees running out of their medications as well as other significant gaps in the management of their chronic illnesses. In response, many refugees would show at the JPS Emergency Department (ED) or Urgent Care (UC) center just to refill their medications. In 2015, around 40% of all newly arrived adult refugees presented to the JPS ED or urgent care prior to their first FHC visit.

Planning

The FHC front-line medical staff first noticed this situation, which was viewed as both an unnecessary burden on system resources and poor care for patients. The Director of the Refugee Health in the FHC (Dr. Nelson), discussed the situation with the clinic manager at the time (Tracy Shea) and obtained support from the JPS IT department to mine Epic electronic health records.

It was concluded there was poor coordination between FHC, TCHD, and the VOLAGs. In addition, there was no mechanism by which the FHC staff could identify newly-arriving refugees with ongoing medical needs and prioritize their appointments with a primary care physician. There were few other JPS resources to assist.

Any solution would require developing close coordination and communication between the FHC and TCHD, the VOLAGs, and the multiple refugee resettlement case-workers.

Improving

Working with the JPS clinic administrator, approval was given for one of the medical assistants (MA) to change her job duties so that she could devote 75% of her time to receive the information from the VOLAGs and TCHD about the new refugees and more quickly assign high-risk patients to FHC clinic slots. At the same time, FHC staff began developing closer communication and relationships with the VOLAGs, along with all of the individual resettlement caseworkers and the TCHD staff. This started in November 2015. The target was to reduce the waiting time from arrival in the U.S. to the first FHC visit for high-risk refugees to be less than 30 days.

The results of these efforts are shown in Figure 1. The number of patients making any visit to the ED or UC prior to visiting the FHC was reduced from 31% to 14% from 2016-2017, the number of patients making multiple visits to these facilities was reduced from 11% to 4%. The FHC was challenged with a surge of refugees in late 2016 and early 2017 as a result of the transition from the Obama to the Trump administration. The team felt that many of the process issues had been ironed out by the spring of 2017. Figure 2 shows that in spite of a surge of new refugee clinic appointments in August 2017, the number of ED/UC visits and “no shows” to the clinic actually dropped further.

Improvement Approaches

Front-line clinicians discovered the care gaps through their direct patient care, not from reports generated by the VOLAGs, TCHD, or JPS management. The motivation to improve this situation was completely

intrinsic with no external pressure to do so or through incentives such as pay-for-performance bonuses.

There were no department-wide QI meetings called to discuss this situation. The Director of Refugee Health (Dr. Nelson) talked to a few key personnel on his own time to make them aware of his observations and recruit help to improve the care. He worked with the Medical Director of the FHC (Dr. Castellon) to run a few Epic reports that documented process measures such as a “No Show” rate of 40% some months and to brainstorm possible solutions. There were no dashboards created, no run charts, no scheduled times to reanalyze data, and no posters to display quarterly performance metrics.

There were few meetings with all the key stakeholders in the room at the same time. Support for the improvements were more often made one face-to-face meeting at a time, supported by emails sent to just a few key people. Meetings were not pre-scheduled out months in advance. They occurred as new information and developments necessitated. Agreements were made between the key personnel such as TCHD and FHC collaborating so that the refugee patients left their TCHD visits with a specific time and date for their first FHC appointment. Ongoing measures of the impact of their improvement efforts was achieved simply through month-to-month direct patient care. With each new patient encounter, the clinicians could see the gap between the patient’s date of entry to the U.S. and the clinic date, and if that patient had already visited the ED or UC. It felt like proposed process changes were not working throughout much of 2016, but a critical mass of agents had changed their workflows by early 2017.

Complex Adaptive Systems and Primary Care

There are key differences in this case that illustrate differences between reductionist traditional industrial QI approaches compared to processes that improve quality in a CAS, which are summarized in Table 2.

For over 2 decades, many healthcare analysts have supported strategies to bring traditional notions of QI from non-healthcare industries in an attempt to further improve the historic performance of primary care, such as six sigma and Toyota lean processes.¹⁵ There are numerous realities that make these strategies problematic in primary care including both operational and patient factors.

This case study demonstrates some of the key features of CAS identified previously. Local agents’ self-organization was the key process which through a relatively simple intervention “tipped” the system into better performance. The values driving the improvement were local, but aligned to higher order values of improved service efficiency and quality of chronic disease care.

There were some similarities between this project and traditional QI projects. Financial support from some level of JPS administration was essential. In this case, explicit support was not required from the top levels of the system. The clinic manager of the hospital-owned clinic approved the change in job description of the refugee MA without adding another MA to the clinic team.

Meaningful data were also important, particularly to track ED and urgent care usage among new refugees. This required someone to work with IT for approval for their time to run occasional reports, though the team never asked for scheduled reports. In fact, numerical assessments of project success were more based on the care gaps observed in month-to-month direct patient care than formal IT reports. Other assumptions underlying this project were that several disciplines were required to achieve success and that opportunities for improvement were best achieved by improving processes, not blaming people. Just as external forces influence traditional QI projects, we acknowledge that an overall decrease in the refugee arrivals to the U.S. at the end of this time period may have influenced the results (though some of the improvements had been achieved before the change in national refugee policy). We have no way of knowing what the numbers would have been if the refugee influx had been stable or increased.

Complexity and Value-Based Care

One could argue that leadership in the U.S. healthcare industry already knows about CASs. The original Crossing the Quality Chasm report includes thoughts on the challenges of CAS.¹⁶ Yet every major national effort since its publication – HEDIS, MACRA, and MIPS,¹⁷ to name a few – demonstrate no evidence of

this understanding. We have been told of the virtues of the checklist manifesto, yet many have pointed out that checklists in the aviation industry apply much simpler and more linear concepts than must be managed in primary healthcare.^{18,19} All of these traditional reductionist approaches encourage standardization of processes and are driven from a top-down approach. They may be appropriate in sectors of healthcare delivery that are more concrete and linear, such as episodes of surgical care or isolated aspects of critical care, but are anathema to improving quality in the complex world of primary care.

Unfortunately, most statements about “value-based care” include these same top-down sentiments where value is determined by small lists of single-disease metrics or measures of “patient experience.” Primary care is complex and poorly understood at the top, but displays the capacity to generate solutions integrated through historical and social connections that may not fit a single-disease or patient reported metrics-based care algorithm.²⁰ National measures of diabetes quality in the U.S. did not improve from 2005 to 2016, which is *prima facie* evidence that top-down approaches such as HEDIS, PCMH, ACOs, and so on made no measurable impact on changing systems of care in a meaningful way.²¹

In contrast to existing models that standardize single-disease definitions of primary care quality, a recent study of personalized care with individualized treatment goals for patients with type 2 diabetes reported a reduced risk of myocardial infarctions and other diabetes-related endpoints (but not overall mortality) compared to usual care.²² The lead author of this study commented, “It is irrational to treat everybody the same way.” Non-compliance or adherence issues,²³ unreasonable patient expectations,²⁴ and unmet patient health needs²⁴ have been identified as other factors that may lead to complex doctor-patient relationships. Even PROMS (patient reported outcome measures) for a single condition such as community acquired pneumonia are highly complex and difficult to interpret in the diversity of primary care²⁵

Accountability of the primary care physician or team to the healthcare system is often measured by scorecards that contain alleged performance of the physician on a small list of single-disease process measures. Scorecards represent a rigid understanding and a fraction of the totality of services provided by primary care physicians that have been imagined by system designers that often differ from reality.²⁶ In contrast, CAS approaches encourage diversity at the individual patient or practice level, which are then able to make positive impacts at the system level.²⁷

Metrics and Social Determinants

Besides the challenges of applying linear mechanical measures to a CAS, single-disease metrics often are much more a reflection of the social determinant challenges faced by the populations being served rather than the quality of care provided by primary care teams or even hospitals.²⁸⁻³⁰ Studies of quality have found that caring for complex patients in a safety net setting are independent predictors of meeting quality goals for hospitals^{31,32} and primary care settings.^{33,34} Physicians in the same practice who had greater proportions of patients who were underinsured, minority, and non-English-speaking were given lower quality rankings.³⁵

QI leaders have discussed attempting to risk adjust patient panels,³⁶ but rigorous methods are lacking and existing models give vastly different results.³⁷ The National Quality Foundation has recognized that socioeconomic factors are important contributors to patient outcomes, that current measurements do not account for these factors, and that adequate risk adjustments for quality outcomes do not currently exist.³⁸ Lacking adequate risk-adjustment methods, primary care physicians working under proposed top-down value-based models will likely be incentivized to abandon the most complex and vulnerable patients from their panels.³⁹

Focusing on specific outcomes that do not reward managing complexity, solving problems, or creativity undermine physician motivation.⁴⁰ Overstating the value of discrete quality measures has the potential to demoralize and demotivate physicians who view their jobs as being more than meeting a series of simplistic metrics⁴¹ and believe that many quality incentives hinder patient care.⁴²

Other Innovations Using CAS Principles

There are signs that a few healthcare leaders around the world are starting to recognize that CASs must be

led differently. For example, Don Berwick, MD recently stated that QI-savvy Boards should ask “How can we help?” And they listen and act on the answers,”⁴³ where change in an organization is led by front-line personnel who work at the bottom of the organizational chart. CAS principles can be used to nudge behavior change in a population. Cantola conducted controlled experiments where social networks were manipulated, which resulted in improved healthy behaviors in intervention groups.⁴⁴

Other examples include randomized controlled trials where the intervention groups were encouraged to develop solutions that fit the overall aims of the studies, but responded to local forces.⁴⁵ Agents in the CAS were allowed to self-organize around existing interdependencies, which allowed the front-line caregivers to engage in sensemaking to determine the best local courses of action. One implemented a short message service (SMS) to improve HIV medication adherence in Kenya⁴⁶ and another used positive deviance to decrease MRSA infections in a hospital by 44%.⁴⁷ Leykum, et al reviewed a series of 8 studies conducted in primary care clinics, which were mostly unsuccessful in changing outcomes in single disease or preventive services metrics.⁴⁸ They concluded that process-based change efforts were best for low-uncertainty contexts, while relationship-based approaches (affecting interdependencies and sensemaking) were best for high-uncertainty situations.⁴⁸ Dynamical and relational understandings of patient journeys through multimorbidity and frailty assists practitioners to identify tipping points and reduce potentially preventable hospitalizations⁴⁹.

New leadership styles have been called for in other healthcare systems. The Advancing Quality Alliance in the UK has identified Discovery Communities that are innovating ways to integrate social care and community health through local efforts.⁵⁰ The less successful UK healthcare leaders were recently characterized as “pacesettering”: they ‘know’ what is required, waste little time asking questions, view uncertainty as a weakness, and are good at driving up performance on a narrow range of goals. In contrast, successful Discovery Communities embraced uncertainty, desired to understand (rather than know), to learn (rather than teach), to share (rather than compete), to experiment (rather than stick to how things are always done), understood the importance of place, and allowed goal processes and outcomes to emerge over time.

For primary care, health system leaders and policy makers should abandon simplistic reductionist linear measures of quality. An early adopter of this approach is the Scottish National Health Service, which has abandoned the Quality and Outcomes Framework⁵¹ and has begun creating general practitioner quality clusters.⁵² These clusters will be organized as groups of five to eight general practitioner practices who will use qualitative and quantitative data to improve care in collaboration with local and national stakeholders.⁵³ Together, front line care givers and administrators will decide what is possible to improve, what challenges are the most important, what resources may be needed to achieve meaningful change, and what defines meaningful improvement.

Braithwaite provides excellent insights on how complexity-oriented leaders (“enablers”) at different organization levels can contribute to create meaningful changes in CASs.⁵⁴ Policy makers are asked to abandon top-down industrial attitudes and instead encourage principles such as customization based on local contexts, de-emphasize standardization, use informal interdependencies, and bolster trust and interpersonal relationships.

These efforts and insights, and our example, provide models for others to follow.

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Table 1 – Chronic Disease Care: Complex Adaptive vs. Standardized Chronic Care Model*

	Complex Adaptive Chronic Care	Standardized Chronic Care Model
Core Values and Agency	Focus on individual health and local systems Bottom up improvement with local and central accountability Key agents: individual patients and clinicians, self-organizing healthcare networks and partnerships Core value is individualized patient care and community health	Focus on “control” of individual disease Top down improvement with protocols and incentives Key agents: policy makers, data analyzers, funders, administrators, providers Core value is evidence-based disease management

	Complex Adaptive Chronic Care	Standardized Chronic Care Model
Structure and Processes	Complex dynamic multi-layered systems Bottom up: self-organization of interacting agents forming evolving structures shaped by internal levers or constraints, or local contextual interactions	Discreet intervention protocols, best practices, static notions of quality Top down: policy leverage and financial incentives used to manage system performance around external system levers and constraints. Linear structures and processes may or may not adjust for local context and systems
Outcomes	Empowerment emerges from complex environments Adaptability, self-organization, and empowerment enable the emergence of improved health outcomes	Success comes from clarity of accountability, “obsessive” tracking and action on key performance indicators, and process-based teamwork

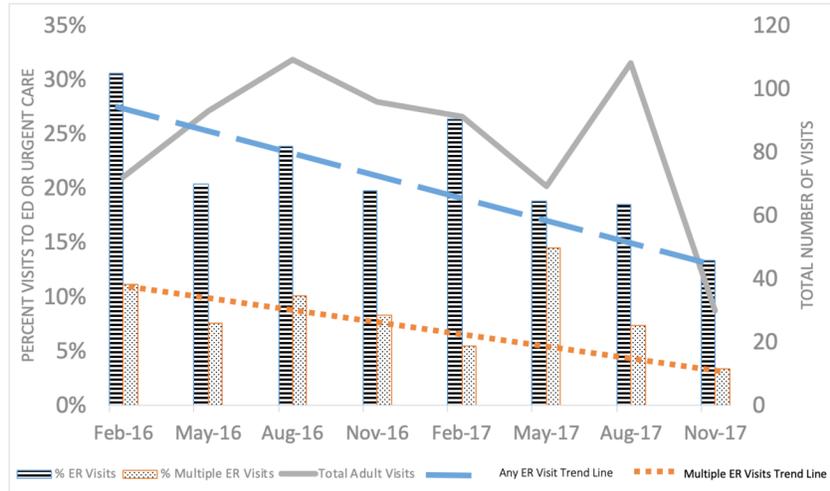
*Adapted from Martin and Sturmberg⁵

Table 2 – Difference and Similarities between Traditional Industrial and Complex Adaptive System Quality Improvement

Construct	Traditional Industrial QI
Differences	Differences
Inspiration for Change	Top-down from administration often using analyses of large datasets.
Selecting Measures of Success	System administration or payers select approved single-disease (often) outcome targets
Setting Target Goals	Administration selects numerical goals often based on best practices or results reported
Selecting Specific Processes to Improve	Front-line personal are expected to rigidly and consistently apply best practices throughout
Naming QI Priorities	System administration or payers declare a list of possible improvements and priorities
Organizational Buy-In and Reporting	Regular organizational meetings with all members expected to participate and report
Recognition and Rewards	Organizations and their subunits are extrinsically recognized and rewarded to help
Similarities	Similarities
Data	Data are needed at several times over the life of the project, which will often require
Resources	Except for the relatively rare and simple “low-hanging fruit” successes, resources are
Multi-disciplinary	Solutions most always include more than one type of clinician on the healthcare team
Processes not People	The classic Deming philosophy that poor quality is almost always the result of poor

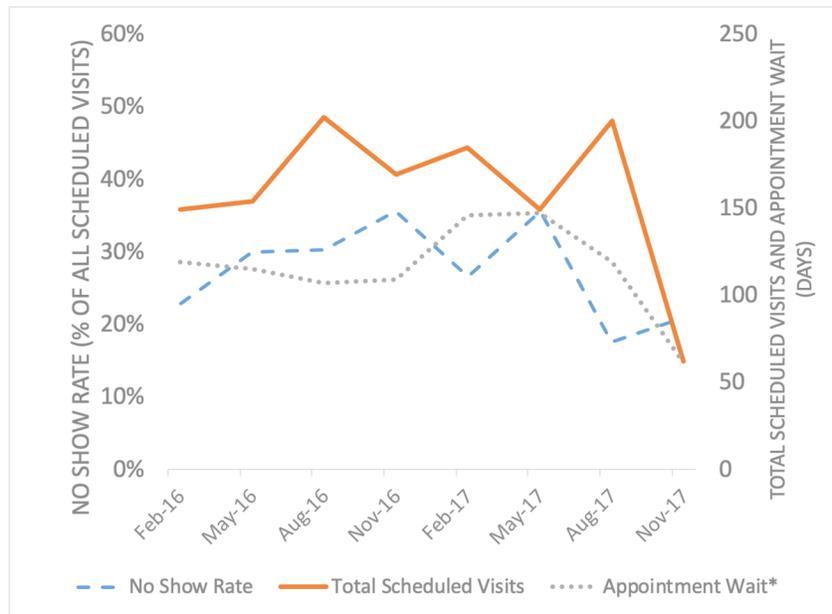
*Plan-Do-Study-Act

Figure 1 Percentage of Adult Patients Attending the Emergency Department, Urgent Care, or the Maternity Ward Prior to the First Family Medicine Clinic Visit*



*Data are based on the month the first clinic appointment was scheduled

Figure 2 No Show Rates for First Family Medicine Clinic Visit, Adults and Children



*Appointment Wait is the number of days from arrival to the U.S. to the date of the first scheduled clinic visit