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STANFORD HEALTH CARE: A SEAMLESS OUTCOMES DATA CAPTURE SOLUTION

NOVEMBER 2014



WHAT YOU WILL FIND IN THIS CASE STUDY

Stanford Health Care is a top-ranking specialist academic hospital that sits within the multi-center Stanford Medicine complex in northern California, USA. In September 2013, Stanford began to implement a seamless patient-reported outcomes data capture model at their Neurological Spine clinic. By leveraging their pre-existing electronic medical record system and re-organizing their workflow, they demonstrated vast improvements in routine patient-reported outcomes data capture. In this case study, we describe how this data capture model was developed – from alignment of clinical, quality and business agendas to iteration of the model and demonstration of improved data capture.

A video documentary accompanying the case is also available online at: <http://www.ichom.org/measure/>



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HOW TO CITE THIS PAPER:

Arora J, Lippa J, Stoefs, J. *Stanford Health Care: A Seamless Outcomes Data Capture Solution*. Cambridge, MA: International Consortium for Health Outcomes Measurement (ICHOM); November 2014. (available at www.ichom.org)

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BACKGROUND

Whilst the theory of using systematic outcomes measurement to improve clinical care is widely accepted, implementation within provider organizations is challenging. An important element of this model of healthcare delivery is the collection of outcomes data. This represents an additional layer of work that is often difficult to integrate into busy clinic workflows and inflexible information technology (IT) infrastructures that are prevalent in healthcare institutions. With clinical services and staff regularly under strain from high patient volume, full integration of this additional layer of work is a key step in ensuring a sustainable effort to measure outcomes without increasing workload for clinic staff. Specifically, two of the most significant hurdles are clinic flow integration and synergy with other clinical data in the electronic medical records (EMR) system.

Stanford Health Care has managed to traverse these obstacles and implement a seamless data collection model at their Neurological Spine clinic, with vast improvements in routine patient-reported outcomes data capture. This case study describes how this initiative came to fruition: from the initial vision and alignment of clinical, quality and business agendas, to the iterative process of developing the data collection model, to demonstration of improved patient-reported outcomes data capture across the department.

A NEW CHALLENGE

Dr. Raj Behal was appointed Chief Quality Officer and Associate Dean for Quality of Stanford Medicine in May 2014. On his first day, after meeting with Amir Dan Rubin—President and Chief Executive Officer of Stanford Health Care—he stopped to gaze at the construction site for the new 800,000 square foot Stanford Health Care complex due for completion in 2018. As he looked ahead, Dr. Behal couldn't help but reflect on that path that had led him here.

Several years ago, as a primary care physician, Dr. Behal had encountered numerous patients that were being failed by clinical services. One such patient, a 68 year-old lady who was recovering from stroke, came to see Dr. Behal in clinic. Dr. Behal had closely followed all clinical protocols for stroke and had managed to get the patient to meet all biochemical targets. He felt he had done his job well, until the patient asked, "Doctor, I go to Church every Sunday and want to be able to raise my right hand to praise the Lord. When will I be able to do this?" Scenarios like this, where clinical services failed to produce answers that matter most to patients, were common. Dr. Behal thus identified patient-centered outcomes as a key focus for his career. Indeed, patient-reported outcomes measurement was also a significant component of Amir Dan Rubin's vision for pre-eminent quality of care at Stanford Health Care.

BOX 1 | ABOUT STANFORD HEALTH CARE

Stanford Health Care is a top-ranking specialist academic hospital that sits within the multi-center Stanford Medicine complex, which also includes Stanford School of Medicine and Lucile Packard Children's Hospital. It is the only Level-1 Trauma Center between San Francisco and San Jose in the state of California, with over 600 licensed beds and 49 operating rooms. The hospital sees over 500,000 patients for ambulatory visits and conducts over 700 Life Flights (a critical care transport program for northern California) per year. The hospital employs over 10,000 staff and is a world-renown center for research and education, housing over 20 Nobel Laureates.

"We don't just want to excel in national quality measures. We want to set a new standard."

Amir Dan Rubin, President & CEO

During their first meeting, Amir Dan Rubin and Dr. Behal discussed this vision, "We need to work out whether we're not just delivering good clinic visits, operations or infection-free encounters, but whether we are truly resolving the problems our patients have. Are we improving their lives? We want to be pre-eminent in clinical care," explained Dan Rubin.

As Dr. Behal observed the construction workers building Stanford Health Care's new site, he wondered how he would build a quality agenda that matched, if not exceeded, the ambition at this elite institution.

"How do we get to pre-eminence?"

Dr. Raj Behal, Chief Quality Officer

From his knowledge and experience, Dr. Behal knew that outcomes data was going to be key to achieving this vision. More so, he knew that the routine collection of outcomes data would be a key early step in the implementation process. With every clinic already struggling with high patient volume, would it be realistic to sustainably add another layer of work for clinic staff? What methods would they use to collect the data? With a provider network-wide EMR already in place, would there be a way to harness this to collect the data easily? Or would this present an additional resource burden? How would staff be coordinated to manage this alongside their clinical duties? These were all difficult questions that Dr. Behal needed to answer.

OUTCOMES MEASUREMENT AT STANFORD

Fortunately, a team at the Stanford Neurosciences department had already developed the blueprint for a patient-reported outcomes data capture model that provided the answers to these questions. This team was led by Dr. John Ratliff, Associate Professor of Neurosurgery, and Alison Kerr, Executive Director of the Neurosciences Service Line.

THE NEUROLOGICAL SPINE CLINIC

In 2011, in the face of increasing payer pressure to demonstrate the value of clinical services provided by the neurosurgical department, Dr. Ratliff decided to start measuring patient outcomes, "We needed to quantify the value we were providing and demonstrate this as proof of improved performance at lower cost." From a clinical perspective, Dr. Ratliff wanted to see where he was succeeding and where he could improve, "Every doctor has successes and failures. Understanding why these occur is important to improve what we do as physicians. That ongoing improvement has to be part of your practice, whatever the stage of your career."

The Neurological Spine clinic were interested in collecting quality of life (QoL) metrics compiled from various patient reported outcomes (PROMs) instruments: the Patient Health Questionnaire-9 (PHQ-9), Neck Disability Index (NDI), Visual Analogue Scale (VAS) and Oswestry Disability Index (ODI). Dr. Ratliff's team were collecting these outcome measures haphazardly during clinic, as there was often little time for patients to complete the questionnaires. The data was also being collected on paper and then entered into the EMR by staff at the end of the day. Because clinic frequently ran late, this often wasn't finished. Further, physicians often had to extend consultations in order for patients to complete new questionnaires whilst at the clinic. As a parallel process, outcomes data collection was a burden.

Dr. Ratliff's vision was to build outcomes data collection into the pre-existing EMR interface and to make this routine practice for all patients at his Neurological Spine clinic. When Dr. Ratliff suggested this to his colleagues, he was met with skepticism, "My colleagues said it would take significant financial and human resources to build the data collection interface. There were also concerns that outcomes data collection would present additional work to already overburdened clinic staff. Like

most other clinics, the Neurological Spine clinic was already running late due to an accumulation of delays throughout the day despite staff working at full capacity.

Despite these doubts, Dr. Ratliff decided to push forward with his vision. He approached Alison Kerr, who was happy to join forces with him, “We always said we were good, but we really needed patient-reported outcomes data to qualify this. Our business agenda was perfectly aligned with Dr. Ratliff’s clinical agenda.”

IMPLEMENTING OUTCOMES DATA COLLECTION

With Dr. Ratliff’s vision in mind, Alison Kerr built a multi-disciplinary team from the clinical, business, quality, administrative, analytics and IT departments within Stanford to manage this project. The QoL Project Team comprised twelve core and fifteen ad-hoc members. Team members were to continue their other work streams alongside the QoL Project. The team composition can be found in Table 1 (below). Coordinated by Kerr, the team met every Wednesday morning from 7-8am between April and September 2013 to develop a robust process for capturing the data they needed. In September, they launched this model and continued to meet at the same time every week until January 2014 to make further iterations, before moving to monthly meetings.

The team identified **three** target areas for improvement:

1. PATIENT FLOW: WHERE WOULD ROUTINE DATA COLLECTION FIT IN WITHOUT ADDING TO CLINIC TIME?

‘Patient flow’ represents the patient journey from check-in at the front desk to discharge from their appointment. The team decided to deconstruct the patient journey in order to identify patient and staff ‘downtime’. These time periods would represent the best windows of opportunity to capture the outcomes data. The team then suggested some changes to clinic flow based on this.

The Old Model

At a specified time point before the consultation, a clinic staff member would manually send a QoL questionnaire to the patient via email for them to complete at home. On the day of their consultation, the patient would check in at the front desk and then sit in the waiting room until a Medical Assistant was ready to escort them to the examination room. Here, they would again wait until the physician was ready to see them. If the patient had not completed the emailed questionnaire at home (70% did not), the physician would ask them to complete it during the consultation. Once seen, the patient would leave the clinic. The clinic would run late by 1-2 hours every day.

“We decided to review our processes and deconstruct clinic flow.”

Dr. John Ratliff, Associate Professor of Neurosurgery

TABLE 1 | QoL PROJECT TEAM

Size	12 core and 15 ad-hoc members
Physician Lead	Dr. John Ratliff, Professor of Neurosurgery
Administrative Lead	Alison Kerr, Executive Director of Neurosciences Service Line
Business	Co-Director of Neurosurgery
Clinical	Physicians, Nurse Practitioner
Quality	Senior Quality Consultants
IT/Analytics	Director of Medical Informatics, Data Analysts and Architects
Administrative	Senior Planning Specialist, Surgery Scheduler, Clinic Managers

*"Don't add work,
add value."*

Dr. John Ratliff, Associate
Professor of Neurosurgery

The New Model

At a specified time point before the consultation, the patient is automatically sent an email by the patient portal within Epic, MyHealth, to prompt them to complete the QoL questionnaire. MyHealth is pre-configured to send this prompt out at specified time points.

On the day of the consultation, the patient checks in at the front desk as per normal. However, the front desk staff now also have displayed the QoL questionnaire status for each patient. If the patient has not completed an assigned questionnaire at home, they are flagged with a red cross. The front desk staff subsequently clicks to trigger activation of the questionnaire. The patient is then escorted to the examination room by a Medical Assistant, who opens up the MyHealth patient portal in Epic for the patient to securely log in. The Medical Assistant has a checklist to complete as they guide the patient through their journey, in order to ensure standardization of data collection. Due to the earlier trigger by the front desk staff, the MyHealth portal displays the QoL questionnaire for the patient to complete as soon as they securely log in. They cannot access any other items in the patient portal until this is completed. The patient then completes the questionnaire with guidance from the Medical Assistant.

The results are uploaded into the physician-facing portal of Epic in real-time. This occurs during the idle waiting time in the examination room, engaging the patient before the physician is ready to see them. The physician's work is thus front-loaded. When the physician enters the examination room, he or she already has the QoL questionnaire results displayed within Epic, and these can be incorporated into the imminent consultation.

2. EMR INTEGRATION: WAS IT POSSIBLE TO BUILD DATA COLLECTION AND REPORTING INTO EPIC?

The Old Model

In each consultation, the physician would open the patient's electronic notes in Epic. This would include medical notes written by the care team and investigation results (e.g. blood test results, scans). In order to access the patient-reported outcomes (PROMs) data, the physician would need to open a different software interface and review the completed questionnaire separately. This meant that the physician would have to switch between Epic and the data collection software in order to analyze and integrate the patient's results, adding time to the consultation. At the end of the consultation, if applicable, the physician would also need to remember to send a follow-up data collection questionnaire to the patient, or remind the administrative staff to do this at a specified time point.

The New Model

The patient completes the QoL questionnaire in MyHealth, and the data is automatically stored locally in Epic. The integration of results from the completed questionnaires into the physician interface in Epic means that the physician can simultaneously visualize these with other clinical data (e.g. biochemical results, operation notes) and create electronic links to the data in his or her notes. The pre-population of data occurs in real-time, meaning that the physician can view results from the questionnaire in this integrated fashion immediately after the patient has completed it. The physician can visualize trends over time for that patient or on an aggregate level in the Epic dashboard. The physician can also 'arrange' for a questionnaire to be sent out to a patient with as little as one click, much like ordering an investigation (e.g. a blood test or scan), or Epic can be pre-configured to send the QoL questionnaire to the patient at specified time points. See Box 2 (above) for more details on how the data capture tool was built within Epic.

BOX 2 | THREE QUESTIONS FOR DR. MATTHEW EISENBERG, DIRECTOR OF MEDICAL INFORMATICS

HOW DID YOU INTEGRATE OUTCOMES DATA COLLECTION AND REPORTING INTO EPIC?

We configured the code and functionalities already within the Epic software to manage specific actions – for instance, triggering the system to send a questionnaire to a patient. All the modifications were made internally and using the pre-existing tools within Epic. We didn't have to write any new code to do this.

SPECIFICALLY WHAT MODIFICATIONS WERE MADE IN EPIC TO MAKE THIS WORK?

We leveraged our patient engagement tools in Epic and MyHealth. This allows patients to access their record, communicate with their provider, check labs and bills, but also has the functionality to allow us to add questionnaires. Once we decided which QoL questionnaires we wanted to use, we built those tools with our technology partners, and worked with Epic to ensure they were easy to read and easy to complete. We tested it in the clinic and found it to be very effective. MyHealth was already well known to us and functioned within our workflow. Epic tools allow us to put in the questions and responses. We customized it so that formatting worked well. We also worked with the web services team and Epic application analysts.

WHAT KIND OF RESOURCES DOES THIS REQUIRE?

It doesn't take significant resources to implement this. We had one Applications Analyst who built the questionnaires and one Data Architect to design data visualization. This entire process took a few weeks, including some time for validation and testing.

3. MULTI-DISCIPLINARY TEAM INTEGRATION: HOW COULD THE TEAMS ALL WORK IN SYNERGY TO DEVELOP A DATA COLLECTION MODEL THAT WOULD FULLY ENGAGE ALL INVOLVED DISCIPLINES?

The Old Model

Prior to inception of the project, the clinical, administrative, quality and IT staff would work in parallel. Physicians and nurses would see patients as soon as they were able; administrative staff would support clinical activities as instructed by management; the quality team would review whatever outcome metrics were collected; and IT staff would build and maintain the data collection interface in isolation. There was no mechanism for discussion and feedback between the different teams.

The New Model

The project team's approach was to ensure regular interaction between the different teams involved in the data collection process. In order to facilitate this, the project team comprised experts from all the necessary disciplines to ensure that the data collection model they built was optimal from clinical, analytical, IT, business and administrative perspectives. For example, there were direct discussions between the IT team and physicians to ensure that a dashboard was built that would work effectively in clinical consultations.

In order to ensure ongoing engagement, the project and clinic teams have daily morning huddles prior to clinic to review their quality dashboard metrics and provide feedback on compliance. The multidisciplinary project team also holds monthly meetings to reflect on the results and discuss successes, failures and potential areas for improvement. Finally, every clinic staff member, with the exception of the physician, has a checklist of tasks to complete as part of the data capture process. This ensures standardization.

"Having multi-disciplinary ownership of the data capture model from an early stage was vital"

Alison Kerr, Executive Director of Neurosciences

TOWARDS PRE-EMINENT QUALITY

Between September 2013 and September 2014, the Neurological Spine clinic underwent an iterative process to embed this data capture model into daily clinical operations. As of November 2014, the clinic captures outcomes data for almost all its patients, increasing capture rate from 15% to 98% (see Figure 1a). The two key changes that triggered this dramatic improvement were that all outcomes data was now captured: 1) electronically and 2) in clinic. 79% of new patients now provide QoL measures, and the MyHealth activation rate (patient engagement with the MyHealth patient portal) has increased by nearly 50%.

Prior to data capture, the average clinic new patient visit time from check-in to check-out was 128 minutes. Post-QoL data capture, the average clinic new patient visit time is 117.0 minutes (see Figure 1b).

NEXT STEPS

After more than a year of iteration, the QoL Project Team's initiative at the Neurological Spine clinic is an unprecedented success. The team is determined to continue this successful transition to routine outcome data capture. Specifically, Dr. Ratliff and Alison Kerr are keen to scale their efforts to the clinics of three other spine surgeons to facilitate data comparison, to non-surgical spine patients who undergo conservative treatment, and to other medical and surgical departments. There is also an ambition to incorporate new QoL indicators from the European Quality of Life-5 Dimensions (EQ-5D) validated instrument and financial metrics into the Epic dashboard.

"In the future, outcomes measurement is only going to rise in importance."

Amir Dan Rubín, President & CEO

Dr. Ratliff is one of many who are surprised by the perception of high barriers to implementation of integrated outcomes data capture, "People think that the challenges associated with building this into an EMR are insurmountable, that it is impossible. But we have shown that it is actually very doable, and that at low cost and with little extra manpower."

Amir Dan Rubín and Dr. Behal are keen to replicate such projects across Stanford Health Care. We are embracing the vision of how important it is to capture these outcome metrics. The Neurological Spine clinic's model is a shining example of how we can truly achieve this – both at Stanford and beyond."

BOX 3 | 10 BENEFITS OF STANFORD'S MODEL OF DATA CAPTURE

1. Low resource investment
2. Integrated into daily clinic routine without adding time
3. Scalable solution
4. Utilizes idle wait time of patient
5. Front-loads physician's work
6. Higher compliance rate for questionnaire completion
7. Easy integration with other clinical tools
8. Encourages patient engagement
9. Encourages participation in quality improvement from all staff members
10. Data-driven justification of quality improvement initiatives

FIGURE 1a | QoL QUESTIONNAIRE COMPLETION RATE (%)

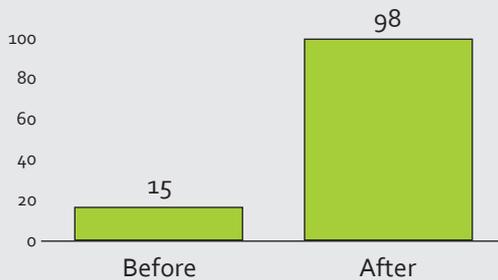
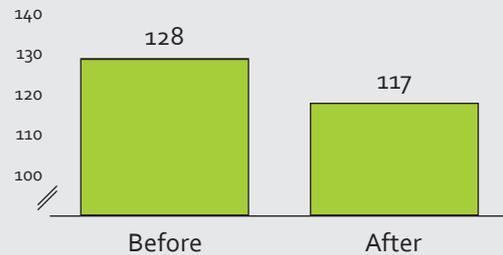


FIGURE 1b | AVERAGE CLINIC NEW PATIENT TIME (MINUTES)



KEY LEARNINGS

1. DECONSTRUCTING CLINIC PROCESSES HELPS TO IDENTIFY WINDOWS OF OPPORTUNITY TO CAPTURE OUTCOMES DATA

The best approach is to utilize the free time of staff and patients during normal clinic operations. This engages both the patient and non-clinical staff members, and ensures that no extra time is required.

2. DATA COLLECTION NEEDS TO BE INTEGRATED INTO CLINIC FLOW RATHER THAN RUN AS A PARALLEL PROCESS

Seamless integration of outcomes data capture into the clinic workflow is key to ensuring that it is completed. If it runs as a parallel process, clinical duties will take precedence and data collection will likely be de-prioritized.

3. EMR INTEGRATION IS POSSIBLE BY LEVERAGING BUILT-IN FUNCTIONALITIES

The Stanford team used only preexisting modules within Epic to set up the data collection system. Clinical information is captured from the standard interface while patient-reported outcomes are captured through the patient portal or a questionnaire pulled up in the exam room.

4. MULTI-DISCIPLINARY TEAM INTEGRATION ENSURES THAT THE DATA COLLECTION MODEL IS OPTIMIZED FOR ALL STAKEHOLDERS

The data collection process involves individuals from multiple disciplines that will come into contact with the data at some point. Therefore, it is essential that these disciplines are involved from an early stage and that they have a hand in the design of the data capture model. This will ensure that the model is optimized for their use once they do come into contact with the data.

5. DATA NEEDS TO BE ACCESSIBLE AND ACTIONABLE

Data should be presented in real-time, in a single location and in an actionable format so that it can readily feed into clinical diagnostic and management pathways.

SOURCES

Site visits to Stanford Health Care in September and October 2014.

Interviews conducted with:

- Amir Dan Rubin, Chief Executive Officer of Stanford Health Care
- Dr. Raj Behal, Chief Quality Officer of Stanford Health Care
- Dr. John Ratliff, Associate Professor of Neurosurgery and Co-Director for the Division of Spine and Peripheral Nerve Surgery.
- Ms Alison Kerr, Executive Director of Neurosciences Service Line
- Mr. Yohan Lee, Senior Quality Consultant
- Ms Alisa Kearney, Nurse Practitioner, Neuroscience
- Ms Lisa Flannery, Principal Clinical Systems Analyst, Clinical Informatics
- Dr. Matthew Eisenberg, Director of Medical Informatics

ACKNOWLEDGMENTS

We are very grateful to the team at Stanford Health Care, who provided us with tremendous support during the writing of this case study.

