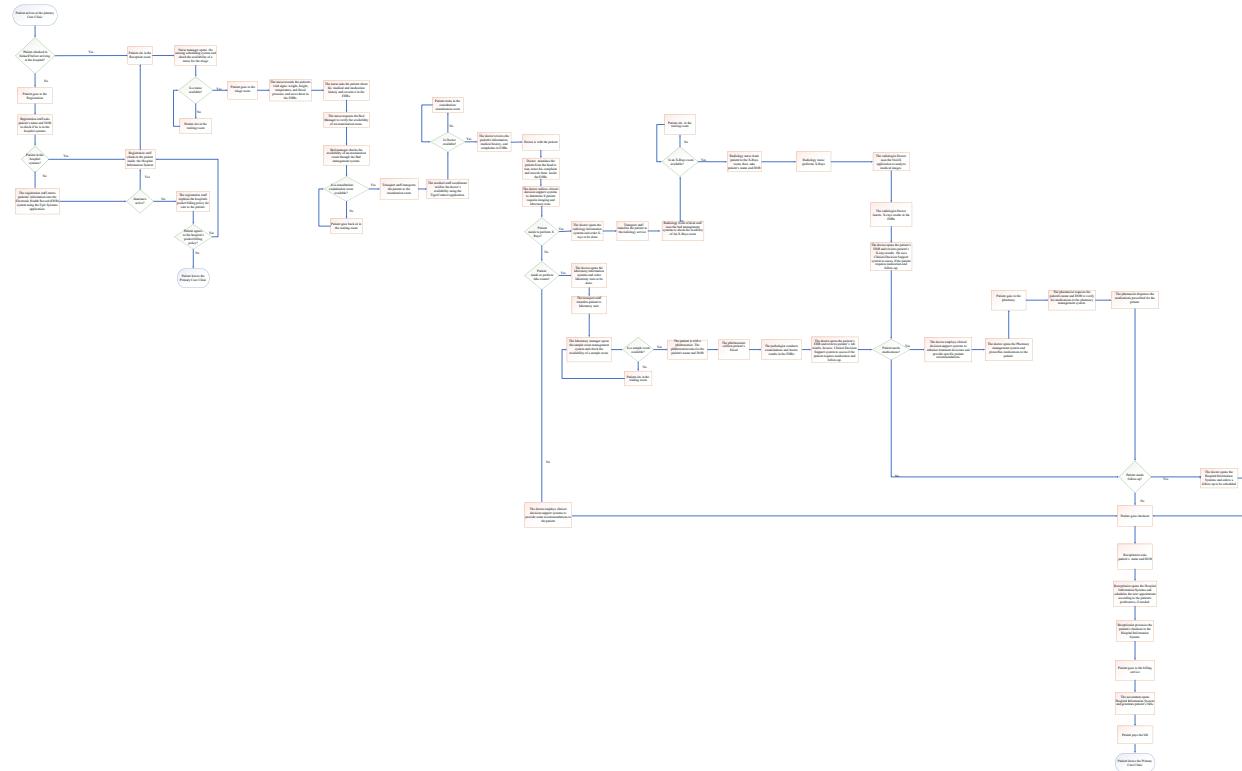


Clinical Patient Workflow and Analysis

BY

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We, future health systems administrators, are excited and looking forward to delivering a clinical patient workflow. Patient flow is the incremental transfer of patients from one unit or department of the healthcare system to another. This process should not only protect patient safety and efficiency but also reduce waste. Hospitals have rolled out billions of tiny changes to control patient populations and deliver the right care at the right time. Science offers many solutions and measures for optimizing patient flow (Nguyen, 2022). In this presentation, we will first conduct a comprehensive analysis of the patient's journey from registration to checkout (I). Next, we will identify areas within the workflow that may have inefficiencies, redundancies, or bottlenecks (II). We will then highlight three specific areas that could benefit from optimization (III). Finally, we will describe these areas, explaining why optimization is necessary and how it can lead to improved patient care and operational efficiency (IV).

I. Comprehensive analysis of patient journey

The flowchart, the subject of our analysis, illustrates the patient's experience (inpatient to outpatient) at a primary care clinic and emphasizes the impact of technology on healthcare. Services highlighted here are registration, clinical assessment, laboratory, imaging, pharmacy, checkout, and billing. These are managed by numerous staff. Those highlighted here are: front desk receptionist, nurse manager, nurse, medical staff coordinator, Laboratory manager, Transport staff, phlebotomist, radiology front-of-desk staff, Radiology nurse, radiologist, doctor, pathologist, pharmacist, checkout receptionist, and accounting. These healthcare information systems include EHRs, Hospital Information Systems (HIS), Bed management systems, Clinical Decision Support Systems, Radiology Information Systems, Laboratory Information Systems, Sample Room Management Systems, and Pharmacy Management Systems. The workforce can access three medical software applications: Epic Systems, OsiriX, and TigerConnect.

Through this flowchart, it appears that this hospital operates in the following way:

- Patients here are separated into three groups: former patients who log in themselves (online). Two are old patients who register at the hospital, and three are new patients who register there. When the first group enters the hospital, they immediately move to the waiting room, take a seat, and wait for staff to attend to them. When a patient in the second category arrives at the hospital, he stops at the registration desk, and the staffer must know his name and DOB to ensure he is in the system. Once approved, registration personnel will sign in (date and time of arrival) through the Hospital Information System. The patient then takes a seat in the waiting room. Moreover, the third patient, also a first-come-first-served patient, goes to the registration counter upon arrival at the hospital. The registrar asks him his name and date of birth. If registration staff discovers the patient is not in the system, then they enter the patient's data into the EHRs via the Epic Systems app.
- After this, the receptionist solicits the patient's insurance. He explains the hospital's policy for pocket billing care to the patient if that one does not have insurance. If the patient refuses to conform to that policy, he is discharged from the hospital. Once the patient consents, he logs the patient into the Hospital Information Systems, then the patient takes a seat in the waiting room. If

the patient is insured, the registration agent checks the patient in, then the patient goes to the waiting room and takes a seat.

- After the patient has been brought to the waiting room, the nurse manager validates the availability of a Nurse for triage within the Nursing Scheduling Systems. Unless a nurse is present, the patient sits in the reception room, waiting until she is ready. If the nurse is available, she will call the patient, and both will go to the triage room. The nurse records the patient's weight, height, temperature, and blood pressure in the EHR. She also asks the patient about his medical and medication history and adds it to the EHRs.
- After recording that information, the nurse calls the bed management staff to check if an examination room is available. The bed manager checks the availability of an examination room through the Bed management system. If an examination room is unavailable, the patient returns to the waiting room. If available, transport staff transport the patient to the examination room.
- Once the patient is inside the examination room, the medical staff coordinator checks the doctor's availability using the TigerConnect application, which this hospital uses to see scheduled staff. If the doctor is unavailable, the patient waits in the examination room until the doctor is available. When available, the doctor reviews the patient's information, medical history, and complaints in EHRs, then comes to see the patient. The doctor examines the patient from head to toe, notes the patient's complaints, and records them in the EHR. He utilizes clinical decision support systems to determine if patients require imaging and laboratory tests.
- If the patient does not need to perform X-rays and labs, and does not need medication and follow-up, the doctor uses the clinical decision support to address some specific recommendations, then the patient goes to checkout.
- When a patient needs an X-ray, the Doctor opens the radiology information systems and requests X-rays. The transportation team then brings the patient to the radiology unit. When a patient comes into the radiology office, the front desk staff asks for their name and DOB to check whether they are in the system. The radiology receptionist enters the Bed Management system to check for an X-ray room. The patient should sit in the waiting room when the X-ray room is unavailable. Both go to the X-ray room when the X-ray room is available, and the radiologist nurse is available too.

The nurse asks for the patient's name and DOB and then performs an X-ray. The radiologist uses the OsiriX app to review images. Then, he inserts X-ray results into the EHRs.

- If the patient must run labs, the doctor opens the lab information systems and requests labs. The transport staff takes the patient to the lab. The laboratory manager opens the Sample Room system and double-checks if a sample room is available. If no sample room is available, the patient waits in the waiting room until we call him. When a sample room is available, the phlebotomist calls the patient and obtains his name and DOB before collecting blood. When the phlebotomist has gathered the patient's blood, the pathologist examines it and enters the results into the EHRs.

- After the tests, the Doctor opens the patient's EHR and sees the lab and X-ray results. He quickly uses the Clinical Decision-Support systems to determine if the patient requires medication and follow-up. If the patient needs medication, the doctor uses clinical decision support systems to enhance treatment decisions and provide specific patient recommendations. Then, he opens the Pharmacy Management System and prescribes medications to the patient. If the patient needs follow-up, the Doctor opens the Hospital Information System and orders a follow-up appointment. Then, the patient goes to the pharmacy.

-Arriving at the pharmacy, the pharmacist opens the Pharmacy Management Systems, then asks the patient's name and DOB to verify the prescription. The pharmacist gives prescribed medications to the patient. Then the patient goes to the checkout.

- At the checkout service, the receptionist efficiently asks for the patient's name and DOB at the checkout service. The receptionist then opens the Hospital Information System and, if needed, schedules the next appointment according to the patient's preferences. She processes the patient's checkout in the Hospital Information System. Finally, the patient goes to the billing service.

- At the billing service, the accountant opens the Hospital Information System and generates the patient's bills. The patient then pays his bill and leaves the primary care clinic.

II. Workflow Inefficiencies, Redundancies, Bottlenecks

Workflow can encounter various issues that lead to wasted time and poor hospital outcomes. Among these problems are inefficiency (a), redundancies (b), and bottlenecks (c).

a. Inefficiency

Workflow inefficiency is the consumption of time, money, or energy in a process. It is a waste, a mistake, and a failure. It also means that the labor involved in achieving the goal is poorly designed or structured and could be improved. Inefficiencies can occur in various places during the patient care process: before and during the visit, during check-in, during the visit, and after the visit. Impaired communication, obsolete technology, redundant process steps, ambiguous roles, delays from bottlenecks, lack of training, and hierarchical work arrangements can cause such issues. Workflow inefficiencies can include repetitive delays, high errors, long cycles, duplicate tasks, overutilization of resources, and employee discontent (Workflow inefficiencies, n.d.).

The flowchart reveals inefficiencies in registration (most notably in verifying a patient's insurance). Collecting patients' names, dates of birth, addresses, and telephone numbers will be a waste of time if the registration team later learns that the patient has no medical insurance or does not agree to the hospital's payment terms. In these instances, the patient quits the process and leaves the hospital, wasting time that could have been better. The staff at registration would need to move the conversation up to include insurance options, hospital payment terms, and procedures before gathering general information on patients.

We have identified another inefficiency in the clinical assessment service. Once the triage is completed, the nurse must call the bed manager to ensure an available examination room. This takes a significant time because the nurse must call and wait for the Bed Manager to respond. It would be quicker and easier for the nurse to verify whether an examination room is open via the bed management system.

Finally, we also discovered inefficiencies in the checkout and billing areas. In this hospital, the checkout is separate from the billing area, and the patient must check out before going to the billing area. However, by combining these two domains, which share the same health information system, notably the Hospital Information System, we are saving the patient time and improving our process, making it a better and more efficient hospital.

b. Redundancies

Workflow redundancy occurs when a process or task is executed multiple times. Repetitive steps in a business process waste time and resources, which can be eliminated by removing redundant steps. Redundancies produce waste, waste time, and lead to low performance. Redundancy occurs when more than one individual or group does the same job, leading to unnecessary duplicative processes (Tay & Signh, 2021). These redundancies can wreak havoc on workflows, decrease productivity, and waste time and money. Examining a workflow allows us to identify duplicate tasks and decide what can be blended to minimize duplication (What Is Redundancy in the Workplace, n.d.).

This flowchart demonstrates potential redundant work items within the clinical assessment service (mainly when the nurse arrives with the patient during triage). When patients walk in, the nurse does not ask for their name or date of birth. Instead, the nurse writes down the patient's vital signs. Failure to confirm the patient's identity could lead to medical errors and bewilderment. Multiple patients, for example, might share the same surname and end up misdiagnosed or mistreated. The nurse must redo the evaluation whenever something does not work out, wasting staff and patients' time and effort.

We have also noticed some redundancy within the clinical assessment service. Prior to entering the examination room, the doctor reviews the patient's electronic health record (EHR). Then, once with the patient, he consults the EHR again. This redundant use of the same application may represent a potential waste of time, particularly when the patient is present. However, it underscores the pressing need to enhance processes and minimize unnecessary time expenditure.

c. Bottlenecks

A bottleneck is a congestion in the flow that arises when input overwhelms the processing power. This results in stretched resources, delayed further action, and can slow or even halt the entire process. Bottlenecks are short- or long-term, depending on the capacity of each step in a workflow and the amount of input it receives (Churchill, 2023).

The organizational chart shows that clinical staff are facing significant bottlenecks. Some decisions have also raised questions about their effectiveness. Here, patients may have to wait a long time for a consultation because nursing staff are not always available. The same goes for

infrastructure and equipment (triage rooms, examination rooms, x-ray rooms, and sample collection rooms), which are not easily accessible.

III. Optimization Areas

In flowcharts, optimization is a step or set of steps that determines and executes the most efficient means of accomplishing a task, typically by examining variables and constraints to identify an optimal outcome within the given parameters (e.g., a decision point at which the flowchart selects the best route based on calculations or criteria). Workflow Optimization means using techniques and strategies to streamline an organization's administrative, industrial, and other processes. Effortful workflow optimization will minimize costs, error rates, and the time required to complete work (Weller, 2021). In our flowchart, we have identified three services that need optimization. It is the registration service (a), the clinical assessment service (b), and the billing service (c).

a. Registration service

This is the first service most patients go to upon arrival at the hospital. Administrative procedures (registration, check-in, and insurance verification) are mostly done here.

b. Clinical assessment service

This is where examination and treatment are mostly provided.

c. Billing service

Covers everything relating to payments, invoicing, and debts. In the next section, we will carefully review each of these services.

IV. Necessity of Optimization

We will discuss the necessity of optimization in three services, notably registration service (a), clinical assessment service (b), and billing service (c).

a. Registration service

Patient registration is the process of gathering and archiving patients' demographic, financial, and medical information when they first request health care at a medical facility. Providers, insurance companies, and billers use this information to bill and reimburse

patients accurately and efficiently. The reception area is often the first place a patient meets the clinic. They do this by signing patient registration forms, insurance papers, consent forms, and financial responsibility agreements (Patient Registration, n.d.). Optimizing the patient registration process involves the deliberate registration and onboarding of patients in a healthcare system. This workflow upgrade aims to automate and optimize patient registration from data collection to check-in. The objective is to develop a faster, simpler, no-hitch process that focuses on speed, simplicity, and smooth operation (Collins, 2022).

In this flowchart, we have identified inefficiencies in the registration service that lead to wasted time. Therefore, it is necessary to redesign this flowchart to allow registration staff to handle insurance and payment policies before collecting general patient information. Insurance verification is essential, so we urge the hospital to implement more robust electronic verification to ensure that patients and registration staff are as fully informed as possible about patients' insurance status. Electronic methods for assessing patients' insurance coverage can ensure greater accuracy and eliminate manual verification (Tay & Signh, 2021).

During our analysis of this chart, we noticed that some patients check in online before coming to the hospital, suggesting that the hospital has an online check-in system. However, this application is currently only available to former patients. We recommend improving the application so that new patients can also register online. Automated online patient registration will enable patients to provide more information and better understand the payment policy. The goal is to lighten the task, use time rationally, avoid wasting time, reduce manual data entry, and avoid errors (Putty, 2024).

b. Clinical assessment service

Clinical Assessment Service is an intermediate service designed to provide a higher level of clinical expertise in patient assessments than what is typically expected from a referring clinician. This specialized expertise ensures that patients are efficiently and effectively directed to the most suitable onward care pathway. The service's functionality enables providers to review referrals, treat patients, and refer them to additional services if necessary (Clinical Assessment Services and the NHS e-Referral Service, 2023). Optimization is the key to clinical assessment services because it ensures accurate, timely, and efficient patient care. There are a few reasons we should want to make these services more efficient: for one, it improves patients' and employees'

lives. By streamlining processes and leveraging resources, optimization minimizes wait times. It also makes diagnoses more accurate. Optimization helps fill this gap as the demand for clinical evaluation services rises. It reduces costs and redundancies while increasing productivity (Clinical Assessment Services and the NHS e-Referral Service, 2023).

The clinical assessment service was found to have many inefficiencies, redundant tasks, and bottlenecks. For example, nurses waste time calling the bed manager to ask whether examination rooms are available. To resolve this issue, we propose training all nurses at this hospital for continuous practice and providing them with a way to navigate the bed management system and independently check room availability. This step is a complete waste of time and needs to be removed from the flowchart.

We also discovered potential redundancy in the triage process, mainly because nurses do not consistently ask patients for their names and birth dates. This neglect is prone to inconsistency and medical misjudgment, leading to clinical failure and wasted time, money, and effort. It is therefore important to include this step in the flowchart and ensure that all employees follow it consistently.

Additionally, we observed that the doctor had unjustifiably double-entered EHRs for the same patient, another source of time wastage. We propose adjusting the flowchart to prevent unnecessary duplication of actions and, in doing so, save time.

The flowchart we are currently studying suggests the hospital may need to address a shortage of nurses, supplies, and facilities. These shortcomings can lead to longer wait times between departments, longer wait times overall, and reduced patient satisfaction. Also, it helps to explain why scheduling may be challenging. We recommend improving the staff scheduling system, recruiting sufficient employees, and implementing infrastructure and dedicated equipment to overcome these concerns. With patient satisfaction a prime consideration, the hospital should use patient engagement technologies such as portals and mobile apps to enhance patient satisfaction and health outcomes. Additionally, staff should be expected to perform to the best of their ability to improve morale, reduce burnout, and enhance the quality of care (Laoyan, 2024).

a. Billing service

Hospital billing services are the processes of managing and processing hospital patient billing and insurance claims. Here, systems print out hospital-ordered bills and send them to patients and their insurance companies. Invoices include inpatient and outpatient care, diagnosis, and treatment. Software automates the revenue stream from claim generation and coding to payment to payers (Bhatnagar, n.d.). By efficiently using hospital billing services, healthcare companies can streamline the revenue cycle, reduce costs, and enhance patient satisfaction, improving the bottom line and competitiveness (Gupta, 2024).

The flowchart shows that checkout and billing are separate now. However, the two fields might be merged into a single workflow. Treating them as discrete components squanders time and resources. Therefore, a complete restructuring of the entire process must be considered. In addition, they should add more billing functionality. Simplifying the billing process might reduce human errors and improve efficiency. To do this, the hospital should investigate establishing an Online Payment Portal where patients can pay their bills. Such an arrangement would replace paper statements and reduce manual payments (Luther, 2023).

Conclusion

This task required developing a flowchart to fully represent the patient experience from registration through checkout. This led to the discovery of three services (registration, clinical assessment, and billing) where inefficiencies, redundancies, and bottlenecks emerged. Next, we outlined these three services and discussed how to use them most effectively to improve patient care and business efficiency. In sum, it has helped to broaden our understanding of healthcare optimization. We also figured out how healthcare workers use information systems and how information systems impact hospital workflow. As wannabe health information managers, we hope our knowledge will be a big boon to our hospital structures.

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