
Communications About Patients and Care Coordination in the Clinical Social Network

Wayne Zachary, Ph.D.

Starship Health Technologies
P.O. Box 266
Ft. Washington, PA 19034 USA
wzachary@starshiphealth.com

Russell Maulitz, M.D., Ph.D.

Starship Health Technologies
P.O. Box 266
Ft. Washington, PA 19034 USA
rmaulitz@starshiphealth.com

Elisa Iverson

Drexel School of Public Health
1505 Race Street
Mail Stop 660
Philadelphia, PA 19102 USA
Emi23@drexel.edu

Chioma Onyekwelu

Drexel School of Public Health
1505 Race Street
Mail Stop 660
Philadelphia, PA 19102 USA
Coo28@drexel.edu

Zachary Risler

Drexel School of Public Health
1505 Race Street
Mail Stop 660
Philadelphia, PA 19102 USA
Zwr23@drexel.edu

Lauren Zenel

Drexel School of Public Health
1505 Race Street
Mail Stop 660
Philadelphia, PA 19102 USA
Lpz26@drexel.edu

Abstract

Care coordination unfolds through communications between clinicians in a largely informal process that is also ephemeral. Augmented social network analysis methods are used to capture and analyze fine-grained data on the care coordination process, and to help design a technology to facilitate, support and document it.

Author Keywords

Clinical communications; care coordination; social network analysis; social media

ACM Classification Keywords

J.3 Life and Medical Sciences, Medical Information Systems; H.5.3 Group and Organization Interfaces, Computer-supported cooperative work; H.5.2 User Interfaces, User-centered design

General Terms

Design, Human Factors

Introduction

Care coordination in medicine poses an interesting and special case of collaboration and teamwork for several reasons. The coordination process unfolds across long periods of time (often days or weeks) and is often

distributed over many spatial locations. It involves clinical participants belonging to multiple organizations, and having diverse specialties and roles. It also varies widely from one patient-episode to another. Care coordination is recognized to affect clinical outcomes [1], and as critical to avoiding the communication failures that underlie many medical errors [e.g.,2]. Through these factors, it is also seen as critical to reducing ever-increasing medical costs [3]. The medium in which care coordination occurs is Clinical communications About specific Patients, or CAPs.

While other aspects of clinical practice have received large investments in research and information technology (e.g., electronic health records [EHRs], telemedicine, computerized physician order entry [CPOE]), CAPs and care coordination have not. Part of the reason for this may be that these processes are almost entirely informal, and learned through informal (not classroom) means. Clinicians communicate exist today in much the same way they have for decades -- via face-to-face and telephone transactions, supplemented by fax, email and rudimentary tasking systems embedded in EHRs. The communications are largely ephemeral and undocumented, and utilize idiosyncratic networks maintained "in the clinicians heads."

One way to consider this disconnect is to consider first the characteristics of formal communications. Formal CAPs, such as subspecialist consulting physicians' letters that report "officially" on findings and recommendations, have canonical, almost rigid requirements and results. (Results include the ability of the consultant to obtain reimbursement for services.) Requirements, either *de facto* or *de jure*, include recognized letter form; profuse expressions of

appreciation to referring providers for having provided the "opportunity" to provide care even when the primary care provider may have no knowledge the specialty care has occurred; and, most importantly, memorialization of the content of the formal communication.

By contrast, informal communications are virtually never memorialized. Only since the advent of EHRs and their rather rudimentary tasking modules have informal communications become in any way "sticky." These communications, often in fact glaringly unsuited for EHR tasking systems, include a variety of heretofore ephemeral functions. Such functions include signing patients out at the end of shifts; informal "curbside" consultations; and cross-coverage duties such as peers' handing off a panel of patients while calling out the most problematic or unstable ones when colleagues take over for nights and weekends.

Informal communication in the broader society has been revolutionized by social media technology to facilitate personal relationship maintenance and information-sharing (e.g., Facebook, Pinterest, etc.), business networking (e.g., LinkedIn), and topical and news discussions and commentary (e.g., Twitter, Tumblr). The analogs to this revolution in terms of patient care coordination, surprisingly, have been woefully underserved and understudied.

Care Coordination As an Augmented Social Network Analysis Problem

We are studying care coordination by capturing data on the CAPs in the clinical social network with qualitative observational data, and then analyzing those data using

methods from Social Network Analysis (SNA) [4]. Basic SNA represents individuals (here, the physicians and other clinicians) as nodes on a graph, and individual dyadic relationships between them as links connecting pairs of nodes. This basic model lends itself well to analyses that identify the structural properties of the overall network and roles within it. However, we are also interested in the *content* of CAPS, and the *process* by which care coordination is constructed from them. We have therefore augmented the basic SNA model in two specific ways.

First, we are capturing data on the content of each CAP. These data include the communicative function involved, the basis by which the initiating party chooses recipient parties, and the information communicated, including any patient-specific information involved.

Second, we are examining care coordination as a *process* within a network. To do this, we are tracing the coordination involved in a given patient-episode as the growing chain of CAPs that propagates through an informal clinical social network. Each chain exposes the sub-network that is being by the growing group of clinicians who become involved that patient's specific illness episode. For example, Figure 1 shows a hypothetical network of clinicians, with the solid links depicting relationships that have been activated by CAPS during specific illness-episode, and dotted links depicting links not activated. The roles of each node are shown for the activated sub-network, which include PCPs or primary care physicians, specialists, and trainees (respectively P, SP and T in Figure 1).

This augmented SNA provides a novel framework for both (structurally) exploring how interpersonal clinical

networks are activated during care coordination, and (processually) tracing how the care coordination process unfolds, in individual cases, across the clinical social network.

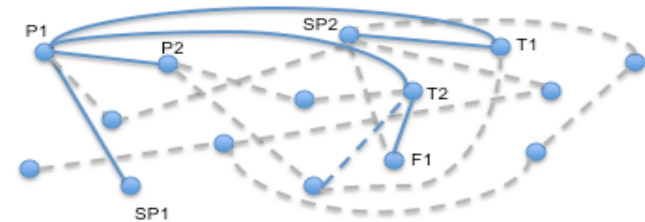


Figure 1. Care-coordination as an Activated Subnetwork

Data Collection

Data collection is being undertaken at three clinical primary care sites with an urban University-based integrated medical practice. Currently, we are examining care coordination from the perspective of the PCP. This is based, in part, on an emerging normative clinical model for achieving coordinated care as a hub-and-spoke process [5], with the PCP acting as the central hub of communication, particularly for chronic illness patients. The CAP networks of PCPs will allow us to understand whether and how the networks of CAPs conform to or deviate from this model, and to determine the factors which affect variability in CAPs.

Each physician is directly shadowed for a full clinical shift by an observer/interviewer who captures information on CAPs as they occur using a structured post-event interview protocol. The data are then aggregated by physician to produce individual ego-centric networks, and across physicians to produce a shared

network common to each office/site. The initial data on this phase will be discussed at the workshop.

A second phase of data collection will focus on collection and analysis of the full care coordination chains over time, tracking CAPS across patient-episodes for which care begins at one of the participating PCP offices.

Technology Support

In parallel with the behavioral data collection and analysis, we are designing a technology to structure and facilitate care coordination processes by applying the newly-emerged technologies of social computing. Called Communication Processes for Accountable Care Enhancement (C-PACE, pronounced SEE-pace), it also renders what have always been important but fundamentally transitory communications as data objects that provide a persistent documentation of the processes. Such a digital record will create new opportunities for care-coordination measurement, for workflow support and improvement, and for research.

We are designing C-PACE as a client-server distributed software product that provides a common interface and access point to the communication and care-coordination process. Its clinical users access C-PACE through a desktop/laptop computer, tablet computer, or smart phone – whichever device they prefer and that fits their current location and situation. The users interact with it through a common user interface for creating solitary CAPs (such as providing cross-coverage information to a colleague) or for initiating or adding to CAP chains for a specific patient episode. This same interface (designed to use interaction conventions that have arisen from commercial social

computing products) allows the user to view the current open patient-episode chains in which they are participating, and offers support by bringing attention to time-critical CAPs or identifying chains that may have been broken and need to be re-connected. C-PACE support functions can identify the patient's PCP in the chain, and bring relevant secondary communications back to that PCP to support the PCP's possible role as the 'hub' in a hub-and-spokes model of coordination. More generally, C-PACE can provide workflow support for applying and customizing Clinical Practice Guidelines (CPG) for care coordination, while at the same time adding the additional elements to document goals of care, and patient preferences.

Acknowledgements

We thank all the physicians and staff at our clinical data collection sites for their cooperation.

References

- [1] Kahn JM, Angus DC (2011). Going home on the right medications: prescription errors and transitions of care. *JAMA* 306: 878-879.
- [2] Sutcliffe, K, Lewton, E., Rosenthal, M. (2004) Communication Failures: An Insidious Contributor to Medical Mishaps. *Academic Medicine* 79(2):186-194
- [3] Yong, P., Saunders, R., and Olsen L. Eds. (2011) *The Healthcare Imperative: Lowering Costs and Improving Outcomes - Workshop Series Summary*. Washington: National Academies Press.
- [4] Wasserman, S. & Faust, K. (1994) *Social Network Analysis: Methods and Applications*. NY: Cambridge
- [5] Stille, C., Jerant, A., Bell, D., Meltzer, D., and Elmore, J. (2005) Coordinating Care across Diseases, Settings, and Clinicians: A Key Role for the Generalist in Practice. *Annals of Internal Medicine* 14(9):700-708.