

MAMMOGRAM **CASE STUDY**

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Q1. What matters to the patient in the process at a radiology department?

The flow time and patient's waiting time to get the tests done are two most important factors for the patient in the process at the radiology department. As per the case, the below instances led to delay in the process.

- **Missing Navigation Signs**

The patients have difficulty in finding different areas in the hospital. One of the instances where a patient overheard the conversation of another patient who was looking for a registration desk. To save time, proper guidance or appropriate sign boards should be placed in hospital.

- **Duplication of Work**

The paperwork was done and checked multiple times. As per the guidelines, a patient needed to appear 30 mins before the test to complete the formalities. But this time was increased due to duplicate paperwork and multiple verification of information. Certain patients did not have an appointment or had incomplete forms.

- **Parking Spot unavailability**

The parking system was not organized, and patients had trouble finding a parking spot which led to unnecessary time consumption.

- **Wait Time**

The wait time is very high compared to the time taken for the actual process. One of the patients, Nancy's wait time was 2 hours out of which the screening process was for 15 minutes.

This is because of multiple delays which can be avoided.

- **Quick Results**

The results are delivered after some time only and the patient has to wait there because in case of an abnormal mammogram, a patient needs to get other imaging for further treatment.

Q2. What would the doctor's perspective be on the process? What does a radiologist do during the day?

Doctor's Perspective

The doctor's perspective can be summarized in the following points and the evidence can be obtained from Dr. Valerie's report. Overall, the doctors found the complete process to be highly mismanaged which led to workload to their schedule.

- **Additional Assistance**

The extra load on the doctors can be reduced if they could get additional help that could handle the various other tasks that the doctor needs to do apart from his regular duties.

- **Technical Issues**

Doctor's time was consumed due to multiple technical issues like longer time for image transfer to doctor's system. No proper training given for any software upgraded in the hospital. This led to delay as the staff is not familiar with the software.

- **Coordination with Technologist**

For any issue with the doctor needs help from a technologist who is well trained in software, then the doctor must wait for approximately 2 minutes. This was due to overutilization of technologists that was caused by poor software and device bandwidth being low.

- **Lack of housekeeping services**

The doctors had to help in tasks like changing lines multiple times in a day. This wasted a doctor's time and effort. It was almost 15 times a day with approximately 3 minutes every time.

Tasks of Radiologist in a day

Radiologist works 10 hours a day and 4 days per week. The timing of the radiologist is 7:00 AM-5:00 PM.

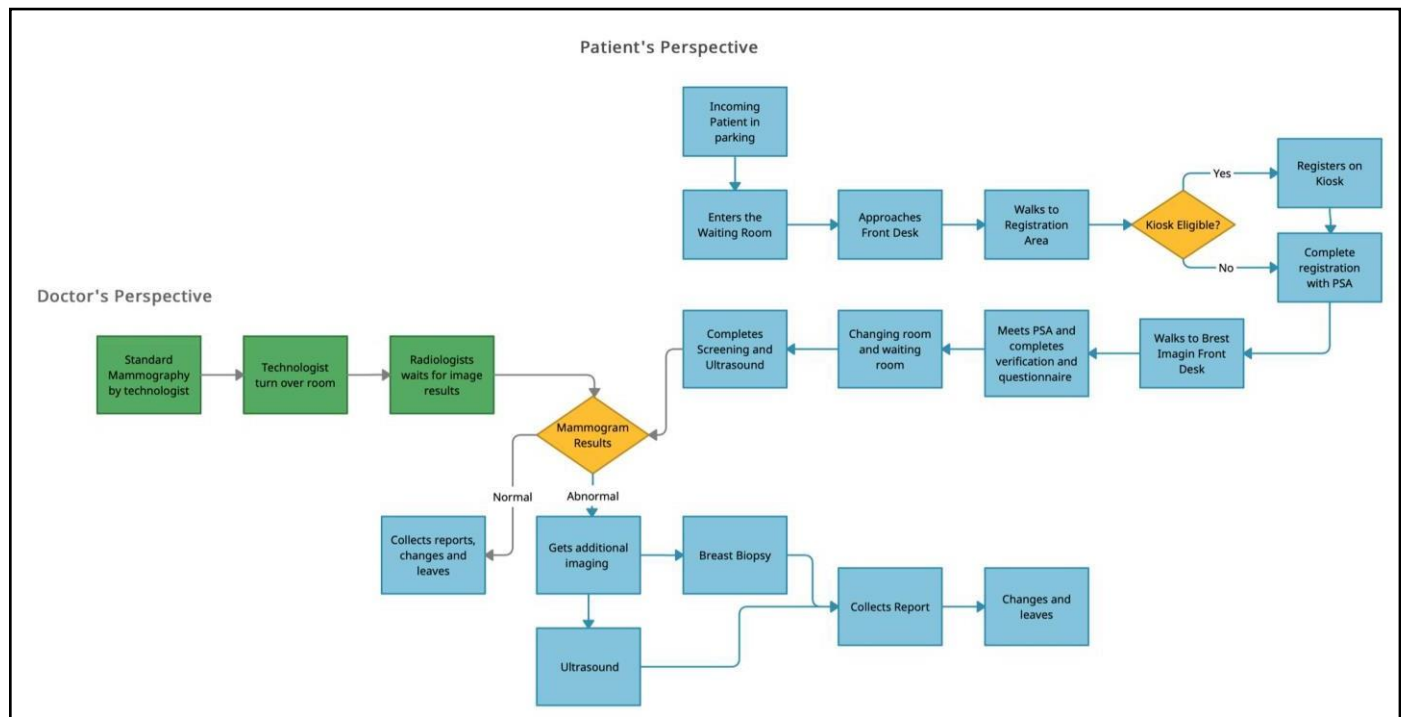
There are majorly 3 types of activities performed by radiologists and at a time only 2 radiologist works out of 7.

1. Non-Problematic Cases: Identifying normal cases out of x-ray images received
2. Problematic Cases: Special mammography required
3. Handling Procedures: Performing pathological study on cases where no conclusive diagnosis was done

Cases	Cases per day	Time per case	Total time
Non-problematic	70	3	210 mins
Problematic	15	8	120 mins
Handling procedures	6/7	40	240-280 mins

Additional work performed by radiologists were performing certain housekeeping duties and completing scheduled studies and procedures for the day.

Q3. Use the process-based view to combine the patient perspective with the doctor's perspective. Draw a process flow diagram. It is a worker paced process with two aspects (patient's journey and doctor's tasks).



Q4. Discuss the trade-off between customer utility and system efficiency.

Customer utility is the advantage or value that customers receive in exchange for purchasing or using certain services. It is mostly determined by how long they must wait for their findings or how quickly they can receive them.

The case study demonstrates various instances where there is a conflict between utility and efficiency, and where there is a possibility to increase the system's efficiency. Some key aspects from the case are:

- Radiologists at PAH have a habit of booking a slew of additional tests and procedures on the same day. This leads to a lot of variation. Although this benefits patients by allowing them to obtain care on the same day and avoiding the need to return at a later date when necessary, it also increases the likelihood of the system becoming more inefficient. The majority of the radiology clinic's employees are already working at full capacity and aren't

even taking their mandated hour lunch break. As a result, the system is unable to cope with the effects of variability.

- Information Collection – Once the patient's records were checked at the registration center, that information should be shared across everyone concerned at the center. Also, if any information was missing, the patient should be able to add it by their own at the kiosk to make it electronically available to whomever might need it.
- Patient Services Associates (PSA) are also working lengthy hours, implying that they are overworked, according to the case. As a result, they make frequent errors, such as failing to notice missing information in the patient's medical record, which wastes the radiologist's time.
- We can assume that these customer service issues are similar to usual customer service problems because specific information about the causes of human errors is not provided. Unfortunately, this type of employment is both time consuming and monotonous. Human error allows for mistakes or incomplete information to travel through the system, resulting in an error that must be repaired at the earliest possible opportunity. As a result, PSAs should be trained to provide outstanding customer service from the start.
- Clear navigation could help reduce a lot of time that was wasted in finding the right room.
- The findings of mammography or other tests are occasionally presented to patients the same day (15 minutes per instance) after the radiologist has finished assessing the results. This method is growing in popularity as more patients choose PAH over other institutions for this reason: it decreases possible "worry" for patients by offering virtually instant outcomes and humanizes therapeutic work. By putting a face to an x-ray, it aids in the development of a strong relationship between doctors and patients, although the radiologist's valuable time may have been better spent evaluating images. According to evidence from numerous research, a highly efficient, mechanical system creates a new set of issues, such as boredom and a lack of sensitivity.

Q5. Identify areas of waste in the process

- **Delay in arrival time**
Nancy arrives late for her appointment because of traffic, and she also had trouble finding the parking. The time taken for her to reach from the main entrance of the hospital to the front desk in the radiology registration area is **10 minutes**.

- **Kiosk-ineligible**

A patient may become kiosk-ineligible due to missing demographic information, insurance, or prescription. In Nancy's case it was because of the missing demographic information. This resulted in additional **10 minutes** to complete her check-in at one of the four check-in stations. Also, sometimes there would be a wait time for the registration due to the pile of patients who are kiosk-ineligible.

- **Unclear Navigation signs**

Due to unclear navigation signs, many patients go to the Breast Imaging Center directly without going to radiology registration first. This causes wastage of time and the overall process time for the patient increases.

- **Redundant patient information**

Patients are asked to fill out the patient history questionnaire again which leads to gathering of redundant information and hence an unnecessary waste of time. This approximately takes **5 minutes**.

- **Missing Prescriptions**

The general registration area failed to identify the missing prescription of one of the patients and the patient was sent to the Breast Imaging Center front desk by mistake. This resulted in the patient waiting time for the prescription to arrive.

- **Additional appointments scheduled**

Many additional appointments were scheduled on the same day. This resulted in patient wait time at the Breast Imaging Center. Nancy had to wait **20 minutes** for her procedure to get started.

- **Bandwidth challenges**

In 25% of the cases, the transfer of the images to the workstation was slow. This resulted in an additional **30 seconds** per case.

- **IT issues**

There were as many as 70 images in a file which resulted in congestion on the internal network. For another 25% of the cases, **30 seconds** were lost per case due to the recent installation of a new software system with which the radiologists were not comfortable to use.

- **Poor report writing software**

The report writing software was poorly designed leading to consumption of additional **1 minute** per case.

- **Poor coordination with staff**

The technologists were highly utilized. Because of this Valerie found it difficult to get her questions answered from them. This happened in 15 cases per day and there was a delay of about **2 minutes per case**, resulting in a delay of **30 minutes per day**.

- **Room turnover time**

For 15 times a day, the skilled radiologists had to change the linens and perform other housekeeping services to keep the patients moving. This took about **3 minutes per case**.

- **Delay in additional procedures**

When the images were not sufficient to come to a diagnostic conclusion, additional procedures had to be performed. These were around 6 to 7 per day. These procedures required around 40 minutes per case. Out of the 40 minutes, **20 minutes** were wasted in filling out the consent forms (3 minutes/case), pathology paperwork preparation (4 minutes), equipment preparation and searching for supplies (8 minutes) and the time taken to walk from reading room to procedure room (5 minutes). All these were time being wasted.

Q6. Identify opportunities and recommend improvement.

With respect to the areas of waste identified in Q5, below recommendations are given to improve the overall process:

- **Delay in arrival time**

Patients should be instructed to arrive on time and maybe the arrival time could be changed from 30 minutes to 45 minutes to make up for the time lost in traffic and the information regarding the parking should be provided beforehand during the appointment booking.

- **Kiosk-ineligible**

Should make sure that all the patients are kiosk-eligible to avoid the extra time spent for registration at the hospital. Patients should have an option to provide their demographic information, insurance etc. through an online portal.

- **Unclear Navigation signs**

Clear instructions should be provided on the steps that need to be taken before reaching the Breast Imaging Center to the patients after the appointment is made. These instructions could be posted on their online account. Maybe a map of the hospital could help patients in identifying the areas. Also, clear, and simple navigation signs should be shown at the hospital entrance to prevent patients from roaming in the hospital looking for signs.

- **Redundant patient information**

The patient information should be linked across all the hospital systems to avoid redundant storing of data, or the information provided at the first registration could be printed out and handed over to the patient to show at the next PSA station.

- **Missing Prescriptions**

Prescriptions should be received from the referring doctor prior to the appointment.

- **Additional appointments scheduled**

The scheduling of appointments should be better managed to avoid wait time of the patients at the hospital. Nancy had to wait for 20 minutes in the waiting area to get started with her procedure. The hospital should come up with the numbers that it could handle per day.

- **Bandwidth challenges**

The hospital should consider upgrading their network infrastructure so that the images are transferred faster over the network.

- **IT issues**

A proper training should be provided to the radiologists for the usage of the new software system. This could be a short-term recommendation.

- **Poor report writing software**

The report writing software could be upgraded to avoid the extra time of 1 minute. This could be a long-term recommendation.

- **Poor coordination with staff**

The hospital should make sure that there is no technologist burnout by hiring additional staff and working more on the schedule. This would give them time to coordinate better with the radiologists and avoid the 2-minute time spent per case.

- **Room turnover time**

The hospital should hire individuals to take care of the room turnover so that the highly skilled radiologists and technologists do not spend their time on turnover, rather they could spend their time on more important tasks.

- **Delay in additional procedures**

The 20 hours of time spent on other activities could be minimized by having the patients fill out the consent forms prior to the procedure.

- **Additional room utilization**

As the additional room can accommodate the third ultrasound machine and could reduce the patient wait time, the hospital should consider doing this for the long term, although it costs \$0.7 million per room.