

Putting Patients First

Use case #1: Open Application Program Interface Technologies (APIs)

Making digital health data useful to patients is a key pre-requisite to improving health outcomes and reducing the cost of healthcare delivery. The same API technologies that let ATMs connect to banks and airline systems connect to travel portals are needed in healthcare. APIs are starting to enter the electronic health record (EHR) market because of the government's Health IT Certification Program authorized under the Health Information Technology for Economic and Clinical Health (HITECH) Act, the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA) and the recently passed 21st Century Cures Act. The certification program creates incentives for the exchange of interoperable information between EHRs created by different suppliers and used by disparate organizations. The various systems housing patient records must be able to efficiently mobilize these data via secure data exchange and proper identity authentication.

Although still in its infancy in terms of broad industry usage, APIs based on the Fast Healthcare Interoperability Resources (FHIR) Specification by HL-7 are gaining widespread acceptance. FHIR is uniquely helpful because of its potential to make data from EHRs more readily available, discoverable, and understandable. In addition, it also offers a means of standardizing and structuring data to better support automated clinical decision support that can advise patients of how to best address a health condition.

Imagine a college student on spring break a long way from home. During a run with his friends on the beach, he has some chest pain, begins wheezing and is extremely short of breath. His friends notify a lifeguard who radios for an emergency vehicle that takes him to an emergency room less than a mile away. On the way to the ED, the paramedic administers a bronchodilator and transmits the student's demographic information and vital signs to the ED. A physician in the ED opens the student's medical record to review the vital signs prior to the student's arrival. Other than the vital signs, the physician has no medical information on the student. He does, however, have an indication in the student's chart that information is available on the student from his provider's office in his home town. The physician reviews the student's data and notices he has a history of exercise induced asthma and has an active prescription for salmeterol to manage it. A few minutes later, he visits the student in the ED, who appears to be feeling much better. The physician informs the student he was able to review his medical history from his home town and asks him if he used his inhaler that morning. The student told the physician he had forgotten to refill his prescription. The physician sent an electronic prescription for the same dosage the student was previously prescribed and reminded the student to not do any running without ensuring he had used his inhaler within the past 10-12 hours.

Putting Patients First

Use case #2: Digital Health Advisors (DHAs)

Imagine you wake up one morning and notice a rash on your ankle. You don't think much about it and head off to your first class as usual. By the end of the day, it has started to become quite itchy and uncomfortable. The student health clinic is closed for the day and you don't have the desire or money to visit the local emergency room. You consult your roommate, who tells you not to worry about it and that it will probably go away on its own in a day or two.

Now imagine you take a picture of the rash on your smartphone and launch your personal digital health advisor (DHA). The DHA reviews the picture and the voice assistant asks you when you first noticed the rash and whether it has gotten better, worse or stayed the same in the last day. After you reply, the DHA combines your answers with data from your electronic record, checks the information available from your local pharmacy and accesses a database of current medical knowledge regarding rashes. Using the clinical decision support tool in the DHA, the voice assistant informs you that the rash is likely due to a medication you began using a week ago. The advisor suggests to stop taking the medication and provides information on additional symptoms you should monitor to ensure the problem isn't related to a more serious problem. It then looks up the NHIN Direct e-mail address of the provider who prescribed the medication and sends a message that indicates you've been recommended to discontinue the medication. Attached to the message is the photo you took, the answers to the questions about the onset and progression of the rash and the additional symptoms you were asked to monitor. You receive an automated reply within a minute from your provider's office acknowledging receipt of the message and suggesting times the next day when the provider is available for a tele-health visit to examine the rash and discuss an alternative medication. The message also contains the provider's 24-hour access number in case you need to reach her prior to the tele-health visit the next day. Imagine the convenience and peace of mind this type of digital health service would provide. Perhaps your team has an idea for your own digital health advisor.

Putting Patients First

Use case #3: Patient Reported Outcomes

Patient-reported outcome surveys ask patients about their physical, mental and social health. In an effort to advance the use of patient reported outcomes for research and care delivery, the national Institutes of Health recently awarded a \$6.3 million grant to nine universities. Providers use patient reported outcome data in combination with the patient's medical information to determine how clinical care is impacting the health of patients.

PROMIS (Patient Reported Outcomes Measurements Information System) is a computerized survey tool that adapts to a patients answers. It can be integrated with the medical information in a patient's EHR to provide the patient perspective on physical, mental and social health.

John Evans recently underwent a total replacement of his right knee joint due to severe osteoarthritis that had not responded to other therapies. At the time of his discharge, he was shown how to use PROMIS to upload the distance he was able to walk each day from his FitBit device, the level of pain he was experiencing and other activities he was able to do each day without fatigue. John was asked to record the information daily for 12 weeks after surgery and was told that his surgeon and care coordinator would also have access to the information John was recording to monitor his progress. John progressed as expected the first two weeks after surgery, however, starting in week three he experienced some swelling and discomfort in his knee that caused him to reduce the frequency and length of his walks, as well his other activities. On the third day of week three after his surgery, John received a call from his care coordinator indicating he had received a warning from the practice's EHR that John's outcomes were not as expected for the past two days and that the data was recorded manually instead of via upload from Jon's FitBit. He asked John if he had time for a quick video visit to allow the coordinator to examine his knee and ask him a few additional questions. During the visit, John's coordinator asked if he was following the guidelines had been given for the amount of walking to be done each day. John conceded that since he had felt so good the first two weeks, he had been walking about half a mile each day for the past two days. John's coordinator told John that the swelling was due to John trying to do 'too much, too soon' and reminded John he needed to avoid doing 'extra' until his knee had a sufficient time to heal. He also asked John if he was having problems with his FitBit since John hadn't uploaded his data the past two days. John told him he had purposely not worn the device because he wondered if he shouldn't be walking as much and 'would get in trouble'. After a good natured discussion between them, John indicated he understood what to do and not do moving forward and would upload the data from his FitBit so his coordinator could see exactly what level of activity was doing each day. The swelling in John's knee disappeared in two days and he made a full and uneventful recovery thereafter.

Putting Patients First

Your Challenge!!

The above are examples of various technologies that help put the interests of the patient at the center of the care delivery process. Your team is free to use them as “food for thought” on your project or propose something entirely different that helps ensure the status and needs of the patient are efficiently communicated to and understood by the care team. Perhaps you have an idea on how to ensure social data about the patient to be better integrated with the patient’s medical data, to ensure these factors are taken into consideration when planning care. What about the behavioral health status of a patient and its effect on the patient’s medical health and ability to remain healthy and/or recover from illness? How could the mind-body continuum be better represented and understood by the care team? It’s up to your team to decide how to use technology to provide greater benefit for the patient. We look forward to the discussion and learning from you!!

DRAFT