Training Change Agents in CTA to Bring Healthcare Transformation to Scale:
The Case of Primary Care Practice Facilitators

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Abstract

Primary care medical practice is in a period of transformational change. Practices have limited capacity to cope with this transformation. Thousands of practices require support, and any intervention must both scale to that level and be usable by practices with limited change capacity. Various organizations train practice facilitators (PFs) to help with this transformation. We developed a training program for PFs to learn the basics of Cognitive Task Analysis (CTA) to analyse and advise practices, and help them transform by improving macrocognitive functions. The training program comprised preparatory readings, and 14 hours of didactic sessions and guided exercises over two days. That was followed by a three-interview progression under actual field conditions: seconding for an experienced lead interviewer, leading with an experience interviewer as second, and leading with another PF as second. The data collection, analysis, and reporting are highly structured, tailored to the constraints of primary care, and scalable. Early experience with practices in Alberta indicates the resulting CTA reports to have significant impact. PFs have spontaneously transferred their use of CTA skills to other areas of their facilitation work.

Keywords: Macrocognition; Cognitive Task Analysis; Training; Healthcare, Primary Care; Patient Centred Medical Home; Organizational Change, Healthcare Transformation, Change Facilitation

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Introduction

Healthcare is a cognitively complex work environment that is transforming at a fast pace. The increased use of health information technology, growing emphasis on coordination of care, and shift to preventive care and population health are examples of how the work in health care organizations is becoming more integrated and complex. These are not incremental changes, but rather transformational ones. They not only require a range of fundamental clinical and organizational changes, but an evolution in how providers, administrators, payers, and patients think about care delivery.

Primary care has been undergoing such a transformation to the “patient-centered medical home” (PCMH) model.¹ The shift to PCMH requires many and profound practice change interventions, as well as changes in how different medical organizations coordinate amongst themselves. PCMH transformation is characterized by two fundamental shifts in care delivery: 1) a move away from the physician-with helpers model of care delivery towards intra- and inter-organizational, team-based care delivery, and 2) an ever-increasing use of technology and information systems to improve the speed, quality, and continuity of care (termed “systems-based care” in the PCMH literature). The full PCMH comprises over 100 elements across 13 domains² that together are intended to address the “Triple Aim”³ – improved quality, reduced cost, and improved patient experience – in the primary care setting.

The transformation to PCMH is a years-long process that requires changing existing routines, integrating new technologies, and creating new processes and roles. The process of transformation places greater and more sustained macrocognitive demands on physicians,

¹ https://www.pcpcc.org/
² http://www.ncqa.org/Programs/Recognition/PatientCenteredMedicalHomePCMH.aspx
³ http://www.ihi.org/Engage/Initiatives/TripleAim/Pages/default.aspx

administrators, and staff members that does a single organizational change. In addition, the evolving socio-technical system of organizational and clinical workflows place changing macrocognitive demands on physicians, administrators, and staff member, including new mechanisms of coordination, new types of decisions, and new types of planning.

Given the challenges of transformation, it is not surprising that healthcare organizations, including primary care practices, are turning to approaches and tools to help them systematically transform. Many have adopted quality improvement (QI) techniques, such as Lean Thinking (Womack & Jones, 2010) and Plan-Do-Study-Act cycles (PDSA; Deming, 2000) to help with their process re-design (Taylor et al., 2014). Most primary care practices, however, are under-resourced and do not have the change expertise and change capacity (Nutting, Crabtree, Miller, Stange, Stewart, & Jaen, 2011) to undertake PCMH transformation alone. It is widely recognized that most practices require external support to effectuate this transformation, and programs to provide support using more conventional QI and change management approaches are widespread (Agency for Healthcare Research and Quality, 2013).

The problem, however, is that these QI techniques were developed in the 1950s to improve production quality, and were refined largely in manufacturing environments. Although they have been adapted to use in process re-design, they still tend to focus on incremental improvements in the physical, not cognitive, aspects of work and workflow. As such, they are not as helpful in effectuating transformational change or preparing a practice environment (i.e., the context) to adapt so it can better implement a practice change intervention (Damschroder, et al., 2009, Tomoaia-Cotisel et al., 2013). One solution is to take up what Ciancolo (2014) suggests: Training healthcare workers in human-centred systems engineering to increase the likelihood of successfully adapting implementation efforts to local contexts.
Cognitive task analysis (CTA) is a human-centered systems engineering approach with a long track record of gaining insights into complex cognitive work in various domains—insights that have been used to improve work processes and training (Crandall, Klein, Hoffman, 2006). Although CTA has also played a growing role in healthcare (e.g., Baxter, Monk, Tan, Dear, & Newell, 2005; Fackler et al., 2009; Militello et al., 2014; Weir et al., 2007), it too has focused largely on incremental improvements. CTA consultation can also be used to help transform primary care practices by helping to identify and address context-specific macrocognitive functions in both the clinical routines that need to change and in the key organizational routines critical to the transformation process. For example, we have used CTA to help practices improve key macrocognitive functions and begin the transformation process to the PCMH model (Green et al., 2015). What makes using traditional CTA for transformation problematic is that it requires specialized expertise to conduct (Adams, Rogers, & Fisk, 2012), is resource intensive, and takes time (Militello & Hutton, 1998). Moreover, there is a dearth of individuals trained in CTA to help practices transform, and so a full-scale CTA consultation for every one of the many thousands of primary care practices in need is not only far too resource-intensive to be sustainable, but logistically impossible.

To address the costs and logistics of conducting CTA, Militello and Hutton (1998) developed Applied Cognitive Task Analysis (ACTA)—a simplified form of CTA designed to be conducted by working practitioners. The goal of ACTA is to equip practitioners to gain insight into the complex cognitive work in their domains by interviewing experts to improve work processes and design more effective training. Despite Militello and Hutton’s proof of concept and over 150 citations, we found only a single, very recent peer-reviewed article (Gore, Bank, & McDowall, 2015) in the intervening years that sought to train practitioners in ACTA and
evaluate how well they apply it. The lack of published articles on training practitioners in ACTA or CTA is consistent with admissions by Gary A. Klein (personal communication, August 20, 2015) and Eduardo Salas (personal communication, November 5, 2015)—two founding figures in CTA—that training practitioners in CTA has been a challenge, and that CTA seems to be as much art as science.

To facilitate the PCMH transformation, a large and growing workforce of change agents, often called “practice facilitators” (PFs) and loosely modelled on change agents in the US Department of Agriculture’s Extension Service (Brunner & Yang, 1949), has emerged in the US and Canada. The Agency for Healthcare Research and Quality maintains a central resource for accessing or creating training programs for PFs (Agency for Healthcare Research and Quality, n.d.). Most PFs in the US and Canada are employed by large vertically-integrated health care systems, cooperative groups of independent practices, practice-based research networks, and public agencies. They come from various employment backgrounds, have varying educational backgrounds, and receive training that is typically specific to the setting in which they are working. The training tends to focus on QI and change management skills. In nearly a decade of work in this area, and personal acquaintance with most of the leaders in practice facilitation in the US and Canada, the authors have yet to encounter any other training program that prepares PFs to directly address the complex cognitive dimension of the transformations with which they are helping (Baskerville, Liddy, & Hogg, 2012; Geonnotti et al., 2015). We saw training PFs in a simplified version of CTA as a potentially viable way to bring PCMH transformation to scale.

The Present Study

We sought to develop an approach to training an existing, experienced workforce of PFs in CTA to support large-scale practice transformation by adapting our experience and insights of
using CTA to help guide primary care transformation in research projects (Green, et al. 2015; Holtrop, Potworowski, Fitzpatrick, Kowalk, & Green, 2015). We worked with the province of Alberta, which was in the early stages of transforming approximately 3000 practices spread across over 250,000 square miles to the PCMH model.

The CTA program was designed to meet three key conditions. First, the CTA data collection process had to impact practice operations as little as possible. Because small, busy practices are under-resourced as it is, they have little to no slack and could only spare 45-60 minutes of time from each of their key personnel. In addition, interviews had to be conducted on site in the limited physical space available, which was designed for clinical care.

Second, the analysis process had to be structured to allow relatively quick turnaround of reports. We were able to draw on the PFs’ existing relationships with the practices to get them to agree to CTA interviews the first time, but the results (i.e., recommendations) had to be clearly value-added if the practices would agree to such interviews moving forward.

Third, the CTA reports had to be understandable and actionable by practices with limited resources and change capacity (Nutting, Crabtree, Miller, Stange, Stewart, & Jaen, 2011). The practices are small groups, typically one to four physicians and a handful of staff. They generally lack professional management, and are overworked. To be actionable, the CTA insights in the analysis had to be crafted into recommendations that were prescriptive, concrete, feasible, sequenced (where applicable), clearly explained and justified, and couched in the language of primary care.

Methods

This study involved two steps. The first was training PFs in CTA, which began with a two-day workshop. This was followed by two days of CTA field training in elicitation in the first
month after the workshop, then field application and six days of analysis and representation training over the next 17 months. During this period, we also sought feedback from practices at multiple points about the process and CTA reports. The second step involved interviewing PFs after 18 months to understand their experiences using CTA.

**Trainees**

The candidates for training in Alberta were the 14 PFs of the Toward Optimized Practice (TOP) program. Their role in the province at the time of the training was to assist voluntary associations of practices, known as primary care networks (PCNs), to implement aspects of the PCMH model and other improvements in care in PCN member practices. The bulk of a PFs’ work is typically oriented to improving discrete tasks. For example, the help practices revise their patient scheduling systems to reduce waiting times for appointments, or help implement recall systems to prevent abnormal lab values from being overlooked. The PFs are well-educated, many having masters’ degrees, some have training in change management, and all are experienced at clinical transformation. They come from a variety of health care or health care management backgrounds, and include former practice managers, nurses, social workers, and individuals specifically trained in change management. Based on our interviews, some PFs tend to be big picture thinkers, while others are more detail-oriented; some have domain expertise in particular areas of clinical transformation (e.g., back pain), while others have deeper expertise in facilitating the actual change process. PFs are geographically distributed around the province, working with practices in their respective areas. They had established relationships with the clinicians, administrators, and staff in the practices as they have helped them with several changes. Still, for better and for worse, the PFs are still considered outsiders.

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4 [http://topalbertadoctors.org/home](http://topalbertadoctors.org/home)
Training

GP is a cognitive and organizational scientist and LG is a family physician. Both have extensive experience using CTA together to understand and improve change capacity and facilitate implementation in primary care settings (Christensen, Fetters, & Green, 2005; Green, et al. 2015; Holtrop, Potworowski, Fitzpatrick, Kowalk, & Green, 2015; Potworowski & Green, 2013). The present training program was adapted from a CTA training program we developed and conducted for three research teams in Michigan, plus for three other studies involving CTA purely for data collection (no intervention – no report delivery) in over 50 practices.

Workshop Training. Prior to the workshop, the PFs were assigned readings on CTA to give them a working understanding of macrocognition. The two-day workshop itself began with GP and LG answering PFs’ questions about the readings. PFs were then presented an overview of complex cognitive systems, where they exist in primary care, a review of macrocognition and CTA, and how they are related to QI and PDSA. PFs were then trained to ask the framing questions for CTA and introduced to the task diagram (TD) and team knowledge audit (TKA). They then did a short exercise in which they “re-framed” their upcoming PCMH project as a CTA project. The first day of the workshop ended with some CTA tips (e.g., repeat back, ask clarifying questions, ensure SMEs do not slip into generalities) and traps (e.g., avoid getting side-tracked, caught up in minutiae, or following personally interesting but non-critical threads) before PFs paired-up to conduct mini-TDs on each other. For homework they were asked to conduct a short TD on a friend or relative on an appropriate topic. We began the second day by debriefing the homework TDs. We then worked in two teams to design an interview guide for a TD and TKA to be conducted on two health care professionals (our subject matter experts, or SMEs) later that day. The domain would be on an actual PCMH change intervention in their
practice—a screening guidelines implementation. While one team did a TD and KA with the physician, the other team did theirs with the medical assistant. The teams then switched SMEs and conducted a TD and KA while looking for gaps and differences in the SMEs’ accounts. We debriefed the TD and KA and in so doing realized that the PFs would benefit from additional exposure to a TD and KA. We altered the remainder of the training to lead a live TD and KA.

We wanted to use an “every day,” non-medical domain for three related reasons. First, we felt it was important to further demystify CTA and sensitize trainees to the macrocognition all around them by illustrating that CTA can be used to understand any complex cognitive activity in which well-executed macrocognitive functions are critical for success. Second, we felt that offering an example of CTA in a very different domain from the first would further encourage the transfer of thinking in macrocognitive terms to new and different contexts (Barnett & Ceci, 2002). This would allow students to notice a broader range of opportunities in their diverse work environments that could benefit from CTA. Third, we felt it might be beneficial to conduct a CTA in a domain in which most of our trainees would have no prior knowledge. Doing so would force students to ask (or think of) questions that were not grounded in experienced-based assumptions. It also allowed us to point out the importance of preparing before conducting CTA interviews: The more one learns about the domain beforehand, the more one can spend one’s limited interview time asking deeper and more nuanced questions.

To select the domain of the live TD and KA, we asked if any PF was good at a pass-time in which decision-making was critical and failure was consequential. One of the PFs was an experienced rock-climber, so we chose rock-climbing as the domain for the TD and KA. While conducting the TD and KA, we frequently stopped to ask the other PFs what they noticed, if they had questions, and how they would proceed. We then debriefed the TD and KA.

Field training: Elicitation. Three weeks after the workshop, we began data collection in three practices in one PCN. Prior to beginning fieldwork, LG and the subset of PFs met as a team to design the probe cue sheets and then refine them through pilot testing with colleagues (physicians and staff) who were not in the target practices. PFs involved in this stage were the subset of seven who worked in the area covered by the PCN, though not necessarily those who had relationships with the specific practices. Most did not; the selection of PFs was for logistical feasibility (travel and time) not for their relationships with practices.

During the fieldwork, we debriefed with the practices immediately after each set of interviews to evaluate their impact on practice operations, and modified our elicitation methods based on their feedback. This led to rapid convergence on a data collection visit structure that obtained the needed information and met our first condition of impacting the practice’s operations as little as possible. By the third visit, we had developed an efficient standard visit format: A pair of PFs, visiting for two days, conducting no more than three 45-60 minute interviews each day. At least 60 minutes were allowed between interviews for the pair to consolidate their notes and impressions and to make observations and field notes. The two PFs alternated the lead and second roles in interviews. Interviews were conducted with at least one physician, nurse, medical office assistant, clerical (non-clinical) staff member, and the practice manager if there was one. Each interview began with a basic Task Diagram, using 5–7 of the A4-size blanks (one for each step) that we designed (Appendix 1) to fit the cramped offices and exam rooms in which interviews were conducted and to make the TA and KT more interactive. The interviewers then focused on a Knowledge Audit in the areas identified as requiring intensive macrocognitive efforts.

During the training period, four PFs conducted the first visit of the first site with LG and the other three of the seven conducted the first visit of the second site with LG. In each case on day 1 at the site LG led the first interview with a PF seconding and the others observing. The PF who had seconded for LG then led the next interview, with LG seconding and the others observing. Subsequent PFs rotated through seconding then leading with LG observing on day 1, then the PFs continued without LG on day 2. A team debriefing and feedback session was held on the evening of day 1. The third site’s first visit, and all site follow-up visits, were conducted by the PFs themselves.

**Field training: Analysis.** LG led the field training in CTA analysis. First, LG and the seven PFs iteratively developed and refined an efficient coding and theme abstraction procedure. For the analysis of the first site, all seven of the PFs involved in fieldwork participated for training purposes. For the analysis of the two subsequent sites, four team members, the two who visited the site and two who did not, were involved. Each note taken during an interview, together with the question or probe that elicited it, was coded for the macrocognitive functions represented using the categories in Table 1. The coding was divided in a staggered overlapping manner, such that each note was coded independently by two PFs, with the first half of any one PF’s assignment coded by a different colleague than the second half. In a meeting of LG and all four PFs (the coding group), the coding was reconciled. The two coding team PFs who had not visited the site provided feedback to make assumptions explicit and force the site visit pair to clarify their interpretations. The themes were abstracted into a description of the practice for each macrocognitive function. The coding group then considered two questions for each category: 1) What is the practice’s level of skill at this macrocognitive function? and 2) What is the practice’s characteristic way of executing this function? Both questions were further broken.
down into formal and informal use of the function (e.g., spontaneous conversation vs. structured methods for coordination).

Finally, based on the categorical analyses, emergent themes, and field notes and artifacts collected, the coding group assembled a portrait of the practice’s overall mental model of care delivery. The mental model was summarized, implications explained, and ideas for recommendations compiled. This process was supported by an analysis template we developed, through multiple iterations, for the purpose (Appendix 2).

**Field training: Knowledge representation.** LG led the field training in CTA representation. Through debriefing and feedback from participating practices, we iteratively developed and refined a report format that met our third condition—usefulness to the practices within the constraints they face. LG and GP discovered in previous work (CITE?) that reports with broad re-design suggestions were usable by high-functioning practices with high change capacity, but were difficult for ordinary primary care practices to make sense of or put to use. For this reason, the reports for the practices in this project were highly structured, with recommendations that were relatively directive (see mock report in Appendix 3).

Upon completion of the analysis for a given site, one of the two PFs who visited the site was assigned to draft the report to the practice. The draft was revised by the coding group (4 PFs and LG), sent to the practice leadership, and areas unclear to them clarified based on their feedback. The final report was then presented to the practice in a discussion meeting lasting up to an hour. Several weeks later, we visited the practice to learn what use they had made of the report, and gathered their input for further improvement of our method.

**Interviews.** After 18 months, the project came to an end. In that time, unexpected evidence of transfer of training led us to decide to report the effects of the CTA training. GP was
not involved after the workshop training. For this reason, GP led the interviews of the seven PFs who had undergone training and had participated in fieldwork to date (see Results below) with LG taking notes and acting as second. The goal of the interviews was to assess what impact PFs felt the CTA training had on their work. The interview protocol included questions about their backgrounds, how they had facilitated practice change and transformation before the CTA training, their experience of the workshop, their initial field experiences, what they found challenging about CTA, whether and how the CTA training had changed how they thought about and did their work, and what they saw as next steps (if any). The interviews were conducted by phone, and each one lasted between 60-120 minutes. The notes from the interviews were analyzed for themes separately by GP and LG, who then met twice to discuss them and reconcile. Little, if any, reconciliation was necessary as there was convergence on themes.

Results

All 14 PFs completed the initial training. Seven of them, determined by geography and the project’s logistical needs, had the opportunity to participate in the field training and CTA data collection over the subsequent 18 months. None dropped out of training or declined an opportunity to participate in fieldwork. Several of the seven who had not had the opportunity to participate in fieldwork asked (often more than once) to do so as soon as an opportunity was available. It should be noted that this CTA project occupied only a small fraction (at most roughly 15%) of any PF’s time; most of their work continued to be less complex practice facilitation.

Success Of The Training Program

CTA reports were completed, delivered to, and followed up on in three practices. Several others are in queue awaiting our teams’ visits. The PFs have demonstrated that they could meet
the three key conditions of using of CTA to improve PCMH implementation at scale: 1) The data collection process had minimal impact on practice operations, which was acceptable to practice leadership, 2) the analysis process led to a quick turnaround of reports using modest resources, and 3) the reports were understandable and actionable by practices with limited resources and change capacity. We detail each of these findings below.

Data collection in each of these typical time-pressured family medicine practices required 2 days from each of 2 people per practice from the CTA team, and approximately 5-6 hours of personnel time from the members of the practice. Each member of the CTA team also spent about one day preparing the visit and another day organizing notes and field observations afterward. Practices confirmed that the time commitment to participate in the CTA interviews was acceptable, and they would be willing to recommend participation to colleagues.

The structured data analysis and report completion required 45 to 50 hours of total effort per practice, divided among the four PFs of the coding team. Our quickest report delivery took 3 weeks. Our analysis process was slowed by three factors: 1) we built in additional time for instruction, 2) PFs were inexperienced at this kind of analysis, and 3) scheduling constraints. Depending on how flexible PFs’ schedules were, we expect that subsequent reports could be returned in as little as two weeks after the data collection visit.

The structured CTA reports were understandable to and actionable by the practices. Although the practices lack professional managerial or leadership resources or training, the reports had significant impact. In one case, the report has caused intense internal discussion centered on the practice’s mental model of primary care delivery: The practice is currently highly physician-centric, and its physicians were unaware that there was any other way to deliver care more effectively. To add to the challenge, the physicians value their status. Thus, the realization

that they would have to change their mental model of care to one that is less hierarchical, and more team-based if they were to progress toward the PCMH has been very unsettling for them.

The reports for the other two practices did not recommend fundamental shifts in mental model. Both have devoted significant personnel time to act on the different recommendations about processes in their respective reports. The larger of the two practices found that the report helped them understand clearly where and why their implementation re-planning processes were sometimes going astray. As a result, they put in place a formal coordination mechanism to improve the process. Employees of the smaller practice realized that they were relying much more heavily on informal means of coordination than they were aware of. They understood that it would become error-prone when they grew in size as planned, and so began implementing more formal coordination processes in anticipation of their growth.

**Additional evidence of training success**

In addition to meeting the three key conditions, there were three other significant indicators that the CTA training was successful, and it is our awareness of the first two that compelled us to interview the PFs and evaluate the training program post hoc. First, PFs very quickly began applying their CTA skills to their other, seemingly less cognitively demanding, practice facilitation work. Although this project occupies only about 15% of their time, in irregular bursts, the PFs began reporting that they were applying what they had learned in CTA training to situations where their regular facilitation work was proving difficult. For example, in one case where apparently agreed-upon patient scheduling changes were repeatedly failing to be implemented, a detailed examination of the practice’s coordination processes revealed a lack of common ground and lack of shared tacit knowledge about how scheduling should be done.

Directly addressing that problem allowed the change to succeed.
Second, near the end of the reporting and follow-up phases of the initial CTA project, one of the PFs was approached, in her role with the Alberta Medical Association, by the Canadian Medical Association’s “Choosing Wisely Canada” program\(^5\) for assistance with a campaign to reduce unnecessary magnetic resonance imaging (MRI) for uncomplicated back pain. The program requested assistance with creating and disseminating an educational program aimed at family physicians. The CTA-trained PF objected and explained that the program first needed to understand the variety of physicians’ mental models of back pain and imaging studies. That objection led to a grant from the program to the PFs, who then engaged LG to guide them in developing a study. LG and GP collaborated to develop a variant of the critical decision method (CDM) for the purpose, and a 3-hour workshop was devoted to adding CDM to the PFs’ skill set. Their experience and understanding of macrocognition and CTA enabled them to pick up CDM and its goals quickly and apply it effectively, generating insights that radically changed the Alberta Medical Association’s approach to implementing Choosing Wisely for back pain imaging.

Third, over the last year (due to the rapidly rising need for practice facilitation) the PFs’ roles in their regular work outside our project have changed largely to a train-the-trainer model. PFs have begun to teach PF basics to less skilled (but less costly) personnel, called Improvement Facilitators (IFs). IFs are shared locally by small clusters of practices, and do more basic practice facilitation work than do PFs. The PFs reported including some basic concepts from CTA in this train-the-trainer work. In particular, they find an overview of the simplified macrocognition categories in Table 1 to be helpful to the local IFs.

\(^5\) http://www.choosingwiselycanada.org

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Practice Facilitator Perspectives on CTA Training

In interviews, PFs explained their approach to practice facilitation and how CTA added to their skill set, and offered considerable feedback about the workshop training and the field training.

**General approach and CTA contribution.** In general, the PFs relied mostly on the Institute for Healthcare Improvement’s formulation of the “Model for Improvement” in their daily work. A few of the PFs with additional training in practice change and facilitation mentioned drawing on other theories, models, frameworks, and tools in an ad hoc fashion, including Deming’s four lenses and System of Profound Knowledge (Deming.org, 2016) (which they compared to the 4 passes/sweeps in the TD), Lean Thinking (Liker & Meier, 2006), process mapping, SWOT analysis, the CIPP model (Stufflebeam, 2003), and Phillips-Kirkpatrick model (Phillips, 1997). Although these theories, models, frameworks, and tools help with change management, none specifically address complex cognitive work. The PFs found that the addition of CTA gave them not only another skill set for practice facilitation, but, more importantly, that thinking in terms of macrocognition allowed them to see practice facilitation challenges more comprehensively.

**Workshop training.** The engagement and individual differences in the PFs was evident in their responses to how they prepared for the training. One PF who identified herself as a very concrete thinker found the reading very theoretical, challenging, and very different from what they were doing in their daily work. Another made extensive notecards of the different concepts and techniques, and another looked for videos online and found one of Gary Klein doing a CTA. All the PFs found the pre-workshop reading important.

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6 http://www.ihi.org/resources/Pages/HowtoImprove/default.aspx
7 http://www.apiweb.org

Two activities in the training workshop that PFs consistently found valuable were the live TD and KA that GP and LG conducted, and the TD and KT that they got a chance to conduct themselves. PFs felt it was important to see a demonstration of a TD and KA done in real time. They appreciated seeing concrete examples of the language that was used to ask, encourage, and direct interviewees, as well as some of the intangibles of the interview process, such as the pace, tone, and emphasis. Several PFs found seeing how LG and GP adjusted on-the-fly during the TD and KA interview especially valuable. Specifically, they found it instructive to see how to keep the interview on track when interviewees misunderstood a question or answered in generalities. They also felt they benefitted from seeing how and how we changed the direction of the interview opportunistically to dig deeper or abandon a line of questioning. Finally, some PFs mentioned the interview taught them how and when to ask clarifying questions and offer the second interviewer a regular chance to speak. One PF said that what had been theoretical in the pre-workshop readings suddenly became very concrete for her in a series of “Aha” moments while observing the live TD and KA.

From a pedagogical perspective, several PFs mentioned appreciating the way LG and GP paused at regular intervals during the TD and KA to comment on what was happening, answer questions about what was happening and why, and ask PFs what they noticed or would do next. PFs also appreciated the debrief and the discussion on how hypothetical alternative scenarios might have played out in the interview (e.g., how we might react to challenging responses that we did not actually encounter).

One PF added that it would have been good to see GP and LG model a TD and KA in the medical context, and thought she would have benefitted from another day of practice.
Field training in elicitation. PFs felt strongly that supervised application soon after the training was important. Seconding for an experienced lead followed by leading with an experienced second (in both cases initially LG, then subsequently other PFs who had seconded or led for LG) helped them consolidate their learning.

PFs supplemented the formal debriefings after the supervised application with informal debriefings on their own. Although they typically discussed the content of the interviews, several mentioned that they had learned from observing one another’s interviewing styles, on the “art” of conducting a CTA. Their work experience as PFs had previously all been solo; they had never worked in pairs before. Two prominent issues of style were how to build rapport with an interviewee, and how to gently, but firmly and consistently, keep the interviewee focused on concrete examples.

Two important realizations emerged for PFs as significant training experiences in the initial field interviews. The first was interviewing in a clinic where the different interviewees presented markedly different ideas of what was happening there. Initially, PFs found this very confusing, but then had the insight that the differences themselves were critical data, informing them that the practice lacked common ground. The second realization was that CTA was allowing PFs to gain very consequential insights into how these clinics actually functioned that the PFs had not known despite having worked with them before.

Field training in analysis. All of the PFs found that working through the process of analysis of their actual interviews greatly increased their understanding of CTA and macrocognition. The PFs commented favourably on the simplified macrocognition categories shown in Table 1. The initial set of categories derived from our previous work in primary care transformation was useful for the task at hand and a manageable starting point from which to
Several mentioned that seeing how other PFs had coded transcripts was valuable because differences in coding led to discussions about where to focus and how to identify key insights for this project. PFs also mentioned developing a better understanding of how the macrocognition concepts were related, and that the categories in Table 1 could be split, made more specific, or reframed differently depending on the project’s aims and the available data.

PFs also pointed out that the insights gained and shared during the early analyses helped them conduct better, more focused interviews subsequently. Specifically, they reported being more confident about knowing where and how to dig deeper because they were more comfortable thinking in terms of the macrocognition involved in the routines and organizational dynamics they were investigating. Several PFs also found that thinking in terms of practitioners’ mental models (the last element of each analysis cycle – see Methods above) helped them finally understand the dynamics and hidden barriers in the practices they were trying to help, but had had considerably difficulty facilitating.

**Field training in representation.** One PF highlighted the degree to which clinics will react differently to the kind of guidance being offered. The PF observed that some clinics have embraced the guidance in the reports, in others it has stirred generative debate about models of care, and still others were not be pleased with the constructive criticism. One PF recounted the case of a clinic that wanted to be told how wonderful they were and to just carry on, but got defensive when the report identified opportunities for improvement.

**Overall impressions.** In addition to their specific comments on activities, several broad principles emerged from the PFs’ reflections on the training and fieldwork. First, the PFs emphasized that the high-level discussion of the concepts and principles of macrocognition was essential context for learning the specific skills of CTA. They also found it important that a
single two-day workshop covered the spectrum from the overall framework and core macrocognition concepts to detailed nuts and bolts of application. PFs also appreciated being introduced to CTA in baby steps, with the workshop focused on introducing macrocognition, designing an interview guide, and observing and conducting a basic TD and KA, and then gaining initial experience in the field with an expert to offer immediate feedback and deepen their knowledge of the subtler points of elicitation, analysis, and representation. Finally, several PFs recognized that there was much more to macrocognition and CTA techniques than they were taught, and expressed excitement at the prospect of learning more, refining their current skillsets through further practice, and applying CTA in upcoming projects, such as developing PF and IF training materials.

**CTA Impact on Practices**

The follow-up visits to the three practices showed this streamlined CTA to have had a significant, though different, impact on all three. In one practice, a key leader found the CTA findings very unsettling; implementing the recommendations would have required changes she was unwilling to make. This practice used only a few minor suggestions but did not act on most of the report. Another practice found the report helped them understand their work better and to get “unstuck” on some areas they were working on. They referred to the report repeatedly during practice team meetings, and implemented almost all of the recommendations. The third practice suffered an unfortunate coincidence of turnover of several key support staff for various unrelated (benign) reasons shortly after the report was delivered. That practice is using the report as a template to rebuilding their team, including making decisions about new staff hires and the recruitment of a new physician partner.
Discussion

A key reason that ACTA was developed was to train practitioners in a more elementary form of CTA so that it would not be as resource- and time-intensive to conduct. ACTA allows practitioners to apply CTA to process re-design and training projects, but a simplified CTA also has the potential to guide the implementation of the same intervention with multiple local adaptations at scale. The end goal of the present project focused on using CTA for the latter goal by training specific change agents called practice facilitators (PFs). PFs are charged with facilitating change at multiple clinical practices by helping them to adapt their current processes so that they can successfully implement a series of PCMH changes in a broader transformative effort.

The evidence from both our observations and PF interviews suggests that the simplified CTA training was effective in a number of ways. The elicitation had minimal impact on practice operations, the analysis process was relatively quick, and the CTA reports guided change in a number of practices with limited resources and change capacity. In addition, the PFs independently applied CTA methods to other projects, and were able to reframe a call for proposals using macrocognition concepts to win a grant. Finally, several PFs expressed eagerness to learn more and apply CTA to upcoming projects.

Implementing a new method of process re-design or organizational learning often works for a few projects, but then fades from use because it does not become ingrained in the thinking and central to the process of how things are done. We feel that this training set the foundation for lasting success in getting PFs to use CTA because they have not only continued to use it, but have applied it more broadly than they had been trained for, both in terms of transferring CTA to different types of applications, and acquiring new CTA techniques and concepts needed to do so.
We think that there are three main factors for the success: The PF trainees, the training, and the PFs’ work characteristics.

**Trainees**

We do not underestimate the importance of having started with a skilled pool of practice facilitators. Our trainees were not like the graduate students with little domain expertise trained by Militello and Hutton (1998), but were similar in some respects to the professional engineers trained by Gore, Bank, and McDowell (2015). Specifically, they were a diverse group of experienced professionals, many with advanced degrees, who were interested and eager to learn and apply CTA. PFs’ expertise varied from individual to individual, but collectively included a mix of expertise in different clinical content areas, in primary care clinical processes, process improvement, and change management. Moreover, they were motivated and reflective practitioners. As such, they began from a knowledge, skill, and experience base that allowed them to quickly adopt macrocognition concepts to extend their own mental models of practice facilitation, and to become increasingly more expert not only at knowledge elicitation, analysis, and representation, but by extension at practice facilitation. CTA gave PFs the language and structure to reveal underlying organizational dynamics, identify problems more quickly, and “to cut to the chase.” In one case, a PF had spent hours trying to uncover why a project was not being implemented despite apparent agreement from all stakeholder. She was not able to make sense of what was happening, but “when I dug into mental models, [it] took 10 minutes to understand what was going on.”

In contrast to the professional engineers trained by Gore, Bank, and McDowell, a PF’s job is fundamentally about helping practitioners understand, learn, and change. This may have provided an additional connection between what the PFs do and the ultimate users of that

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information derived from CTA reports. Both in this sense, and in that they already had domain expertise and change expertise to act as a foundation for CTA, our students were probably halfway between “naïve” practitioners and seasoned researchers who use typical CTA in contracts.

Training

The training was similar to Militello and Hutton’s (1998) and Gore, Bank, and McDowell’s (2015) ACTA training in that we taught the TD and KA, but differed in other respects. First, the goal of our training was not to elicit SME knowledge to develop training materials, but to help PFs elicit knowledge from a variety of practitioners about how they practiced medicine together, as a team. The PFs’ goal in doing so was to use this knowledge to help guide local practitioners in improving their own organizational and clinical processes. This also means that our end product — the CTA report for practitioners—was also quite different from what the trainees in the other two programs produced. In one sense, it was the PFs who were the change experts, and CTA improved their ability to elicit, evaluate, and act on better information. This, in turn, further developed their facilitation expertise in that they could more effectively help guide practices. Framed this way, CTA built on and extended their existing training and so had real-world consequences for them—it was not merely participation in an experiment.

A second difference between our training and Militello and Hutton’s (1998) training is that theirs provided a total of 12 hours of training: A two hour introduction to the concepts of CTA, six hours of training in ACTA techniques, including elicitation and knowledge representation and participation in two interviews with subject matter experts (SMEs), and a four-hour training to analyze data and develop training materials. Our training was similar in

structure and duration to that of Gore, Bank, and McDowell (2015): A two-day introductory workshop, followed by multiple additional days of training over several months.

A third difference is that the PFs trained in teams and pairs. A key part of their ability to learn so quickly was that, despite their differences in educational background, expertise, and individual differences (e.g., big picture, concrete, detail oriented, etc.), they worked well in complementary pairs during elicitation and in a community of practice for analysis and reporting. In this way, we were not training a group of individuals in CTA, but rather a diverse and complementary team.

**Work Characteristics**

The majority of traditional CTA projects are, arguably, one-offs: The individuals conducting CTAs typically do not repeat the same CTA for the same process in similar, but not identical, contexts. Consequently, only a limited amount of content expertise is transferred from site to site. In addition, these individuals usually do not return to the same small group to conduct subsequent CTAs for process changes that build on previous CTA-informed process changes. In short, there is no continuity. As a result, rapport, trust, and knowledge of the context need to be built from scratch each time. For PFs, the opposite is true.

There are two characteristics of PFs’ work environment that are quite different from those of typical CTA practitioners and that may have reinforced the development of their CTA expertise. First, when PFs work on a project, such as back pain, they do it across many practices. This allows PFs to develop content area expertise and transfer it from one case to the next, and with CTA see the differences across practices like never before. This effect is amplified by our reports of vicarious learning from other team members who conducted CTAs at other practices and who participate in the analyses of each others’ transcripts.
Second, because PFs work with the same practices across different projects, PFs can build on what they learned in previous CTAs about a given organization’s dynamics and change capacity. As a result, in each subsequent project they should be able to see the effects of the previous CTA report and conduct somewhat deeper, more targeted, and more efficient CTA analyses. Moreover, we believe that the clinicians and staff in the practices might benefit from having undergone multiple CTAs and received multiple reports. It is hard to imagine how these would not make them more sensitive to the macrocognition in their own work environments. This may lead to a virtuous cycle of PFs and interviewees becoming more reflective practitioners and conducting better CTA interviews and even better reports. The end game in such a cycle could result in practices developing sufficient change capacity to become more independent of the PFs, and in so doing, further contribute to bringing PCMH transformation to scale.

**Next Steps**

There are several ways in which practice and research can build on the present effort. It would be worthwhile to explicitly integrate macrocognition and CTA with other change-related frameworks and QI methods, such as Lean Thinking. This would help make CTA a more systematic and integrated part of PFs’ practice, and would help future CTA training efforts aimed at improving change implementation. Several PF expressed a desire to learn more about macrocognition to be able to conduct deeper analyses. In principle, PFs could benefit from a deeper understanding of the various theories of the components of macrocognition, but this would require time and effort. Exactly how much more would be worth learning is an open question.

Following Gore, Flin, Stanton and Wong’s (2015) call for longitudinal studies of CTA training, we plan to observe how this learning community of professional CTA users evolves.

We will study how they integrate CTA with change facilitation and QI techniques, how independently of LG they can practice, the effects of their train-the-trainer efforts with CTA, and the effect of multiple CTAs on the PF-client interaction. These would all provide valuable insight for training the many other practice facilitators and process engineers who have not yet been exposed to CTA.

**Conclusion**

In this project we have demonstrated that a simplified CTA can be adapted to train professional change agents to provide low-resource primary care practices actionable insights to help them transform into patient-centred medical homes. This provided a new, real-world example of the impact CTA training can have, a template for one type of effective CTA training, and some useful tools as called for by Gore, Flin, Stanton and Wong (2015) and Klein (2015). It also offers a means of helping to bring PCMH transformation to scale that, by leveraging existing expertise and adding to an ongoing program, is logistically practical.

**Acknowledgements**

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References


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### Table 1: Simplified Macrocognition Functions Used In Data Analysis and Reporting

<table>
<thead>
<tr>
<th>Macrocognitive Functions</th>
<th>Description for Coders</th>
</tr>
</thead>
</table>
| Sensemaking and Learning (SL)                          | • A deliberate and systematic attempt to find coherent, conceptual situational understanding  
• Can lead to more monitoring and data gathering if info inadequate  
• Resolved by selectively ignoring data, understanding situation using current mental models (e.g., fitting or force-fitting), or learning  
• Learning consists of modifying a mental model or acquiring (consciously or unconsciously) a new or improved means of doing something. |
| Decision Making (DM)                                  | • Any decision in the clinical or administrative process  
• Includes what decision, by whom, made how, when, where, and why about an individual patient’s care management  
• Can consist of decision rules (IF X, THEN Y) but need not be |
| Planning (PL)                                         | • Objective: Any activity involving the process of intending to (re-) shape another process, e.g., decisions about the clinical process  
• Transitive: Planning (about) something, including learning, coordinating, etc.  
• Includes activities such as meetings, decisions, votes, consults, etc.  
• Includes adjusting the plan (i.e., re-planning) during implementation |
| Monitoring and Detection (MD)                          | • Tracking implementation progress or discovering a situation that is novel, or a potential opportunity or problem  
• Initial detection or subsequent search for/detection of “comorbidities”  
• Deliberate feedback loop (i.e., monitoring) or accidental detection  
• Can lead to sensemaking and learning and (re-)planning |
| Managing the Unknown, Unclear, Unexpected, and Irregular (MU) | • Objective: How uncertainty, risk, ambiguity, or times when processes go awry are dealt with  
• Includes identification of ambiguities and risks, monitoring strategy, and incorporation into decision-making  
• Especially when things have to get started before anything is (or can be) known, or when the person or team has to scramble to deal with irregularities (e.g., patients showing up without required documents, charts unavailable)  
• Includes strategies such as testing, attempts to learn, monitoring (e.g., for emergence) |
| Coordinating (CO)                                     | • Objective: Any activity that helps synchronizes two or more people involved in an activity  
• About clinical and change process  
• “How” includes communication and “maintaining common ground”  
• “What” includes information flow, what gets done for/to patient,  
• “What” includes macrocognition: planning, decision-making, monitoring and detection |

Appendix 1: Task Diagram A4 Sheet

Legend
O = Opportunistic Care Opportunity
CD = Challenging Thinking/Decision
CC = Challenging Coordination
F = Fall through the Cracks
R = Responsibility
→ = transition between steps

### Appendix 2: CTA Analysis Template

<table>
<thead>
<tr>
<th>Macrocognitive Functions</th>
<th>Description</th>
<th>Impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensemaking &amp; Learning</td>
<td>[Each of these cells will have 5-15 bullet points derived from the coded interview notes]</td>
<td></td>
</tr>
<tr>
<td>Decision Making</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring &amp; Detection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Managing the Unknown, Unclear, Unexpected, and Irregular</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coordinating</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Mental Model

[This section is filled in with an overview then specific features, and annotations about the degree to which there is a single shared vs multiple divergent models in the practice]

Areas to probe at follow-up:

Appendix 3: Mock Cognitive Task Analysis Report

Cognitive Task Analysis Report

Fictitious Clinic

This report is confidential, for the internal use of the Clinic and the Fictitious Primary Care Network (FPCN) only. It is generated by and is the intellectual property of the University of Alberta Department of Family Medicine. However, the Department does not have rights to release it in whole or in part, nor to reveal its content, without the express consent of the Clinic and the FPCN. Absent consent, the Department may make reference to it only with regards to the process, i.e., the logistics and feasibility of applying the CTA method in primary care practice, and must not identify the Clinic in so doing. The Clinic and the FPCN may release any or all of it without consulting the Department.

HOW TO USE THIS REPORT

Experienced knowledge workers working in teams rely on certain team-level skills. Many years of studies have found these skills to be consistently important in all disciplines requiring high levels of expertise: medicine, aviation, nuclear engineering, military command, etc. These skills are collectively termed “macrocognition” (Table 1). Cognitive Task Analysis is the process of studying and describing how these skills play out in a particular team.

A CTA report provides a team with descriptive information about how it does its work, at a very fundamental level. It is not a score, report card, “grade”, or evaluation. Neither is it a nuts-and-bolts “efficiency expert” type prescription. It is useful to teams that already understand their work well, and are looking to refine it. It is information that may help the team see itself in different ways, see choices or options it may not have been previously aware of, or provide richer information for choices the team makes. It is information that a high-functioning team can use to inform its strategic thinking.

In this report, for each of the skill areas, we will a) describe the skill, b) describe what we found about the team’s level of skill, and c) describe how the team typically applies that skill.

If a skill is relatively weaker we will offer suggestions for strengthening it. If a skill is already strong we will suggest possible options for other ways of application. These are not “better” or “worse”, just different - but different ways usually have different advantages and disadvantages. These are presented not to imply that the team “should” do one or the other, but to allow the team to make the most informed decision about what best meets its goals. That decision will often be different at different times or in different situations, and this information may help the team get the most value from the broadest range of options as it decides.

Table 1: Macrocognition Skills Descriptions

<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensemaking and Learning (SL)</td>
<td>● Deliberate attempt to find coherent situational understanding</td>
</tr>
<tr>
<td></td>
<td>● Modifying a mental model or generating a new one</td>
</tr>
<tr>
<td></td>
<td>● Includes sensegiving - presenting an understanding to others to adopt</td>
</tr>
<tr>
<td>Decision Making (DM)</td>
<td>● Decisions in, or about, patient care and administrative processes</td>
</tr>
<tr>
<td>Planning and Replanning (PL)</td>
<td>● Shaping or reshaping a patient care or administrative process</td>
</tr>
<tr>
<td>Monitoring and Problem Detection (MD)</td>
<td>● Tracking the progress or outcomes of patient care or administrative processes</td>
</tr>
<tr>
<td></td>
<td>● Planned, ad hoc (“noticing”), formal (data collection), or informal</td>
</tr>
<tr>
<td>Managing the Unknown, Clear, Unexpected, and Irregular (MU)</td>
<td>● Planned or anticipatory (contingencies, fallbacks)</td>
</tr>
<tr>
<td></td>
<td>● Evaluating/estimating risks</td>
</tr>
<tr>
<td></td>
<td>● Unplanned, “scrambling”</td>
</tr>
<tr>
<td>Coordinating (CO)</td>
<td>● Any activity that helps synchronize two or more individuals in a patient care or administrative process, esp. transmitting information or expectations</td>
</tr>
<tr>
<td></td>
<td>● Maintenance of “common ground”, shared expectations/understanding/mental models of processes</td>
</tr>
</tbody>
</table>

SECTION 1: INDIVIDUAL FUNCTION CONSIDERATIONS

Sensemaking and Learning

About this skill

Sensemaking and Learning is how a team builds an understanding of a process, problem, event, or changes it faces, how it gains new information, and even how it decides what information it needs to gain. A typical example in the Alberta context today would be paneling: what is it, what is it for, how is it done, what resources are needed, is training needed, for whom, and how do we get it?

Key finding

The Clinic has mixed skills in this area. Sensemaking is well developed but learning is still at a basic level.

Detailed findings & suggestions

The Clinic understands and adapts new ideas (e.g., the AIM program) to its own context quickly. The style of sensemaking is communal, with everyone participating to generate a shared team understanding. Its approach to learning is largely externally driven. New concepts such as the AIM program are brought to the Clinic by external sources. The Clinic does not in general “forage” for new knowledge to apply in practice.

Communal sensemaking’s advantages are that it is efficient in small groups, it is good at getting everyone “on the same page”, and it imposes low demands on Coordination (see below). Its drawback is logistical: getting everyone into the same place at the same time is difficult to schedule with more than a very small number of staff. It also consumes equal amounts of everyone’s time.

Decision Making

About this skill

Decision Making is more than just the process of choosing between options. It is also the process of identifying options, of even being aware that more than one exists and that a choice can be made, determining how much effort to put into studying the options and making the choice (i.e., navigating between the opposite hazards of “analysis paralysis” vs. “shooting from the hip”), and choosing what process will be used to make the decision. (Will it be decided by one person, by one person with input from others, by a vote, by consensus?) The scope of Decision Making covers everything from the myriad quick, almost unconscious decisions a team makes while seeing patients every day, to the rare major decisions such as moving the clinic or taking on new physicians.

Key finding

One significant skill issue was observed in this area.

Detailed findings & suggestions

Decision making in the Clinic follows three patterns. Administrative decisions are made in a group consensus manner. That is, the staff and both physicians make all significant decisions as a committee of the whole. Minor daily operational decisions are typically made by the Clinic’s RN, who also functions as practice manager. She commonly discusses those decisions with affected staff and there is significant give and take in making them, but no formal process.

The third pattern pertains to clinical decisions. These are made by the two physicians. The Clinic operates on a “physician with helpers” model; very few patient care decisions are made by staff members. Even many decisions about how to handle patient calls, whether to work a patient in on short notice or offer advice by phone, are brought to the physician. Hence the physicians are interrupted with questions between most patient encounters.

Group consensus decision making has the advantage of generally high buy-in by team members, and it places low demands on Coordination. However, it does use significant amounts of everyone’s time. Taking place face-to-face, it can result in individuals being uncomfortable openly sharing divergent views, and can risk false consensus. It works well in small groups but becomes unwieldy as the team grows.

The physician-with-helpers model of practice is a source of professional satisfaction, and indeed core to the professional identity, of some physicians. It requires a profound commitment to change for physicians to learn to “let go” of many decisions, and can be anxiety provoking. It is significantly less efficient than a team-based model in which clinical decisions are delegated to RNs, pharmacists, or others to the limit of those other team members’ skills, with only decisions requiring an MD’s skills reaching the physicians.

We recommend the Clinic consider adding some formal mechanism, such as an anonymous feedback option, to protect against false consensus. Beyond that its current operational decision style serves well.

We recommend the physicians of the Clinic discuss their current model of clinical decision making with colleagues who have worked to develop a team-based model. We understand this is a major, possibly quite unsettling, step. However, experience in thousands of practices in Canada and the US show the team-based approach to be safe, practical, more efficient, and ultimately associated with superior access and quality measures.

Planning and Replanning

About this skill

Planning is self-explanatory; re-planning is the skill of adjusting plans based on observed results or changes in the situation.

Key finding

The Clinic has a high level of skill in informal planning but very limited formal planning and re-planning skills.

Detailed findings & suggestions

The Clinic’s planning process is informal in nature, with the exception of externally-facilitated activities such as AIM. Attendance at meetings where planning is conducted is universal except when individuals are away, and these meetings are usually where Sensemaking occurs as well.

Relatively informal planning practices require less effort than formal practices. They work well in small and highly connected groups such as the Clinic, and with less complex undertakings. The Clinic’s reliance on AIM, TOP, and the FPCN to essentially supply its structured planning and re-planning (particularly in PDSA cycles) is functioning well for them. However, the Clinic should be aware that it will need to develop more internal capability in this area, as other clinics in the FPCN are beginning to make more use of the FPCN’s resources and its share will be limited in the future. The FPCN’s facilitators can help design processes and train staff for this skill area.

Monitoring and Problem Detection

About this skill

Monitoring is deliberate checking on the results of work (including, but not limited to, the outcome of planning). It includes surveillance for known problems; postoperative wound infection rates in hospital is a common example. Problem detection is the noticing of unexpected undesired results, previously unknown problems, or unanticipated outcomes. Both monitoring and problem detection may be either informal or formally structured. Both also involve a great deal of activity that occurs with little or no conscious awareness, and the more expert the team is, the more that is true. This is the second most common place for teams to encounter difficulty (Coordination is first).

Key finding

The informal skills of monitoring and detection in the Clinic are well developed. The formal and structured type is largely externally supported, as above under Planning.

Detailed findings & suggestions

Informal monitoring and detection is relied on heavily to catch gaps in care, such as patients who need flu shots, A1c levels, etc. Clinically, physicians devote considerable effort to determining what gaps exist in patients’ screening, preventive services, care for chronic diseases, lab results and referral reports when those patients come in for appointments. The near-absence of delegation of Decision Making (see above) is reflected here also, in that the clinical Monitoring and Detection burden falls almost 100% on the physicians.

Administratively, informal monitoring and detection is applied to work process issues as well. The relative absence of hierarchy in interpersonal relations in the clinic leads to rapid communication of problems between MOAs, the RN, and the physicians. Formal monitoring, the use of data to evaluate processes and the effect of changes in processes, is almost entirely externally supported by FPCN facilitators, as noted above. The Clinic’s EMR is capable of producing timely reports in a number of areas but these are not used at present, and the Clinic is a member of CPCSSN but does not use the Data Presentation Tool.

The Clinic could reduce physician workload and improve consistency of care delivery by working with the FPCN facilitators to introduce some formal monitoring and detection processes. These could include “tick sheets” at the point of care to identify and close gaps in direct patient care. A larger step would be to activate the EMR’s care plan and reminder function. Some additional IT support would be required for this step. It would work best in conjunction with beginning some Decision Making delegation, as above, allowing staff to respond to some EMR-generated reminders using standing orders.

The Clinic may wish to consult with the FPCN facilitators about introducing regular use of access, preventive service, and chronic disease indicator reports from its EMR to its regular meetings. The Clinic’s highly developed informal Sensemaking and Planning skills could make use of this information effectively; new skills would not need to be developed.

Managing the Unknown

About this skill

Managing the Unknown is the skill of dealing with what cannot be anticipated. It is related to monitoring and detection, in much the way that treatment is related to diagnosis. It too may be informal - the ability to “scramble” to rapidly compensate when things go awry or “hustle” to take advantage of an unexpected opportunity - or formal, e.g., detailed contingency planning, maintaining reserve funds, or obtaining insurance.

Key finding

The Clinic is highly skilled in this area.

Detailed findings

The Clinic’s practices in this area follow a somewhat different pattern than in the few sections above. Its informal skills are highly developed, as they are in other areas, but in contrast to those other areas the Clinic has also done a great deal of deliberate contingency planning. This is true for both clinical emergencies (in terms of supplies, equipment, training, and regular practice) and for administrative issues (unexpected illnesses, facilities problems).

The Clinic seems to have achieved an optimal balance of structured and unstructured management of the unknown, and our analysis identified no areas in which they may wish to consider trade-offs or where skills improvement could be useful.

Coordinating

About this skill

Coordinating is the skill that keeps a team “on the same page.” Seemingly simple, it actually involves a wide range of formal and informal means of transferring information and understanding. Much of that transfer is “tacit”, i.e., it takes place with little or no conscious awareness or intent. Largely because of that, it is the most common area for teams to encounter difficulties. Entire programs have been built around the need to improve high-functioning teams’ abilities in this area, e.g., “crew resource management” in the aviation industry. As with several of the others above, it manifests both in formal and informal practices.

The Clinic has a high level of informal skill in coordinating. Formal coordination is little practiced; we could not estimate the team’s skills in this area. (That is commonly the case in small outpatient clinics.)

The Clinic relies heavily upon informal processes for coordination. This is a typical pattern in small medical practices. Direct verbal communication is usually relied upon, and is usually effective in this setting. There is some written communication but even that tends to be informal (e.g., Post-It notes). At the patient care level, an example is that concerns noted by MOAs when patients arrive (or fail to show up as scheduled) are presented to the busy physicians between patient encounters, but not recorded in writing or in the EMR. This practice combined with the heavy Decision Making load on the physicians sometimes results in “dropping the ball”. At the clinic operations level, meetings that involve issues of Sensemaking or Decision Making (see above) are almost universally attended and therefore people are usually on the same page, though minutes of the meetings are sparse, and are not distributed (though they are kept where everyone can access them).

The Clinic’s communal style of Sensemaking, Decision Making, and Planning above place low demands on formal Coordination, and hence its informal processes in general serve it well. We suggest two issues for consideration in this area. One is regular documentation of transmission of important clinical information between staff and physicians, so that important “open loops” can be closed at end of day. The other is more thorough minuting of meetings, and review at the beginning of each subsequent meeting.

The Clinic faces the prospect of significant growth in the medium term as the area increases in population. If it does take on additional physicians and staff, its Coordination will likely be strained, and development of more formal processes will be required.

SECTION 2: GLOBAL MENTAL MODEL

A “mental model” is a team’s understanding of the way things are, and how and why they do what they do. Mental models are often unconscious; indeed probably more often than explicit. That is, they are often built on a shared set of assumptions that are so deeply ingrained that the team does not even realize they are assumptions, or that there are other ways to be. Differences in mental models are frequently the source of miscommunication between teams. They believe they are talking about the same things, and do not realize that their different mental models result in their using the same terms but meaning significantly different things. (This is how teams end up “talking past each other.”) One of the most important values of CTA in the many settings where it has been used is to make mental models explicit, to make teams aware of their assumptions. That allows the team to make conscious decisions about what they do and how. The decisions may or may not be different as a result, but they are informed and considered - rather than default - decisions.

The physicians of the Clinic conceptualize medical practice in two quite different ways simultaneously. They think of operation of the Clinic as almost a family enterprise, with a very flat hierarchy, nearly a team of equals. At the same time, they see clinical practice as an individual activity, in which all important work is done by physicians who are assisted in only logistical ways by support staff. The path to improved performance in this model is for the doctor to “be smarter and work harder.”

As a result, the two physicians organize their workflows in nearly identical manner, due to the staff’s input. This maximizes the efficiency of staff work. However, the physicians are at significant risk of burnout, and have very limited capacity to address clinical indicator improvement such as ASaP. The RN’s skills are underused.

Discussion

The clinic is enthusiastic about quality improvement and patient safety, is eager to measure and improve its access and clinical indicators, has set the CFPC Patients’ Medical Home as its ambition, and is working with the FPCN facilitators toward these ends. However, the extensive literature on the Medical Home indicates that the “work harder, be smarter” model is not suitable for the Clinic’s goals. At this point the physicians face a difficult decision: they must become comfortable delegating significant work to their staff if they are to achieve their ambition. That means for example having the RN take on the chronic disease management coordination role, perhaps teaching MOAs to perform and document diabetic foot exams, etc. These are skills the physicians value and consider part of their professional identity. Letting go of them will be difficult. The physicians may need to ask for support from colleagues in the FPCN who have already done so.

SECTION 3: FOLLOWUP

CTA can be a powerful event for a team, and follow-up for its findings and its recommendations is often important to the team. We will make ourselves available to the Clinic’s leadership to discuss and clarify any elements of the report. After reflection and clarification if needed, we recommend the report (or key message from it, as appropriate) be shared with the team, including the FPCN members. If the Clinic would like to have that dialog facilitated, we will provide or arrange facilitator support.

If the Clinic wishes to act on the suggestions to explore deliberate Learning Strategies, incorporate more formal Coordination, build internal capacity for Planning and Re-planning, as well as accessing and using chronic disease indicator reports, via EMR data, the FPCN can provide support and we can suggest other resources if desired.

If the Clinic decides to explore the possibility of undertaking a team-based model we recommend working with the FPCN to connect with other practices that have worked to develop this model. Valuable insight may be gained on steps toward effective and safe delegation and use of staff skills. In addition, beginning with the FPCN Evolution program’s Practice Level Medical Home Assessment may assist in working toward its ambition of a CFPC Patients’ Medical Home.