2 – The Investigation

Contents

2.1 Investigation into The Current System at Euxton Hall

2.11 Selecting the Methods Of Investigation

Methods of Investigation	Justification
Interview 1- Richard Priestly Head of Medical records	This is my boss who manages all the staff in the department and informs us of any major changes that occur to the current system. Because of his position and many years present within the company Mr Priestly is quite high up within the staff hierarchy and is definitely a key stakeholder. So he should have quite an informative insight of the system that is beyond my knowledge. Having an interview will allow for a more accurate description with the current system problems. For my questions to Richard, I will try and find new information that I currently don't know and try and ask for any expert advice he has from his 30 plus years with the department. I chose to use this method first as he is definitely the person with the most experience and will give me a clear description from the interview, also any comments he makes I can follow through on from my other methods of investigation and validate them.
Interview 2 – Suzanne Tomkins Bank Staff	As Mrs Tomkins is my mother and has worked there every evening for the past half a decade she is clearly another suitable candidate to be interviewed. She has the task of filing away notes in the evening and occasionally archive them away. The reason to do two interviews is because while Richard still currently does similar tasks to Suzanne, he will formally present his opinions to me when being interviewed and will be unlikely to show mostly negative views of it. Whereas I know for certain that Mrs Tomkins does not hold the system currently in high regard in any way. By having opposing comments of the system it will allow me to possess a wide range of feelings towards the system and could allow me to focus on both the good and bad aspects from it. This would be to include the positive parts and adapt the negative ones. Due to my closeness with Suzanne, the ability to ask follow-up questions will be an easy benefit to interview her.
Observation 1- Monday18/03/19	As I work for Ramsay there is no issue for me to observe my workplace and as I work in medical records it will be easy to observe the current system. I intend to go through the department and will: photograph, watch how other members of staff deal with the task of using the system. When I go around the department I will look for both good and bad aspects but will mainly focus on the features think highlight the inefficiency of the department. This could help me find additional reasons why the current system needs to be overhauled. An observation will be useful for a method of investigation as it will allow me to get a feeling how data flows around the hospital and allows me to see from first-hand experience the systems operation, by shadowing other staff it will give me experience other than my own to how the system is followed.
Observation 2- Saturday 23/03/19	Occasionally staff are allowed to work on Saturday mornings to archive files away if there is no time to do it during the week. This Saturday I will go to Ramsay to do some more observation, if I'm allowed. I have decided to do more observation as during the week demand for filing varies a lot. At the start of a week it may be very quiet while during the weekend medical records could be full of files. I will see if the files on the weekend are full or not but during this time it will allow me to observe how much the system is used during off peak times. While I do have an idea how this observation will go, I intend not to prejudge the system during this time.

Document Analysis 1- Consent form	Document inspection is another method of investigation I intend to use. As the proposed system is centred around data management, I will need copies of notes, referrals and booking information. To accurately implement them onto the system I will need a reference point which will represent the actual document in the finished system. So by seeing how a patient would fill in a document to book an appointment it would allow me to see what objectives I need to include for booking as this is an area I have the least knowledge in. I think the first type of document to inspect is a consent form as I know every patient has to have signed one whenever they go in for an operation. Because of this, it should be a good starting point.
Document Analysis 2 – Letter to patient	As the system currently has many different types of notes and forms, I feel it is important to collect a wide range of these documents as it will have a more accurate representation of how data will be presented in reality. While having every type of document is an impractical solution, a broad range will be beneficial. However as GDPR prohibits me from revealing any information about patient findings and details I will have to be careful of what documents I comment on and scan images from. I think a letter to the patient would be useful to include as I work in medical records I mostly see doctors notes and hardly see things the patient would receive. So by having documentation for a patient it would allow me to see both sides of user documents.
Document Analysis 3 – Doctors notes	This will be the hardest documentation to actually record and get hold of, while I can access these notes during my shifts, it will be impossible for me to take outside of the hospital so I may have to just verbally describe what these notes look like. These are important notes to get a copy from as they are what mostly make up a patients file and what I see the most when working.
Questionnaire – Google forms	To include all four methods of investigations the last thing I will do to investigate the system is to use a questionnaire. This will be primarily aimed towards staff in both the medical record and medical secretary departments. However, it should be open to all staff at Euxton. I will ask questions regarding the system similar to the ones I had in the interview but will have limited written answers for the questions.

2.12 Interviews with key staff at Euxton

Interviews – Richard Priestly

Interview: Mr Richard Priestly

Currently I have managed to get an interview from my boss Mr Richard Priestly, the head of medical records, to discuss the current system. As the time I have to interview him will be short, I will have to ask my questions in a way that won't result in information being left out. As I currently do know quite a bit of how the current system works from my time working there I have chosen my questions carefully so that every new question I ask brings the conversation more towards the idea of replacing the physical system with a digital one. To add to this I will not ask him questions that I already know like how documents are stored. I will prepare follow up questions to the main ones, if I have time and if I may need more information from the previous question. As Mr Priestly is my boss I will have to present myself in a formal manner.

To prepare myself beforehand I have written some questions I intend on asking to Richard:

- What are your thoughts on the current system?
- ~~What processes does the current system provide outside the storing of patient information?~~
- Regarding security of documentation how efficient do you believe this department is in preventing security breaches? how does GDPR affect working with the system?
- What are the overarching issues plaguing the system currently? outside the idea of notes being physical copies?
- ~~What aspects of the system currently In place do you believe to be critical in making sure normal operations are kept, where if any changes where to be made, would those features would be kept?~~
- How would you feel if a new system was to be introduced here at the hospital?
- How do you think the department will be affected by digitalisation of patient notes?

Interviewer's name: James Nurdin
Interviewee's: Mr Richard Priestly

As Mr Priestly was leaving when I arrived to Euxton I didn't have long to ask him questions, therefore, unlike Mrs Tomkins I was unable to ask many follow up questions at all. The questions I didn't get the chance to ask I have crossed out. However the questions he did answer really helped me in understanding the system. From the interview I have found information on:

- **Thoughts on the current system**
- **Security on the system**
- **Major problems on the system**
- **Thoughts on improving the system**
- **General response to proposed idea**

From finishing my discussion with Richard here are the comments he has made

What are your thoughts on the current system with respect to the file management?

> Well, it's an essential reason why the hospital is still running. I couldn't see Euxton last a day without what we do in medical records. However, the only downside of it is that it depends on the staff who use it. A few years ago we had staff here who let the department become the worst we have ever seen in years. To be honest it's not great on other sites either. I was requested over to a certain hospital a few months ago and was told to get the system up to scratch but the way they filed documents was by patient number rather than surname. It was horrendous, they were better off starting from the beginning and closing down the department for a week to get the files in a usable state.

Regarding security of documentation how efficient do you believe this department is in preventing security breaches? how does GDPR affect working with the system?

Right, the first thing I want to make clear is that we have very high security at Euxton and very strict safeguarding procedures in place to make sure documents are not stolen. For instance, the staff ID cards that allow you into the room and the cameras outside every room. As you know every few months we have safeguard training exercises to make sure us staff don't disclose patient information somewhere they shouldn't. However, sometimes things do slip out, so we do try our best and make sure that situations like that hardly occur.

Is there anything like physical security to make sure patients notes aren't stolen?

Like I've said we do use cameras on site to make sure if an emergency occurs where we may have a break in, we can use it to identify the subject, but we have much more than that. We use the key cards where we have every room fit with a scanner with a list of authorised staff. For instance, nurses won't be able to get into the medical records rooms while you wouldn't be able to get a look at the nurse's stations. We also do use the old standard method of lock and keys so if someone was to try and get in with the key card outside working hours they would have to unlock the door as well. However we do not keep all the keys together, as you could imagine.

What are the overarching issues plaguing the system currently?

Definitely the limitations would be the fact that notes are paper based but that is just the start of it. From that many more problems come up. The one you will know best is that notes are continuously being lost. It's a very serious issue as patients with no notes either have to wait for their notes to be found or we have to get the patient to sign all new documents if they want to go into theatre. Other issues are like the actual cost to file notes. It's very demanding on the hospitals budget as to keep on staff every night to just put away notes is rather expensive.

How would you feel if a new system was to be introduced here at the hospital?

Well before you started working at Euxton we did consider virtualising the system where notes would be a digital version of the paper files but the idea was scraped early on, as the hospital did not have enough money to fund it. I mean we are beginning to see how inefficient a system from the mid 90's is showing today but how demanding the hospital is recently we would only consider the idea to be honest.

How do you think the department will be affected by digitalisation of patient notes?

I would think the staff here would welcome the idea. I know I would in their position. I mean the first few months would be tough, sure, but any cross-over from a system this big would be. I have talked around the department suggesting this now for the past few years. The responses do seem positive overall, however, I know that the actual role of scanning would become boring very fast so I would have to wait and see about that job and who would do it.

<u>Key Findings</u>

I feel the information Richard told me, while short, has given me a lot to dissect now and has given me a slightly wider view of the system. While the interview didn't take as long as I wanted, I think with the questions I asked I got some relevant information.

- **Some departments at other hospitals use the system very poorly and are in a much worse situation than Euxton**
- **Security and data security at Euxton are a top priority with good safeguarding procedures in place**
- **Use both physical and digital security measures**
- **Main overall problem is that notes being lost is a serious issue, expensive to keep staff filing constantly**
- **The idea of a digital filing system was already being talked about years ago**
- **Staff are welcome to proposed idea**

Interviews – Suzanne Tomkins

Interview: Mrs Suzanne Tomkins

As Mrs Tomkins is my mother I don't intend to see a time limit with this interview, however, as I don't intend to spend hours on the matter, I will let Mrs Tomkins explain at her own pace but try to keep the interview going. As we have an informal relationship I think that this will help Suzanne bring across her feeling towards the system, however, I do expect to bring over some formality to allow my questions to be serious. As she is not advanced when it comes to technology I will adjust my questions to her accordingly.
To prepare myself beforehand I have written some questions I intend on asking to Richard:

- What do you think about the current method of filing notes and keeping track of their location?
- Can you describe to me what actual information you keep on in the notes at Ramsay?
- What processes does the current system provide that are you aware of?
- What are your thoughts on the security of documents and how the new GDPR affects them?
- What features of the current method of filing notes do you feel like is important?
- What are the major problems of the current system?
- What are your thoughts on moving physical notes to digital copies for the Hospital?

Interviewer's name: James Nurdin
Interviewee's name: Mrs Suzanne Tomkins

From the interview, I had found information on:

- **How they think about the system**
- **The staff do not follow instructions sometimes**
- **What they do in the evening**
- **The data security at Ramsay**
- **Problems they would like to see removed**
- **Thoughts on my proposed solution.**

What are your thoughts on the current method of filing notes and keeping track of their location?

Well don't think it is a very accurate system. The files can get lost very easily. All it takes is for one person not to track the file and it will get lost and you wouldn't be know where to find it.

Accurate, what do you mean by accurate in terms of the system?

You know, inconsistency. When filing, every patient's notes is practically identical besides the printed-out label for them. When you are going through the surname Smith, for example, and you have a John to put away, there is always the chance that you might misplace it by putting it after Julie or somewhere its not meant to be.

From what you previously said, what do you mean by one person not doing their job properly?

Well, all it takes is for one of the Secretaries to not track a file correctly. What I mean by this is that once medical secretaries have handed the file back over to medical records but they did not inform the system that it has happened. if it was to be lost, nobody knows where the file currently is. This happens often.

How often do you reckon that this happens?

Very often, a few times a day maybe? It's now a common occurrence to have a handful of patient's notes be missing, however I mainly focus on filing so I don't really see this. People who have to pull notes struggle now to get every file requested because of this.

What processes does the current system provide that are you aware of?

(*MRS Tomkins was confused by the question I gave her, so I rephrased it)*

What I mean by this is what would you and the employees do on a normal day?

Well like I've said I focus in medical records so I can only really talk about that area. The first thing I do when I arrive is go to the room where all the file are waiting to be put on shelves is to sort the boxes of files out into rooms. So that means I separate surnames A through to H from I to Z as the two groups are both in different rooms. Then I carry the boxes over to the correct room. In reality I shouldn't have to organise the files in the first place. I'm not meat to do that, but now a lot of the time, well nearly all the time now the medical secretaries don't bother putting the files into any order. So I have to put them into alphabetical order to make them easier to put away, or else if you don't you are going from A, then the next one could be I which is in another room altogether which would take ages going backwards and forwards between rooms. Then I spend the night putting them away.

So it is a big issue then at Ramsay staff not following instructions?

Well, I wouldn't say instructions to be honest, it's just etiquette really they don't seem to understand by doing something so simple by ordering files they make our job much less tedious. On the secretary's part it's just laziness, as they have to order them but they just don't do it.

Can you describe to me what actual information you keep at Ramsay?

There is the letter of course that the patient receives inviting them in. There are notes for the doctor requesting that the specialist sees the patient these are the referrals. There are medical questionnaires, so when a patient visits Euxton they have to put down all the information they have.

Okay then, what do you think the most important document is at Ramsay?

Medical questionnaires I assume, as it contains all the information Ramsay need to have before going into any operation. It contains what the conditions needed for that patient to go through with a procedure like medical history and allergies. It is also the first thing any new patient signs when coming to Ramsay.

What are your thoughts on the security of documents and how the new GDPR affects them?

There is really no protection to be honest with you, looking on it, it's really scary how accessible members of staff at medical records can access them. If I were a patient I wouldn't want an entire department having the ability to see my notes. With data protection nothing is really in place

inside the department. I mean of course there are regulations suggesting how you can talk about patient information, with that part you have to be very careful about what you say. But what I'm talking about is where you are putting files away and see a loose sheet there is nothing in place to deal with that. If there is no name that sheet is basically left on the desk for our boss as all sheets are identical it's nearly impossible for the sheet to be returned to that set of notes. Yeah, there's not much in way for data protection.

Are there any special physical security features to protect the files from unauthorised staff?

Well we have the standard burglar alarm that every room has but we have a key-card we wear on site at all times it allows us to get into the building. For most staff who do not work in medical records they won't have access to the department so can't open any doors. We also have a notice to tell all staff to shut the door completely after using it but in the summer it gets unbearably hot, so we have to open the doors to reduce the heat in the room. So anyone can just walk past and help themselves to a file.

What features of the current method of filing notes do you feel like is important?

Definitely filing away accurately for sure, so that other staff like the day staff and any other staff to be honest can actually find the document straight away. Tracking is another, it is very useful when trying to find a document to actually know its last position by showing when the document was used who used it and what was done to it is a very beneficial process in place.

If you were to only choose one which one would that be and why?

Honestly? I couldn't tell you, there are so many important features to the medical department that if one was missing the hospital would fall apart in a matter of days. I truly believe that, I know currently the department itself does filing in a very slow way and that in the process quite a few files are being lost, but currently it's the best we have.

What are the major problems of the current system or things you would like removed?

Files being filed in the wrong place is currently a major issue. As the job depends on your ability to use the alphabet, if one person is to be unable to accurately file away notes it would take months before they were found out. Simply because a file may not be needed for another 6 months or that there are so many staff currently do filing it would be hard to pinpoint the exact individual doing it wrong.

Another problem would be that it is sometimes hard to distinguish surname and forename as a patients file could have the names either way round. Another problem linked to this is foreign names. This really highlights the first point.

How about archiving? Are there any issues with this part of the system?

Definitely, archiving is a nightmare. Because it takes one person to be doing this on a full-time basis because if I'm putting away hundreds and hundreds of files every evening and countless files are being generated from the secretaries. There is never enough shelf space and they constantly need to be archived which isn't feasible because they don't employee someone to archive constantly.

What are your thoughts on moving physical notes to digital copies for the Hospital?

I think it's a great idea definitely. It would certainly welcome the issues of the current paper-based system. They were planning on bringing it to Ramsay when I just started working there but obviously it never took off.

Could you think of any setbacks from the idea of virtual system? do you know why the previous suggestion of virtual copies never came about?

Well it would make me lose my job when the contracted staff are capable of creating the new notes after all the previous patients have their notes added to the system. However I would be certain to say that it would definitely take a few months at the very least.

Also another thing would be that security of the notes and the ability for them to be stolen as they are virtual, when you hear on a daily basis that all of a person's information has been leaked, it's scary to think that could happen to your medical history.

You could say that's already a possibility.

Yeah, that is true but suppose when it's all your information it's definitely worse to know that anyone has access to all your information and could share it with anyone, in a matter of seconds.

How do you think the rest of the department would react to the system?

Very well I would think, I only do this in an evening. Some people have to do this for a full 9 to 5 shift. For them it would be a godsend to be quite honest.

Key Findings

Unlike the interview with Mr Priestly I felt that this interview lasted for a reasonable amount of time because of this I tried to ask questions I asked Richard for consistency but I also threw in some extra questions that Richard may have not wanted to answer. Even though I thought all my questions were suited for Mrs Tomkins, when I interviewed her it seemed as if she was struggling to answer my first few questions. As the interview went on I found that she opened up more. Here are my key findings:

- **Files are frequently lost on a daily basis**
- **Files are hard to be distinguished from each other for patients with similar names**
- **Patients are unlikely to update information if they are discharged, harder to contact them as a result**
- **The method of filing relies on the employee, if staff don't follow what they are meant to do it makes other jobs much harder**
- **Even though the systems in place for data security are high they are hardly followed.**
- **Files are often filed in the wrong place.**
- **The inclusion of a virtual system would mean bank staff would eventually be let go**
- **Most contracted staff would be welcoming to the proposed system**

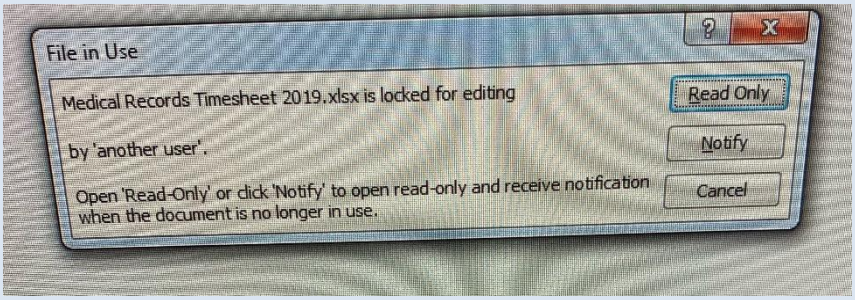
Observation 18/03/19

As I work there most nights from 5pm to 9pm I have recorded my findings for an average day. I have decided to do it by mainly focusing from my perspective as I do everything other members of staff do normally during the day it shouldn't differ if I was to shadow someone else, but I will focus on the area I will end up changing the most on the new system. On the day I arrive most other members of the department including my boss will already have left so I will be pre-told what to do. As I had no need to shadow any member of staff I will be free to focus on problems that were less known to me from working there, despite this I may occasionally pick up on things my other co-workers might do during the shift.

18/03/2019 – Evening shift

17:00PM

When I get to Ramsay most people have left work and it's just me and the other two people who have planned to work tonight. I walk into room 4, the main room in the department, to sign onto a computer. As I don't talk to any employees outside work hours I see the note left on the notice board saying that room 5 where files are kept is full of boxes waiting to be filled away, so we have to do filing this shift. It takes me 20 minutes to login and update the time sheet on Edexcel, this was because it was already opened on another computer it won't let multiple people edit the document. While this happened I logged onto Cosmic the service we use to check for a file's location, as I have also been asked to look out for a missing file for a patient that is about to come to Ramsay for an appointment. While I am filing I had to look out for it



17:20PM

When I get into room 5, I go to the kitchen area where the files have been left for us to put away and see over 50 boxes of files to organise sort and then file correctly. A normal night is usually about 17 but for the past few days no one has been in on an evening, so work for us just stacked up. For the next hour we organise the boxes into somewhat or an order by boxes for rooms 2 (Surnames A to H) and room 5(surnames I to Z) then into alphabetical. It is clear to us we will not do most of them tonight, so we just grab a few boxes each and then carried the boxes to room 2. When we get all the boxes for room 2 we notice that some have files have been left from earlier today by an employee, so I have to file them away before starting my work.

18:30pm
I have now just started to put my files away, I attempt my normal method of approach by initially moving all FAT Files away which removes all the large ones but leaves me with the normal ones which are the majority. I normally then group the regular files for each box into sets related by letter and start at A then finish with H. After each box I determine whether the box they came in is suitable to be reused or if it should be thrown away. On most nights more boxes are disposed of than kept due to them falling apart due to the weight put in them. During the night I cut my fingers on the staples that are used to keep some patients files together. Also I struggle to put some files onto the shelves as they are completely full and do not have the time to archive files. I go back over to room 5 to pick up some more boxes where I see my co-worker having done nearly double what I have done.

20:50PM
The shift is just about to end, we put away the rest of the files back into both kitchens of room 2 and 5 respectively, so we can carry on tomorrow. We then turn off all the lights and sign out of our computers in room 4, unfortunately we did not find the file we were asked to look out for. All the keys for the other rooms are stored in room 4. My experienced co-worker puts in the codes to lock all the other rooms in the department and I lock them manually with the keys. We then meet in room 4 where we say goodnight. As I go to my ride home I see that they walk over to the main reception where they put the key for room 4 away.

Observation 23/03/19

I was lucky enough to get a shift on a Saturday, because of this I chose to do another observation as it allowed me to get a better understanding to how the system runs during off peak times at Euxton. While the Hospital never stops, it's different during the weekend when no medical administrative staff work. So it will be informative to see how the system works while not being flooded with users.

23/03/2019 – Morning shift

08:00AM
I walk into room 4 not knowing what I'm going to do, as last time I was in there was still a lot of filing to be done. Fortunately another note has been left for me telling me to archive the files for the letter M. As no-one is on-site in terms of medical records and medical secretaries network traffic was low so I signed in very fast and was out of room 4 in about 5 minutes. Before I go into room 5 to start archiving I went into room 6 to pick up some empty boxes. In order for me to archive I need boxes to put the unneeded files.

08:10AM

Usually all the shelves are completely packed with files that haven't been used in months, so to archive a letter it allows files to be put away much easier. I took a photo of the shelf I had archived to show how many files where not needed. While archiving I found it hard to locate the dischargement of the patient. As the document doesn't follow a strict format, if a discharge notice is used it can make archiving a single file take up to 10 minutes. This happened a lot to me during the shift which became an annoyance quickly. Besides this nothing really happened during the shift I hadn't already mentioned. I sorted the notes that needed to go off the shelves from archived and re-achieved and left the rest on the shelf.

09:35AM
While archiving I was sent a message from Richard asking if I could try and pull off the shelf a patient's file for their appointment on Wednesday. When I got on the computer and tracked the location of the file I saw that it had last been used a year ago where it had been put onto the shelves. Because of this I knew that the file hadn't been tracked properly as when archiving, inactive files are taken off shelves and removed offsite. Unfortunately because of this I was unable to find the file and went back to archiving.

11:40AM

After about 3 and a half hours I managed to clear the entire shelf of the surname M. When I had finished I had to carry all the boxes to another room which in itself took 30 minutes. When all the boxes where put away we locked up and returned the key back to the reception desk. The photo on the left is a photo of all the boxes I had filed during the shift. The handwritten words on the boxes are to distinguish new files from old files that have already been archived from a prior date.

Key Findings

- **When the evening staff are not in for a few days the department fills up quickly of boxes of files to put away**
- **Some staff leave files anywhere once they have finished. Staff are uncaring**
- **Some staff are faster at putting away files than others. This may be due to lack of making sure files are correctly put away however they may just be good at putting files away**
- **When trying to put away files it is sometimes hard to put files onto a full shelf**
- **Security for the shelves is high**
- **When archiving the shelves normally fill back up in a matter of months**
- **Files are occasionally lost due to poor tracking of their location**

During the normal work week:

***The Head of Department**: Does similar work to the normal staff, but informs non-contracted staff on what they will be doing*

***Contracted staff**: Will carry on tracking and pulling notes*

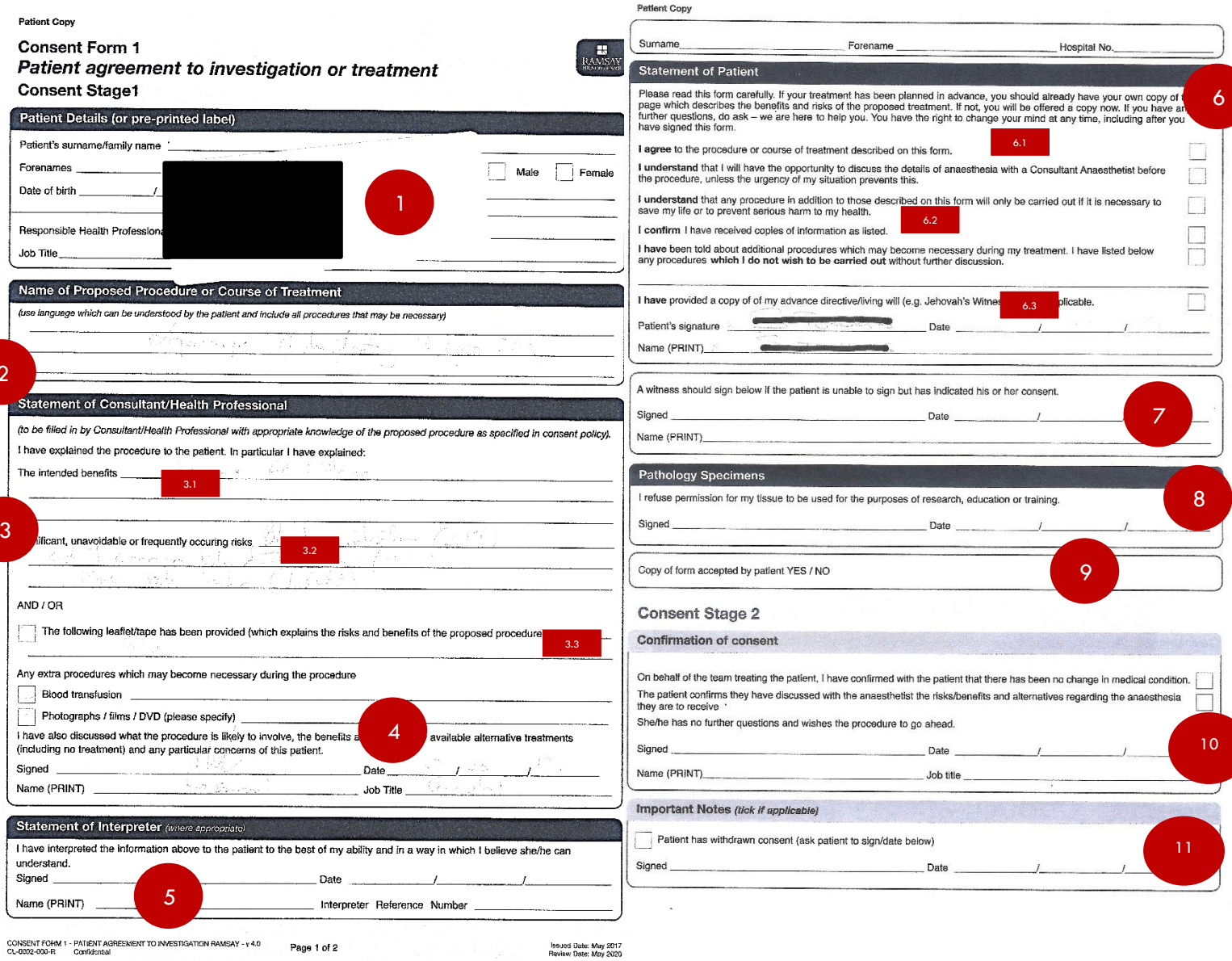
***Bank staff:** Will file away notes during the evening*

If extra workforce is needed:

***Bank staff:** Will work during the weekend to offload files from the shelf or file if more notes need to be filed.*

Document Analysis - Patient Consent from

These are forms every patient have to fill in before they proceed with an operation, it covers all the information that a patient would need to know when looking at going in for an operation. Whilst looking at it now it may not be completely necessary to have used this document as other forms hold much more valuable information about how data is used at Ramsay, this does show one thing I did not notice in other documents. This being that it includes both sections for the doctor and the patient to write in, because of small printing I found it hard distinguishing sections from which the patient would use and what the doctor would write in and can therefore criticise current user documentation for this reason. The patient who gave me the document told me that when signing the document they were told where to put their information. This can help prove the idea that the document isn't easy to use, when in actuality the document should allow for a clear reading. Also whilst reading through this I can also see that the document is not fully filled in, this could be due to there being no need to fill those sections in or a lack of following standard procedure, but overall show that resources to print off sections of documents are wasted. To follow the patient's wishes for me to use this document I have blacked out key information about them, however due to how the scan came out the doctors writing has been distorted so it has not been blacked out as it is impossible to understand and read.



Patient Copy

Consent Form 1

Patient agreement to investigation or treatment

Consent Stage1

Patient Details (or pre-printed label)

Patient's surname/family name

Forenames

Date of birth / /

Responsible Health Professional

Job Title

[redacted] 1

Male Female

Name of Proposed Procedure or Course of Treatment

(use language which can be understood by the patient and include all procedures that may be necessary)

2

Statement of Consultant/Health Professional

(to be filled in by Consultant/Health Professional with appropriate knowledge of the proposed procedure as specified in consent policy).

I have explained the procedure to the patient. In particular I have explained:

The intended benefits 3.1

3

ificant, unavoidable or frequently occuring risks 3.2

AND / OR

The following leaflet/tape has been provided (which explains the risks and benefits of the proposed procedure 3.3

Any extra procedures which may become necessary during the procedure

Blood transfusion

Photographs / films / DVD (please specify)

I have also discussed what the procedure is likely to involve, the benefits a 4 available alternative treatments (including no treatment) and any particular concerns of this patient.

Signed Date / /

Name (PRINT) Job Title

Statement of Interpreter *(where appropriate)*

I have interpreted the information above to the patient to the best of my ability and in a way in which I believe she/he can understand.

Signed Date / /

Name (PRINT) 5 Interpreter Reference Number

CONSENT FORM 1 - PATIENT AGREEMENT TO INVESTIGATION RAMSAY - v 4.0
CL-0002-000-R Confidential

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Issued Date: May 2017
Review Date: May 2020

Patient Copy

Surname Forename Hospital No.

Statement of Patient 6

Please read this form carefully. If your treatment has been planned in advance, you should already have your own copy of page which describes the benefits and risks of the proposed treatment. If not, you will be offered a copy now. If you have an further questions, do ask – we are here to help you. You have the right to change your mind at any time, including after you have signed this form.

I agree to the procedure or course of treatment described on this form. 6.1

I understand that I will have the opportunity to discuss the details of anaesthesia with a Consultant Anaesthetist before the procedure, unless the urgency of my situation prevents this.

I understand that any procedure in addition to those described on this form will only be carried out if it is necessary to save my life or to prevent serious harm to my health. 6.2

I confirm I have received copies of information as listed.

I have been told about additional procedures which may become necessary during my treatment. I have listed below any procedures **which I do not wish to be carried out** without further discussion.

I have provided a copy of of my advance directive/living will (e.g. Jehovah's Witne 6.3 plicable.

Patient's signature [redacted] Date / /

Name (PRINT) [redacted]

A witness should sign below if the patient is unable to sign but has indicated his or her consent.

Signed Date / / 7

Name (PRINT)

Pathology Specimens 8

I refuse permission for my tissue to be used for the purposes of research, education or training.

Signed Date / /

Copy of form accepted by patient YES / NO 9

Consent Stage 2

Confirmation of consent

On behalf of the team treating the patient, I have confirmed with the patient that there has been no change in medical condition.

The patient confirms they have discussed with the anaesthetist the risks/benefits and alternatives regarding the anaesthesia they are to receive

She/he has no further questions and wishes the procedure to go ahead.

Signed Date / / 10

Name (PRINT) Job title

Important Notes *(tick if applicable)*

Patient has withdrawn consent (ask patient to sign/date below) 11

Signed Date / /

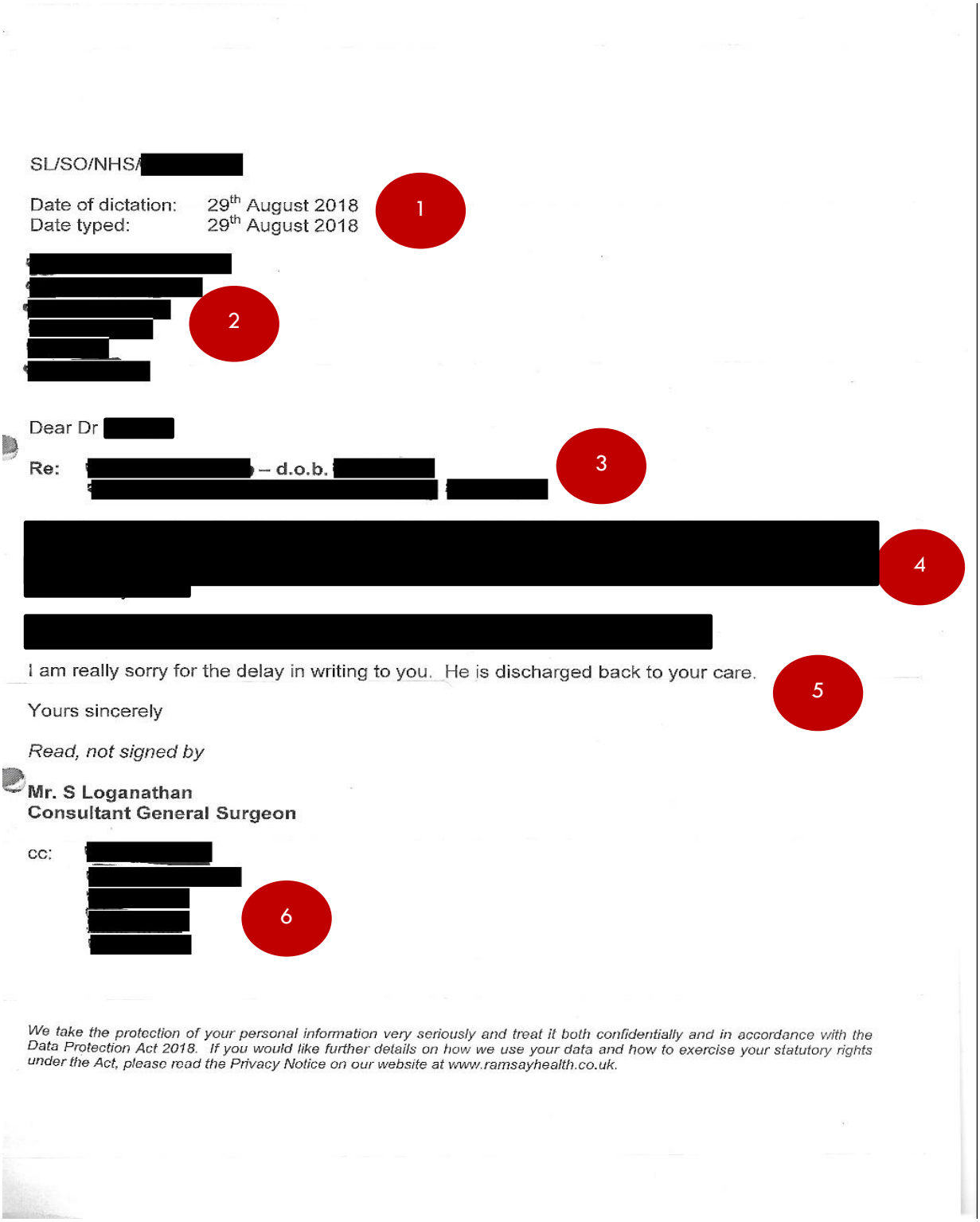
#	Name	Description
1	Patient information	Part of the document where the patient can fill in their information or have one of their pre-existing labels stuck on which contains: Name, Street name, County, Postcode, DOB, NHS number/Ramsay ID, Consultant Name. If it is being filled in by hand it will contain more information about that patient like gender and profession
2	Description of treatment	An area for the consultant to fill in that reveals to the patient, in a chosen language, what course of action they will take in order to treat the patient's illness. It will include the procedures that will occur in order for that to occur.
3	Benefits and Drawbacks	3.1Another area for the consultant to fill in as it suggests to the patient all the proposed benefits that come with that process. 3.2 The next area is an area for the negative effects that are likely to occur when the procedure occurs. 3.3 Finally if the benefits and drawbacks are too important a checkbox is here to inform the person reading that a leaflet has been given to the patient that informs them about the procedure in greater detail.
4	Extra Features	These are check boxes that inform the patient when reading of other procedures that may occur when going through with the treatment. The blood transfusion and Photographs/Digital recordings are included. Finally a consultant signature box is included to make sure that the proposed suggestions are correct.
5	Statement of interpreter	A confirmation box to make sure that the information that the interpreter has tried to get across the information the consultant has said to the patient to the best of their ability. With a reference number to confirm they are a professional interpreter.
6	Statement of Patient	6 Overall is a confirmation box making sure the patient is happy about how the procedure will occur and what will happen. 6.1 A checkbox that indicates whether they accept the suggested procedures from the consultant and are happy with them. 6.2 Is a confirmation box suggesting that any additional procedures may occur if they are ultimately are needed. 6.3 A confirmation box stating whether if the patient has supplied a will, underneath is a confirmation box giving their signature and date.
7	Witness Statement	This is a box for the witness (could be friend or family) to have given consent in part of the patient's wishes if they are unable to give consent themselves.
8	Pathology specimens	This is to allow the patient to give tissue to be used for research and other medical reasons beyond the reason of treating the patient. They can either accept or reject this request.
9	Copy for patient	A check box to confirm on the consultant's part that they acknowledge whether the patient wants to receive a copy of this form.
10	Confirmation of Consent	This is a confirmation box for the consultant to recognise that the patient is now 100% onboard with the proposed solution and has no lingering questions about aspects involving anaesthetic. Here they also must sign and date this part of the document.
11	Important notices	Here is a tick box to inform the hospital at a later date for any reason that the patient has rejected his/her consent and must sign it appropriately.

Key Findings

- **When filling in the document the patient is made aware of the proposed solution**
- **They are informed on the benefits and drawbacks of the solution**
- **The patient must give their consent on the solution**
- **The patient may provide procedures they wish not to proceed without further discussion**
- **The patient has to give consent for research on their tissue samples**
- **The patient can request for a copy of this form**
- **The consultant must give consent that the information supplied is correct**
- **The patient has the ability to reject their consent at a later date**
- **The document itself is cluttered with small print making it hard to determine where to sign**

Document Analysis - Consultants notes to patients GP

This document is for the consultant end of the system these are notes that are sent to the patient's general practitioner to confirm findings. It mainly contains a short but exact finding from the consultant and suggests what happens next. As the document is highly personal I have blacked out all the information that would be private. I'm pleased to have this document as it will probably be the most common document I have seen while working at Ramsay so by having an example I can have a template to base my virtual notes from. It also opposes the patient documents in the sense that it has no branding, large headings to make it easier to read it just contains advanced information.



SL/SO/NHS/[redacted]

Date of dictation: 29th August 2018
Date typed: 29th August 2018

1

[redacted]

2

Dear Dr [redacted]

Re: [redacted] – d.o.b. [redacted]

3

[redacted]

4

[redacted]

I am really sorry for the delay in writing to you. He is discharged back to your care.

5

Yours sincerely

Read, not signed by

Mr. S Loganathan
Consultant General Surgeon

cc: [redacted]

6

We take the protection of your personal information very seriously and treat it both confidentially and in accordance with the Data Protection Act 2018. If you would like further details on how we use your data and how to exercise your statutory rights under the Act, please read the Privacy Notice on our website at www.ramsayhealth.co.uk.

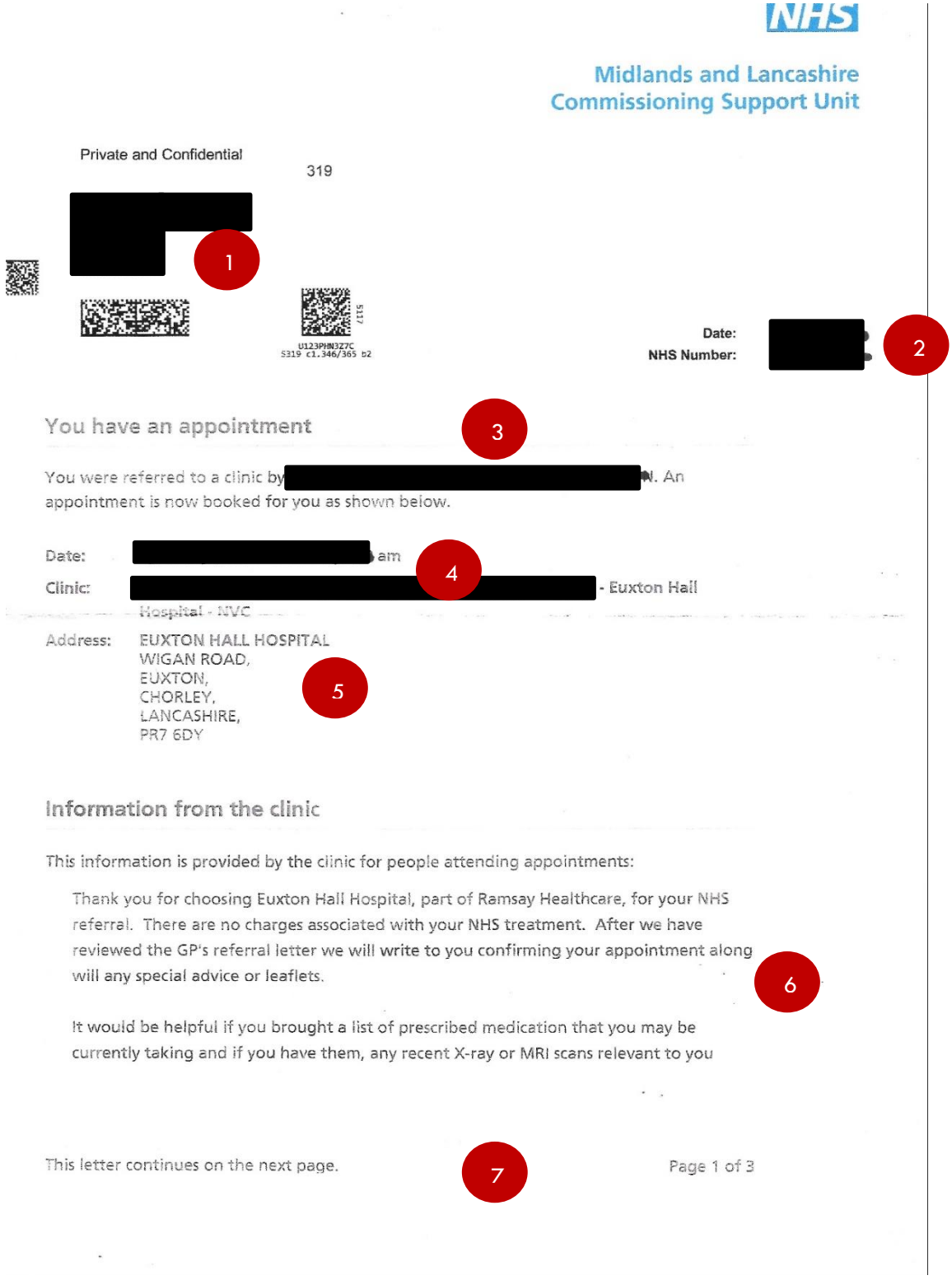
#	Name	Description
1	Date Dictated/Date Typed	This contains the date when the findings where dictated by the consultant and contains the date when the dictations where typed up by the secretaries. This is normally done on separate days if little occurs on a day, both the verbal dictations and being typed up will happen, this is very unlikely.
2	Patient's Local practitioner address	This is so it can be sent to the correct address to inform the patients GP This contains: Practitioners Surgery House number and street The Town The County Postcode
3	Patient information	This is so the GP can understand which patient the consultant is on about this contains: Patients Full name, Their DOB House number, Street, Town, Postcode
4	Consultants findings	Here it contains all the findings the consultant has seen. It contains very advanced medical information that most readers will not understand entirely. Here it will also contain if another appointment should be made and if any medication should be prescribed.
5	Dischargement	As a final notice the document should end with a closing statement if necessary informing that the patient has been discharged from the clinic. Occasionally supplementary statements like "If any concerns please don't hesitate to call" are also made.
6	Carbon Copy	If the patient would like a copy a carbon copy address will be given this contains: Name of patient House number, Street name Town City Postcode

Key Findings

- **The date a file is dictated is typed up at a later date**
- **The document is mainly for the GP and the consultant, but the patient may wish to receive a copy**
- **Contains high level medical language. It will be hard for the patient to follow through the document and fully understand.**
- **Contains information about upcoming appointments or if the patient has been discharged**
- **The format of the document is bland and has no large headings or colour.**

Document Analysis – Letter to Patient

While the previous document is directed mainly for the Consultant and GP this document is for the patient it is a clear opposite to the other document for appointment information as it has a clear layout and has subheadings clearly laid out. By having all three of the documents I will have now seen every type of document for the users.



NHS

Midlands and Lancashire
Commissioning Support Unit

Private and Confidential

319

[redacted]

1

U123PHN3Z7C
S319 C1.346/365 b2

Date:
NHS Number: [redacted]

2

You have an appointment

3

You were referred to a clinic by [redacted]. An appointment is now booked for you as shown below.

Date: [redacted] am

4

Clinic: [redacted] - Euxton Hall Hospital - NVC

Address: EUXTON HALL HOSPITAL
WIGAN ROAD,
EUXTON,
CHORLEY,
LANCASHIRE,
PR7 6DY

5

Information from the clinic

This information is provided by the clinic for people attending appointments:

Thank you for choosing Euxton Hall Hospital, part of Ramsay Healthcare, for your NHS referral. There are no charges associated with your NHS treatment. After we have reviewed the GP's referral letter we will write to you confirming your appointment along will any special advice or leaflets.

6

It would be helpful if you brought a list of prescribed medication that you may be currently taking and if you have them, any recent X-ray or MRI scans relevant to you

This letter continues on the next page.

7

Page 1 of 3

condition. Don't forget your diary in case we want to see you again. You are most welcome to bring someone with you for your appointment and we can provide chaperones if required.

8

You will find that at our hospital there is no charge for car parking. There are parking spaces for disabled drivers at the front of the building.

If you would like more information about our hospital visit us at
www.ramsayhealth.co.uk
You can see what other patients say about our hospital and leave your own comment at
www.nhs.uk

9

If you need to rebook your appointment please call 01257 237 002.

This letter continues on the next page.

10

Changing your appointment

If you need to change or cancel this appointment, use one of the options below. You will need to provide your referral details.

To cancel or change

Go to
www.nhs.uk/referrals

or phone the
NHS appointment line on
0345 608 8888

11

or text phone **0345 850 2250**

Referral details

Booking reference number

[redacted]

12

Access code

[redacted]

The NHS appointment line is open Monday to Friday - 8am to 8pm, weekends and bank holidays - 8am to 4pm. A full translation service is available. All calls are charged at local rates.

The NHS constitution gives you the right to get some treatments within a set amount of time and get help to choose another clinic or hospital if you have to wait too long for some treatments.
To find out more visit www.nhs.uk/nhsconstitution, or contact the organisation that referred you.

This is the end of the letter.

#	Name	Description
1	Patient Address	This contains the address of the patient including: Name of patient House number and Street Town County Postcode
2	Date of letter and NHS number	This contains the date the document was written along with the Patients NHS number.
3	Referral clinic information	This contains the address of the local clinic of the patients GP who originally referred the patient to Euxton.
4	Date and name of the hospital	As it is an NHS document it specifies which date the appointment is and at what clinic the patient is going to in this case its Euxton.
5	Address of the hospital	This is the address of the Euxton hospital which contains: Name of hospital Road Town County Postcode
6	Information regarding the clinic	This is a main title as the hospital differs on all the NHS documents this one contains all the information the patient needs about Euxton, as the patient may not be a Ramsay patient they ask the patient to bring all the relevant information like medical history.
7	Next page indication	This shows the patient that the document continues onto the other page, this shows the layout of the document to be friendly to the patient. However it's not entirely relevant it just shows how the documentation differs from patient and consultant information.
8	Parking information	This shows the patient information regarding parking at Euxton and the different types of parking available.
9	Phone number 1	This part gives the patient a phone number regarding whether if they want to rebook a date of an appointment. This is for the hospital at Euxton.
10	Clear title	This is now another clear title but this time it's the NHS guide to appointments, there is a small description to the guide stating that the patient can change the booking information from the details below
11	Changing or cancelling appointments	11.1 a website in large and bold letters to the NHS's referral site. A logo accompanies this to show that it can be reached from a computer. 11.2 Two phone numbers regarding how to contact the NHS by a phone. 11.3 A small paragraph stating information regarding phone calls like charge rate and when the phone calls will be answered
12	Referral information	This is the patients NHS referral information if they want to change the booking information they will have to use these details.

Key Findings

- **As the document is for the patient and is from the NHS and Ramsay it has a clear layout with colour and small images in some areas**
- **The document Informs the patient about what to do regarding there appointment and also has some information about what to do on the day of the appointment**
- **However there are in total 3 phone numbers and 4 websites this is very confusing for the reader**
- **Also the document has two different methods to change bookings which is very confusing. It may lead the patient to use one system and forget the other**

Questionnaire – Google Forms

To have a broad range of input to use for my investigation the final inclusion to my methods of investigation would be a Google Form. I decided to not have too many questions on this, as I want a general response to the idea of a new virtual system. I let all the staff at Euxton fill in the survey but there are questions aimed towards certain departments. Here where my questions.

Managing Files within Euxton

Hi all, this is a quick survey to get the general feelings towards the current paper based system here at Euxton Hall. I would appreciate it if you were honest in your answers and could give some time to think about each question. This is mainly aimed towards administrative staff but all are welcome to participate. Many thanks James Nurdin Medical Records.

*Required

What department do you work in *

- [ ] Medical Records
- [ ] Outpatients bookings
- [ ] Medical Secretaries
- [ ] Reception
- [ ] Maintance
- [ ] Physiotherapy/Theatre/Ward/X-Ray
- [ ] Other: _____

How do you feel about the current paper based filing system at Euxton? *

	1	2	3	4	5	6	7	8	9	10	
The system needs to be overhauled	○	○	○	○	○	○	○	○	○	○	I am happy with the current system

Have the following ever occurred to you? (Consultants only)

- [ ] When requesting a file for a patient, the set of notes where lost entirely/information was missing.
- [ ] when requesting for a set of notes they took too long to arrive.
- [ ] The patients file was in some way damaged when receiving it
- [ ] Other: _____

Have the following ever occurred to you? (Medical Records only)

- [ ] When filing away patient's notes,the shelf it was to go on was full
- [ ] When filing away you come across loose paper
- [ ] When filing you come across files that aren't meant to be there
- [ ] When archiving it took too long to determine if a patient was discharged.
- [ ] Other: _____

How happy are you using Cambio Cosmic to track patients notes? *

	1	2	3	4	5	6	7	8	9	10	
Unhappy	○	○	○	○	○	○	○	○	○	○	Happy

If a new system was to be introduced how would you feel towards it? *

	1	2	3	4	5	6	7	8	9	10	
Unwelcoming	○	○	○	○	○	○	○	○	○	○	Welcoming

Are there any issues when it comes to patient's notes? If no please state so.

Your answer

(Medical Secretaries) How would you feel towards having the ability to quickly fill in patient information for any set of notes

	1	2	3	4	5	
Not Bothered	○	○	○	○	○	Welcoming

If the current paper based system was to be visualised what impact would it have on you? (This can be positive or negative) *

	1	2	3	4	5	6	7	8	9	10	
Not at all	○	○	○	○	○	○	○	○	○	○	A major impact on what i do

Please state all the suggestions you would have towards the previous questions *

This could be how it would affect you. Any thoughts what so ever on the idea. Any questions you would have.

Your answer

SUBMIT

Never submit passwords through Google Forms.

While I didn't receive lots of responses from the hospital I had a wide range from every department I listed and a few others I did not consider. This investigation was not used to extract new information and major feedback regarding the new system but was a questionnaire about feelings towards the pre-existing system.

The images below are the results from the questionnaire as it goes from one to ten it goes from bad to good. However for the last one it goes from not affected to heavily affected.

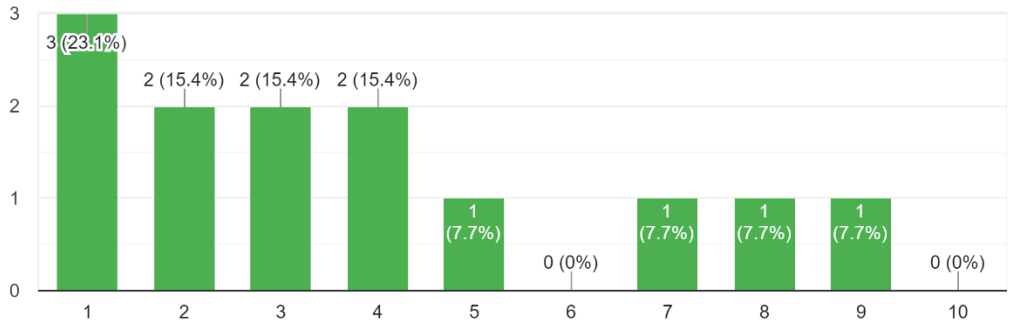
Key Findings

From the questionnaire most of the staff Euxton where feeling mostly positive towards the idea of a virtualised system

The graphs show there is a negative correlation between how much people like the current system suggesting the system currently is not liked.

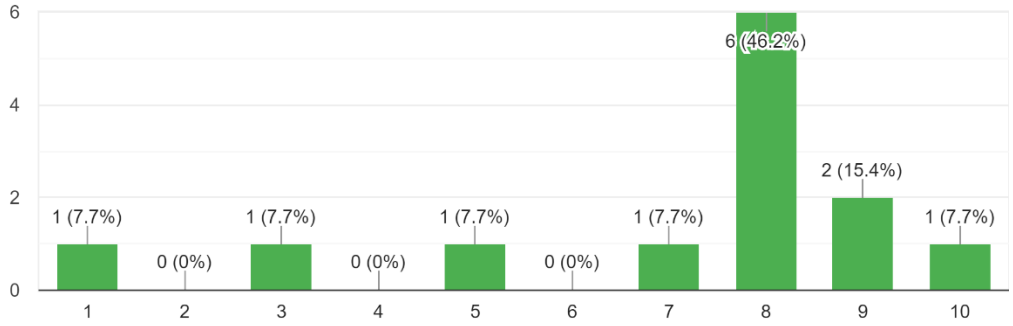
How do you feel about the current paper based filing system at Euxton?

13 responses



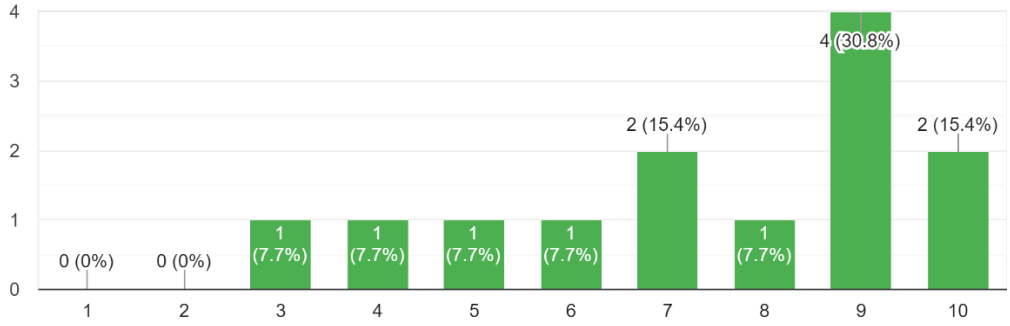
If a new system was to be introduced how would you feel towards it?

13 responses



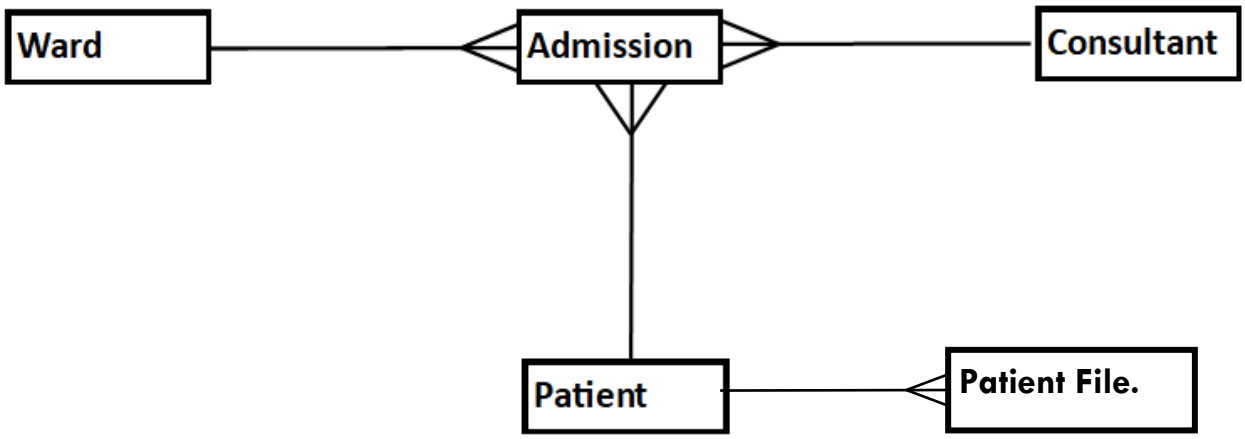
If the current paper based system was to be visualised what impact would it have on you? (This can be positive or negative)

13 responses



2.13 The Entity Relationships of the Current System

Here is the representtion of the relationships between entities here at Euxton, while in reality there are way more relaltions between entities, however this is a good diagram to show the relationships between major entities currently in place. The pateint can be admitted for several ailments but only one patient can be assigned to the admission. The consultant can treat many admissions but a admission can only be treated by a single consulatnt. The ward can have many admissins but the admission can oly be assigned to a single ward. While the patient file could be considered an attribute of a patient, I see it as an entity. This is because it contains attributes of itself like number of files, if it is an NHS/Ramsay File, Fat File ETC. While the patient can have many files, a file can only be related back to one patient.



2.14 The Current System's Inputs Outputs and Processes

Patient File

While the argument can be made determining if the object is an entity or not I believe this has to be considered an entity on the fact that the item holds the documents surrounding the patient. Although the entity has little input onto the system. The processes that happen to them are the most important of all, as I perform some processes on the files for my job.

Inputs	Example	Description
FAT File	*No*	An attribute of the file it determines on the system where the file should be stored. The attribute determines relative size of the file and if a patient has frequent visits to the hospital.
NHS/Private file	*NHS*	A patients file can be a private one while the patient is an NHS patient. It determines the treatment of the admission, and if they are billed at the end.
File Numbers	*2*	The number of the file in use out of all the patient's files.
Temporary file	*Yes*	An attribute that demines if a file needs to be merged with the original. A temp file is created when the original is not with the patient for an appointment for any reason.

Process	Description	Output Format	Output Content	Example Data
Storage of Patient notes	Where the files about the patient are stored whilst in use by the consultants. They are held in medical records by order of surname then first name. They are held here for no more than four months at a time.	*These are stored as physical files*	*A collection of files all in one place.*	*Jack Nurdin* *James Nurdin* *Alex Smith* *Karl Smithwood* *Shane Taylor* *The files above would be sorted in this order and would be stored on separate surname letter shelving.*
Archiving	When files are no longer needed they are checked for discharges and if are adequate to be removed, they are taken of the shelf. They are then determined as re-archive or new-archived.	*This is again done physically, as the notes are paper based*	*This is done to the file as a whole. So should include all the data regarding the file.*	*The file will be marked with a label indicating if the file has been archived previously. If they have been archived they will be removed off shelves.*

Tracking	A virtual process that displays the current whereabouts of a patients file may be. It is done whenever the file is moved from one site to another. It is done to ensure files are not lost at any point.	*On Screen*	*The name of who last tracked the file, The location of the file, The date of when it happened*	*Date: 10/02/2019 User: John Smith Department: Med Recs Description: RTF*
Pulling	When a file is requested for a consultant they are taken off the shelf and sent to the consultant before an appointment.	*This is done as a physical process.*	*The file for a consultant*	*A list of names to be pulled Would give a pile of files with each respective patient.*
Filing	After an appointment the file needs to be stored somewhere. They are then sorted back onto the shelf.	*The process is a physical one*	*The entire file would be used*	*The file will be inserted back into its correct place.*

Patient

This is the main entity the whole system revolves around, besides the ability to book appointments there are very little processes around them. However the attributes they possess contain all the information you would need when describing that patient as an individual. However the ailments they would have along with their consultant would be put under admission as they could have multiple problems with them.

Inputs	Example	Description
Patient's Full name	*John Smith*	Contains the patient's name.
NHS ID	*1234567890*	Contains the patient's National Health service ID. This identifies them nationally.
Ramsay ID	*0987654321*	Contains the patient's personal Ramsay ID, this identifies them inside the Ramsay ecosystem.
Address	*55 Street Lane, Lower Ground Greater Manchester WN6 9LW*	Contains the full address of the patient's home this has their: House number and lane, Borough, County, Postcode
Referral clinic	*MR Jones Medical Clinic*	The name of the patient's local GP.
Date of Birth	*09/05/1962*	Contains the DOB of the patient.
Blood Type	*AB*	Contains the blood type of the patient.
Emergency Contact information	*Allison Smith Wife 0123456789*	This contains the name of the contact, the relation between the patient and them, and a method of contacting them the hospital can use.
Allergies	***Penicillin*** *aquagenic urticaria*	A list of allergies the patient to make sure they are seen they are written clearly on the inside of the cover, common items that are more likely to be used are bolded.

Process	Description	Output Format	Output Content	Example Data
Make a manual booking for an appointment	The entity can book an appointment for themselves for some time in the future. This would also links to the admission entity as each appointment would be specific for an admission.	*A letter confirming that an appointment has been made, an email with external links*	*The data included would be the date of the booking and the day of the appointment*	*Dear John Smith, your appointment has been made for the 5th of May 2019 we will we give you more information coming closer to the date*
Automatic Booking for an Appointment	If the patient wishes they can subscribe for an automatic follow up booking of an appointment a certain time in the future.	*A letter confirming that an appointment has been made, an email with external links.*	*The data included would be the date of the booking and the day of the appointment*	*Dear John Smith, your automatic appointment has been made for the 5th of May 2019 we will we give you more information coming closer to the date*
View a booking	The patient has the ability to view upcoming appointment.	*Depending on how the appointment was made, if they had a physical copy that would be used*	*When the appointment is Where it will occur Who will be there*	*John Smith your appointment is on the 19/04/2019 please go to reception and we will direct you to the consultant*
Cancel a booking	If for some reason the patient has to cancel the appointment they can reschedule it or just cancel it.	*This is on screen as it would have already been put onto the system*	*The data included would have been the proposed date of admission and the patient name.*	*John Smith, your appointment on the 19/04/2018 has been cancelled.*
View information	The patient can view all the information the	*Physical and paper based*	*List of all documents*	*Name Weight Weight*

about an admission	hospital holds about them.		*and general information*	*Blood Type Letter to Consultant etc*
Request their data is removed	The patient can request that all information about them is removed once they have need discharged.	*Physical and paper based*	*All data*	*The data would be deleted*
View documents	The patient can request for their file and can look at any document within it.	*The process is a physical one*	*A specific document would be viewed*	*Any document i.e. Test results.*

Admission

This is what the actual ailment of the patient is and holds information surrounding it. As a patient can have many medical problems they have to have many admissions as a result of this. The admission also links the documents of the patient's file to the consultant together as well, as a patient only gets to meet a consultant because they have the right training for the ailment the patient has. There are few processes for this because of it being a non-user entity, therefore only a handful of automated processes exist for the admission entity.

Inputs	Example	Description
Ailment	*Arthritis*	The medical problem the patient is having.
Date of Admission	*25/11/2018*	The date the patient was admitted to Euxton.
Next appointment Date	*12/04/2019*	The next date the patient has to visit Euxton.
Consultant	*DR Luke Hammersmith*	The name of the patient's consultant, he deals with discussing medical procedures and everything regarding the patient.
Medication	*0.5g Naproxen Sodium*	The type of medication the patient is using and the dosage.
Proposed procedure	*Injection to reduce pain*	A brief description of the plan of treatment.
Booking date	*12/07/2019*	A date the appointment is made.
Medical notes	*Test results Letter to GP*	A document that holds information regarding the particular admission.
List of all admissions	*Gallstones 10/05/1990 DR Luke Hammersmith* *Mild Arthritis 30/01/2019 Dr James Cage*	A list of all the admissions a patient has had it is at the front of a patients file.
Number of appointments	*7*	The total number of visits the patient has made for that admission.
Private or NHS admission	*NHS*	As the hospital provides both private and national health care for each admission a method of treatment must be used.

Process	Description	Output Format	Output Content	Example Data
Automatic Discharging of admission	While a patient's admission is never removed from the site as it is historical medical information. A dischargement can be used to show there is no need for the patient to visit Euxton anymore. This is done automatically, when no new appointment is made.	*On screen and paper based which is sent to medical records*	*Discharge status*	*Discharged: True*
Calculating fees	A calculation that determines the cost for an admission.	*An electronic or physical bill*	*Description of admission then fine*	*Hip replacement Total cost: £1,200.00*
Determining a ward	When a patient has an admission they are then assigned a ward.	*On screen*	*The ward of admission*	*John Smith, you have been assigned to the Physiotherapy ward.*
Calculating next recommended check-up	If the illness has been treated for an automatic check up date is created to make sure everything is fine. The patient's file shouldn't be needed.	*Email, phone or letter*	*Date of check up*	*John Smith, your automated check up date is the 28/05/2019 please leave this date free.*

Consultant

These are an important entity in the current system for many reasons. The consultant can have many admissions to treat but an admission can only be treated by a single consultant. The consultant entity will share some of the same processes as the patient but will have unique input data as they are the only ones who create new data for the admissions.

Inputs	Example	Description
Medical dictations	*Mr Smith came for his appointment today, after talking through the proposed treatment he has decided to go through with the planned operation in 6 months' time*	When a visit has happened the admission will be updated to inform what the speculated problem is for the patient. If any new information is found the consultant will input the data onto the system.
Letters to Patient	*Letter informing of an upcoming appointment*	This a letter that is given to the patient for any reasons, a copy is created an put into the file, as a historic document to notify the reader that a letter was sent.
Referral notes	*Past medical information*	A document that contains a new patient's prior medical history, including major operations, problematic issues regarding the patient etc.
Consultant Findings	*Document to patient's GP*	A document that is sent to the patient's GP informing them about the progress regarding the patient, i.e. notifying an appointment took place.
Test results	*98% positive, strong positive correlation, no abnormalities*	Another document the file stores. It contains advanced information regarding previous medical examinations of tissue and other medical practises and the findings from it.
Proposing operations and Procedures	*I will suggest to Mr Smith on his next visit about the possibility of acupuncture*	When the consultant has an idea about how to treat an illness, they will write down what they plan on doing and will show it to the patient at the next appointment.

Process	Description	Output Format	Output Content	Example Data
View a patient's file	To discuss further treatment the consultant may wish to view a patients file which contains all their information.	*A physical file*	*All the documents in the file*	*Test results following a recent MRI scan.*
Prescribe medication	If a treatable illness is found the consultant may inform the patient to take medication for a certain amount of time.	*Physical object*	*The name of the drug The dosage The contents The expiatory date*	*Naproxen Sodium 0.5g a day Expires 10/12/2020*
Request files	If an appointment has been made, the consultant can request for their file to be sent to him.	*Paper based*	*A list of files that are needed*	*File; John Smith Appointment date: 20/12/2019*
View admissions	The consultant can look at all the patent admissions he is treating at the moment.	*On screen*	*List of all patients*	*John Smith, Arthritis Tom Holland, Back pain*
Create a booking	The consultant can create an appointment for the patient.	*On Screen*	*Date of appointment Time, Name of patient*	*20/04/2019 10:40AM John Smith*
View a booking	The patient has the ability to view upcoming appointment.	*Depending on how the appointment was made, if they had a physical copy that would be used*	*When the appointment is Where it will occur Who will be there*	*John Smith your appointment is on the 19/04/2019 please go to reception and we will direct you to the consultant*
Manual dischargement /of a patient	When a patient has no need to come back to Euxton they can be discharged if the consultant deems them able.	*On screen and paper based*	*Dischargement status*	*Discharged: True*

Process	Description	Output Format	Output Content	Example Data
Searching admissions	If any patient has a long medical history and has multiple health issues. Anyone can search through a patient's history to find what they need. This is the first sheet in a patients file.	*On screen*	*Problem* *Date of admission* *Consultant*	*Gallstones* *10/05/1990* *DR Luke Hammersmith* *Mild Arthritis* *30/01/2019* *Dr James Cage*
Edit Admissions	Allows the user to edit and change information regarding the admission.	*On screen*	*A new updated admission file*	*Kidney stones* *10/05/1990* *DR Luke Hammersmith*
Creating Admissions	When a patient comes to Euxton they have a new admission created on the system which informs a user on why they are here.	*On screen*	*A new admission*	*Patient: James Nurdin* *Admission Date: 30/03/19* *Described ailment: Back Pain* *Ward: Physiotherapy*

Ward

The ward is the last main entity to be included on the system. This contains the information about the actual treatment of the patient. This is where the patient goes to be treated and includes actual medical procedures like operations. While they don't include large amounts of processes or inputs for the system they are needed to ensure that admissions are grouped correctly and facilities are accessible to those who need them.

Inputs	Example	Description
Name of ward	*Physiotherapy*	The name of the ward.
Theatre Status	*Not in use*	A description of if the theatre in the ward is in use.
Equipment available	*10 syringes 20 latex gloves 200g anaesthetic*	A list of all the available disposable equipment available.
Head of department	*Rob Grant*	Name of the head of the ward.
Beds available	*13*	The total number of beds available.
Specialities	*Joints*	Specialities within the ward.
Number of admissions	*43*	The number of total admissions currently being treated.
Number of consultants	*5*	The number of active consultants onsite.

Process	Description	Output Format	Output Content	Example Data
Files returned back to Medical records	Unused documents are sent back to medical records.	*Paper based*	*The patients file*	*John Smith's file has been RTF*
Ordering new medical equipment	If equipment is running low an order is placed to receive more items.	*On screen order*	*A list of incoming equipment, and a bill*	*ORDER 500 syringes COST £600.00*
Admitting a patient to a bed	If a patient needs a bed for any reason the request is made, and a room is given.	*On screen*	*A name of the patient and location of the room*	*John Smith Room P06*
Booking the operation theatre for a patient	As there are a finite number of theatres, they have to be precooked in advance.	*On screen*	*Name of patient Theatre Date Time*	*John Smith Theatre 2 10/12/2020*

2.15 Current stakeholder involvement with the System

Even though there are countless different stakeholders within Euxton these are the ones that have the most crucial role in maintaining and using of patient files and notes.

Medical Records

- The main user who deals with the files at Euxton, during the day and evening they maintain the files on the shelves making sure that no files are left lying around. They work closely with medical secretaries to ensure a patient's file is up to date and is where it needs to be. When demand for files is low or a shelf is in desperate need of more space archiving will happen to remove unneeded files from the site.
- If a file is requested staff in the department have to track the location of the file and get it to the consultant before the appointment date. This creates a constant deadline for the department creating an unneeded stress. As files are seeming to be lost at a higher rate than ever it seems that something needs to be done sooner rather than later.
- They need to be constantly running as if they are closed for a couple of days the work will fill up and the whole hospital comes to a standstill as there are no patient files being circulated. It is crucial that workflow remains at constant, the department is heavily underfunded to keep things running the way they are with more files being used every day and the number of employees decreasing it is becoming a serious concern.
- As most of the investigation has revolved around this department, with all interviews, document inspections and observations being centred around the medical records it is clear that the focus after software development will be to receive feedback mainly from this department. It should also be noted that during development that if any suggestions made should be followed.
- As this department is the reason the system is being proposed, the main requirements for the new system is efficiency when handling documents. As this department will focus on getting old documents onto the new system a smooth changeover period should also be recognised as a primary requirement, this is due to the investigations I held as a common question was about how old documents would be brought over.

Patient

- These are the people who come to the hospital to have an illness treated, they allow for their medical information to be stored in the system as the form of medical files. When they visit they usually expect for their illness to be treated. They are the most vital user as the majority of data revolves around them.
- They need to make sure they arrive for appointments on time and also take the medicine they have been prescribed to try and get better. If it is a bigger issue they may go in for an operation.
- The primary aim for this user is Security and ease of access. This reason being that we need for all documents that Euxton possess on a patient to be safe and protected, if a data breach was to occur the hospital could be sued under the argument the lack of security was in place. Ease of access is the second requirement because the patient needs to have an easy time navigating through tabs and windows in order to access their document information.

Medical Secretaries

- In the current system this department is in charge for typing up dictations for the consultant, similarly to medical records they are under a constant deadline for patients notes to be up to date and moving through the system at an even rate.
- However as it appears to me, it seems that this department is coping better on the increasing workload every staff member has to face, this is probably because the department they work for is not reducing staff hours unlike medical records.
- If an upcoming appointment is seen they will send a request to medical records asking for the patent file. This is then relayed back to the consultant before the appointment date.
- As the secretaries have to do a lot during the day the new requirements should be efficiency when typing up documents.

Consultants – other medical experts

- This user has the second most important role within the system. They supply all the new information back to the secretaries to type up. They will also try and help the patient by proposing treatment to help them get better.
- They are the most medically advanced user on the system as they need to know how to effectively treat patient ailments. Unlike the other staff stakeholders they seem to have the least deadlines out of all the staff, as they can only take as long as they require when with a patient at an appointment and can create new extra visiting dates if more time is needed.
- As of the current system the consultant only needs to dictate their findings to the secretaries through the use of voice recordings. They don't need to request upcoming patient files, so they have this task done for them. They have little actions on the current system.
- The main requirement with this user is ease of access to amend and view patient information and the ability to share these documents. This is because the only time they interact with the current system is to view patient notes, if this was streamlined in a way that the consultant could search for documents it would greatly improve their job.

2.16 Limitations with the Current System

Difficult to go through a patient's file

When patients visit many times their file begins to fill up very quickly. When a file needs to be archived or a certain document needs to be found, it becomes increasingly frustrating to try find the most recent dischargement notice or letter when there are over a hundred documents in a single file. By having a searching and sorting feature when viewing documents it would allow for letters to be found almost instantly theoretically. As for statuses like dischargement a single page would allow for instant viewings. The documents themselves are also subjectable to wearing and being lost which means partial documentation is another occasional occurrence. However as all the new system is digitalised this will not occur anymore.

Partially filled in documents

During my observations and documentation inspection I found that a worrying number of printed documents had been only partially filled in such as blood types and other medical information that should be present but is left out. This results in missing information which could be vital in case of emergency like attitudes towards anaesthetic or other important equipment. An easy way to address this would be to have a presence check in mandatory fields like blood type. By addressing this, important information would not be missing in case of emergency.

Validation/ updating of personal details

As a document may be typed up during the evening, mistakes can easily be made which may be serious later on if in an emergency. This could be that a patient's blood type was typed up wrong which if not fixed could be fatal for the patient, which is a very serious issue. Other issues like failing to keep patient contact information is also a frequent occurrence at Euxton. By addressing these issues it would remove inaccurate or misrepresentative information regarding a patient. This would also allow for the hospital to have access to the patient by some method of communication. The clear issue is data inconsistency as some patients will have their surname changed but will re-register as a new patient meaning that an old file consisting of the old patient exists but will not be used meaning data is lost and forgotten about.

Doctors Handwriting

As the current system has improved from previous iterations as all notes were handwritten. As of now most findings from the consultant are verbally dictated to reduce the issue from arising, however some notes are still handwritten by the consultant which still become a straining activity trying to read a set of proposed document which may be an issue for the patient if their vision is poor or if they are unable to determine key words. By addressing this issue, by digitalising documentation in all cases, it will allow other staff and patients the ability to read all the documents easily and improve productivity.

Paper Based notes and files

This is a pinnacle issue affecting Euxton at the moment, it is now a daily occurrence for a file to be damaged/Lost/Misplaced. Because of this patients are losing their medical information from a system that should have been updated a decade ago. By addressing this limitation in particular it would relieve medical records with the constant pressure to be moving files around Euxton at a ridiculous pace. Because the issue is so large I have deconstructed the problem into smaller pressing issues:

Filing

This in reality is a sub-limitation as it is mainly caused by the paper-based notes. Anyway filing is a tedious task to try and file away unneeded files, as there is always a demand for shelving space to be created but this never happens, as a result of this there are always overflow boxes for a surname that is never in a particular order. This makes the process of pulling a nightmare as it is impossible to find a file if there are 6 overflow boxes for the surname S. By removing paper-based notes this would completely eliminate the issue.

Tracking of files

Again this can be subcategorised under the issue related by the paper-based documents. Tracking is another limitation that highlights the inefficiency and shows a clear problem of the system. This is because when trying to locate a patients file, a long reference value is used this is mainly is the NHS ID. When a search query is made however it goes through the entire UK Ramsay database so searching by common fields like first name or surname isn't an option as this can take minutes to load. Even when a patient account has been found it is likely that it hasn't been updated properly and has no relevant information that can help you find the real file. This could be that it was last used 6 years ago which has no real help whatsoever. Again the issue could be addressed if a file was virtualised so there would be no need to access a files' location.

The other side of tracking files is also an issue as it is plagued with validation issues. This occurs due to updating the current whereabouts of a file being done by staff. Like any other task it is subjective to human error. This occurs in the form of key fields being excluded on the update of the files location where the main field being the actual new location being missed, ultimately resulting in the file being lost when needed in months into the future. To circumvent this major issue the easiest fix would be to attach present checks on any key fields that are required of the system to always to be included.

Archiving

As stated the purpose of archiving is to remove unused files on the shelves and allow space onto the shelves, while the process sounds like it should be praised it is fairly limited. When a shelving unit is archived it means that the files are placed into a collection of boxes waiting to be tracked however as the process of tracking takes a while it means that the boxes are left in a non-ideal location. In addition to this determining whether or not a file needs to be archived is an issue, while it is possible to find out if said patient has an upcoming appointment it takes too long to do so in an efficient manner so appointments are assumed by checking the documentation and if the appointment document is skipped a file that is needed may be archived away.

Safeguarding and access to files

Currently the most dangerous issue persistent in the current system is the ability for a patient's information to be easily looked at and copied. As I have worked around this department I can confirm that the availability of information is concerning to say the least. Whilst physical security is not the issue it's the accessibility that is eye opening. Currently nothing can be done as they are needed to be looked at by the departments to determine whether if they can be discharged. However the benefits of resolving this is that it would only allow for the authorised people to access the data.

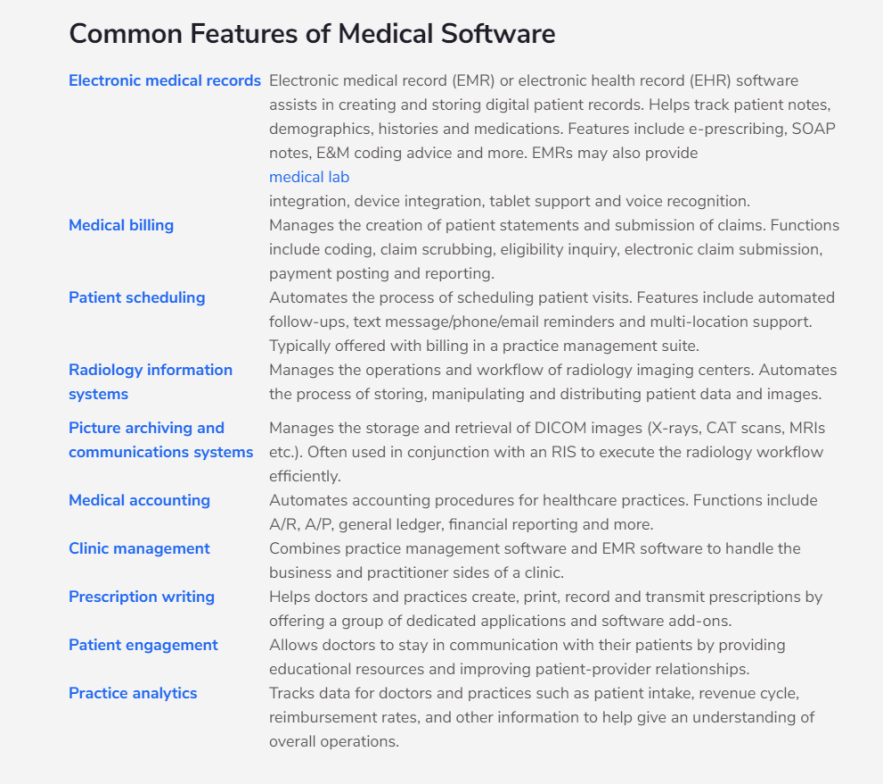
Cardboard boxes and paper wastage

While this is not a major concern it is noticeable how much wasted cardboard and paper is produced from boxes and loose paper. The major benefit of removing this is that it would have no wasted materials in medical records, as currently we have to bulk order cardboard boxes to transport files. Not only this but it would be much greener too resulting in less cardboard being used a handful of times then being sent to the recycling facility.

2.2 Research into Existing Solutions

There are countless systems similar to mine when I have been researching into these online medical systems, for me what I am surprised the most is that how highly polished they are look and feel. To help me look into the systems I have found this comparison site called Software Advice.
https://www.softwareadvice.com/medical/

The tools it gave me to search through software was outstanding. It also provided me with a buyer's guide to common features, it completely astonished me how the rest of the software looks and feels and large the competition is.



Common Features of Medical Software

Electronic medical records	Electronic medical record (EMR) or electronic health record (EHR) software assists in creating and storing digital patient records. Helps track patient notes, demographics, histories and medications. Features include e-prescribing, SOAP notes, E&M coding advice and more. EMRs may also provide medical lab integration, device integration, tablet support and voice recognition.
Medical billing	Manages the creation of patient statements and submission of claims. Functions include coding, claim scrubbing, eligibility inquiry, electronic claim submission, payment posting and reporting.
Patient scheduling	Automates the process of scheduling patient visits. Features include automated follow-ups, text message/phone/email reminders and multi-location support. Typically offered with billing in a practice management suite.
Radiology information systems	Manages the operations and workflow of radiology imaging centers. Automates the process of storing, manipulating and distributing patient data and images.
Picture archiving and communications systems	Manages the storage and retrieval of DICOM images (X-rays, CAT scans, MRIs etc.). Often used in conjunction with an RIS to execute the radiology workflow efficiently.
Medical accounting	Automates accounting procedures for healthcare practices. Functions include A/R, A/P, general ledger, financial reporting and more.
Clinic management	Combines practice management software and EMR software to handle the business and practitioner sides of a clinic.
Prescription writing	Helps doctors and practices create, print, record and transmit prescriptions by offering a group of dedicated applications and software add-ons.
Patient engagement	Allows doctors to stay in communication with their patients by providing educational resources and improving patient-provider relationships.
Practice analytics	Tracks data for doctors and practices such as patient intake, revenue cycle, reimbursement rates, and other information to help give an understanding of overall operations.

The two that impressed me the most was:

CareCloud – Due to the friendliness of its user end systems and compatibility with mobile applications.

Praxis – Due to how efficient the layout was and how professional it looks but has an approachable interface.

CareCloud

CareCloud is a cloud-based data management system that focuses on the user experience over everything else. The whole software should be considered as a platform rather than a piece of software due to the vast number of features and items they present to the customer. They believe that their platform helps consultants "maximize the efficiency and effectiveness of their practices, while connecting and collaborating directly with patients in support of better care". They also believe that the software they provide and the options available allow for the user to select the exact tools needed by the hospital and staff who use it.

They also believe themselves to be partners with a hospital when distributing the software rather than a developer and customer relationship. While at heart the platform is a general usage EHR (Electronic Healthcare Record) The wow factor of the software is about its integration with customer billing. As it is a US based software company I can see the need, but as the NHS provides free healthcare I will not focus on the economic aspects of the software as I will not use it, I did consider it in my discussion, but it was ultimately left out.

Another Key aspect of the software is the social interactions it uses that allows documents to be easily shared amongst colleagues and patients. It also has a pop-up chat box to enter a quick chat with a consultant. The company who designed the software claims to have been inspired by the ability to comment and share and say Facebook was a major inspiration. Again, I will not go into more detail about this feature as I will not ultimately include it but the premise was a unique idea so I thought it was worth mentioning.

The main selling point of the software also seems to be around the levels of software that can be acquired based around the number of consultants onsite. While it seems all the software provided is the same the contribution to the changeover of a site seems different for each size of package. It scales by the following:

Small Practices – Providing the basic software at an affordable price.

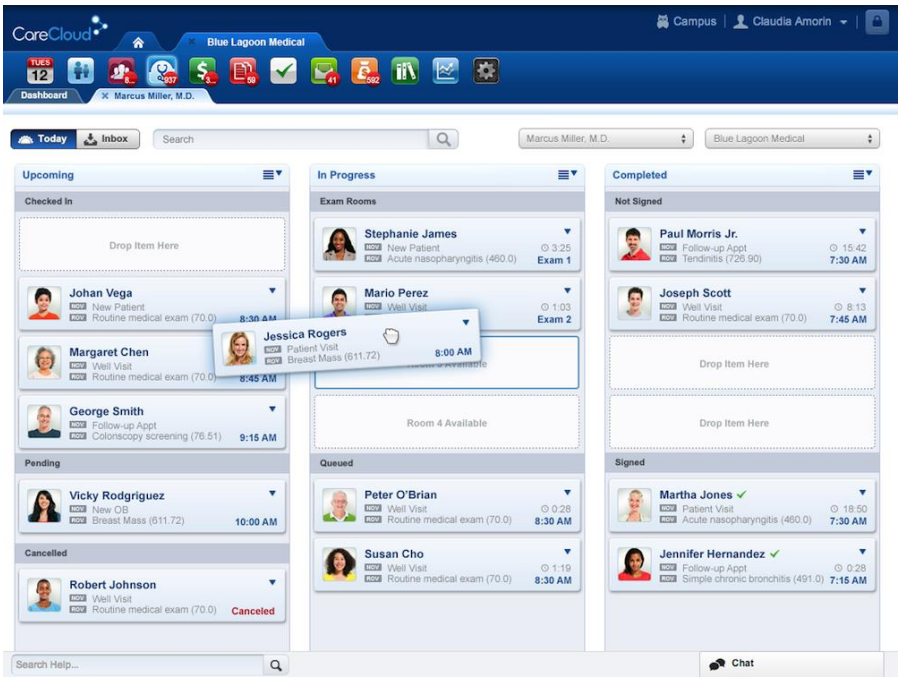
Large Medical Groups - CareCloud partners with the Hospital to help them increase profitability and productivity.

Enterprise Solutions – The team will work with the healthcare providers to create a powerful virtual platform built from the ground up

Speciality-Specific Solutions – CareCloud will provide the specific tools necessary to create a custom system to allow the hospital to be more effective

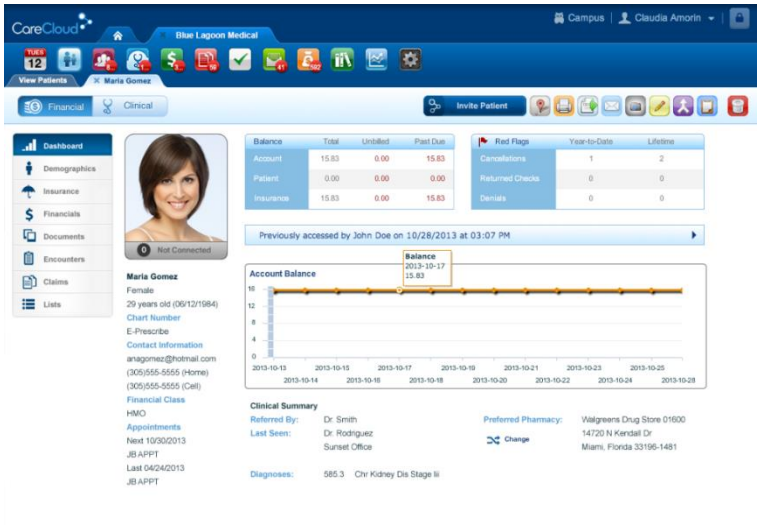
The software claims to have an easy app-like desktop experience comparing the main sections on the upper tab bar to the apps on a phone. It also claims that the **tabs** within each section are "unique" to allow a web browser experience to allow **multiple patients** to be brought up to allow for a true multitasking experience. These are clearly the 8 main entities of the system. The order of apps actually follow a smart design as they show the progression of the patient's life cycle for a visit starting from booking to payment. For what I am interested in, I am only concerned about 3 of the application from left to right for me the features I am

most impressed by is applications 1,2 and 4. These surround the main ideas I wish to pursue in more detail so I will look into these a little more any ideas I find interesting I will inherit.



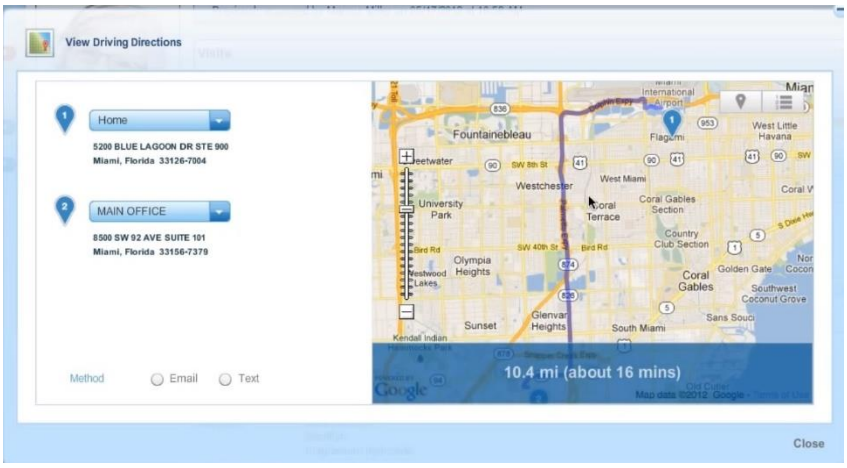
Appointment Schedular

To allow an intuitive and streamlined booking system the Appointment scheduler contains a drag and drop aspect to allow patient time slots and can be sorted by resources or location of where the appointment is taking place at. While the image to the left does not show this, there is a feature that allows for individual patients to have the background of their tile show a colour. Following the Green, Amber, Red system. This indicates if they have been or are about to visit in progress. This allows for a clear progression of how the patient's appointment is happening. The ability to drag and drop also sees so allow for an easy transition from one time slot to another. With a search bar at the top finding exact patients will be a quick and painless task.



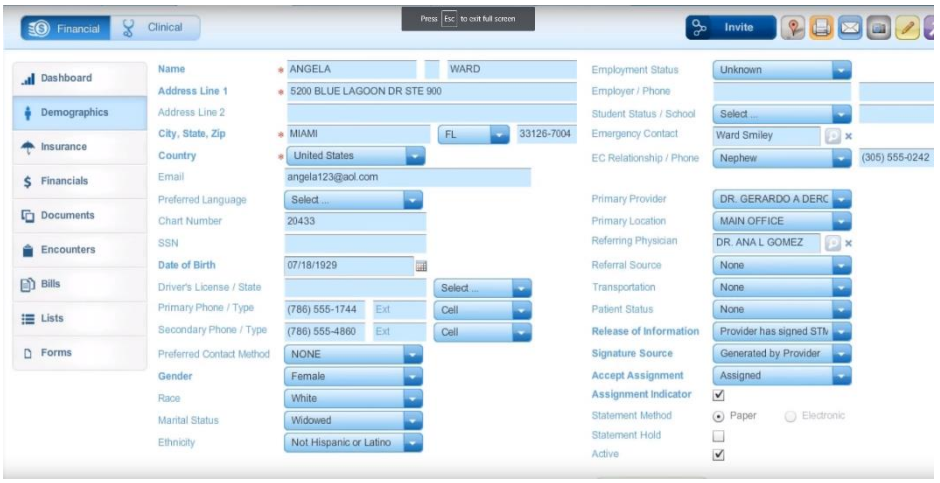
Patient financial dashboard

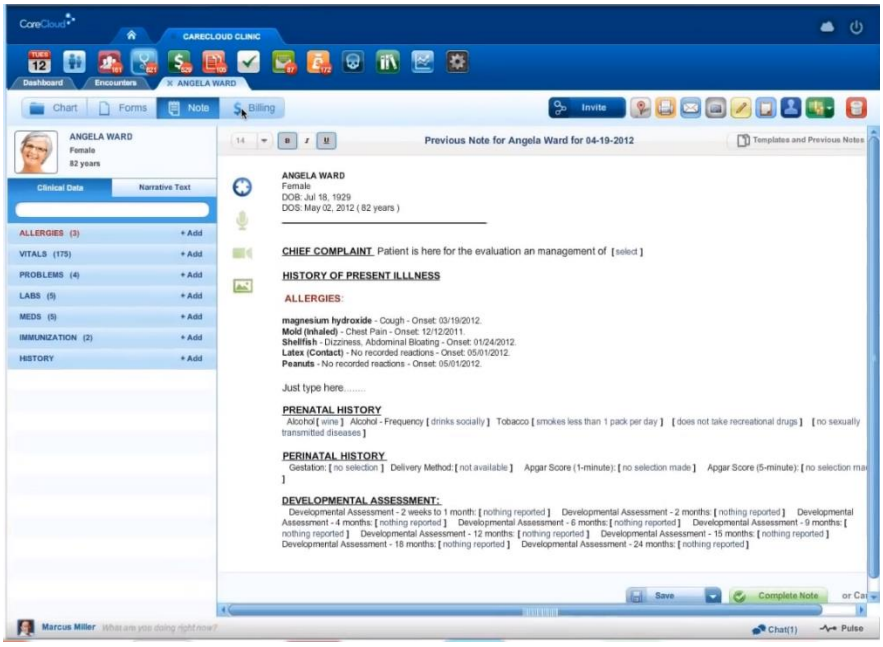
This is the second area in the system that: balances patient information, points out red flags and demonstrates account balance history. To provide further information a general page for clinical information this also tracks a few other finance information like account balance and other properties. The graph can be swapped out by comparing variables like appointments visited and other statistics. While for me financial aspects are not going to be included, on the left is a panel that shows a general information regarding the patient. This lists all the vital information about a client without the need of going to the demographics tab.



For the patient information section the application uses Google maps to provide an easy way to show the patient the way to the hospital as it shows on the right, patients have the option to select which hospital they want to go to. This is especially interesting for my system as there are three hospitals all within a 2-hour drive from each other.

Finally, the last part of this interface contains a user Demographics side tab, which is hard for most medical software sites. By including required information it creates the ability for the user to input as much information as they want. The ability to have drop down boxes also allows for control for what the user inputs which is a good method for validation. At the bottom right there is a check box to determine active status. For me this is a very clear sign that CareCloud have experience about what they are doing. Also the software will use the postcode of the patients address to automatically fill in the rest of the relevant information to this and also suggests the referral clinic the patient came from.

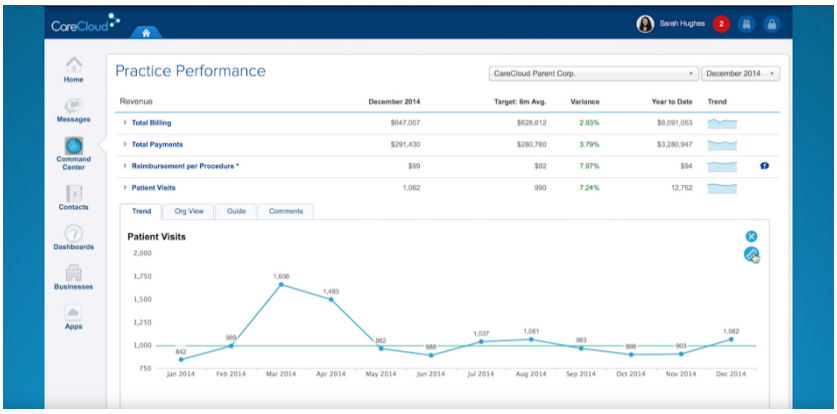




Charts

Charts is a fully customisable EHR and is the main utility I intend on investigating right now. It is a fully functioning and customisable EHR used to retrieve Clinical and appointment text, documents a patient's visit and even has the ability to prescribe medication to the patient.

This is a very in-depth example of what a system like this can look and feel like. The overall aesthetic of the software is very easy to look at with the simple and app-like icons creating a familiar software feel to the one I use on my phone. The usage of the constant colour of light blue accented by the dark blue creates a simple GUI. There is also one last feature of the platform I was blown away by, this was its graphing abilities.



By having the ability to graph patient information like number of visits, quantities of supplies it would for an automatic evaluation of the hospitals running and could allow for the ability to generate more revenue.

If this was to be implemented for Euxton it would allow for a more accurate way patient data is processed and presented.

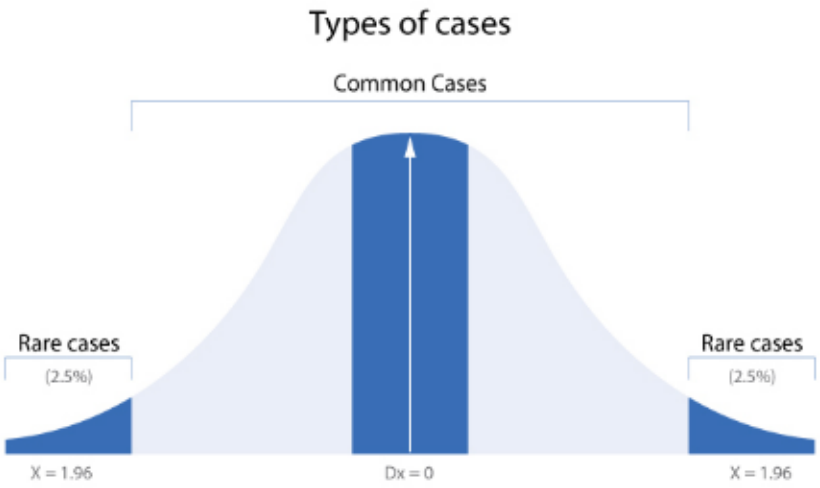
Feature/Facility	Justification	Source
Colours represent patient status on booking system	As a booking schedule will be cluttered with information and the possibility it won't be sorted by date. The ability to find the progress on an appointment is an easy but helpful add to the booking system I have already planned.	CareCloud
A tab on the document window will be for each patient, multiple tabs will be used	Efficiency needs to be a key factor when manging through patient files the ability to treat an entire patient as a tab would allow for very fast switching between the consultant and the software.	CareCloud
Generate a chart for information like patients visited	The data that is normally generated in an EHR is quite simplistic and basic, a key selling factor of CareCloud was the ability the graph certain data like appointments this could help the consultants at Euxton determine if the patient may become a FAT file.	CareCloud
Drop down boxes for inputting standard data	Validation is important for a hospital as we want the input data to be accurate and correct. By having drop down boxes we help eliminate false or inaccurate data when creating a new patient.	CareCloud
A panel on every page concerning the patient	When going through notes they all look identical, by having a panel that contains all the critical information about a patient it will be clear which patient is being used.	CareCloud

Praxis

Praxis EMR is an electronic records system, that claims to be template free. The developers claim that Praxis utilises artificial intelligence called *concept processing* that learns from the consultant. The company claims that "Most Praxis EMR users finish notes in less than 45 seconds". They also claim that the software "thinks like you and gets faster and smarter as you use it". Their main entities consist mainly of the consultant and the patient, despite the patient having much access

The Concept Processor

The software is centred around the artificial intelligence that learns from how the consultant uses the system, called The Concept Processor. As the system is "template free" the software strongly pushes the idea that every entry the consultant writes shouldn't be restricted by drop down boxes. It demonstrates how the software learns through a distribution frequency graph on the right. It shows how Praxis uses input from previous medical cases and automatically determines how similar a case is to any other one recorded and from that generates:



Prescriptions
Lab Orders
Procedure Reports
Referrals
Letters
Excuse Notes
Admitting Orders

The consultant then doesn't have to worry about inaccuracy as they have already generated a report for that type of case just for a different patient in the past. However to keep the consultant reassured they can go back into the document and edit the document if the case was similar but not identical. Which is a major benefit for a system that involves automating documents essentially. Praxis can then save a new case if changes are made to the document for next time. The software reinforces the main idea that the more it is used the less it will need for you to input data.

I chose to investigate into this software as it keeps the idea of storage for patient information at heart but focuses on the people who input the data rather than actually using it. The main benefit and draw to the system was its claim to have documents typed up within 45 seconds.

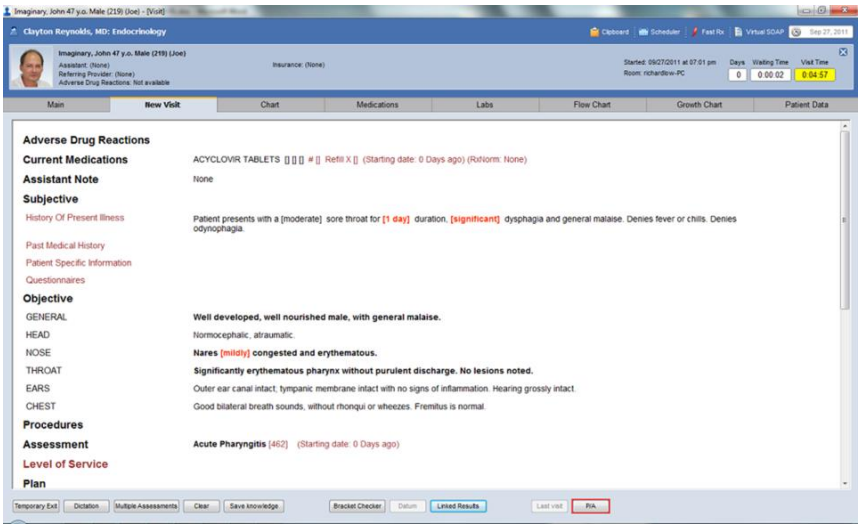
Go paperless and changeover

To support the idea of a fluid and quick typing up of documents the software also comes packaged with the software Scanaway which archive all patient information onto Praxis.

From doing some further research Scanaway is a medical software that conveniently stores and archives away a wide range of documentation voice dictations, faxes and even video and movies files. In addition to this they allow them to be accessed anywhere that has an internet access

To add to this to allow for a smooth changeover an initial feature is to **Import Current Patient Demographics;**

Praxis imports patient demographics from any EHR. Or, Praxis connects to virtually all billing & practice management systems and migrates their demographics automatically.



User interface

Unlike CareCloud the format and layout of the software is more formal and has a less cluttered interface. While the software is much older it seems to me to have a simpler layout than CareCloud it however feels striped of functionality and seems to be a regular EHR at first glance. However the colouring and location of tabs seem too outdated for a system that costs around £250 a month, however the speciality of the software seems to be functionality over its appearance, so it's not really an issue. I know my GUI will look similar to the layout of this. But the way I will colour and layout my tabs windows and text will be more approachable for a user than this. One feature I saw on the image on the left is a timer for when the next patient arrives in. This is a good feature to use for a hospital as it shows when they should arrive exactly. It will also take into account delays to the system which is a major benefit as an appointment is never exact.

To be honest the software is quite simplistic as it pretty much contains most of the features I intend on using to the system. Despite it being 25 years old however there is a few major features I intend on gathering inspiration from for my proposed solution.

Feature/Facility	Justification	Source
Automatic suggesting of admissions	I have thought about this idea in my discussion however this has made me certify the idea I want something similar to this on my system. This is because the ability to fill in documents quickly has always been a major feature to include on the system. However Praxis has uniquely created the idea of having it automatically suggesting documents to use as it knows a similar admission to this has already occurred. This is a much better idea than having multiple drop down boxes as it allows for freedom when inputting data onto the system a drawback to most other major EHRs available at the moment. This will allow me to be more unique in an area of software that already is full.	Praxis
Clean layout/ not cluttered	While CareCloud seemed to be more user-friendly with nice smooth curved colourful boxes, another thing I will daw heavily from is the clean functionality and minimalistic layout of this software. While for the user end it can appear friendly as I have already said the staff-end of the software doesn't need to be like that. So I think a clean layout will help efficiently when it comes to typing up documents.	Praxis
Time for next appointment	As the patient's appointment may never be on time for whatever reason, a timer would allow for the ability to push forward or delay an appointment according for a consultant. This could be a useful feature to include as it is important that an appointment doesn't over run and affect other patients.	Praxis

2.3 The proposed System

2.31 New requirements of stakeholders

Consultants

These are the most Important stakeholders on the system as they will now take over some of the old medical secretaries' roles. The benefit of having this entity on the system is that having a user other than the patient, especially someone inside the hospital who can view and edit notes helps ensure that documents are up to date and correct. They will bridge the patient stakeholder to the treatment they will receive through the admission and can:

- Search quickly for a patients file and bring up all their information
- Sort their patients file by many key fields like by demographic, medical history, prescriptions etc
- View all the information about their patient, including private information like medical history
- Consultants who have no affiliation with a patient will have restricted access to documents unless given access by the patient's consultant.
- Add new documents like letters to the patients file, it can be done in a matter of minutes as it suggests appropriate responses to input
- Edit patient documents with ease all the information should still be there when editing, this will update the correct document
- View their appointment schedule of all upcoming visits for their patients only and an active status for each patient
- If they can't make an appointment they can select the best suited available consultant to make it for them
- Request for a follow up appointment for the patient which is sent to the staff
- They can print off the patient's medical information to give to them
- For this stakeholder efficiency is the most important aspect of the user. As they will type up the patients documents now it needs to be done in a matter of moments than how current medical secretaries do it now.
- If a patient no longer needs to visit a dischargement status should be enabled, which archives an admission
- An admission can be resurge if an ailment comes back
- The feature to move forward an appointment by a set amount of time, and a timer to allow the consultant to view if an appointment is taking too long
- Have multiple tabs available so that they can switch between patients quickly
- Their GUI doesn't need to be friendly but be clear, non-cluttered and functionality oriented. The main benefits of the last two points is to allow for a fast access to all a patient's information and that tasks don't need to take longer than they should

Administrative Staff

These are the users that will deal will processes that the consultant does not have time for, they will be used to link the actual patient and consultant together.

- Add new patients onto the system
- Create new admissions for a patient
- Remove information regarding a patient if requested
- View the basic information regarding a patient's demographic
- Add new bookings for a patient, while they may automatically produce it needs to be done by some staff as the patient won't have the ability to add themselves.
- They can view all appointments for every consultant and see the status of
- They will have to add all the previous documents from the current system onto the system
- They will be unable to view any personal information about anything for the patient, this could be ailment, what the appointment is about
- The interface for this stakeholder is both friendliness and efficiency, this is because while they need to be fast while working, coming from my experience having an employee who doesn't work there every day they need to be able to have some understanding of what the features do without having to consult an online guide on how to use it.

Patients

These are the second most important users on the system as they have their data sorted on the system. The benefit of them being a stakeholder in the new system is that they will have more controlling power over what they can and can't see about their medical information. For these stakeholders it should be crucial that they are able to use the system from their end and have the access to the processes they previously had. Therefore they can:

- View all the information about them, and the file they have on them
- A files information is sorted initially by admissions and an admission is archived if no longer in use
- They can sort their medical information by a key field like date
- They are able to request for any document to be printed of if it is about them
- They are able to request that all their information to be deleted
- Choose a date to book an appointment
- View their prescriptions and other medical requirements
- Move the date of a booking to a better one
- They are able to cancel a booking
- They have to update their personal information every 3 months to make sure everything is up to date
- The interface for them should be friendly with icons being clear, panels being relevant to them, and that the patient shouldn't have to try every tab to get to the information they need. They should know what every window and tabs is generally about without having to look in it

Management

Management will consist of the onsite IT support and technicians and an offsite data storage company who would allow for a large storage facility to be used at Euxton. The benefit of now having a management staff for the system is that they will now be able to dictate how the new system is ran replacing the current poorly designed head of departments. They will have access to external features that would be unable to be used by any other end user or stakeholder. They will be able to:

- Add Consultants onto the system they will have the ability to remove consultants but not delete them in case they need to be contacted for whatever reason
- Add staff onto the system and have the ability to edit any of their information like
- Admissions are not deleted but are rather achieved where all the information is reduced to keep patient file sizes down
- View who edits documents and view the update log for every patient. This benefits the system as it shows who have been editing logs and spot discrepancies when it comes to patient information
- Adjust how the backups for the data are occurring
- The user interface and layout will not need to be a major concern as it should be a command line interface to allow the most functionality for the most advanced IT user.

2.32 Specification for Proposed System

Functionality of the new system

The fundamental purpose of the new system is to virtualise the current paper-based system. This will be done by first scanning in all previous documents from the old system and grouping them by patient and adding them onto the patients record. During the changeover period the system will allow for the consultant to type up the current documents that are already used to the new system, however it will be done through the GUI by drop down boxes and combo boxes unlike how documents are created using a text editor currently. These will then be saved to the patients record. The current booking system used will be moved over to the new system. Here the patient can look at all their information in a fast and efficient way. Staff on the new system will have a more restricted access to patient information but will able to add/ edit and cancel bookings.

Scope of the system

Included features

In the new system it primarily focuses on document and data management. However, to add some practicality to it a booking system is included to help centralise other major aspects of the current system. This means however that other features of the old system are left out this is simply because they were out of scope from the two main ideas. While the idea is ambitious I believe to have it contain some functionality besides a general document viewer like some EHRs I saw while investigating other systems similar to mine, the features I aim to include are:

- The ability to view all the documents a patient has
- The ability to add/amend/delete patient documents
- All patient documents are encrypted to ensure secure data
- When adding a document it will suggest similar inputs from similar admissions
- A file is organised by admissions, when not I use anymore the admission is achieved
- Data access levels will be prominent throughout the system
- The ability for patients/staff/consultants to add amend a patient's appointment
- Management can add/deactivate staff and consultant accounts
- Management will be in charge of the backup procedures and have the option for a manual backup they can edit the frequencies of automated ones

Excluded Features

However to keep my main idea the most relevant and the focus point to the entire system there are many processes and features that I will not include in the proposed solution the most noticeable being:

- Advanced Expert System dealing with medical questions
- Ordering and maintaining medical equipment
- Communication between system users
- Payment from patients, and wages of staff
- Medical Education of staff/Training of nurses and doctors
- Offsite location of data storage
- Mobile applications
- Touch screen accommodations

Interface

The interfaces will be split by the three main users: Staff, patients and management. Each user requires a different approach when it comes to the interface as they all have different priorities when it comes to the new system.

Staff

For staff, this includes both administrative staff and consultants, the priority for the user interface for them is efficiency and speed as currently the system is too slow for them for how data travels around the system. These staff need access to the most important information and have to keep doing the same process every hour, so by having a monotonous task made to a quick process it will allow for more time to do processes that matter. They should have somewhat of a friendly user experience as the staff may not use the system everyday so it would allow for inexperienced users to have some ability to navigate the main tabs and window without the need of consulting a guide.

Patients

For patients the focus for them is friendliness and usability. For this user there is no need for them to have overcomplicated features when they can't find the demographic page to update their information. Because of this it needs to be clean and approachable layout with clear labels to all important tabs and buttons. They should be able to move through the system without the needing to go through every window to get to what they want. It would be great to allow for special access like touch screen as it is a hospital, but it is too far out of scope for my system.

Management

The most important thing for this user is features as they will be the most advanced user they will have no need for a GUI therefore a command line is the best option to go with for this user. This will allow for more practicality from the user as they can just use the functions available to them. It will also allow for this user to have a faster time accessing information they want.

Functions and Features

There are many things that will occur on this system, here is a list of all the functions so far are to be included onto the system, during development some more are likely to be added but here are all the ones I have so far:

- Search quickly for a patients file and bring up all their information
- Sort their patients file by many key fields like by demographic
- Add new documents like letters to the patients file
- Edit patient documents
- print off the patient's medical information
- Sort their medical information by a key field like date
- Search for bookings by any key field
- cancel a booking
- Add new patients onto the system
- Create new admissions for a patient
- Remove information regarding a patient if requested
- Add Consultants onto the system
- Remove consultants but not delete them
- Add staff onto the system and have the ability to edit any of their information like

Also the features of the system are this:

- A hierarchy of data access so unauthorised staff are not permitted to view private information about the patient
- When an admission is finished and the ailment is resolved the collection of related notes will be archived, but the sets of notes can always be reinstated as active in case the admission becomes active again
- The notes are backed up during off peak times to prevent data loss
- Similar admissions will result in documents being partially filled in with relevant information
- Before an appointment date the patient can input data into a simple GUI which will determine if the ailment is worth an appointment it will also automatically fill in some of the booking form.

Performance

Correct implementation of features

To determine if a feature has been implemented onto the system correctly the following should have happened:

Testing for every input of the feature, so that all inputs are correctly validated with every type of testing data having been used to check for any incorrect inputs.
When checking the processes of the system, every output they give are intended and expected. No bugs occur like missing objects or text not appearing.
The operation of the function itself does not hinder the operation of any other feature of the system
The code is correctly commented to show an accurate representation of how it works. Also any unnecessary code is removed.

Running on other computers

While my laptop will be able to process the data requirements for the system and all software will be ran from one device. The computers currently at Euxton are more than up to a high standard for this side of computer hardware therefore I have no worrying thoughts about the system not running on their environment. However when it comes to data storage it is clear that their systems in place is not suited to handle masses of potential patient information. Even though their hardware for each user might be up to date the end server currently in place is not capable of supporting a network for relaying large amounts of information between users.

Real Time Control

Liked I mentioned in my discussion I am not including any real time control systems onto the system as currently there are none that are within the scope of my system. It would have been included if was to manage the status of the operation theatres making sure that the temperature was neither too high or low, however as it is not used real time control is not needed.

To add to this while processes don't need to be instantaneous, the ability to load patient documents should have a minimal processing time to allow the best functionality for the patients.

Real Time Transaction

Unlike Real Time Control, we use Real time transaction to allow for the integrity of bookings to be kept. While it doesn't play a massive role in booking the ability to ensure an appointment Is not booked twice will be important for the avoiding of accidental updates of patient information.

Reason for proposing the new system

Why the system needs to be digitalised

The current system needs to be overhauled for countless reasons as provided by the investigations I held. From them I found that the time taken to retrieve a patients file was exasperated by the possibility it might not be found. As the amount of staff who work in the department are drastically decreasing something needs to happen to reduce the demand on the department as a whole. To add to this the in order for a patient to access any information it needs to be printed of and either sent home through the postal service or given to them through an appointment. Either way the patient has no instant access to the information they have. Euxton have shown that money is becoming a slight issue, despite this they continue to employ staff to constantly archive away files. If the system was virtualised that money being used to keep staff filing could have gone to a better source like new equipment or for other important necessities.

The end purpose of the system

The end goal of the proposed system Is to modernise a system that is in dire need of being brought over to a digital medium. While the changeover process will be long, it will overall result in the hospital running more efficiently and allow for the patient to view their information whenever they want. As consultants become used to the system documents should be able to be created in a matter of minutes and be able to be seen by patients. When a patient books an appointment they will have a timer to until it happens reducing the likelihood of missing appointments.

2.33 Methods to be used in Proposed System

The language I will choose is Java as it is currently the best choice to use for development of my software. The main benefit of this being that I have an existing knowledge on how to use the language and will use it to my advantage. Another advantage of java is its main paradigm and main draw which is an object orientated approach, this is another reason to choose java as it will allow for me to create an effective GUI with the extension of swing, an extension that has a large online support, using an object orientated approach also allows me to utilise its main aspects such as encapsulation, polymorphism and most importantly inheritance, This will allow my classes to receive attributes and functions from their parent class allowing for some efficiency to be introduced without much thought. Inanition to these properties Oop also utilises abstraction and object hierarchy which will be used to aid my programming of the system. Other reasons to use the language will be for:

- its wide support online and help through external resource. Being one of the most used languages other than C will allow for a wide range of help for all aspects of the language.
- It uses a complier rather than an interpreter this will allow me to only compile the code once unlike an interpreter which is needed every time it is ran.

However, one thing that I have considered but will not ultimately use is an IDE, while integrated development environments like NetBeans and Eclipse do provide a substantial benefit to software design I've been suggested to use a general text editor. Because of this I will use the text editor Notepad++ to develop my system, while it does contain features of an IDE like automatic formatting, colour coded syntax is does not point out errors or use any debugging features like a point break or a variable watch.

Method	Technical Justification
Java Swing, an extension of Java	The java swing extension will be used as it will allow me to create a GUI for the user interface. Swing is being used over other GUI's like SWT due to how extensive, customisable and lightweight the interface is for the user. To add to this the components Swing uses are more flexible and powerful than most other GUI components. Because of this developing the interface for the staff and patients should be an easier task. To minimise time spending positioning components I may also utilise a custom program called JGUID which simply allows the dragging and dropping of components however besides declaring location and size the component has little other attributes declared leaving me to fully declare the rest to suit my needs.
Command Line Interface and Graphical User Interface	While the process of creating the GUI will be done through the extension of Swing I also believe that the interface should be discussed. To create a coherent experience for the user I will not use multiple types of interfaces for a single user and the display will be either CLI or GUI with no changes whatsoever. As a CLI will only be used for the management entity the aim of the output will be to be efficient and focus on clearness, any visual flair will not be prioritised.
Data Structures	To allow for entities to have their data stored, data structures will be used to hold all the data. As java is an object-oriented programming language it will allow me to use records to hold information about entities like patient ID. By using Java, classes can be easily be used to create unlimited objects which will be held in an array and eventually written to file.

Method	Technical Justification
Files	These will be the most important data structure on the system as they will be needed to permanently hold any data created by the system when in use. Because of this a large amount of data will be present and the issue of finding induvial data will play a big part into making the system efficient. This can be overcome with the use of primary keys which will uniquely identify the line in question for example PatientID in the patient demographic page.
Records	Besides files records are the most important data structure. While a file will be used to hold information while offline and not in use a record will be used while the system is currently in use. This is because of many reasons such as it allows attributes of any data type to be held unlike arrays, they can allow the use of functions and procedures. Finally they can also utilise the physical aspects of oop such as inheritance which reduces the amount of declaration which is massive.
Arrays	Arrays will be useful for holding objects such as patients who may have many attributes attached to them and will be useful for searching and sorting algorithms, this seems to be the main use for them in the system. They will also be beneficial as they will be able to be written to file pretty quickly due to them only having one dimension. They will have to be ordered however if any binary search is to be used which means the array cannot be too large if it has to be reordered to include a new object. Finally the issue of array size is important as a method to increase it's size will be needed to prevent any error out of bounds issues from arising.
Multidimensional arrays	I will also use multidimensional arrays to allow the storing of multi indexed data for processes like holding the names of patients with similar surnames. The main draw to utilising this data structure is its ability to allow data of the same type to be stored on separate indexes. While the system is use, having an array of arrays will allow for data of the same type to be collectively held in the same row which could be helpful in searching for individual attributes of objects.
Functions and modules	By using modular programming, it will allow me to reuse functions and modules and call them whenever I need them. This will be vital when a process that needs to repeat often like an encryption process or writing to file and will reduce the workload when compiling the script. The ability to use parameters to pass in anything will allow me to use polymorphism to essentially overload any processes that may not be required when passing through said data and instead finetune the method to suit the parameters requirements. Also by having procedural programs it will allow me to test in isolation and develop more efficiently. As I use java, polymorphism will allow me to adjust parameters and allow for new types of input which is a major benefit.

Method	Technical Justification
Searching	Searching will need to be implemented as patients will have countless documents and papers. They will need the ability to go through all their documents to find what they need. During development the best searching algorithm will be implemented to improve overall efficiency when it comes to finding specific documents. As of now the search method will be a binary search, documents will already have to be in order so it makes sense to use it anyway, the main appealing aspect to the search is that it can discard large amounts of items in the list pretty quickly and has the possibility to find the desired item if it is the middle value. If a better one is needed it will be used. As the search query like a name may have countless results they search will have to return all results as it will be unable to determine the entity needed by the user. To improve efficiency I will declare a generalised search algorithm and then allow the list of items to be passed through along with the search data, this will greatly reduce time during development which is a major benefit.
Sorting	A sorting algorithm will need to be implemented onto the system as the proposed solution will contain items that will need to be sorted into different field orders. One example of this will be the booking system, this is because the system will need to allow different users the ability to view the bookings in the way they want it could be done by patientID, by urgency, or even by date. Again similar to the searching one I will use the best method I know as of now but if during testing a better one needs to be used it can. Insertion sort will be used as it is the best so far, this is because it will efficiently sort each variable using them as input and will not take up much development time to develop and test. However to reduce file size I intend to create a general algorithm using polymorphism in which the sort order is decided and from that the correct sort it used.
File Handling	Writing to file and reading from file will need to be implemented onto the system as the system will need to externally store documents as they may be needed to be printed of or used to store patient information to be kept when the system is not being used. Fortunately Java already contains functions to write and read to files so they shouldn't be an issue. When writing and reading to file so I will use them, I will also use encryption and decryption methods to keep my data secure, which I intend on developing my own but will allow it to be changed and swapped out if necessary. While for some files new data will be saved in chronological order like time for the employee action log for instance others will have to be sorted before being read and stored in a primary key order such as patientID however for simplicity's sake as of now I intend on holding major text files in the same folder but that seems likely to change further on.

Method	Technical Justification
Validation	Validation will need to be a big part of my system as it is due to poor validation of user inputs the old system was in need of replacing. Because of this data integrity is a key issue on the system as I will need to prevent other such issues from arising like poor data consistency for example a new patient being created for someone who already has an existing account. For every input at least some validation will be used to ensure that user input is correct for the value being asked is correct. An example being when a patient is inputting medical information i.e. blood type the system will check all the known blood types to make sure that the user input was one of those. Something worth considering in addition to this will be for checking for existing objects that represent the entity being added to the system, one way to circumvent this would be to do a fast search seeing if main attributes match however this may be ultimately excluded.
Verification	Verification will need to be implemented onto the system to ensure when adding information it can be verified the most obvious way to ensure this will be a login page to allow access to staff features for authorised users. Other methods of verification will be for patients asking for their patient ID followed by their password to ensure extra security. When setting up accounts, double entry should be used to make sure passwords and are correct. Another verification I will use will be warnings such as if a consultant wishes to leave a page which they are currently editing and to save it before leaving. The last verification I would be happy to include would be popup menus ensuring that the user is happy with the decision made and if they are willing to continue.
Encryption and Encapsulation	Encryption is another technical implementation that will needed to be used in the system as when writing to file it needs to have some security when accessing a file. The main security measure will be encryption as a result of this it is important it works. When a document is written to file it will be encrypted using the encryption cypher. When a document is read it will be decrypted, again using the cypher to add meaning to the text. Like I've said before as of now a simple Caesar Shift will be used, however during development if it needs to be updated it can be done so that it will not affect the system besides rewriting any prior data but as it will not be near the end of development I don't see this as an issue. To also improve security encapsulation will be used to improve security of the cypher preventing unauthorised classes gaining access to attributes or methods they are not supposed to.
Data storage	While this isn't one hundred percent needed to be explained I have included it as its effects running speeds of all processes. The data storage media I will use is my solid-state storage to accommodate the system. This is because the NAND memory will allow for instant access to instructions and data. This is a massive benefit over any hard drive disc as it will retrieve data from memory instantly and will not fragment over time or slow down when more data is added onto the medium. In addition to this, another problem is avoided when using an HDD would be disk thrashing and other related issues as data access is immediate due to the use of transistors, this is a major benefit of using a SSD, especially in a system similar to mine where lots of data is constantly being etched from text files.

Method	Technical Justification
File Organisation	As many documents will be held in text files, file organisation is an important issue to control. Because of this to easily identify lines on a file, they should start with some sort of primary key to identify them against the lines alongside it. However primary fields such as PatientID will not be the only method of organisation as Date and time will also be used in such areas like the action log or booking system where time is the most important or where keys like StaffID are pointless due to the text file only relating to them. Furthermore other features of file organisation such as Sequential and Direct Random File Access should also be incorporated to effectively store data. However I will aim to use different types in different situations, data that does not need to be in any particular order should clearly use series, whereas much larger files should use DRFA as the hashing algorithm will be able to effectively hash the data to the correct physical address.
Primary key generation And other notable processes and calculations	While this is not a large aspect to discuss I still believe it is important to include as it will have an effect of my development of the system at Euxton. Primary key generation will be needed for my system and as a result a system to uniquely generate identifications for every object on the system. Therefore I believe it is imperative that when creating this, it does not share the same arrangement of characters as any other ID. This can be achieved through a variety of ways but I believe the best way to achieve this would be to use the first three characters of the users surname along with a 7 long randomly generated number. While it is still possible to get an exact match in ID the probability in doing so will be very low. However there are also other calculations that need to be addressed such the use of the MOD and DIV calculations these will be used predominately for searching in lists where the number of items is not an even value. This in particular will be for the binary search when finding the midpoint for the list of entities where it is possible that there are an odd amount of object

2.34 Objectives

As some objectives are universal, and some are not the entity specific objectives are put under their respective heading. However for some processes there is no entity involved these should be available to the program as a whole.

Function	Objective	Success Criteria	Required Performance
1. Input symptoms into expert system	The patient/ user (to become patient) should have the ability to input/select all their symptoms they are experiencing onto the system.	– To count as a success when the user has entered all their symptoms, they will then submit the information onto the system no errors should occur. – This should be for the patient and new users who will become patients. More than one symptom should be able to be selected.	When selecting symptoms, the patient should be able to select from a large list containing a range of ailments. The panel should load the components within 2 seconds. A text box should also be used to enter symptoms that do not appear to prevent important symptoms being missed that were not initially included on the system.
2. Determine suggestion of diagnosis	After the symptoms have been inputted the system should quickly determine the best course of action for the user either suggest off the shelf drug or urge them to book an appointment.	– If a selection of symptoms is unrecognised the instinctive option is to push for an appointment. – A basic diagnosis should be generated once all the symptoms have been entered by the user, giving at least a broad expectation to what the system perceives it to be.	The process of determining the best solution should be quick and would take no less than 5 seconds. The quality of creating a suitable diagnosis should be correct resulting in an accurate estimate for the suggestion for the symptoms presented.

Function	Objective	Success Criteria	Required Performance
3. Generating new patients on system	If a user who wants to create an appointment, but can't login, they should be forced to create an account on the system.	– Detect if the new account is pre-existing, this would be that the user is trying to create an account with similar credentials as a current patient. – Generate a new patient account onto the system containing all the initially required information.	Generating the actual account (adding them onto the system itself) should not slow down the system by a notable amount and should take less than 5 seconds. The account information should be correctly added to the right file.
4. Generating a new admission on the system	This should create a new record in the patient file with some information currently filled in like initial early symptoms and a possible diagnosis if available.	– Adding the admission to the account should generate a corresponding consultant. – The consultant assigned to the patient should see that a new admission has been created. – The admission should be added to the patients account containing all the relevant information.	The process should add the admission to the system in about 3 seconds. Information that can be filled in should be with no mistakes. Generating an admission should take around 4 seconds.

Function	Objective	Success Criteria	Required Performance
5. Booking a new appointment on the system	Once a new admission has been made the patient will have the ability to create an appointment for themselves or get a preassigned one.	– If the user wants to choose a booking only free times should be available to prevent double bookings, loss of integrity. – Automatically assigned appointments should be generated quickly and at an available time. – The system should then lock out that time for the consultant once booked.	An appointment generated should not clash with other patients on the system under the same consultant. An appointment should be generated within 3 seconds. Locking out fields should be immediate and done as soon as possible.
6. Login users	If the expert system is not needed the only other option is to login in for the system for the following users: Consultant Patient Staff Admin	– An error message should be generated if not correct. if the password is wrong that should be notified id the username is wrong then that should be notified. – If the credentials have been entered correctly the corresponding user should be allowed access onto the respective part of the system.	Logins should be checked to validate the input, so no incorrect information is entered on the account and allowed access. Checking details and allowing entry should be done in less than 4 seconds.
7. Display menu options	The program will display the options available to the user. ***No pseudocode is required for this section***	– The buttons should be noticeable and clear to what they do.	This should be a quick, less than 4 seconds, and simple process no lagging for the Generations of GUI components should occur. No components should be generated unless intended.

Function	Objective	Success Criteria	Required Performance
8. Add employees onto the system	The management staff should be able to create new employees and add them onto the system.	– All staff inputs should be validated – New staff/consultant entities should be able to be generated on the system containing all the required information.	Adding employees should not break the system by resulting in errors when manipulating staff information. The time taken to generate the account should be less than 3 seconds.
9. Archive employees from the system	The management staff should be able to set a staff's working status to no longer current.	– Should be a quick action that hides the employee from all parts of the system. – The employee should no longer be visible to any other form of user. – The employee should no longer be able to interact with any part of the system or access the account.	The process should take around 3 seconds causing no issues with processing performance. The employee should no longer have access to the system, once this occurs, any attempt to login should result in error messages.
10. Sort employees	Management should be able to sort through employees by key fields.	– Once selected the list of employees should be ordered by key field. And then should be returned to management.	Sorting should be correct and show no errors when in order. Sorting itself should be an efficient method and be done in less than 5 seconds.
11. Search for employees	Management should be able to search through employees by key fields.	– When finished the system should return the correct information needed for management. – If an account or entry can't be found a notice should appear that no items that match the query were found.	Searching for employees should be a very quick process less than 5 seconds. No incorrect employees should be returned.

Function	Objective	Success Criteria	Required Performance
12. View an employee's transaction log	Management should be able to see every action the employee has done to any patient record.	– As it could be very large the user should be able to section off parts of the log and view the specified area. – After entering the times, a list should appear containing all the actions performed by the employee along with information relating to it.	It should be done in command line to save resources therefore should be done in at least 10 seconds. No records outside the specified time should be shown.
13. A Read transaction log from file	When management staff wish to see actions performed by the employee the system will read from the specific time chosen and read over all the available information.	– The date, time and patient should be included with a description of what was done for each specific action should all be copied over from file to view – This should also be done where the running of the system is disrupted or slowed.	The process should not take too long as it should be added to the end of the file so should take around 3 seconds.
13. B write transaction log to file	When an employee amends/adds/ creates to or on a patient's details information is wrote to their individual file	– This should be done for every action the employee performs – The date, time and patient should be included with a description of what was done.	This should also be done where the running of the system is disrupted or slowed. The process should not take too long as it should be added to the end of the file so should take around 3 seconds.

Function	Objective	Success Criteria	Required Performance
14. Staff entity can sort for patients	The entity should be able to search for patients by a key field.	– Once selected the list of patients should be ordered by key field and presented to the staff.	Sorting should be correct and show no errors when in order. Sorting itself should be an efficient method and be done in less than 5 seconds.
15. Staff entity can search for a patient	The entity should be able to sort for patients by a key field and receive the person they are looking for.	– When finished the system should return the correct information needed for staff. – If an account or entry can't be found a notice should appear that such item was not found.	Searching for patients should be a very quick process less than 5 seconds. No irrelevant patients should be returned, only patients who meet the search query should be returned.
16. View no restricted patient details	Staff should be able to view all basic information regarding the patient.	– No advanced medical information should be seen by this user that could be confidential. – The entity should be able to see all generic information regarding the patient.	This should load very quickly less than 3 seconds. This should only show the basic information of the patient.
17. Add archived notes from old system	The staff should be able to add pdf files to this section of the patient's account and add subsequent tags relating the scan and allow for then to be searched and ordered.	– A pdf should have visible document where handwriting should be able to be seen. – If a section can't be read from the scan the ability to add missing text should be present.	The quality of the scan should be high. The file size of the pdf should not be greater than 5mb. The time taken to save a document to a patient should be less than 2 seconds.

Function	Objective	Success Criteria	Required Performance
18. Amend bookings	Staff should be able to add and edit patient bookings on behalf of the consultant's request if a change needs to occur for a booking it can be made.	– New bookings should be created and stored to the patient's admission correctly. – Validation should occur to ensure that double bookings do not occur. – Once amended the entire system should respectively update as well instantly. – The patient should be notified if a change is made.	New bookings do not interfere with new/automated bookings. The process of amending bookings should be used to replace the old data.
19. View patient bookings	The staff entity should be able to view all upcoming and past bookings made, but the advanced information of the booking should be unknown.	– Only basic appointment information should be visible such as time – More personal information like required actions like bringing samples, not eating should be unavailable –	The information should be displayed instantly in about 2 seconds for the staff user. No information that can viewed should be left out.
20. View patient's non restricted information about admissions	The staff entity is able to view most of the information of an admission besides doctors' notes.	– Doctors notes should not be able to be viewed by this user – All the admission information should be easy to read and follow	They should be loaded in very fast less than 5 seconds. No gaps of information should be left within the patient admission.
21. Have patients view their Admissions and Demographic information	Once the patient has logged on, they should be able to view both their demographic and admission information for this to occur it needs to be saved in the patients file respectively.	– The patient should see all the information held about them – No information should be missing from the page – All the information in the patients file should be brought up –	They should be both displayed under less than 10 seconds as they could both be large. The page should both be easy to read and understand what every GUI component does.

Function	Objective	Success Criteria	Required Performance
22. Amend demographic information	The patient should be able to add (if missing data) or edit current demographic information about them.	– This should once finished update the entire system about what has happened – If not occurred for three months, it should be enforced on the user to make sure it is up to date – Only basic fields must be kept and not removed i.e. name – The patient should be able to enter new information onto their file where necessary and available	When saving the data, it should take less than 3 seconds. The location where it should be saved on the file should contain the data that has been added the next time the file is opened. Adding information should not affect performance to access their file.
23. Validate information	Once the patient has entered/updated any of their information they entered will be validated checking everything is acceptable.	– It should detect if a field is missing and notify that it has been missed – Type checks should be done to make sure that the entered value is of the correct data type – The system should accept correct data and reject invalid data that don't meet the validation conditions	Validating the data should take less than 4 seconds. No invalid data should be able to be saved to the patients file.
23. A) Presence Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted
23. B) Type Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned. – The correct data type should also be passed through to allow comparisons	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted

Function	Objective	Success Criteria	Required Performance
23. C) Format Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned. – The correct data format should also be passed through to allow comparisons	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted
23. D) Range Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned. – The correct range of data should also be passed through to allow comparisons	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted
23. E) Lookup Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned. – The correct list of data should also be passed through to allow comparisons	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted
23. F) Length Check	When the data is passed through the parameters for this function it will output whether if it acceptable or not	– When the data is passed through the correct output should be produced either returning true or false no other output should be returned. – The correct data length should also be passed through to allow comparisons	As this will be for small fields comparisons should take less than 1 second, in addition to this the correct output should always be made no wrong data should be accepted
24. View bookings in its entirety	The patient should be able to view their upcoming appointments.	– Every past and upcoming appointment should be shown to the patient – The location, room, time, consultant and pre appointment notes should be shown – No information should be obscured by the GUI	Loading the patient's bookings should be fast and take less than 3 seconds. The patient should be able to select any of their upcoming appointments and view the correct information.

Function	Objective	Success Criteria	Required Performance
25. Add bookings	The patient should be able to add bookings.	– The adding of a booking should instantly be updated across the system to prevent integrity issues from occurring – Double bookings should not occurred	Currently filled in time slots should not allow to be chosen. Saving a booking should correctly update the location of the field and be updated across the system. Saving fields for bookings should take less than 4 seconds.
26. A) Sort documents	The patient should be able to sort their documents.	– When the selected sort has been chosen the system should place the documents in the admission in that order	Sorting for patients should be a very quick process less than 5 seconds. The system should have all the documents in that particular order
26. B) search documents	The patient should be able to search their documents.	– When finished the system should return the correct information needed for staff – If an account or entry can't be found a notice should appear that such item was not found	Searching for patients should be a very quick process less than 5 seconds. The system should return all documents that meet the search conditions.
27. Print documents	The patient should be able to print off any document they choose.	– Printed documents should show the on the paper all the information that was desired to be printed – Allow the printing off of any documents from their file	It should not slow down the system so the process of printing should be less than 3 seconds. Spooling should allow for other tasks to occur while this happens.

Function	Objective	Success Criteria	Required Performance
28. Consultant can Search for patients	The consultant should be able to entre different types of search fields and be returned all the corresponding patients.	– It should correctly return all the correct patients from the search query – If no one is returned a message should appear informing them of so	This should only be for patients who are linked to the consultant, patients he is not looking after shouldn't appear. It should be fast to execute and done in less than 4 second.
29. Consultant can view patient files	Once a patient has chosen, the consultant should be taken to the patient's complete file which shows every single piece of data held to them either on the page itself or contain links to other pages.	– It should not be cluttered, or hard to find relevant information. Everything should be easily identifiable – All their patients' content should be able to be accessed from this file	Loading in the page should not take less than 5 seconds. When loading the page, no issues should appear like components of the GUI being missing or not there.
30. View patient Demographic information	If the consultant wants to go further into the patient demographic information they can and see all the basic non admission information held about the patient.	– All the information should appear as intended nothing should be missing or obscured from sight – No missing components of the GUI should be present.	This should be a fast process which should load the page in no more than 2 seconds. No incorrect information, such as old information, should be shown and everything should be correct.
31. Sort admission	The user has the ability to sort the admissions with different fields.	– When they are being sorted, they should be in the correct order – It should return the admissions in the correct order as desired	The ability to sort the admissions should be done very fast less than 4 seconds. The most suitable sort algorithm should be used to maximise performance.
32. Edit Prescriptions	If the consultant wants to edit prescription information, they can edit most information.	– when selected to be updated, when loaded it should fill in all currently filled fields with the old information to allow for slight adjustments like dosage without removing all the data	Once it is saved it should update the entire system but should not impair operations. Saving the edited information should be instant less than 3 seconds.

Function	Objective	Success Criteria	Required Performance
33. Add Admission information	The consultant is able to enter admission information about the patient.	– The information added should be correct and no errors should be included – The consultant should be able to add a wide range of information to the admission like documents to general information – The information added should be saved to the action log	Once added it should be saved in less than 3 seconds.
34. Edit Admission information	The consultant should be able to edit admission information.	– The patient should be notified in some way if a change is made to the admission – The information should be saved to the action log –	The information should be saved in less than 4 seconds. The old information should be discarded.
35. Add notes	The consultant should have the ability to add consultant documents correctly.	– The input should be validated – The new set should correctly be added to the correct location – The patient should be able to view the new document once added –	The ability to save notes should take 3 seconds. Adding documents to the admission should not slow down the system dramatically and should be hard to notice a difference.

Function	Objective	Success Criteria	Required Performance
36. Encrypting data before being written to file	When a document is about to be wrote to file it will be encrypted before it is added.	– When this occurs, it should correctly encrypt the data that has passed through it. When it enters the data should be correctly changed to the right data type and then encrypted and should then pass on the data to wherever it needs to be sent	This process should be very fast taking less than 4 seconds. The encryption cypher should be advanced enough to result in no resemblance with the original data.
37. Decrypting that has been read from file	When a document has been read from file it should be decrypted into readable text.	– When read from file it should decrypted using the same cypher into the correct data type.	The process should be very fast around 3 seconds. The function that will do this should correctly return the original data that was passed through the encryption function.

Function	Objective	Success Criteria	Required Performance
38. Using the Jargon library	Patients and administrative staff should be able to view the definition of jargon when entering a specific word.	– When the user accesses the library, they should be able to enter a specific word onto the system and see for the definition – If no definition is present it should be automatically put forward for it to be added	A definition should be generated if present in around 3 seconds. The correct definition should be with the word associated with it. Searching for a definition should not slow down other tasks occurring.
39. Adding to the Jargon library	Consultants should be able to generate a new definition for a new word and should be saved to the system.	– When the consultant accesses the page, they should either select a word that has been requested or enter in a word of their own – Once a new definition has been generated it should be immediately added to the database	Saving a word to the system should be a very fast process and take less than 5 seconds. It should be able to be accessed immediately after being added.
40. Search through Bookings	As the consultant will have many appointments on the system in order to retrieve the correct one, it will have to be searched for	– When the system neds to view a booking this will be used to return the correct information to the system to allow for the process to continue – When unable to return a patient's booking, i.e. it doesn't exist it will return an error message	The process should be less than 2 seconds as it will be a very small list of items Other bookings can be returned if they also meet the search query
41. Search through demographic information	The system will allow the demographic file to be searched through and return a patient's demographic information	– When ran it should go through the file and return the patient that correctly matches the search query as only one is intended no others should be returned	The process may take some time as there will be many patient demographics so this will take less than 3 seconds.