Patient Bridge – Major Step towards Full Interoperability

Swetha Yenduru, MD

Department of Medical Informatics and Clinical Epidemiology, Oregon Health and Sciences University

BMI 581 - Capstone Project

Dr. Michelle Hribar

June 9, 2020

School of Medicine

Oregon Health & Science University

CERTIFICATE OF APPROVAL

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

S. Yenduru

"Patient Bridge – Major Step towards Full Interoperability"

Has been approved

_____

Capstone Advisor
Michelle R. Hribar, PhD

Introduction:
Health information exchange (HIE) allows secured access and transmission of patient medical records across several physicians, nurses, pharmacists and other healthcare providers. HIE technology has been shown to allow physicians access clinical records real time, avoid redundant testing and treatment (1), improve productivity at initial visit, enhance completeness of patient records, and improve workflow among others with ultimate goal of improving patient outcomes(2) (3). Physicians have opined HIE has great value however, it is imperfect when there is limited availability of data (2). Mandated as part of Meaningful Use stage 2, HIE envisioned the interoperability that is essential for improving health care quality, safety, and patient outcomes. Although interoperability has been stagnant due to lack of standardization in spite of the advances in health information technology, physicians awareness and utilization of HIE likewise have been lagging (4).

The majority of exchange initiatives are in the initial phases of development and implementation (2). Baptist Health is a multi-hospital health system, serving residents of the Montgomery, Alabama. Among the three hospitals, Baptist Medical Center South is the flagship facility with 450 beds that serves as a regional referral center, level II trauma center and primary stroke center. Also, it is one of the regional campuses of University of Alabama at Birmingham that houses Internal Medicine residency program and Baptist Health's Family Medicine residency program. Baptist Health uses Cerner electronic medical records system for clinical access of patients' medical records and uses Cerner exchange platform to communicate broadly with the other networks (Cerner, North Kansas City, MO). Cerner is connected to both Care-Equality and E-health exchange, which are health information exchange consortiums that provide broad based interoperability and have huge national presence but limited local presence. In response, Baptist Health founded Patient Bridge in 2015 based on the Cerner exchange platform. Physician training in 2015 resulted in short lived interest as local participation in Patient Bridge was limited to Baptist Health. As additional sources were slowly added, providers were notified, but there was not enough content to justify their time and effort. Liaisons have been sent periodically to both market the HIE and reeducate community practices about the benefits of HIE. With the addition of many new local networks over the last year, there have been targeted attempts to increase adoption across hospitals of Baptist Health such as education sessions at department and hospitalist meetings.

It is unclear if Emergency Medicine (EM) physicians, Internal Medicine (IM) residents and faculty at Baptist Medical Center South lack awareness of Patient Bridge and its benefits. This study will focus on identifying the barriers for usage and increasing physician awareness to Patient Bridge using mixed methods.

Methods:
I conducted a mixed methods study, which includes quasi-experimental and pretest-posttest design to educate EM physicians and IM residents and faculty with use case scenarios to increase utilization of Patient Bridge.

Study Setting
The study was performed at Baptist Medical Center South, a regional tertiary care hospital that serves the residents of and around Montgomery, Alabama. Cerner electronic medical record system is used for accessing patients' clinical information. Although physician awareness is lacking as a whole, the scope of the study is narrowed due to time constraints, and includes Emergency Medicine physicians and Internal Medicine residents and faculty. Emergency medicine physicians are the first point of contact that can

reduce duplicate testing and benefit from the interoperability. Internal medicine residents and faculty are chosen to increase their awareness of Patient Bridge and teach the importance of cost effective management. Initial qualitative survey was collected during January and February 2020. The study's intervention was executed in March and April 2020 for IM residents and faculty and EM physicians respectively. Subsequently, the data was collected and analyzed in May 2020.

Initial Qualitative Survey

Before intervention, I interviewed aforementioned physicians who have used Patient Bridge at least once between January and December 2019.

Survey Questions:

1. What do you know about Patient Bridge?
2. Why do you use Patient Bridge?
3. Did you find it useful? Please explain.
4. Would you recommend other physicians to use Patient Bridge? Please explain.
5. Have you noticed any barriers in using Patient Bridge? Please explain. How do you think we can limit the barriers?
6. What networks do you want to see on Patient Bridge?

The qualitative data underwent thematic coding to analyze like numerical data. Inductive coding is conducted to avoid bias and code frame is organized in a hierarchical framework.

Education intervention

The use case scenarios were formulated and presented differently for the two cohorts. IM residents and faculty had a live presentation (see Appendix A) and dissemination of information with impromptu use of Patient Bridge in the beginning of March 2020. Since it was not possible to gather all EM physicians practicing at Baptist Medical Center South during the evolving and unprecedented times of COVID-19, a PowerPoint presentation of use case scenarios was created and disseminated in early April 2020 (see Appendix B). Flyers were created and pasted around the ED physicians' desk area to ensure they check their inbox (see Appendix C).

Monthly usage reports of Patient Bridge were compared before and following the education to determine the impact of the education on usage. Counts of unique provider logins to Patient Bridge were measured in January/February 2020 (pretest population) and March/April 2020 (post-test population). The usage measurements were compared between the two groups using a two-sample t-test for determining statistical significance.

Final Qualitative Survey

Those physicians who accessed Patient Bridge more than 5 times post intervention were interviewed using similar questions to assess the trend for their usage of Patient Bridge.

1. What do you know about Patient Bridge?
2. How did you find out about Patient Bridge? Was the presentation useful?
3. Do you find Patient Bridge useful? Please explain.
4. Would you recommend other physicians to use Patient Bridge?
5. Have you noticed any barriers in using Patient Bridge? Please explain. How do you think we can limit the barriers?
6. During the COVID pandemic, how have you felt about the interoperability of Patient Bridge?

Survey responses were analyzed using the same methods as the initial qualitative survey.

Results:

	EM Physicians	IM Physicians
Number of participants in study	38	32
Gender		
• Male	31	14
• Female	7	18
Number of participants interviewed		
• Pretest	1	13
• Posttest	2	10

Table 1. Characteristics of the participants in the study

Initial Qualitative survey

Of 70 participants, 14 physicians (20%) were interviewed.

What do you know about Patient Bridge?

9 of the 14 interviewed participants (64%) were unaware of Patient Bridge, its role in interoperability, or its location in Cerner system. In contrast, 3 of the 14 participants (21%) knew it as a source to access other medical records of the patient. One participant was familiar of it, but was not sure how to use it and was unaware of its location.

Why do you use Patient Bridge?

4 of the 14 participants (28.5%) stated using Patient Bridge to access other hospital records, outpatient office notes, medications, ECHOs.

Did you find it useful? Please explain.

9 of the 14 participants (64%) were not sure of it and 1 participant although aware of its existence was not able to comment.

Would you recommend other physicians to use Patient Bridge? Please explain.

Most of them were unable to answer because they were not familiar of its advantages/disadvantages.

Have you noticed any barriers in using Patient Bridge? Please explain. How do you think we can limit the barriers?

Following a brief explanation of Patient Bridge, 4 physicians (28%) mentioned lack of awareness as the rate-limiting barrier and 6 physicians (42%) have recommended physician education to increase awareness of Patient Bridge.

What networks do you want to see on Patient Bridge?

Most of the respondents requested to have access to patient medical records of Jackson hospital, regional hospitals in Montgomery and Birmingham area including University of Alabama at Birmingham, private offices including cardiology, orthopedic, and oncology offices. An EM physician has requested for nursing home records in addition to the above.

Education Intervention

The average monthly usage increased by 2.4 times in the IM cohort following live presentation with impromptu use case scenarios. Meanwhile, EM cohort had a relative increase in the trend of user logins

(or clicks) per month after a PowerPoint presentation that was disseminated as a required reading (see Table 2 and 3).

	EM Physicians			**IM Physicians**		
	Pretest	Posttest	p-value	Pretest	Posttest	p-value
Total usage (clicks per month)	7	26	0.35	55	171	0.014
Average monthly usage (clicks per person)	1.2	1.63	0.4	1.53	3.7	0.08

Table 2. Usage reports of Patient Bridge among EM and IM physicians before and after education intervention

	EM Physicians		**IM Physicians**	
	Pretest	Posttest	Pretest	Posttest
Number of physicians accessed more than once (1-5 clicks	3	6	16	11
Number of physicians accessed > 5 (6-10 clicks)	0	1	2	6
Number of physicians accessed > 10	0	1	0	6

Table 3. Trend of physician usage of Patient Bridge pre and post intervention

Final Qualitative survey

Of 70 participants, 12 physicians (17%) who had accessed Patient Bridge more than 5 times post intervention were interviewed. All the participants were aware of a resource called Patient Bridge.

What do you know about Patient Bridge?
11 of the 12 (91%) participants knew it as a gateway to access records of other clinics office visit notes and outside labs/imaging studies.

How did you find out about Patient Bridge? Was the presentation useful?
9 of the 12 (75%) interviewed participants found out about Patient Bridge through the presentation and found the presentation helpful. 4 physicians (14%) were aware of Patient Bridge by word of mouth – mentioned by a nurse manager or a resident and these people were not present during the presentation coincidentally.

Do you find Patient Bridge useful? Please explain.
5 of the 12 (42%) physicians found Patient Bridge useful to access a particular group of cardiology office visits and ECHO results which avoided re-testing. Otherwise, more than half of the participants felt that it has the potential where it can be useful going forward if it has more than the internal content of Baptist Health Cerner electronic medical record.

Would you recommend other physicians to use Patient Bridge?

Despite the limitations, about 50% (6 of 12 participants) stated they would recommend other physicians to use Patient Bridge.

Have you noticed any barriers in using Patient Bridge? Please explain. How do you think we can limit the barriers?
Interviewed participants of this study reported lack of network interoperability and user interface as two common barriers to its use and recommended physician education in the form of resident noon conferences, pamphlets, and email reminders and updates on Patient Bridge (see Table 4).

	Pretest (n = 14)	**Posttest (n = 12)**
Barriers in using Patient Bridge		
Lack of network interoperability	3	5
Privacy concern	1	1
Lack of awareness	5	-
User interface	2	6
No barriers	-	2
Measures to mitigate barriers using Patient Bridge		
Physician education	5	9

Table 4. Common themes identified as barriers in using Patient Bridge and measures to mitigate the barriers during initial and final qualitative survey

During the COVID pandemic, how have you felt about the interoperability of Patient Bridge?
Majority of the physicians did not find any difference in regards to interoperability of Patient Bridge during the COVID-19 crisis for the aforementioned reasons.

Discussion:
Despite heavy investment on HIE's, these platforms remain underutilized(5). This study has shown that physicians underutilize Patient Bridge due to lack of awareness. Education aimed at EM and IM physicians using specialty specific use case scenarios has increased the awareness. However, a majority of physicians have mentioned that its use is somewhat limited due to lack of network interoperability and concerns with user interface.

Hersh et al. (6) had accurately posed a question "How can HIE be implemented in order to result in the greatest benefit for patients, clinicians, and health systems with the least cost and harm?" Patients and providers saw benefit when patients learned how to generate clinical care document through their VA portal and shared with non-VA providers (7). Similarly, physician education and awareness is a plausible solution. Following the awareness of Patient Bridge, both EM and IM physicians have referred to Patient Bridge to avoid repeating ECHOs or labs. One EM physician has found it useful for its organized presentation that summarized the patient's clinical profile and appreciated the display of objective data. Another EM physician of more than 20 years of practice has recommended a "socio-community effort" to gain the full potential of HIE – by involving the right stakeholders at the right time, ensuring that patient data is shared in a healthy, non-compete manner and remembering that patients are shared between healthcare systems. Furthermore, frequent reminders and updates of Patient Bridge from the department leadership and physician champions can be productive. IM residents have strongly

recommended sharing knowledge about Patient Bridge during intern year orientation as well as frequent reminders during real time practice to make it a part of their workflow.

Although more than 50% interviewed participants deemed HIE to be a useful resource, they are not recommending other physicians to use Patient Bridge at this time due to lack of interoperable networks. Majority of the EM and IM physicians interact with patients who receive clinical care through clinics/offices that are affiliated but not part of Baptist Health. Unable to provide timely and effective care due to lack of desired patient data, not knowing which networks participate in Patient Bridge steers physicians away from Patient Bridge. Furthermore, concerns related to user interface, specifically excessive clicking, data processing speed, information crowding may cause providers to evade utilizing Patient Bridge. Few physicians have mentioned it was difficult to find the correct encounter, when found, no data was retrievable. Having physician champions who can provide one-on-one training every month for a selected number of physicians is an acceptable solution.

Although the scope of the study was limited to EM and IM physicians, the trend of usage was in the positive direction even though the data analysis was conducted following a brief period of intervention. That said, a small sample size could not generate the power for study to determine a statistical significance. A handful of physicians could not be interviewed face-to-face due to sickness or unavailability that could have influenced our overall understanding of Patient Bridge. Moreover, it was conspicuous that EM physician assistants, nurse practitioners and scribes utilize the Patient Bridge more compared to the ED physicians while looking through the usage reports. Considering including advanced practicing clinicians in the future studies would be appropriate to get their perspective to improve patient outcomes since practicing medicine is teamwork.

In conclusion, physician awareness of Patient Bridge through use case scenarios had a positive reinforcement on the utilization. Certain barriers including network interoperability and user interface are identified as contributors to decreased utilization in addition to lack of awareness that was addressed through education.

Acknowledgements:
I am thankful to my mentor, Dr. Mason Brown, Chief Medical Informatics Officer of Baptist Health, Montgomery, Alabama who informed me about the underutilization of Patient Bridge by EM physicians and provided constant guidance as I fine-tuned the project. I took it as an opportunity to educate not only EM physicians but also IM residents and faculty. I am grateful to Pruett Troy, Network Director of Patient Bridge, who provided the essential background and helped with giving access to usage report that helped my data collection process. Finally yet importantly, I am grateful to Dr. Michelle Hribar, my mentor at Oregon Health and Sciences University (OHSU) for her constant support, encouragement, and guidance throughout my capstone duration without whom this project would not have been successful.

References:

1. Bailey JE, Pope RA, Elliott EC, Wan JY, Waters TM, Frisse ME. Health Information Exchange Reduces Repeated Diagnostic Imaging for Back Pain. Ann Emerg Med. 2013 Jul 1;62(1):16–24.
2. Hincapie AL, Warholak TL, Murcko AC, Slack M, Malone DC. Physicians' opinions of a health information exchange. J Am Med Inform Assoc. 2011 Jan 1;18(1):60–5.
3. Wu H, LaRue EM. Linking the health data system in the U.S.: Challenges to the benefits. Int J Nurs Sci. 2017 Oct 10;4(4):410–7.

4. EHRIntelligence. 3 Ways to Enhance Healthcare Interoperability with Health IT [Internet]. EHRIntelligence. 2020 [cited 2020 May 2]. Available from: https://ehrintelligence.com/news/3-ways-to-enhance-healthcare-interoperability-with-health-it
5. SNFs, hospitals under use HIEs, study finds [Internet]. [cited 2020 May 25]. Available from: https://www.beckershospitalreview.com/healthcare-information-technology/snfs-hospitals-under-use-hies-study-finds.html
6. Hersh WR, Totten AM, Eden KB, Devine B, Gorman P, Kassakian SZ, et al. Outcomes From Health Information Exchange: Systematic Review and Future Research Needs. JMIR Med Inform. 2015;3(4):e39.
7. Turvey CL, Klein DM, Witry M, Klutts JS, Hill EL, Alexander B, et al. Patient Education for Consumer-Mediated HIE. Appl Clin Inform. 2016 Aug 3;7(3):765–76.