Exploring high-level themes in primary care team collaboration

By

Usanisa Setboonsarng

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CERTIFICATE OF APPROVAL

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This is to certify that the Master's Capstone Project of

Usanisa Setboonsarng

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Paul Gorman, M.D.

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Abstract

Primary care is a practice of adapting to unpredictability, and the clinical staff has been entrusted to process rising volumes of patients. Clinical and non-clinical staff attempt to alleviate cumbersome information transfer and documentation processes that are complicated by introduction of digital information systems. To assess how practice staffs understand connectedness and communication in workflow streamlining, transcripts of interviews with 39 members of five small and medium size rural primary practices who were engaged in workflow assessment were interpreted for thematic content. Analysis revealed a list of characteristics related to team cohesion. A lack of commonly understood team-based goals and a disconnect between collaborative aims and workflow descriptions were noted. Predominant modes of communication were informal and face to face, while digital tools were minimally utilized for managing interrelated work dependencies. It is important to acknowledge the need for metrics to evaluate emotional pressures, member recognition of task dependencies, and connecting practice-wide goals with workflow. Clear measurement of these factors can help remove uncertainty and negativity from a smooth, working office.

Introduction

A primary care practice is a complex entity comprised of interrelated parts which together provide services to an influx of patients. In order to better understand this system, workflow analysis has been introduced to describe and evaluate interactions and connections that exist within it. Clear representation is needed for the many pathways, or 'trajectories' in primary care that allow processes and patients to flow in what can be described as a Complex Adaptive System. This study uses qualitative analysis of interviews with primary care practice staff to better characterize communication and connectivity in primary care clinics: How are members communicating? What do they understand about workflow? How is teamwork managed?

The Complex Adaptive System

Primary care clinics are a representative example of a Complex Adaptive System (CAS), that is, a collection of interrelated parts that influence functionality and modes of interaction. A CAS can be defined in terms of many descriptive parts that work together as a whole. Only recently has primary care been described in this "theoretical framework for relating and integrating the parts [that can] incorporate a dynamic, emergent, creative" entity. [8, 10] More specifically:

> "*A complex adaptive system is a collection of individual agents with freedom to act in ways that are not always totally predictable, and whose actions are interconnected so that one agent's action changes the context for other agents.*"[10]

A feature of a complex system such as healthcare is its 'fuzzy boundaries'. "Membership can

change, and agents can simultaneously be members of several systems… [which] complicate problem solving and lead to unexpected actions in response to change." [10] What governs each agent's actions and decision-making, are internalized rules, which are their individual internal models of core features, including cultural hierarchy and role responsibility. These models "within which independent agents operate are not fixed"; [10] thus cause varying degrees of unpredictability. How to best mitigate or accommodate these fuzzy boundaries has emerged as a key question to improve their linkages. "Too little attention [has been] paid to describing the actual communicative process of collaboration and teamwork… [the] lack of scrutiny of the relationships among collaboration, teamwork, and the hierarchical culture of Western medicine",[5] that stands as the missing piece to fully comprehend the CAS. Enhanced communication may be the key process, and tool, to relay agents' cognitive processes and expectations from one to another in order to resolve change, tension, and uncertainty. In other words, communication could be described as a method of linking adaptive agents (nodes) within the dynamic system that will facilitate its co-evolution. How communication currently functions in the healthcare CAS is another aspect to be explored in this study.

In the CAS model of internal webs of activity, the elemental goals are described as "attractors," connected by trajectories from the agents in the system. Each member – an agent – holds a position and functionality pertaining to elemental goals, affecting the context of work for the others. "Each of these [agents'] internal models operates by sending out trajectories toward achievement of several endpoints, known as attractors… Attractors can also be understood as the motivators and values of the practice."[8] Agents should, thus, be able to achieve the attractors (or goals) in the most effective manner. Concise and optimal information and

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communication flow that shapes a robust web needs to be constructed among CAS members. This would also serve as concrete representation for future researchers to understand.

As each agent performs their role in the web of communicating systems, they "seek out information or feedback that will support and sustain their movement toward the practice's attractors. The collective result of the trajectories created…is the specific shape of the complex adaptive system."[8] The organization's overall shape is influenced by the way evaluated attractors are achieved, or how they are repositioned. The 3 strategies proposed by Crabtree et al. that can 'reshape' the current web includes: [8]

- **Joining** works by enhancing existing attractors using the practice's known internal models; to be consistent with the practice's internal model of attractors
- **Transforming** involves changing an attractor or creating a new one
- **Learning** the techniques necessary for increasing awareness of internal models by physicians, patients, and office staff

Yet, to successfully achieve restructuring (a.k.a. change), researchers and practitioners must understand *how* the agents and attractors currently connect to each other. For example, how is a nurse practitioner achieving conflict resolution? Or, how are practice leaders ensuring availability for consultation on problems? [9] As previously mentioned, this challenge suggests the need to examine the actual modes of communication that carry the connective trajectories for achieving change. Better understanding of these modalities will help answer questions like: How can attractors (goals) be modified and achieved? How do structured trajectories (e.g. communication streams) facilitate or obstruct workflow within the primary care practice?

Although somewhat unpredictable, "there is often an overall pattern" in the behavior of complex systems. Such patterns, at a grounded work and data flow level, include patient information documentation needs, pharmacy refill routes and completion, coordination with insurance, etc. These flows have been described by clinicians (a.k.a. system participants or agents), and are targets that "health IT [information technology] can ... [help] reorganize and improve". [17] However, "knowledge and technology by themselves are insufficient to initiate and maintain practice change. A different way of thinking is needed to understand the organization of medical practice operations. A new understanding could lead us toward change interventions that are grounded in the knowledge of the unique configurations of individual practices."[8] This new way of thinking may involve the assessment toward practice-wide agreement on workflow 'patterns' and pathways of care. Knowing this may be the first step toward true knowledge of a practice's configuration. It may further suggest the level of 'team identity' that correlates to enhanced functionality, like encompassing concrete coordination and collaborative attitudes. Examination of workflow descriptions by clinical staff may provide insights into communication, collaborative relations, and workflow, offering a unique approach to identifying implications of this new strategy toward operational improvement.

Practice Operation as Workflow

The CAS concept is a highly theoretical framework capturing the operations and processes as trajectories that together form webs, uniquely shaped by local rules and constraints. These processes are tangibly represented as workflow diagrams. CAS conceptualizes the dynamic nature of interrelated individual models that are governed by organizational rules. Workflow

models, on the other hand, depict the progression of work and information through those agents' actions that lead to daily production or goal attainment. Workflow can, in one dimension, be stated as:

"*Defining the interaction patterns among a practice's staff as they fulfill tasks and produce outcomes using available resources*" [13]

Or as,

"*The sequence of physical and mental tasks performed by various people within and between work environments. It can occur at several levels (one person, between people, across organizations) and can occur sequentially or simultaneously*" [17]

Many definitions of workflow exist that serves different purposes. However, a system agent's definition of workflow can lend insight into attitudes and personal perspectives of independent and dependent work processes, and of team responsibilities. Currently there is "a dearth of understanding" of workflow variations, let alone participants' articulation of this topic. [13] This study explores this area by examining workflow descriptions given by primary care practice staff. A clinic's work system contains multiple agents, and how its members fit together in this model may provide insight into their understanding of dependencies. In addition, how their interactions with others (via communication forms) can lead to achieving mutual goals and alleviate friction in work and information flows.

The Clinical Culture and Organization

One of the rules that govern the shape of a healthcare CAS is the underlying hierarchical culture of clinical and non-clinical staff. This is a pervasive internalized rule that makes inadequate collaboration the norm. For example, medical practice has been described as a "loose coalitions of clinicians engaged in incremental development of their own service largely on their own terms". [14] Doctors hold a special position in the hierarchical rules of the system. They hold "considerable power over these scant resources, and are able to argue from an authoritative…position" [5] the work and flow of the medical office. Additionally, pairwise research on healthcare collaboration (e.g. nurse-physician, nurse practitioner-physician, social worker-physician, pharmacist-physician, and physician-physician collaborations) confirms a pervasive pattern of expertise-based autonomy that is physician-centric, creating positional silos operating under the authority of physicians. The result of this hierarchical physician centric culture can be unclear communication or planning, such that "comprehensive and efficient treatment of the patient is not possible". [5]

Four qualitative approaches that have been used to understand team dynamics include: group dynamics model, systems theorist model (CAS), a collaborative/consensus approach, and social constructivism. [5] Each approach reveals a unique spectrum of team dimensions. These have served as building blocks to create measurement tools that can capture organizational qualities. Additionally, recent research has focused on developing measurement instruments that could be used as both baseline and outcome measures for targeted system interventions. [9] Such measurement instruments are a starting point to clinical system's improvement.

Practice attributes that are brought to light via quantifiable surveys and questionnaires have

great implications for existing workflow. For example, a study relating organizational culture and practice systems in primary care evaluated 7 domains of practice systems via a survey format. [4] This study aimed to benchmark performance, for informed improvement activities. Specificity of the tool for primary care marked a key difference from previous instruments meant for larger health systems like hospitals. With staff rating cultural attributes, the study concluded the significance of collegiality, interest in quality, and autonomy towards system improvement.

In a study by Ohman-Strickland et al., another measurement tool was systematically developed to evaluate key attributes of the primary care setting in the framework of the complexity theory.[9] The survey measured 4 core elements specific to the primary care setting, highlighting those necessary for group-wide improvement. The 4 elements incorporated into this measurement scheme for primary care practices' sustainable change include:

1. Motivation of key stakeholders
2. Resources for change:
    a. Internal resources: relationships among members
    b. Leadership and decision-making approaches that engages diverse perspectives, share of critical information for enhanced problem-solving; culture to foster openness/connectedness/learning
    c. [relationships that foster] Communication
    d. Perception of competing demands
3. Outside motivators

4. Opportunities for change

One of the "four interdependent elements that determine a practice's capacity for sustainable change" (or simply its present attributes), is the internal capacity for communication. The present study builds on this finding by focusing in its analysis on themes in communication streams that connect agents and their workflows.

Enhancing Clinical Collaboration

The research summarized above suggests that the properties of a strong cohesive team of agents and robust connectivity among them are critical to success in a complex adaptive system. Hence there is a need not only to "[invest] in human capital, but in the complex context of health care, there may also be a need to invest in social capital, to [nurture skills that] foster inter-professional communication and learning in the workplace."[14]. Agents need the right tools to attain the right information, at the right time to perform meaningful and functional tasks. Developers of information systems thus need to internalize the CAS structure, and design its tools to align with the existing teamwork mechanism. "[E]ffective clinicians need to understand those pathways and systems of care...working both within and with those systems", and be able identify their needs to developers. [14] Capturing agent's understanding of the CAS from provides insight into how they view the CAS structure and its connectivity. How do clinic members ensure that attractors are reached? To what extent has leadership been successful in strengthening teamwork?

Leadership is a core feature of a CAS, where leadership can be defined as:

"a multifaceted process of identifying a goal or target, motivating other people

to act, and providing support and motivation to achieve mutually negotiated

goals… a process whereby an individual influences a group of individuals to

achieve a common goal. (Northouse)" [3]

Its ability to empower others and build relationships for team advancement is fundamental to

strong teamwork. Thus, understanding other team members' roles and their interactions within

a CAS strengthens teamwork, and may improve and streamline workflow. Enhancement of

clinical collaboration and therefore strengthening of teamwork for smoother workflow has

been proposed in 3 main ways. The first emphasizes additional training, in efforts to increase

the capacity of the current workforce. This extends from training "dynamic nurse leaders to

shape and direct clinical practice", [3, 11] to physician leadership training. [6] Secondly, addition

of practice facilitators and care managers, for example, could be key contributors to the

redesign of primary care. [15] The third solution is to recognize the gap in quality that is

attributed to organizational weaknesses. Organizational weaknesses include mechanisms for

coordination, systematic monitoring, or simply, a lacking of structured communication. [5, 4]

A report reviewing progress in clinical communication highlights issues in collaborative

processes among healthcare teams, which are summarized here. Firstly, clear definition of the

team is mandatory, i.e. make clear of overlapping roles and tasks, which are sometimes

"difficult because of territorial behavior by members of different disciplines". [5] Secondly,

contextual factors which may constrain team effectiveness must be addressed. Thirdly, conflict

mitigation should address importance of interpersonal skills and interaction among team

members. Critics point out that "effectiveness of teams is often in doubt", where research tends to assume presence of these features (understanding of roles, teams function in an egalitarian, cooperative, interdependent manner).

Research Question

Given the view of primary care practices as examples of a CAS, and in light of the findings summarized above, this study sought to answer the following research questions:

1. How do clinic staffs (agents) understand communication, as evidenced by their descriptions of workflows?

2. Is there a structured communication system to foster interaction within the interdependent CAS web of work and information flow?

3. Is there clarity in roles, recognition of interdependence, and presence of team identity by defined mutual goals (attractors) that also works to shape the CAS?

Methods

The present study is a secondary analysis of data collected during an earlier study of workflow assessment by staff in independent primary care practices.   In that study, 18 rural primary care practices formed project teams, chose a locally important workflow, and performed a workflow assessment for the purpose of improving practice and making better use of health information technology. Qualitative analysis was performed by a multidisciplinary research team to examine any change in knowledge of workflow assessment, knowledge of specific practice workflows, and practice attributes and constraints that contributed to success or failure. [18]

Sample

 The earlier study included 18 small (1-5 clinicians) and medium-sized (6-10 clinicians) independent rural primary care practices in Wisconsin and Oregon.   The present study examined all interview transcripts and field notes for five practices, chosen to balance size and state of origin. Subjects included 39 clinical and non-clinical staff members in the five practices.

Data Collection

All staff on practice teams were interviewed before and after their ten week project, focusing on their understanding of workflow and workflow assessment, and including descriptions of specific workflows in their practice. In addition, field notes were recorded by a member of the research team at biweekly team meetings. All interviews and field notes were transcribed and validated against audio recordings in a systematic process. [18]

Data Analysis

Qualitative analysis of this data was informed by complex adaptive system theory and guided by three categorical frameworks: communication, teamwork/collaboration, and relation to workflow. Analysis was to address the research questions, analysis identified themes in the data through an iterative process of five stages as described by Pope et. al., and summarized here: [12]

1. Familiarization (immersion)

2. Identifying a thematic framework (category development of key issues, concepts, etc.)

3. Indexing (or coding; applying identified themes to all the data by annotating transcripts)

4. Charting (rearranging and relating the coded data)

5. Mapping and interpretation (connecting)

Transcripts were read and annotated by the author, one clinic at a time. Initially, the kick-off

meeting note was read (immersion), and then coded by annotation with color highlights,

bolding and standard typeface. Next, pre-interview transcripts were read (in semi-random

order) and coded in the same fashion, followed by field notes in chronological order. Each

successive transcript was coded using previously identified themes, while examining each for

newly emergent pervasive themes. When identified, previously coded transcripts were reread
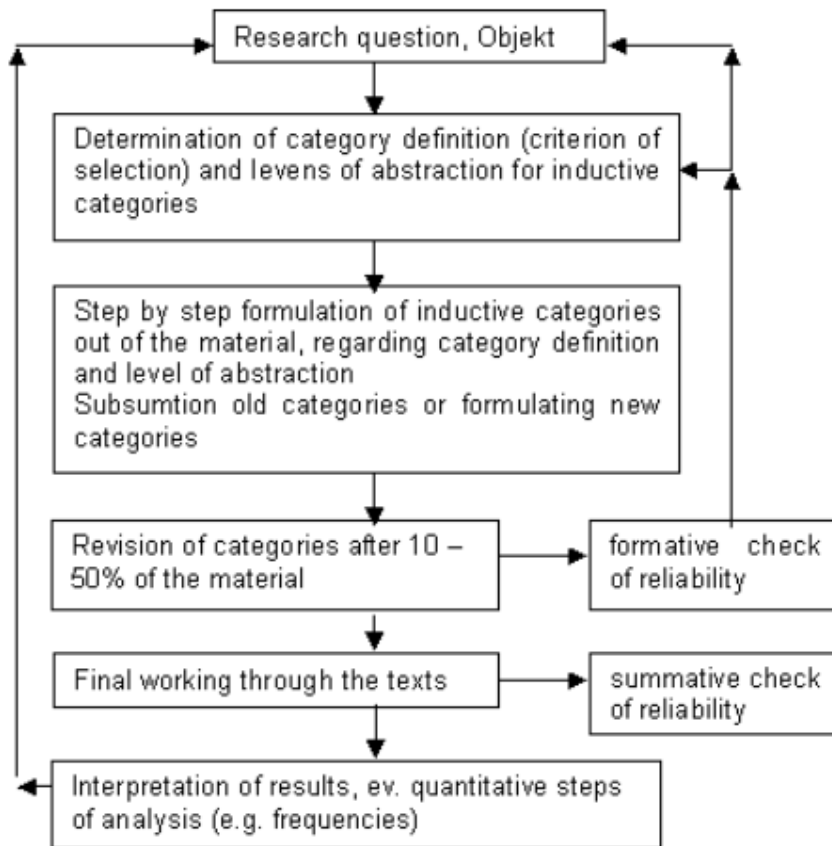

Figure 1: Steps of inductive category development[7]

to incorporate these new themes. This iterative and recursive process ensures consistency of coding and validity of the analysis. In this study, saturation of themes occurred after the 3rd clinic transcript reading. The 4th and 5th clinic transcripts were therefore confirmation of the theme index. The process is depicted in Figure 1.

Next, the annotated and coded transcripts and their codes were compared to detect patterns in their presence/absence, frequency of occurrence, and co-occurrence. The overall inductive style (as opposed to deductive) by inferring from text is represented in Figure 2. Further guidance for the analysis was obtained from Crabtree and Miller [1]. Because this analysis was conducted manually, both manifest and latent (implicit) meanings were noted.
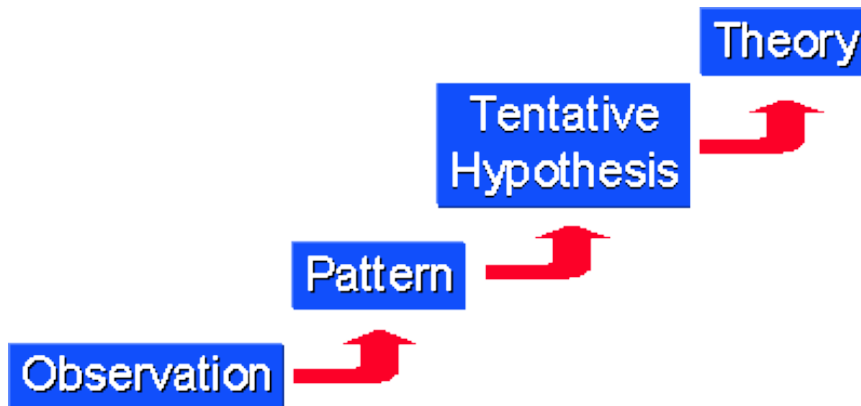

Figure 2: Progression of the inductive coding style[16]

Results

Five independent, rural primary care practices were included in this analysis, whose description is provided in Table 1.

Table 1: **Description of Primary Care Clinics**

	Clinic 1	Clinic 2	Clinic 3	Clinic 4	Clinic 5
Size (Small = 1-5, Medium = 6-10 providers)	Small	Solo	Medium	Medium	Small
Ownership / affiliation		Physician owned	Federally Qualified Health Center	Physician owned	Physician owned
# Interviewed	6	6	7	8	12
Positions interviewed	APNP, Clinic MGR, MD, PAC, RN, WHITEC	MD, Billing, MA, Office MGR, Receptionist, RN	CEO, CFO, COO, CSC, MD, MedRecs, Quality Coordinator (RadTech)	IT Tech, LPN, LCSW, MA, MD, Office MGR, PA, Receptionist	Care Coordinator, Clinic Supervisor, CSMGR, EMR Specialist, LPN, MD (2), MLT lab, Operations MGR, PA, Registration, Scheduler

Each clinic presented unique management styles and approaches to its workflow solutions. Agents (staff) varied in their technology competence and reported experience with prior process improvement. Through iterative text interpretation guided by the three categories, 17 themes were identified, organized in three clusters: Team Identification/Level of Collaboration; Contextual Obstacles and Facilitating Factors; and Personas and Team Dynamics.

Team Identification, Level of collaboration:

1. *Description of persistent issues* – immediate vs. resolved issues in workflow that were addressed by a member. Variation in this content suggests the level to which members are working together to resolve the same problems.

2. *Team vs. self responsibilities* – expressed understanding of what one's role is, and/or how it

    relates to the larger team or practice system.

3. *Teamwork in effect; shared long term goals* – described collaborative instances and their

    relation to a stated goal.

4. *Sharing of knowledge* – to achieve better performance, members may have exchanged tips

    and expectations for each other.

5. *Perceived value of workflow* – expressed importance of understanding workflow, its

    expected outcomes or consequences.

6. *Communication modality* – member's method of communication within clinic and

    externally; communication may refer to one- and two-way communication.

7. *Participation in previous process change* – described operational modifications that speaker

    has been involved in; level of detail on how the change was executed, and detected sense.

    of willingness and satisfaction is noted (accomplishment, necessity, troubled)

8. *Data management method / tool* – how information is stored or exchanged to conduct daily

    tasks.

Contextual obstacles and facilitating factors:

9. *Emotional pressure / opinions elicited* – positive or negative feelings toward current

    workflow streams or process changes, e.g. adopting digital systems.

10. *Communication amongst members about 'workflow'* – explicit statements (or lack thereof)

    regarding an interaction needed to enable work to move forward.

11. *Training* – reference to heightened on-site attention provided by an external entity, to

ensure comprehensive use of a new tool or system.

12. *Tangent work ethics* – reference to principles that speaker believes one's work should

enforce.

13. *Resource constraint* –constraints that appear to hinder a good working environment,

whether it is time, human capital, physical space, etc.

14. *Resource utilization* – decided allocation of available resources to achieve improved

operational performance, or specified lack of allocation.

Personas and team dynamics:

15. *Recurring personas and their role including*:

   a. <u>Team leader</u>: either discreetly or outwardly the ultimate decision maker of the group,

      facilitates/moves the discussion along a line of decision or logical progressions (though

      noting that at two clinics a designated project leader was also selected)

   b. <u>Expressive colleague</u>: is expressive of their thoughts and opinions, both in support or in

      disagreement with subject matter

   c. <u>Critical colleague</u>: perhaps also infamously dubbed the curmudgeon, this person often

      evaluates the alternate courses of action that can or would occur in proposed workflow

      redesigns

   d. <u>Supporter</u>: seen to reiterate or confirm speculations or occurrences in the clinic, though

      often a supporting staff

   e. <u>IT champion</u>: member who is involved with IT implementation and/or its maintenance

16. *Team-engaging responsibilities* – meeting discusses team-wide attractors/how to achieve

goal, as opposed to focusing on multiple independent problems

17. *Dis/organization in team meetings* – meetings proceed in a clear and focused manner for

workflow resolution, as opposed to participant tardiness/absence, going off on tangents, or

merely expressing uncertainty in work processes.

Data Trends

Team identity and levels of collaboration

- There were differences in recognition of dependencies and connectivity in workflow,

  both within clinic and among clinics. Mutual understanding of how the parts fit together

  is not presently articulated (Box 1). As such, the theme *Teamwork* (3) often co-occurred

  with *Team and self responsibilities* (2), and to a lesser extent, with *Communication*

  among members (10).

- There was often a major disconnect between explicit goal statements and workflow

  descriptions.

  - Descriptions coded *Perceived value of workflow* (5) often indicated a desired

    performance or process pathway efficiency, functionality, or consistency.

    However, there was no co-occurrence with *Tangent work ethics* (12). Instead,

    Tangent work ethics (12) texts were concerned with patient care and the patient

    experience. *Perceived value of workflow* (5) was neither co-occurring with *Team*

    vs. self responsibilities (2). The lack of association among these themes thus

    shows a disconnect between desired workflow, stated goals or performance

    outcomes, and what is taken as principles to enforce. Neither is connected to

statements on the dependence of self and overall team responsibilities.

- While process improvement objectives were discussed, recognition of team-wide collaboration goal was not widely expressed as a means to achieving the objective. Examples of such goal statements are shown in Box 2.

Communication and workflow

- Clinics were seen to use informal communication methods (face to face, meetings, calls) and tangible methods (printed letters, hard copy reports, post-it notes, report cards) in the transfer of information and patient care.
  - Digital communication mechanisms (EHR, e-mail) were not often described in daily usage. *Communication amongst members* (10) and *Data management methods/tools* (8) co-occurred only twice. This suggests that instead of using data management tools such as software to systematize work transfers such as placing an order, direct communication (phone call, walk over, paper notes) was routinely used.
- *Data management method/tools* (8) involve the EHR, printed/faxed and scanning of reports. EHR was mostly referred to for documentation and e-prescription.
  - An MD at clinic 5 emphasizes a key realization (not mentioned by any other participants): "*the computer doesn't do things the way the paper does, and so you have to modify your workflow to take advantage of what the computer can do and allow it to help you as opposed to just trying to slap paper on a computer*".

- Frequent mention of on-site and consistent *Training* (11) was seen to positively correlate to smooth adoption of health information technology (HIT) as seen in Box 3 (lack of *Described persistent issues* (1) and *Emotional pressures* (9)).

Resource management

- Recurrence of *Resource constraint* (13) exemplifies constraints such as time, space, aid

- *Resource utilization* (14) often refers to allocation of human capital, i.e. staff knowing where to be for most effective use of time.

- Presence of *Emotional pressure/opinions* (9) indicated a factor that may be taxing on productivity, e.g. frustration, confusion.

Team dynamics

- 5 generalized personas could be recognized among clinic members during workflow meetings. These personas did not correlate with specific titles or roles in the organizations.
  - There is varied levels of input (frequency of recorded speech) when discussing practice change.

Box 1: Clinics differed in level of recognizing work dependencies when defining workflow

Within Clinic 1, there appears to be a good focal point among members realizing that they are to work together. The APNP only describes the need of synchronizing with patient flow, however.

In clinic 3, Clinic Service Coordinator, MedRecs, and Medical Director also recognize the need to appropriately manage work dependencies to best collaborate. Others in the clinic, however, speak of a rather linear process of completing steps to get to the next.

Members of clinic 2, on the other hand, present divergent ways of explaining workflow, where only the MD and Receptionist suggest importance of dependencies.

The difference in work dependency recognition varies in the 3 clinic examples. Not only might there be difference in number of people alluding to work dependencies, but the precision that it is described can suggest importance.

Clinic 1

"the process that we go through, as an organization to collaboratively do a specific task that's required for a function of the organization"

- MD

"paramount that everybody is working on the same page and knows...what the expected activity is"

- RN

"where the patient is in the pathway...helps me determine where I go next"

- APNP

"important for us to identify exactly what we're doing in our workflow to make it go more smoothly...[by] developing a protocol, this is what's done, this is whose doing it"

- PAC

"process by which we accomplish things in the clinic...most efficient way...understand what everyone's role is to make sure...everyone's on the same page"

- Clinic MGR

Clinic 2

"structured process to get...a certain task done...most efficiently...you don't forget steps [especially with] a new task or changes"

- Office MGR

"who is doing what...who's all part of a workflow...to find out where something is not working...then we can make it more efficient"

- MD

"a good day...very important to me to incorporate a good workflow...understand what [my] job is and what is expected of [me]...there's team effort type of thing"

- RN

"achieve whatever we can do like exceptional work, the least amount of time...accomplish a task that we can do efficient...[if there is an issue] we try to meet once a month and whatever that issue is, we discuss it"

- Billing

"understanding workflow would make things flow smoother, the sequence or everything would just jive better...between people...between everybody"

- Receptionist

"the function of... a patient [and] the clinic or practice...helps get...the patient in a timely matter...anything that can improve the patient's visit"

- MA

Clinic 3

"one workflow not communicating with the second workflow, the just don't mix...[one must be] doing their workflow...in the limits of their job in order for the entire workflow to work properly"

- Clinical Service Coordinator

"the steps people go through in order to get something done... need to have right workflows to get the information where it needs to go"

- CEO

"the process by which we manage our daily tasks"

- Quality Coordinator

"everybody working together to come out with the same end product...is making sure everything goes smoothly...to discuss with the direct people [change is] gonna affect"

- MedRecs

"the order in which things happen, basically to get work done"

- CFO

"understand who is involved...half the providers are sending results to one person and another half of them are sending to another and not realizing that behind the scenes, people are fixing that and moving it to the right person"

- Medical Director

Box 2: Statements of collaboration is not widely verbalized as a team-wide working goal

A minor number of clinic members referenced collaboration as a practice goal. While a team-wide objective e.g. ensure timely patient visits would generally be understood, the necessity of a team-wide collaboration to achieve the objective is not verbalized.

Clinic 2

"I have a goal, and then how do I achieve that goal?"

       - MD

Clinic 3

"[previously employed at a dentist clinic,] we did a workflow issue on how much time…then we set our goals for their bonus levels based on what they could do"

       - CEO

"we understand what we're here for and that the workflow are all kind of geared toward that goal"

       - COO

Clinic 4

"workflow and what it means is important in our practice, because if we are not all…aware of or cognizant of the common goal, then we can get caught up in our own work processes at the expense of the entire clinic's flow"

       - PA

Clinic 5

"you get through a process [to] deliver the…health care… make sure that we're from beginning to end that we're accomplishing the goal at the end"

       - Operations MGR

Box 3: **Positive relationship of training support to smooth adoption and acceptance of new systems, and vice versa**

With reference to change particularly in the event of bringing in functionality of the EMR, clinic staff reflected positively when sufficient time and support was provided for users to familiarize themselves (clinic 2, 5). On the other hand, when there is insufficient on-hand training, users were left to figure things out which caused negativity and inefficiency (clinic 3, 4).

Clinic 2

"I would ask, I would…go to the RN that is training me, I would just ask her…and she would [answer]"

- MA

Clinic 3

"we got training on how to scan things in…and kind of a process of what is [wanted]…it was kind of a trust thing when we went to EMR"

- MedRecs

Clinic 4

""they bought a scanner and stuff and said 'here you go'…wasn't anyone that came in and trained me…a little overwhelming…we had a guy here that kind of showed us how to use the…appointment scheduler…this is how you set up…lab or ER report…then he kind of just let me go…so I just had to…go through the system and figure out how"

- IT Clerk

"we really weren't trained or anything on [EHR]. We just kind of jumped in…goofed around with it as much as I could to learn…I know that there's a lot that it could do to help us, that we have no clue how to use it."

- Receptionist

Clinic 5

"staff [to get] comfortable using the computer…we had {EMR vendor name} come out…worked with super users…worked with all of the staff…whence we started actually out on the floor, they were here. Because, as you're in a training environment, everything is going smooth, and then you get that patient in front of you, and it's like 'oh, how do I do this…?' So they were here."

- EMR specialist

"you have to train and retrain and when you talk to people, we do…we tips and tricks. We don't do them enough"

- Operations MGR

"we had three months…learning what everything was…every so many months, they would add…have us do more…we started out pretty simple…they trained us very well. They really did."

- LPN

Methodological Issues

Guided by complex adaptive system theory, qualitative analysis of interviews and field notes from primary care practices conducting workflow assessment, identified themes that contextualize views of workflow in the primary care setting. However, because this study is a secondary analysis of data collected for a different project, transcript content may not speak directly to the research questions posed. Guided interpretation and theme refinement does, however, direct the analysis to best evaluate member's views of communication, teamwork and workflow.

Interpretation of transcripts was done in an iterative fashion. Re-interpretation and coding ensures consistency and completeness of transcript coding. Kick-off field notes were first read, to better contextualize the clinic group. Later field notes were read chronologically to better determine group's progressive interactivity. Only pre-interview transcripts were interpreted for clinical staff's original, unaltered understanding of workflow. It eliminates the variation of familiarity with researchers, and bias of 'expected' answers in order to gauge naturally formed concepts of the team and workflow.

Transcripts altogether demonstrated presence or absence of the themes identified. Listed themes are those that were recurrent, and apparent in multiple transcripts in at least two sites. Some themes appeared in both interview responses as well as during group meeting field notes. Proposed correlations, however, are not indicative of causation. Interpretation of verbal responses should be supplemented with observations directly in light of the research question. Downstream quantitative analysis can also help identify confounding factors such as size,

establishment, ownership, vendor-specification, state-specific resources and regulations, effect of prior internal change efforts, or duration of staffing.

Limitations of qualitative analysis as this one include the limitation of text versus observation. The unmeasurable differences in personal speaking style, willingness to disclose, recall bias, and generalizability of extracted meaning is limited. The more abstraction or interpretation of text is done, the more it loses its contextual meaning as well. With a primary data collection and analysis, perhaps these aspects can be minimized. Replicability of the coding scheme shall be validated by more than one coder, while generalizability of themes shall be validated with a larger and more representative sample.

Discussion

Qualitative analysis of data collected for a study of workflow assessment in primary care was guided by the complex adaptive system theory, and focused on three qualities: communication, teamwork, and relationship to workflow. In an iterative process based on Crabtree et. Al [1] and Pope [12], interviews and field notes involving 39 participants in five primary care practices revealed pervasive themes that contextualize views of workflow in the primary care setting.

It was observed that participant's definition and/or description of workflows are in light of physical steps, with a minor few to include cognitive processes (e.g. decision making and cognizant of others' task dependence). Although at least one participant in two of the five clinics referred to cognitive process to direct work or information flow, implications of these cognitive steps in team collaboration should in future be more prominently acknowledged.

The resulting thematic set includes 17 total points of consideration, which were clustered in three groups: The first 8 described are indicative of Team identification and collaboration. Themes 9-14 are contextual facilitators or obstacles that are present in at least two clinics. Next, personas deduced from field notes generalize styles of involvement and input displayed by members of clinics. The five personas are not seen to associate with any particular title. Physician's philosophy and style was somewhat detectable. Some were meeting facilitators, while other clinics had elected meeting managers. Presence of the last two themes roughly illustrates the dynamics in which the group approaches problem solving.

Some clinics were seen to be more collaborative than others. This is gauged especially by content of themes 1-8, similarity in chosen workflow example, and descriptiveness of the process (number of steps). Contrast is seen between members in clinics (Box 1). Despite the clinics' similarity in size, difference in management attitude is apparent. Characteristics of current team interactions suggest some improvement potential in this area.

Although the CAS framework can bring together the big picture for an effective health care system, each agent's fraction in the CAS intersects with a sub few of other's. Some clinicians interact only within the practice, and some reach out to external entities. A formal definition and expectation of how wide the healthcare CAS extends to (in-clinic, hospital systems, to drug stores, independent labs, the mailman, etc.) will help clinic members apply the concept, limiting its boundaries only to relevant and influential parts.

Conclusion

Firstly, face to face interactions remain a meaningful communication modality. Not only are tasks communicated between staff in this informal manner, but frequent operational meetings were seen to be a success factor for managing workflow changes. E-mail was not seen to be predominantly used in work stream development, except in clinic 5 where announcements, change plans and expectations were frequently sent by change manager *and read by staff*. The EHR was seen to be mentioned sparingly in light of workflow. It was, for the most part, seen to be used for ensuring patient information updates and formal documentation.

Secondly, by asking members to formally reflect on the understanding of workflow, patterns of teamwork (or lack thereof) were revealed. There seems to be a widespread lack of common understanding of team-based goals, as opposed to process objectives. This undermines the ability to clearly break down what is expected for team collaboration, and to succeed in clinic-wide management of expectations for cohesiveness. Fragments of goal statements suggest the need and desire for efficiency and optimization. Yet, there was disconnect between these goal statements and workflow description and values. There is furthermore a range in recognition of work dependencies and their connectivity within the overall CAS that is the clinic.

In reference to the CAS framework, information transactions are made at intersections of workflows where one agent triggers another's workflow. A clear and consistent fashion by which this is achieved was assumed, but therefore should be clearly defined. Not all forms of communication can be bi-directional, and when it is not, there is a significant need to be cognizant of others' responsibilities and to manage expectations through clear responsibility

assignment.

Identified work ethics and perceived value of workflow described by members lay in 'providing good patient experience' rather than to improve collaboration. Focus on improved collaboration would, however, not only reduce documentation risks (things don't "fall through the gaps"), but would facilitate and permit self-managed work and information flow. Frequent communication is likewise critical for this to happen. Moreover, many issues may be simultaneously transpiring in the clinic. Yet, a team-wide focus on few topics enables the group effort to produce most effective results.

The last takeaway point involves the potential functionality of the EHR. The mandated system would seem to be a useful tool to facilitate team collaboration and increase its cohesion. However, the EHR is infrequently mentioned and is mostly utilized as a documentation platform. While the "key to successful implementation of health information technology (health IT) is to recognize its impact on both clinical and administrative workflow", samples in this study have instead shown that there is fundamental disconnect between discussing workflows and the goal of connectedness. [17] Efficiency and understanding work dependency was not emphasized enough as a commonly understood, end-goal in workflow development.

EHR implementation was a big issue for staff to adapt to. A correlation was seen of high presence of on-site training to positive adoption. Yet, the EHR was neither contextually placed under the meaning of resource (theme 14). The verbalization of smart resource usage tended to refer to reorganizing and allocating staff efforts. Resource was not referred to in light of implementing (HIT) tools to facilitate work and information flow. Widespread recognition of the

need to incorporate HIT for resource management was not often expressed by clinical staff. Additionally, the failure to recognize interrelations and dependencies limits the practices' ability to achieve streamlined workflows together.

Future Directions

The themes identified here may be further validated in a more quantitative content analysis. With larger sample sizes controlling for clinical characteristics (or contrarily, more diverse clinical characteristics) confirming and disconfirming examples may be identified. Thematic frequencies, and their dispersion and distribution in responses to defining and describing workflow, can be analyzed with formal text analysis tools. This would more quantitative correlations among the themes set and more robust conclusions. Such results are likely to quantitatively confirm team interdependence.

Furthermore, an assessment of the dispersion of personas and association by title can be made to assess the degree of an egalitarian culture. Assertiveness of the clinic staff is suggestive of power relations and egalitarian openness of the team. Attendance and timeliness of participants can also indicate level of engagement in 'workflow meeting sessions'. Theme analysis can furthermore elicit observations regarding how 'good teamwork and workflow' may positively or negatively correlate with patient volume; and whether there is an 'optimum ratio' of support staff per physician.

Themes identified in this study are considerations upon future clinical workflow modification. Awareness of group dynamics, dependencies, and connectedness, while acknowledging a

formal goal, can be valuable to better prime and engage members to achieve efficiency. As regulatory mandates such as Meaningful Use are introduced, clinical teams should assess their current state of interactivity, their readiness for change. This would yield the most effective transition into heightened functional use of health information technology tools.

Themes 9 and 12 highlight individual member's conscious values. These can be correlated to further reveal attitudes and characterize practice culture. Content of theme 12 such as completeness of patient care, patient (experience) and staff satisfaction, indicate individual-level goals. Content of theme 9 included emotions like frustration and confusion that can be taxing on clinic workflow and performance. Although theme 9 was not always present in participant responses, it may be a significant characteristic to measure for comprehensive process improvement.

It is therefore important to acknowledge the need to recognize and evaluate emotional pressures, member recognition of task dependencies, and connection of practice-wide goals with workflow. Clear measurement of these factors can help remove uncertainty and negativity from a smooth, working office.

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