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Tower of Babel Problem in Telehealth: Addressing the Health Information Exchange Needs of the North Carolina Statewide Telepsychiatry Program (NC-STeP)

Sy Atezaz Saeed[1]

Abstract Telepsychiatry is a viable option for providing psychiatric care to those who are currently underserved or who lack access to services. While the current technology is adequate for most uses, and continues to advance, there remain barriers to its widespread utilization. One such barrier when working with different healthcare systems is that they utilize different electronic medical record systems (EMRs). This paper describes the experience of the North Carolina Statewide Telepsychiatry Program (NC-STeP) with this problem and how the program successfully resolved it by establishing a web portal that connects participating hospital emergency departments and remote psychiatric providers to share secure electronic health information regarding patient encounters across different EMRs. The Portal also facilitates scheduling, status tracking, and reporting on each patient encounter, as well as delivers the necessary data for the billing to process charges for each consult and to administrators for the operation of the program. The portal effectively bridges the needs of the multiple actors in the telepsychiatry virtual encounter. It provides an efficient experience for the patient and the point-of-care provider, a reliable document exchange for the psychiatric provider, and effective record keeping for the billing and government entities.

Keywords Telepsychiatry · Electronic health records · Health information exchange (HIE) · Electronic medical record (EMR) · Health information technology · Consolidated clinical document architecture (C-CDA) · North Carolina statewide Telepsychiatry program (NC-STeP)

The story of the tower of Babel, described in Genesis 11, explains the origins of the multiplicity of languages. According to the story, God was concerned that humans had

✉ Sy Atezaz Saeed
    saeeds@ecu.edu

[1] Department of Psychiatry and Behavioral Medicine, Brody School of Medicine at East Carolina University, 600 Moye Blvd, Greenville, NC 27834, USA

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too much freedom to do as they wished, so God brought into existence multiple languages. Metaphorically speaking, the tower-of-Babel problem refers to the challenge of enabling a collaboration among people speaking different languages.

Introduction

The East Carolina University Center for Telepsychiatry launched the North Carolina Statewide Telepsychiatry Program (NC-STeP) in October of 2013 [1, 2]. This was in response to the state seeing a steady increase in emergency department (ED) admissions related to behavioral health issues and extended lengths of stays (LOS) in EDs, ranging from long hours to multiple days [3]. According to a study by the Centers for Disease Control, in 2010, patients with mental illness made up about 10% of all emergency room visits in North Carolina, and people with mental health disorders were admitted to the hospital at twice the rate of those without [4]. Nationally, greater than 6.4 million visits to EDs in 2010, about 5% of total visits, involved patients whose primary diagnosis was a mental health condition or substance abuse [5].

NC-STeP linked hospital EDs that did not have access to mental health professionals with psychiatrists and other mental health professionals to initiate assessment and treatment for patients who presented to the EDs in mental health or substance abuse crises. The telepsychiatry project utilized secure, real-time, interactive audio and video technology to enable mental health professionals to evaluate, diagnose, and treat individuals needing care at any remote referring site. The ECU Center for Telepsychiatry was tasked by the state of North Carolina with developing the network and establishing the infrastructure and guidelines for administering the program in 2013. Since then, the program has grown rapidly to its current network of over 70 hospitals state wide. Figure 1 shows the foot print of the program as of June 30, 2017. The darker color counties represent where the program is currently live and the lighter colored ones are the counties where the program is in the process of going live (e.g. going through credentialing, training, or portal development process, etc.).

From the start of the conceptual design of the program there was a realization that it was unlikely that the program would be interacting with only one EMR. There were a total of 108 hospitals with one or more EDs in North Carolina at the time NC-STeP went live in 2013. 75%
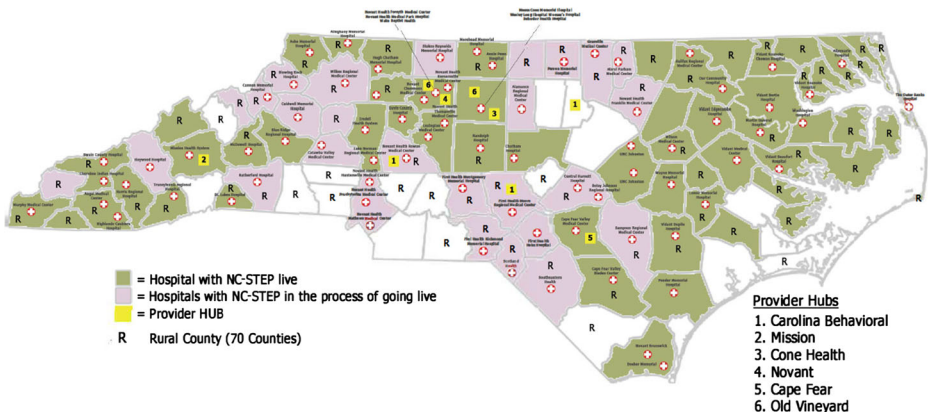

Fig. 1 Footprint of North Carolina Statewide Telepsychiatry Program

of these hospitals were utilizing one of the three major EMRs and it became apparent to the program that an electronic health information exchange (HIE) was needed to coordinate seamless communication, in real time, across various EMRs. However, while such an HIE was in the works at the state level, it was also clear that the program needed a viable solution until such an HIE became available. Various interim solutions were contemplated such as linking into an existing technology solution, use of fax, and the use of secure e-mails to share extracted clinical information from the patients' chart with the consulting psychiatrist. The use of secure emails required that we defined the basic minimum of this extracted information and who needed to attend to it at the patients' sites. It also required for us to define the process of how the consulting psychiatrist would share his/her consult report with the ED. No available solution appeared to offer the Center a viable option to effectively exchange clinical information in real time. Thus, the Center sent out a Request for Information (RFI) to collect information and recommendations for a viable solution that would meet or exceed the needs of the telepsychiatry program.

The Center envisioned a telepsychiatry "portal" that supported all the health information technology (HIT) functions required of the telepsychiatry network, including: scheduling of patients and providers; exchanging clinical data for patient care; and the collection of encounter data to support the needs of network managers and billing agents to support timely referrals and program reporting. The portal was conceptualized as a group of separate but related technologies to serve as the primary interface through which data was reviewed and created regarding patient encounters. We realized that most of these components of the portal existed at the time and were readily available. However, it was also clear that for the telepsychiatry network to be successful, these components must be integrated to work as a whole and network participants should be required to implement and utilize the portal as prescribed. In addition, any proposed solution should adhere to the Guiding Principles and Technology Vision of the Program, which was as follows:

- The primary goals of the program are to empower efficient consults and referrals
- "Shovel-ready" tools should be selected wherever possible
- The solutions should be as automated as possible and cause the least amount of disruption to existing provider workflow
- Health information technology (HIT) investments should support future telepsychiatry and telemedicine applications and be as self-sustaining as possible.

The Request for Information that was released specified the following:

Criteria for Desired Solution

Scheduling of Patients and Providers

The referring and consulting sites need to coordinate a list of patients waiting to be scheduled for telepsychiatry consultation. A scheduling module should serve as an active patient list regarding consultations as well as the central component of the portal that provides the core knowledge of who has been seen, when, where, under what circumstances, how long it took to receive consultation recommendations (regarding diagnosis and treatment), overall length of stay, and the final disposition of patients. It should track patients from the beginning through the end of an

episode of care on the telepsychiatry network and record important data for use by providers and network managers, monitoring at least three stages of referral and consultation:

- New: Patient awaiting consultation.
- Scheduled: Patients assigned to a consulting providers and awaiting evaluation.
- Completed: Patients who have been evaluated and referred as appropriate.

The scheduling module needed to be flexible and customizable to allow network managers to view patient lists in the three phases of scheduling listed above, and perhaps new criteria as defined by network managers. The lists should be sortable by criteria such as length of time awaiting referral or acuity, for example. The network creates a "marketplace" of telepsychiatry referrals on behalf of referring and consulting sites. We sought a scheduling module based on standards, secure, as automated as possible, and easy to use.

Exchanging Clinical Data for Patient Care

The portal needed to allow consultants to review patient's chart, and record consultation report in the chart regardless of what EMR is being used at the referring site. The two primary methods of health information exchanged identified were:

- Query-based exchange: the ability to request patient information from multiple sources and receive data in a single response, also referred to as *pull* exchange.
- Directed exchange: the ability to receive clinical data from a specific source in response to a query, also referred to *push* exchange.

We envisioned a telepsychiatry network that supported directed exchange at a minimum, such as the Direct Protocol, which "specified a simple, secure, scalable, standards-based way for participants to send authenticated, encrypted health information directly to known, trusted recipients over the Internet."

Data Collection and Analytics

The portal needed to enable sufficient data collection and analytics to support the routine operation of the network, the requirements of the enabling legislation that funded the program, and the research needs of the Center. The data collection system should be as seamless as possible and have limited interruption in provider and biller workflow. The scheduling module acts as the nexus of information regarding each episode of care, including data regarding patients and episodes of care. The portal should record as much data as is required to support the project and should therefore be flexible, yet without requiring excessive technical resources by participating hospitals.

Each episode of care needs to yield sufficient data to satisfy four reporting requirements of the enabling legislation:

i. Number of consultant sites and referring sites participating in the program.
ii. Number of psychiatric assessments conducted under the program, reported by site or region.
iii. Length of stay of patients receiving telepsychiatry services in the emergency departments of hospitals participating in the program, reported by disposition.

iv.   Number of involuntary commitments resulting from psychiatric assessments conducted by consulting providers under the program, reported by year and compared to prior years.

The electronic records system also needs to permit the telepsychiatry center staff to extract a fully linked data set. The extracted data set must be organized and identifiable by patient-event identification number. Data extraction must be possible individually (one patient-event record at a time) or by group (multiple events in one download). Once downloaded the data set needs to be easily imported into standard spreadsheet and database programs (Excel, Microsoft Access, txt. Files, SPSS, SAS). The portal should also support role-based access to canned and ad hoc reporting. Referring sites, consultant sites, and network managers will require different views of reports in order to be HIPAA-compliant. For example, it is anticipated that billing agents and planners for referring and consultant sites will need appropriate access to data to perform their jobs.

The Solution: NC-STeP Portal Overview

The final solution that was built as the NC-STeP Portal provided the overall solution to facilitate secure, real-time interactive patient care. The Portal serves as a Web-based hub that connects participating hospital emergency departments (ED) and remote psychiatric providers to share secure electronic health information regarding patient encounters. The Portal also facilitates scheduling, status tracking, and reporting on each patient encounter, as well as delivers the necessary data for the billing agent to process charges for each consult and to administrators for the operation of the program.

One of the main benefits of the Portal is that it provides a single platform for conducting telepsychiatry assessments across EDs and providers, regardless of the electronic health record (EHR) vendor or if there is no EHR available to an ED or provider. The Portal takes advantage of a secure messaging capability of all EHRs that are certified for Stage 2 or higher of the Medicare and Medicaid EHR Incentive Programs. These EHRs can exchange Direct Messages with the Portal containing demographic, clinical, and billing data in a Consolidated Clinical Document Architecture (C-CDA) attached to the message.

The C-CDA data standard defines that certain data elements be included in the document in a machine-readable format. The Portal can parse these data from the C-CDA and into the Portal's relational database where it is displayed in the user interface and processed in the reporting system. Some of the data elements usually found in a C-CDA include the following:

- Patient Name
- Date of Birth
- Medical Record Number
- Sex
- Race
- Ethnicity
- Patient Address
- Telephone
- Patient IDs
- Encounter ID
- Encounter Date
- Encounter Location

- Reason for Visit/Chief Complaint
- Encounter Details
- Active Allergies and Adverse Reactions
- Current Medications
- Active Problems
- Immunizations
- Social History
- Last Filed Vital Signs
- Results
- Procedures
- Plan of Care
- Results
- Visit Diagnoses
- Administered Medications
- Insurance Providers/Guarantor

If the ED cannot send all the required data in the format specified by the Certified EHR Technology (CEHRT) standards of the Meaningful Use programs, or if the ED can't send a Direct message at all, the Portal can accept data in a combination of manual entry, fax, or electronic document attached to the patient encounter in the Portal. Certain fields must be entered as structured, such as Name, Date of Birth, and Medical Record Number, whereas other fields may be faxed or attached, such as Medications, Lab Results, and Diagnostic Procedures. The Portal provides flexibility of data entry to accommodate the needs of users while embracing technological standards established by the EHR Incentive Programs.

A general outline of the workflow for the Portal is as follows:

- ED physician requests a telepsychiatry assessment.
- ED nurse or other staff transfers patient data from hospital EHR to the Portal via Direct Message and C-CDA. Supplemental information is faxed or attached to the patient record.
- ED nurse logs into the Portal and confirms patient data and submits to psychiatric provider work queue in the Portal.
- Provider conducts telepsychiatry consult and documents the results in the Portal, which sends the results to the hospital EHR to the Portal via Direct Message and C-CDA.
- ED physician reviews telepsychiatry consult results and determines best course of action.
- ED nurse discharges patient and closes the encounter.

Once received by the Portal, patient data is organized and presented to the provider for the assessment process, and the results are returned to the ED via Direct Message immediately upon completion of the assessment by the provider. An automated courtesy phone call, as well as fax of the results, can be pushed to the ED if desired upon completion of the consult. The results, as well as all the demographic, clinical, billing, and assessment data are available in the Portal to authorized users.

A patient encounter that lasts multiple days may result in multiple consults. The Portal provides structured data to the billing agent on a nightly basis for consults that are completed in the previous 24 h. A reporting system allows NC-STeP administrators to monitor the number of consults for each encounter, as well as other metrics such as the amount of time each patient spends awaiting a consult, the duration of the examination, the total length of stay for each encounter, whether involuntary commitment (IVC) was overturned, for example.

Conclusions

Telepsychiatry is a viable and reasonable option for providing psychiatric care to those who are currently underserved or who lack access to services. While the current technology is adequate for most uses and continues to advance, there remain barriers to its widespread utilization. One such barrier when working with different healthcare systems is that they utilize different EMRs. In this paper, we have described our experience with successfully resolving this problem by establishing a web portal that connects participating hospital emergency departments and remote psychiatric providers to share secure electronic health information regarding patient encounters. The Portal also facilitates scheduling, status tracking, and reporting on each patient encounter, as well as delivers the necessary data for the billing agent to process charges for each consult and to administrators for the operation of the program. The portal effectively bridges the needs of the multiple actors in the telepsychiatry virtual encounter. It provides an efficient experience for the patient and the point-of-care provider, a reliable document exchange for the psychiatric provider, and effective record keeping for the billing and government entities. It does this while respecting the idea that the purpose and fit of telecare services in the wider care system should drive its introduction –not the technology.

Compliance with Ethical Standards

Ethical Approval This article does not contain any studies with human participants or animals performed by any of the authors.

References

1. North Carolina Statewide Telepsychiatry Program. Available at http://www.ecu.edu/cs-dhs/ncstep/. Accessed 29 Aug 2017.
2. Statewide Telepsychiatry Program. Available at https://www.ncdhhs.gov/statewide-telepsychiatry-program. Accessed 29 Aug 2017.
3. Akland G & Akland A. State psychiatric hospital admission delays in North Carolina; 2010. Available at http://naminc.org/nn/publications/namiwakerpt.pdf. Accessed.
4. Emergency Department Visits by Patients with Mental Health Disorders – North Carolina, 2008–2010. Available at https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6223a4.htm. Accessed 29 Aug 2017.
5. Creswell JER. Costs for mentally ill soar, and hospitals seek better way, NY Times, December 25, 2013. Available at http://www.nytimes.com/2013/12/26/health/er-costs-for-mentally-ill-soar-and-hospitals-seek-better-way.html?mcubz=3. Accessed 29 Aug 2017.

Sy Atezaz Saeed, MD, is Professor and Chairman in the Department of Psychiatry and Behavioral Medicine at the Brody School of Medicine, East Carolina University (ECU). He also serves as the Director of the Center for Telepsychiatry at ECU and as the Director of North Carolina Statewide Telepsychiatry Program (NC-STeP), a state-funded program covering over 70 hospitals in North Carolina.