

SmartPA: An Electronic Solution for Secure Prior Authorization Processing

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Abstract. Electronic Prior Authorization (Electronic PA) is a fast and efficient way of ensuring that prior authorization, needed for medical drug and treatment dispensing, is accurately and promptly completed, supporting quick delivery of medications to patients. Electronic PA (ePA) solutions are the next big revolution in healthcare industry after the introduction of electronic health records. ePA is a time saver for prescribers as well as a cost-saving solution to insurance companies and Medicare services. ePA is new to the industry and due to a knowledge gap among medical professionals and their IT solution providers, ePA applications lack sophisticated components to ease the workflow. Instead of being time-saving, broken ePA processes become time consuming. A research study identified common gaps around the PA process by interviewing and gathering feedback from key stakeholders in the process. The results of the study have demonstrated how a new electronic solution that was developed working with the stakeholders has helped close some of the identified gaps. The resulting solution, SmartPA, provides a secure, reliable interface in support of medical standards, as well as enhancing the PA workflow process.

Keywords: User centered design (UCD) · Electronic prior authorization (ePA) · Digital healthcare systems

1 Introduction

Scenarios where the transition to electronic health records from paper charting caused the documentation process to become more tedious have been documented [1, 2]. The target user community of medical professionals was not happy with the change to the new electronic health records (EHRs) or the lack of communication that the change was to occur. Along with designing novel technologies for the benefit of the users, developers must include user input and ideas from early on to avoid disappointments in the resulting system design. One of the overarching goals of human-computer interaction (HCI) research has been to increase the good experiences and possibly reduce or mitigate horrible first experiences with technology [1]. When migrating to a new technology, the transition should be smooth.

A more efficient solution to prior authorization (PA), as it is currently in practice, is needed. PA is a vital procedure that involves prescribers (doctors, nurses, nurse practitioners, physician assistants), patients, pharmacists as well as insurance companies and companies that manage their benefits (PBM). Insurance companies maintain drugs in lists called formulary lists and non-formulary lists. Drugs listed under the formulary list category are dispensed using a process called Prior Authorization. These formulary drug lists have prescriptions that have been tested and researched to be safe and effective, as well as less costly to both the insurance carrier and the member. The insurance companies see formulary drug lists as a way to increase safety and effectiveness (although, it can be debatable if their formularies have the best prescriptions out there, it just depends on the specific case and insurance carrier) while also keeping costs down for both parties. Both brand name drugs and generic drugs can be found on formularies, however, generic drugs are almost always less costly and chemically equivalent to brand name drugs [19].

Several of the drugs that are restricted in nature due to clinical usage or even cost are controlled using the PA process. In a typical scenario, a patient goes to a doctor’s office for treatment of a condition they are experiencing and the prescriber writes a prescription for the medication. The patient takes the prescription to a pharmacy for fulfillment. The pharmacist will run this script through the dispensing system. For the formulary drugs, if the patient is denied the medication, he/she is requested to contact their prescriber to the next action. A call is placed to the prescription benefit management (PBM) company that serves the insurance plan for further action. Once, the prescriber calls the PBM, he/she is taken through the PA process flow where they are asked detailed questions for the usage of the medication. The PBM will then make a decision of “Approval” or “Denial” for the requested medication. In case of an approval, the patient can return back to the pharmacy and receive their medication. In case of “Denial”, further case reviews occur. Figure 1 details the Prior Authorization workflow process.

Non-formulary prescriptions aren’t on the insurance policies list of preferred drugs. Knowing that, non-formularies are costlier as well as experimental in nature. The PA process to receive this medication is often very complicated due to the nature of their

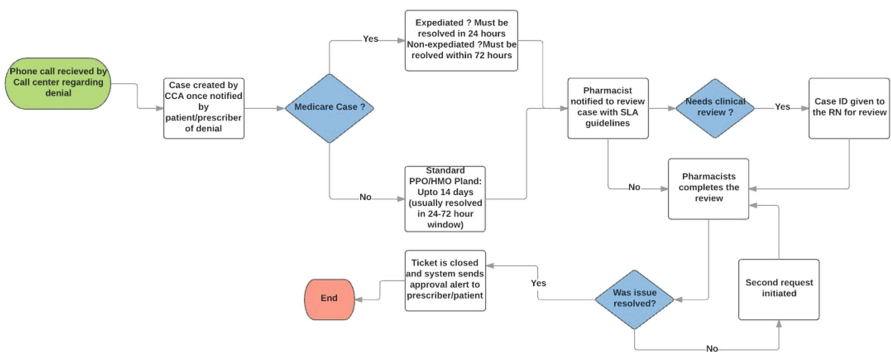


Fig. 1. Prior authorization workflow process.

administration. Most of the patients receiving these drugs will be in the hospital and closely monitored [20]. Non-formulary drug PA processes are excluded from this paper.

An ineffective PA process can have a significant impact on healthcare [3, 4]. The U.S. spends four times as much money on PA compared to Canada [5]. Most of the money goes to physician income due to the amount of time they spend in negotiation between pharmacies and PBMs to resolve a denial case [6]. Patient care could be improved if the PA process was less time-consuming for physicians [7, 8]. Therefore, an effective electronic solution is required to make this cumbersome process simple for the users who are prescribers, pharmacists, and PBM employees and for the overall benefit of the patients [9].

2 Methodology

It is essential for developers to engage stakeholder when attempting to rebuild old broken processes [10]. A key stakeholder is defined as an individual, a group, or an organization who may affect, be affected by, or perceive itself to be affected by a decision, activity, or outcome of a project, program, or portfolio [10]. The following are the identified key stakeholders and their defined roles in the process of electronic prior authorization [11, 12]:

- *Managed Care Pharmacists*

- Work with other health professionals to establish drug utilization guidelines and administrative policies for prior authorization criteria.
- Design communication protocols to be used in call centers to ensure that the correct information is collected as required for PA processes.
- Analyze prescription claim data to identify problematic prescription use patterns.
- Ensure safe drug distribution, encourage appropriate prescribing and proper use of medications by reviewing PA requests, determine if additional information is needed, work with other health care professionals to make a decision on the request and meet turn-around times.

- *Case Manager Registered Nurse (RN)*

- Initiate and review both prospective and retrospective prior authorization requests (electronic, fax or phone).
- Ensure that correct forms according to plans are used and data is accurately filled out according to the established guidelines.
- Be knowledgeable of formulary that typically requires prior authorization in order to take action at the point of care.
- Refer cases to physicians if necessary to ensure accuracy of forms.
- Review progress of PA requests and handle denials efficiently. Submit second requests if necessary.

- **Call Center Agent**

- Aid prescribers in the PA process, especially those who are still performing the process manually.
- Assist prescribers in obtaining correct PA forms and faxing them.
- Inform prescribers of requirements for letters documenting medical necessity.
- Handle the request by phone.
- Notify prescribers of the status of their PA request.

For this study, participants were recruited from different backgrounds to accurately present the user community. An initial survey was circulated among potential users who initially expressed interest in taking part in the study. The survey had an informed consent to ensure users did not feel compelled to participate and knew their right to withdraw at any time from the study. Figure 2 presents the questions included in the initial survey:

Three focus groups were conducted based on user's role, and include pharmacists (4), case management nurses (4), and call center agents (3):

Managed care pharmacists are the most vital part of the prior authorization process. They perform end-to-end business roles including receiving the claim information from the prescriber, reviewing the claim for drug interactions or misuse, drug distribution

1. What is current role at your place of employment ?
 - a. Physician/Nurse Practitioner
 - b. Registered Nurse
 - c. Pharmacist
 - d. Call Center Agent
 - e. Other: _____
2. How long have you been employed at your current job ?
 - a. Less than a year
 - b. 1 - 5 years
 - c. 5 - 10 years
 - d. Other: _____
3. Is your primary job responsibility related to prior-authorization ?
 - a. Yes
 - b. No
 - c. I'm not sure
4. How many hours do you spend working with prior authorization process in a week ?
 - a. Less 3 hours
 - b. 3 - 6 hours
 - c. 6 - 10 hours
 - d. More than 10 hours
5. Do you have an opinion you would like to share regarding making the current prior authorization process that you work with more efficient ?
 - a. Yes
 - b. No

Fig. 2. Initial survey questions.

and dispensing, ensuring patient safety as well as business and cost management [16]. These pharmacists are doctorate-prepared professionals with a minimum of five years' experience in the traditional pharmacy setting before being recruited onto managed care responsibility [11].

Case management nurses bring a different perspective to the business. Their role is to certify the medical necessity provided by the prescriber regarding the prescribed drug or procedure. They make their decision based on detailed medical information about the patient such as current diagnosis, lab results, scans, previous prescriptions, hospital visits, etc. They are highly trained and usually possess five years or more industry experience along with a graduate degree in case management nursing [12]. Their input is essential to patient safety and quality administration.

Call center agents (CCAs) are an important part of the prior authorization process and are usually the first point of contact for patients and prescribers. They should possess prioritization and organization skills. They can be hired for the position if they have a high school diploma and knowledge of primary medical terminology. All CCA's should have basic HIPPA training to protect confidential patient information.

3 Survey Results

All survey participants were informed that participation in the focus group was voluntary and they could withdraw their participation at any time per protocol of NIH PHRP [21]. Each focus group was carried out by one facilitator and lasted an average 30 min, during which the facilitator invited users to expand on their thought and suggestions [13]. An open dialogue format was used during the discussion [14, 15]. The top concerns brought up by the users based on their roles are presented here.

Managed care pharmacists had the most input with several key concerns associated with the system they are using currently:

- One of the pharmacists initiated the discussion by suggesting that he has witnessed multiple users accessing the same case ID for a patient at the same time resulting in simultaneous entries which can cause medical errors.
- Additionally, everyone had the same consensus about the process being extremely manual. For a given patient case ID, three to seven screens need to be accessed across several systems to gather pertinent information about a single patient. This can cause delay and excessive frustration.
- One user reported that existing systems are slow and based on some highly unstable old platforms. Any updates from the technology team causes system failures.
- Another user reported lack of Auto save function in case the application crashes, which is quite common.
- In general, users said there is no standard user interface across the different business areas. If a job change happens, users have to learn a new system every time.
- Finally, no update tags or user edit comment functionality is provided in the current system. If multiple users work on a single case ID, it is difficult to determine who made the last change.

Case management nurses also had their fair share of disappointment with the current systems due to the fact that they don't get a distinction in the application.

- The system lacks access control and according to the users, everyone has the same access control in the application causing information overload for nurses.
- These users have to go fishing for the data. There is no dedicated workflow for nurses to get assigned cases. They must receive case IDs from the call center or pharmacists to pick up their assignment.
- Once the case ID is manually entered, the users are bombarded with information and based solely on their experience, they review pertinent data.
- The system also lacks a patient 360-degree view that would provide assessment data, previous history, etc. for facilitating case reviews.
- Finally, no workflow setup is present to transfer the case back to the call center agent or pharmacists once reviewed by the nurse.

Call center agents were not as happy after they learned that developing a more efficient electronic PA might cut down on the total number of call centers. However, they were reassured that an efficient PA will affect them equally compared to other users and a comprehensive prior authorization process should have call centers to include physicians that are not using electronic health record or CoverMyMeds® system in their offices.

- Some CCA users reported there was no easy way to read drug usage information to assist the patient on the phone. From the focus group discussion, it was noted that if a patient call in, a CCA will answer any drug information related question.
- One of the user's internal company surveys revealed that approximately 25% of the faxes and phone calls are misdirected to the wrong department causing user frustration. The misdirection is possible due to an ineffective integrated voice recognition (IVR) component of the ePA.
- Users reported that case details are in different pages and tabs without a summary view to read out to the patient when they call in to ask about their case decision. The lack of a summary page of case details results in lengthy call times.
- Lastly, no easy workflow exists for transferring case requests to a pharmacist or RN, which seems to be a common failure point in all three user groups. It requires manual calls along with passing of an explicit and correct case id instead of direct workflow routing.

4 Design Concept

The web-based platform developed is designed to identify and introduce complete automation in the existing manual process. Future functionality will have the call center agent processing cases in 1/10th of the time as it takes in the manual spread sheet driven process. The time calculation is based on the reported time it takes to "create case" in manual environment versus expected automated process. The patient's medical record along with the physician request for the formulary medication will be presented to the call center agent using highly efficient web services. These XML web services

will fetch the data from the back end repositories and provide it to the call center agent for case processing. The web services will perform the role to streamline the data and present only relevant pieces of information in an efficient manner. This will avoid direct SQL calls to the backend data stores and will encapsulate business data safely and efficiently.

SmartPA, a JavaScript/CSS based web application, is a real-time, end-to-end electronic prior authorization solution that is scalable and integrated within the physician and pharmacy application workflow. A basic PA application helps in processing coverage reviews of any PBM eligibility and claims adjudication system. This system monitors the status and outcomes of coverage reviews made by PBM and manages coverage reviews of prescription rejections. The application also administers client specific coverage criteria with complete adherence to Medicare and HCR rules and other state specific regulations. Prior Auth application design follows a layered architecture (Fig. 3).

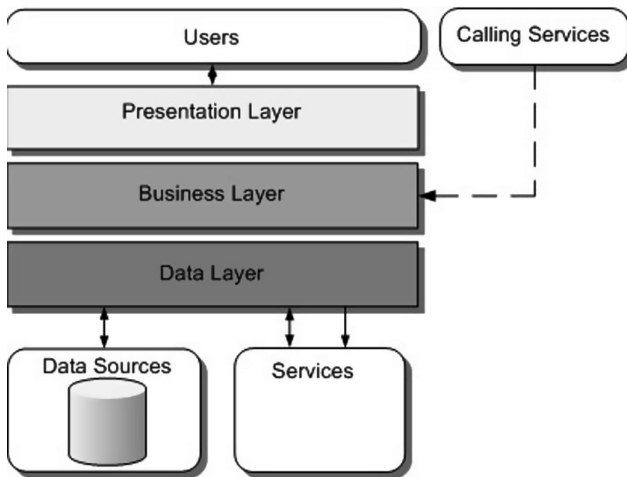


Fig. 3. Platform architecture

This particular PA application is designed to support four types of users.

1. Pharmacists
2. Case Management nurses
3. Customer care representatives
4. Physicians (using a separate end of the application)

Presentation layer components implement the functionality required to allow users to interact with the application. This layer contains UI components and UI validation components. User interface (UI) components provide the mechanism for users to interact with the application. They format data and render it for display, and acquire and validate data entered by users. PA application uses HTML components for UI.

UI validation component ensures data integrity in the system and protects the process by imposing data validation. PA application uses Java script based UI validation.

5 Usability Testing

5.1 Overall User Testing

User testing was conducted at an off-site facility to keep the bias to a minimal from the current system that users are exposed to already. There were total of eight attendees who participated in Test 1 after development cycle 1 and six in Test 2 after development cycle 2. Typically, a total of six to eight participants are involved in a usability test to ensure stable results [13]. Each individual session lasted approximately fifteen minutes. Test scenarios differed from test 1 versus test 2. In general, all participants found SmartPA to be clearer, more straightforward, and overall better system to use. During Test 1, 85% thought the SmartPA was easy to use, was a more stable environment and was easy to navigate. 15% of the participants thought that application can be improved significantly.

During Test 1 following were the identified minor problems:

- Lack of auto-save function in the application
- Manual ID entry is the only way to look up a patient or an existing case
- Clients cannot see a sequential break-down of the case components

During Test 2 following were the identified minor problems:

- Inability to save entered information in the forms during application crash was one of the initial problems recognized in the legacy system.
 - In first round of testing, users were not able to verify if that function exists in the application. During the application testing in developing environment, application was stopped during “debug” mode to test for data retention during application crash.
 - During round 2 testing, users were able to go back to the previous page and see the stored information in the previously filled forms, however, that does not guarantee application’s ability to retain entered data in an event of a crash. To properly assess that, we will need to create a crash simulation in the user (deployment) environment.
- It was successfully assessed that manual user entry has dual advantage in the SmartPA application system.
 - It will be ensured that user ID’s entered in the directory for each user will match their member ID’s as well. Entering the user ID will add an additional security feature by making it hard for application users to browse non-essential health records.
 - Only essential, case-pertinent health records should be accessed by users as well as the application allows only one health record to be opened at a time. However, users are able to do “last name” look up for ease of case search.

- Multiple users are prohibited from accessing the same health record on multiple machines to keep data entry accurate and information up to date. This removes the need for data cleaning and comment association for each change.
- Lastly, clients are able to see sequential breakdown of the case summary including member information, physician contact information, details regarding the case as well as coverage review decision
 - This prevents the need to toggle between different applications as well as potentially reducing errors by displaying all patient information on one screen.
 - In client focus interviews, 100% of the participants preferred single screen display versus multiple page information gathering.

Users were also given a wireframe diagram of a superior electronic PA system to study and identify major differences between their legacy app and this wireframe simulation of a sophisticated ePA summary screen (Fig. 4)

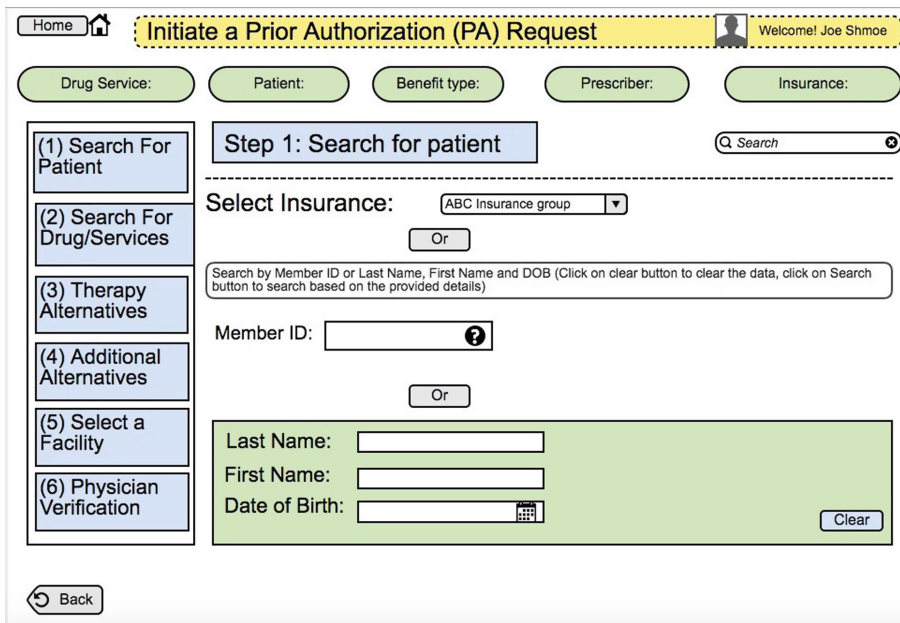


Fig. 4. SmartPA reference wireframe

Unfortunately, all focus groups returned with mission critical failures they have noticed in their legacy systems. Major key points included:

- application UI crash or hang-up in the middle of case creating queue which leads to patient frustration and increased call times
- One single sign-on for all roles and no work-queue segregation causing full exposure of patient data for all members
- Need to toggle among applications to retrieve information
- Significant amount of manual entry forms

The representatives of ePA teams suggested that it is all about keeping up with the latest technology. Migration to better systems will potentially help save money by reducing maintenance costs. Failing to keep up with IT trends makes any business lose their competitive edge. There are several competitor products that have been launched to support ePAs in various environments. As a business, being unable to keep up with the strong currents of technology will seriously affect company earnings and potential extinction [18].

5.2 Test Methodology

Task-Based Evaluation: After the application was completed in development cycle 2, the participants were invited to perform user acceptance testing (UAT) on the application to assess the usability of SmartPA. Participants were assigned two task sequences to complete major functions of the SmartPA: Case create and Case review. UAT was performed by employing a usability tool called “Task decomposition” during which user is given a task sequence to follow and their activity time is recorded [17]. These results are primarily based on test 2 of the application development due to completeness of the app and a better workflow achieved after the 2nd round of development. The participants were grouped together for the sake of simplicity and also due to the fact that the two major functionalities are synonymous on all of the user screens. Three categories of users were provided with three separate logins, one for each user category, which was a major improvement over the legacy systems. RNs, pharmacists and CCAs each had their own individual logins into SmartPA. The group had six members and two from each group representation.

All participants successfully completed Task sequence 1 (“Case Search”). Five of the six (84%) completed Task 5 within expected time which was 2 min and 46 s with a standard deviation of 51 s.

Approximately half (50%) of participants were able to complete Task 2 (Case create, Fig. 5) in expected time of 4 min and 15 s with a standard deviation of 54 s.

Since there was no effective measure of key logging or error capturing, if a participant had felt that they had reached a point of no return in the sequence, they were allowed to restart the task and measuring stop- watch allowed to be reset. The previous

Fig. 5. “Create Case” screen in SmartPA

score was discarded. Records reflected in the log are only where the user successfully completed the sequence.

Task Rating: Task rating is an essential measure to be done when performing task decomposition. This establishes the efficacy of the new features in a product versus legacy features. [13, 17]. After the completion of each task, participants were asked to rate the ease or difficulty of performing these functions since these will be essential parts of their work routine. Following three factors were considered in ratings:

- As a user, it was easy to find my way to this information from the homepage.
- As a user, as I was searching for this information, I was able to keep track of where I was in the website.
- As a user, I was able to accurately predict which section of the website contained this information.

The 5-point rating scale ranged from 1 (Strongly disagree) to 5 (Strongly agree). Agree ratings are the agree and strongly agree ratings combined with a mean agreement rating of >4.0 considered as the user agrees that the information was easy to find, that they could keep track of their location and predict the section to find the information [17].

All participants agreed it was easy to create a case (mean agreement rating = 4.23) and 76% found it easy to perform coverage review for a case (mean agreement rating = 4.11).

6 Future Recommendations

With an application such as SmartPA, there are significant opportunities for future implementations. Many enhanced features can be added to the application such as RFID two factor authentication to pad security features, e-fax ability and fax queuing as well as e-letter generation during case rejections. Based on budget allocation and manpower, the application can integrate with several other electronic methods of data feeds such as CoverMyMeds®, leading EHRs and e-pharmacy systems. The call center agent will also benefit from the questions and answers in an electronic fashion. This will be much faster and more efficient than the current manual fax and phone call process. The data will be electronically sent over to the application and stored in the system of record database. Several channels such as ePA and Mobile will allow for requests to come in without having to go through the Call center agent 100% of the time. This is a highly efficient and organized way to handle PA requests and a company can enjoy a significant cost reduction with automated channels. In an ePA request, the physician's office is able to use CoverMyMeds® (CMM) to initiate a case for PA. This request then hits the PBM via an electronic record transfer. The data is then automatically fed to the 'case create' Web service to initiate a case for request for Prior Authorization. This method bypasses the need to call into the Call center. Using Mobile is also another efficient option. The patient can use the mobile app to open a request for Prior Auth.

The questions and answers are then sent and received electronically via mobile. The entire process is quick and cost efficient. Thereby, the combination of Call Center application streamlining along with reducing the load to the call center via self-service automated channels allows for a much leaner and efficient Prior Authorization process.

7 Conclusions

A majority of the participants found SmartPA to be well-organized, comprehensive, and uncluttered UI. This resulted in an effective, easy-to-use application overall. Some of the less technically experienced individuals had difficulty picking up the technology. SmartPA presents users with a centralized portal to find information, a positive factor enhanced by application stability while maintaining patient privacy. Implementing the recommendations from this research and continuing to work with users in practical settings will ensure the continued development of a user-centered application for ePA in the future.

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