Improving Coordination During Care Transition between Ambulatory and Inpatient Care Facilities: Evaluating the Utilization and Scope of Ehr Facilitated Longitudinal Plan of Care

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Abstract

Gaps in generation and timely transfer of relevant information during care transitions remain a great challenge to care coordination. Electronic Health Record (EHR) based information transfer tools are not efficiently used by most providers. The objective of this project was to understand the current process of care transition between ambulatory and inpatient care setting and to explore the utilization and scope of an EHR based Longitudinal Plan of Care in improving coordination during care transition. The Longitudinal Plan of Care when compared with transition of care practices recommended by Transitions of Care Consensus Conference and National Transitions of Care Coalition work group showed that it lacked some information pertinent to care coordination. The survey performed indicated that most commonly used Electronic Health Record tool for care transition were notes and chart reviews (97.4%, 93.4%). Only 12% of the participants expressed high satisfaction with the currently used tool. Among the participants who used the Longitudinal Plan of Care, only 8.8% reported it as a sufficient tool for information transfer. Majority (93.5%) were unaware that such a tool existed and had never explored its functionality. Improving the functionality of Longitudinal Plan of Care and training health care providers can greatly facilitate information transfer during care transition.

Key words: *Care transition; Electronic Health Record; Longitudinal Plan of Care; Care coordination; Inpatient care setting; Ambulatory care setting.*

Introduction

Health care has experienced an evolutionary change, seeing a shift from simple physician office visits and lengthy hospital stays to short hospital stays and office visits to different specialty providers with a highway of choices around them [1]. Transitions between care settings are periods of vulnerability for patients, especially for the chronically ill. Poor care transitions can compromise patient safety, resulting in costly hospital admissions. Using evidence-based information transfer tools at every level of transition can optimize the quality and safety of patient care [2]. This study evaluates the utilization of an electronic health record (EHR) based Longitudinal Plan of Care (LPOC) in improving care coordination between ambulatory and inpatient care setting in a

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tertiary care facility and suggests systems solutions to fill the identified gaps in information transfer during transition of care.

Background and Significance

Care transitions is the movement of patients between care settings or between care providers within the same setting. The process can put patients and their families at a risk for complications if attention is not given to efficient transfer of information and coordination between providers [3]. The American Geriatrics Society defines care transitions as a set of actions designed to ensure the coordination and continuity of health care as patients transfer between different locations or different levels of care within the same location [3].

The increasing rates of potentially avoidable hospitalizations and health-care spending in the country has pointed towards addressing gaps in transitions of care [4]. As patient care is transitioned between inpatient and ambulatory care setting, the amount and complexity of information to be conveyed is often overwhelming. Increasing workload of providers and inefficient systems could lead to gaps in communication. More than half of all preventable adverse events that occur soon after discharge can be traced back to poor transfer of information resulting in poor care coordination [5].

While widespread use of EHRs has greatly improved the quality and accuracy of available information required for safe transition, there is significant gap in timely transfer of this information as patients move between facilities, affecting care coordination. This is primarily due to unavailability of a comprehensive care transition tool enabled by the EHR that is interoperable and uniformly used across settings [6].

There are many studies that have tested the usefulness of a variety of tools or interventions to improve care transition and coordination (see appendix1). Incorporating interoperable EHR- based tools and promoting inclusion of social determinants of health data has facilitated exchange of health information between the hospital and primary care settings and has improved long term outcomes [7].However, a review of successful hospital readmission reduction strategies show the benefit of collaboration with primary care providers augmented with utilization of effective information exchange capabilities of EHR in improving care transition outcomes such as hospital readmissions [8].

LPOC is an existing functionality in the Epic EHR (Epic Systems Inc., Verona, WI) used currently in the organization. It contains populated information relevant to care transition including patient demographics, current medications, problem list, referrals, contact information about care providers and advance care directives. LPOC tool is highly underutilized for information transfer when care transitions occur between ambulatory and inpatient setting. Use of LPOC by providers during care transitions may be a viable option in improving care coordination during transitions and the scope of its utilization within the system isn't completely known. As healthcare systems and providers strive to enhance coordination of care through meaningful use of electronic health records, one could evaluate the scope of LPOC in improving coordination during transition of care across settings [9]

Objectives

The objective of this study is to understand the current process of care transition between ambulatory and inpatient care setting, to determine the current state of use of LPOC's during care transition, to evaluate the components of LPOC's, identify information gaps and to explore the scope of longitudinal plan of care to improve care coordination between ambulatory and inpatient care setting at an academic health system. The findings of this study would pave the path towards suggesting solutions that maximize the functionality and utilization of LPOC's and for suggesting training programs and institutional policies that support safe transitions.

Methods

LPOC Review

The components of LPOC was compared against

the transition of care recommendations by Transitions of Care Consensus Conference (TOCCC), 2008) [10] and framework for measuring transitions of care, as proposed by the National Transitions of Care Coalition (NTOCC) Work Group,2008 [11] to understand the capability of EHR to document the required information for safe care transition and populate it in LPOC.

Survey

The survey questionnaire was distributed to 100 members of the health care team involved in care transition, both in ambulatory and inpatient settings including physicians, care managers, case managers, nurses, social workers and pharmacists. A self-administered semi-structured questionnaire was used to explore the current care transition process, utilization of LPOC's by health care providers during care transitions and to identify information gaps as perceived by the respondents (See appendix 2). Two open ended questions were included to understand the as-is process of care transition between inpatient and ambulatory care setting. The scope of EHR based LPOC in improving coordination during transitions of care was evaluated.

Study data were collected and managed using REDCap electronic data capture tools hosted at the *. REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing 1) an intuitive interface for validated data entry; 2) audit trails for tracking data manipulation and export procedures; 3) automated export procedures for seamless data downloads to common statistical packages; and 4) procedures for importing data from external sources [12].

Results

LPOC Review

The Longitudinal Plan of Care in EHR was compared with the Transition of Care process measures recommended by NTOCC and TOCCC to identify missing components in LPOC for safe and efficient transition.

LPOC has information populated from EHR and hence incomplete or inaccurate entry of information in EHR would mean incomplete data in LPOC. LPOC currently has information on current medications, problem list, referral and follow up, contact information of care team, allergy information, advance directives, general risk score, upcoming health maintenance, recent vitals, recent outpatient visits and outpatient progress notes.

However, we found that many essential information required for safe transition process such as patient demographics, admission and discharge dates, test or procedure results and recommendations after consults are not populated in LPOC, though this information is available in EHR as documented by various care team members. The EHR capability to pull this information into LPOC can be easily created. Certain other relevant information pertaining to treatment of active problem, patients' response to treatment, functional and cognitive status of patients, counseling provided, patient/family education for self-management and informed consent for care transition are currently not adequately documented in EHR in a manner that it can be populated in LPOC. Information as treatment of active problem and response to treatment are written in note form by doctors and getting it meaningfully populated in LPOC could be a challenge.

(based on Transition of care recommendations by TOCCC and framework for measuring transitions of care, as proposed by NTOCC Work Group,2008)

X^1= Information currently populated in LPOC

X^2 = Information available and can be potentially pulled into the LPOC

X^3 = not currently documented in a way that can be pulled into LPOC

Table 1: LPOC Review

Transition of Care- Process measures	Information is documented in EHR	Information is populated in LPOC	Gaps/Potential solution
A. Care team processes (Transition record with following information)			
Patient Demographics2	X	-	Not available currently in LPOC. Can be easily pulled from EHR.
Date of Admission2	X	-	
Date of discharge2	X	-	
Care plan 3	X	-	Not interdisciplinary Incomplete
Main diagnosis and problem list1	X	X	
Treatment of the active problem and response to treatment3	X	-	Documented as notes in EHR by physicians, difficult to populate in LPOC
Names and contact details of responsible health care providers3	X	-	Incomplete information in HER
Medication reconciliation2	X	-	Only current medications available in LPOC
Test/procedure results (laboratory, radiology, and other diagnostic procedures)2	X	-	Can be easily made available in LPOC
Recommendations of any subspecialty consultants3	-	-	Note type – Consult. Has the potential to be a lengthy list – can they be linked and collapsed?
Patients functional/cognitive status at discharge3	-	-	Documentation exists, is not utilized
Tracking of referrals to other providers or settings of care1	X	X	

***Cont.*. Table 1: LPOC Review**

Admission and discharge planning is included3	X	-	Case management DC planning? Flowsheets in Case Manager navigator– discharge disposition field
Follow-up appointment tracking mechanisms are in place1	X	X	Can be improved
End-of-life decision making available2	X	-	Steal stuff from app report that pops up when you click on the header
Emergency plan and contact number of responsible person3	-	-	No plan documented
Treatment and diagnostic plan2	X	-	Possible to be populated in LPOC
Prognosis and goals of care 2	X	-	Not discretely documented in HER
Advance directives, power of attorney, consent1	X	X	
Assessment of caregiver status 3	-	-	Not currently documented in HER
Counseling provided to patient and caregiver 2	X	-	
Code status1	X	X	
B. Information transferred is			
Timely	-	-	Captured in survey
Complete	-	-	
Accurate	-	-	
C. Patient and family education and engagement			
Patient and/or family preparation for transfer3	-	-	Not currently documented in a way that can be pulled into LPOC
Patient and/or family education for self-care management3	-	-	
Patient and/or family agreement with the care transition (informed consent)3	-	-	

***Cont.*. Table 1: LPOC Review**

Structure measures	
Accountable provider is available at all points of care transition serving as central coordinator(s) across all settings	Care managers, case managers and social workers coordinate care
A tool for plan of care is used	Not comprehensive or interdisciplinary
Use of a health information technology-integrated system that would be interoperable and available to both patients and providers.	Available between inpatient and ambulatory setting

Survey Results

Of the 77 respondents who participated in the survey, majority (31,40.3%) were either case managers or care managers followed by social workers (27,35.1%), physicians (10,13%), nurses and others who were mostly pharmacists (7, 9.1%). Of the respondents, 66.7% worked in an inpatient setting. The EHR tool reported as most commonly used for care transition were notes in EHR and chart reviews (97.4%, 93.4%). All respondents reported as using more than one EHR tool for information transfer. Many used tools as flowsheets, results review, navigators, Medication Admission Record (MAR) and referrals to facilitate information transfer during care transition. Few reported as using Information and Care Everywhere media tab, After Visit Summary, interfacility discharge orders and in-basket messaging for transferring information between care settings.

Only 12% of the participants expressed that they are highly satisfied with the EHR tool that they currently use for care transition and 1.4% reported that the information transferred during transitions is always complete. While 10% of them reported that information transferred is accurate, only 2.7% expressed that it is timely. It was indicated that the discharge summary is never available at the time of transfer and some commented that they depended on discharge instructions which is handed over to the patients.

Only 6.5% of them used LPOC and most (93.5%) expressed that they are not aware that LPOC existed in EHR and have never used it nor explored its functionality. Even those who used LPOC used it only sometimes (6.7%) during care transitions. Since most have never used LPOC to facilitate care transition, they did not respond to the question as to what components they would like to see included in LPOC to make it a more efficient tool for information transfer. Among those who responded, only 8.8% of them indicated that LPOC is a sufficient tool for information transfer, most (75.4%)expressed that an interdisciplinary care plan should be included in LPOC. The other information components suggested to be included were treatment for specific problems (63.2%), response to treatment (45.6%), preparation for self -management (47.4%) and more aspects as home support, admission and discharge information, disease specific criteria, disease specific care plan and community resources. The open-ended questions in the survey to outline the as-is process of information transfer sought a variety of responses suggesting that there is no single, comprehensive tool in EHR that could be uniformly used for care transitions. It was gathered from responses that any specific information to care managers, case managers or social workers was mostly communicated by e-mail, phone or as in-basket messages. Most expressed that clinical information extracted from different tools of EHR is often communicated to providers across settings by hard fax or by print. The required information is extracted from various records in EHR, such as home health care orders, chart reviews of notes, care plan, and medication reconciliation. It was also described that information from inpatient team is rarely relayed to the

outpatient team, allowing no follow-up or feedback on patients' status. Discharge summaries were sent across settings when ready, but almost never at the time of transfer**.**

Discussion

Most reviewed studies show the immense role that electronic health record play in facilitating care transitions and coordination though transition planning support enabled by EHR is not comprehensive. The result of the study reflects on underutilization of EHR capabilities to enhance care coordination during transitions. Most of the needed information that is missing in LPOC is available in EHR and if functionality be created in EHR to populate these information components into LPOC, it can be used routinely during care transitions as an effective tool for information transfer between providers. Efforts are taken to train the providers to document the necessary, precise information in EHR related to treatment response, self-management preparation, care plan and counselling so that it could be populated in LPOC. With lack of a comprehensive tool for information transfer, providers involved in care transition collect the required information from EHR which is often incomplete, inaccurate and time consuming. An inter-disciplinary comprehensive care plan is currently not available in EHR and hence this information is not populated in LPOC. Based on the study findings, we have suggested solutions to improve the functionality of EHR to populate all the information required for safe transition in LPOC so that it can serve as the single tool for information transfer during transition of care, at-least between inpatient and ambulatory care setting of the facility where EHR is interoperable. We have also suggested policies that would support the use of LPOC's by all personnel involved in care transitions and are hoping that this initiative will pave way to a more efficient, safe and paperless process of transition between settings, thus improving care coordination and quality of care.

The review findings point to the need for incorporating effective care transition tools in EHR which would ensure timely transfer of accurate and relevant information between providers as patient care in transitioned between facilities. It is equally vital to have interoperable EHR systems with a comprehensive care transition record to facilitate care coordination and safe transitions.

Conclusion

EHRs should be optimally utilized to improve healthcare delivery. A comprehensive, interdisciplinary care transition tool in the EHR may improve the efficiency and effectiveness of care transitions by allowing timely information transfer between providers. The functionality of EHR can be enhanced to include all the required information for safe care transition and populate it in the Longitudinal Plan of Care so that it can transform into an efficient, uniform mode of information transfer between care settings within the facility. Use of an interdisciplinary care plan in EHR would serve as an invaluable source of care transition- relevant information which could be populated in LPOC. Considering the impact of safe transitions and care coordination on quality of health care delivery and health outcomes, it is highly empirical to be proactive in implementing simple, yet effective systems that facilitate safer care transitions.

Clinical Relevance

LPOC is an existing tool in EHR which contains populated information on most components required for safe care transition. Comparing LPOC with recommended practice measures by TOCCC and NTOCC has enabled us to understand the information gaps and work with EHR providers to improve the LPOC functionality. The survey results gave us additional inputs to generate in EHR the missing information required for care transition and to populate this information in LPOC. This initiative would transform LPOC into a single, efficient tool for information transfer between providers in inpatient and ambulatory care settings thus enhancing care coordination and patient safety.

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Conflict of Interest

Authors of this study have no financial and personal relationships with other people or organizations that may inappropriately influence or bias the objectivity of submitted content and/or its acceptance for publication in this journal. The authors declare that they have no conflicts of interest in the research.

Protection of Human Subjects

This work is considered as a process improvement project and hence was exempted from review by * Institutional Review Board. The study did not involve collecting patient health information. Those health care personnel who participated in the survey were informed of the purpose of the project and had consented to participate in it.

References

1. Pugh MA, Mills V. Transitioning Care Across Various Health Care Organizations. *Nurs Clin North Am*. 2015;50(4):631-643. doi:10.1016/j.cnur.2015.07.003
2. Nelson JM, Carrington JM. Transitioning the older adult in the ambulatory care setting. *AORN J*. 2011;94(4):348-358; quiz 359-361. doi:10.1016/j.aorn.2011.04.025
3. What Does "Care Transitions" Really Mean? | American Society on Aging. https://www.asaging.org/blog/what-does-care-transitions-really-mean. Accessed November 15, 2018
4. Marcotte L, Kirtane J, Lynn J, McKethan A. Integrating Health Information Technology to Achieve Seamless Care Transitions. *J Patient Saf*. 2015;11(4):185. doi:10.1097/PTS.0000000000000077
5. McLeod LA. Patient transitions from inpatient to outpatient: Where are the risks? Can we address them? *J Healthc Risk Manag*. 2013;32(3):13-19. doi:10.1002/jhrm.21101
6. Samal L, Dykes PC, Greenberg JO, et al. Care coordination gaps due to lack of interoperability in the United States: a qualitative study and literature review. *BMC Health Serv Res*. 2016;16(1):143. doi:10.1186/s12913-016-1373-y
7. Hewner S, Casucci S, Sullivan S, et al. Integrating Social Determinants of Health into Primary Care Clinical and Informational Workflow during Care Transitions. *EGEMS Wash DC*. 2017;5(2):2. doi:10.13063/2327-9214.1282
8. Kash BA, Baek J, Davis E, Champagne-Langabeer T, Langabeer JR. Review of successful hospital readmission reduction strategies and the role of health information exchange. *Int J Med Inf*. 2017;104:97-104. doi:10.1016/j.ijmedinf.2017.05.012
9. Dykes PC, Samal L, Donahue M, et al. A patient-centered longitudinal care plan: vision versus reality. *J Am Med Inform Assoc*. 2014;21(6):1082-1090. doi:10.1136/amiajnl-2013-002454
10. Snow V, Beck D, Budnitz T, et al. Transitions of Care Consensus Policy Statement American College of Physicians-Society of General Internal Medicine-Society of Hospital Medicine-American Geriatrics Society-American College of Emergency Physicians-Society of Academic Emergency Medicine. *J Gen Intern Med*. 2009;24(8):971-976. doi:10.1007/s11606-009-0969-x
11. Transitions of Care Measures. 2008.
12. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research Electronic Data Capture (REDCap) - A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform*. 2009;42(2):377-381. doi:10.1016/j.jbi.2008.08