SIL EMR Requirements Documentation

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This document focuses on the **what**, rather than the **how**. It is a vision statement, not a blueprint.

You can download it in EPUB3 and PDF.

CHAPTER

ONE

FUNCTIONAL REQUIREMENTS

1.1 Product: Billing and back office

Billings and payments are the two functions that have the greatest influence on cash flow. In healthcare, like in any other business, 'cash is king'. Every healthcare enterprise wants to make more revenue, collect all of that revenue, minimize purchasing spend and pay suppliers at the last 'polite' moment.

1.1.1 Theme: Registration and visits

This is the entry point for all clinical and administrative processes.

Epic: Patient registration

Instead of providing separate registration experiences e.g quick registration for emergency rooms and 'normal' registration for other settings, this design will target a streamlined patient registration function that can be used in all settings.

The important fields should be clustered at the top of the page - so that a time pressed department can opt to fill in the important ones first and add the rest later.

Note: The assigned patient numbers should be **unique network-wide**. One suggestion is for them to be namespaced alphanumerics that have at least 16 characters, a mix of letters and numbers. The designers of this numbering scheme should however be humane; the numbers should be easy to "chunk" into working memory.

Note: The **Master Patient Index** should provide a way in which related patients (e.g mother and baby or siblings) are cross-referenced.

The MPI should support **merging of patient records**.

Note: The complete history of a patient record's changes should be maintained.

Story: Find existing patient record

The focus here should be on providing search that is of sufficiently high quality - high enough that the users almost never have to rely on the 'Advanced Search'.

The search should tolerate common errors (transpositions, translations, ommissions) etc, tolerate alternate spellings (British vs. American) and support transliterated Arabic names (e.g Mohammed vs Mohamad vs Muhamed).

The available search fields *include*:

- patient names (surname, first name, middle name)
- date of birth / age
- gender
- unique patient identifier / medical record number
- alias
- father's or mother's name - useful for neonates
- identification document number
- phone number
- location e.g room or bed
- visit number
- visit date
- admission date
- admitting physician
- discharge date
- family linkage e.g son of

Many of these are more suited to the 'Advanced Search' function. We should strive to implement default search so that it is good enough to obviate the need for these most of the time.

The patients list should be sorted in reverse chronological order by default.

Listing 1.1: **Find an existing patient via full text search**

```
Feature: Find existing patient record
    The system should support multiple patient search criteria, including:
    names, partial names, historical names e.g maiden names, identification
    numbers e.g National ID or passport number, medical record / patient
    numbers, visit / encounter numbers e.g IP / OP number and insurance
    numbers e.g NHIF or private insurance member numbers.

    The search should be tolerant of simple spelling mistakes e.g
    translocations, transpositions, translations, alternate spellings
    ( American vs British spellings ), common abbreviations ( e.g. 'Bill' for
    'William' ) etc. A partial name should work as well as a full name, even if
    the order of the names is reversed.

    The multi-location nature of the enterprise ( e.g a multi-branch healthcare
    chain ) should not matter - a patient registered in one branch should have
    their record available in any other branch.

    Scenario: Search for a patient record from a patient list
        Given that I am logged in as "a <POS> user>"
        And I navigate to the "<POS>" home page
        And I navigate to the "Patients" listing
        And I click on the search box
        When I type at least three characters of the "<field>" of a patient
            that exists
        Then I should see records that match the "<field>" on the patient
        listing, with each listing entry showing the name, patient number,
        identification number, date of birth, gender and current patient queue,
        a patient photo, visit status, preauthorization status and copay status
        And I should get fewer and better matches as I type more
        And the patient list should be sorted in reverse chronological order by
```

```
            default

        Examples:
            | POS        | field                                      |
            | Triage     | name                                       |
            | Triage     | historical name e.g maiden name            |
            | Triage     | patient record number                      |
            | Triage     | identification number e.g national ID      |
            | Triage     | insurance number e.g NHIF or member number |
            | Triage     | visit number ( IP or OP )                  |
            | Pharmacy   | name                                       |
            | Pharmacy   | historical name e.g maiden name            |
            | Pharmacy   | patient record number                      |
            | Pharmacy   | identification number e.g national ID      |
            | Pharmacy   | insurance number e.g NHIF or member number |
            | Pharmacy   | visit number ( IP or OP )                  |
            | Lab        | name                                       |
            | Lab        | historical name e.g maiden name            |
            | Lab        | patient record number                      |
            | Lab        | identification number e.g national ID      |
            | Lab        | insurance number e.g NHIF or member number |
            | Lab        | visit number ( IP or OP )                  |
            | Radiology  | name                                       |
            | Radiology  | historical name e.g maiden name            |
            | Radiology  | patient record number                      |
            | Radiology  | identification number e.g national ID      |
            | Radiology  | insurance number e.g NHIF or member number |
            | Radiology  | visit number ( IP or OP )                  |
            | Blood bank | name                                       |
            | Blood bank | historical name e.g maiden name            |
            | Blood bank | patient record number                      |
            | Blood bank | identification number e.g national ID      |
            | Blood bank | insurance number e.g NHIF or member number |
            | Blood bank | visit number ( IP or OP )                  |

        And I should be able to open an editing view to edit patient
            registration details
        And I should see a start visit button for patients with no ongoing
            visit
        And I should see a link / button to the current visit for patients with
            and ongoing visit

    Scenario: Advanced patient search
        If ordinary search returns too many hits, the user may resort to
        filtering the search results.

        Given that I am logged in as "a <POS> user>"
        And I navigate to the "<POS>" home page
        And I navigate to the "Patients" listing
        And I click on the search box
        When I type at least three characters of the "<field>" of a patient
            that exists
        And I click on the filter area of the list view
        And I constrain my search results by entering values into these field:
            | Field                |
            | Gender               |
            | Age or date of birth |
            | Phone number         |
            | Email address        |
            | Postal address       |
            | Last visit date      |
        Then I should see records that match the "<field>" on the patient
        listing and the constraining filter, with each listing entry showing
```

```
        the name, patient number, identification number, date of birth, gender
        and current patient queue, a patient photo, visit status,
        pre-authorization status and copay status
        And I should get fewer and better matches as I type more

        Examples:
            | POS        | field                                      |
            | Triage     | name                                       |
            | Triage     | historical name e.g maiden name            |
            | Triage     | patient record number                      |
            | Triage     | identification number e.g national ID      |
            | Triage     | insurance number e.g NHIF or member number |
            | Triage     | visit number ( IP or OP )                  |
            | Pharmacy   | name                                       |
            | Pharmacy   | historical name e.g maiden name            |
            | Pharmacy   | patient record number                      |
            | Pharmacy   | identification number e.g national ID      |
            | Pharmacy   | insurance number e.g NHIF or member number |
            | Pharmacy   | visit number ( IP or OP )                  |
            | Lab        | name                                       |
            | Lab        | historical name e.g maiden name            |
            | Lab        | patient record number                      |
            | Lab        | identification number e.g national ID      |
            | Lab        | insurance number e.g NHIF or member number |
            | Lab        | visit number ( IP or OP )                  |
            | Radiology  | name                                       |
            | Radiology  | historical name e.g maiden name            |
            | Radiology  | patient record number                      |
            | Radiology  | identification number e.g national ID      |
            | Radiology  | insurance number e.g NHIF or member number |
            | Radiology  | visit number ( IP or OP )                  |
            | Blood bank | name                                       |
            | Blood bank | historical name e.g maiden name            |
            | Blood bank | patient record number                      |
            | Blood bank | identification number e.g national ID      |
            | Blood bank | insurance number e.g NHIF or member number |
            | Blood bank | visit number ( IP or OP )                  |

        And I should be able to open an editing view to edit patient
            registration details
        And I should see a start visit button for patients with no ongoing
            visit
        And I should see a link / button to the current visit for patients with
            and ongoing visit
```

Story: Full patient registration

Listing 1.2: **Full / standard patient registration at the front desk**

```
Feature: Full' patient registration
    This will be the patient registration path that will be followed in
    settings that are not severely time constrained e.g at a registration desk
    for regular outpatients.

    Background:
        Given that I am logged in as a 'registration desk' user
        And I click on the 'Front Desk' main navigation link

    Scenario: Register a patient with no prior system record ( first timer )
        If the patient is a new born baby that has not been named yet, they
```

```
        will initially be registered under by prefixing their mother's name
        with 'Baby '. These records will be edited later.

        This form will also serve as a quick registration form. In a quick
        registration scenario, the optional fields will be left unfilled. It
        should be possible to fill in the form in 'quick registration mode'
        in 15 seconds ( verified by user testing ).

        Given that I have logged in and navigated to the front desk
        And I navigate to the "Patients" listing
        And I click on "Add New Patient"
        When I fill in the following unique data
          | field           | explanation                                  |
          | title           | Title of address e.g Mr, Dr ( optional ).    |
          | name            | Name: family, give and middle components     |
          | photo           | A photograph of the patient ( optional )     |
          | aliases         | e.g maiden names, old names ( optional )     |
          | father's name   | ( optional )                                 |
          | mother's name   | ( optional ) might include her maiden name   |
          | gender          | Administrative gender                        |
          | sex             | Birth sex ( optional, hidden by default )    |
          | birth date      | Date of birth, **can be estimated**          |
          | ID documents    | e.g ID or passport; can be more than one     |
          | Guardian's ID   | For minors                                   |
          | nationality     |                                              |
          | marital status  | Civil / marital status ( optional )          |
          | religion        |                                              |
          | telephone no(s) | Current phone contacts ( optional )          |
          | email(s)        | Current email contacts ( optional )          |
          | addresses       | Postal and physical addresses ( optional )   |
          | residence       | Country -> street and door ( optional )      |
          | next of kin     | Names, relationship, phone, residence        |
          | payment method  | Default payment method ( optional )          |
          | payment details | e.g NHIF, insurance details ( optional )     |
          | occupation      | ( optional )                                 |
          | employer        | ( optional )                                 |
          | notes           | ( optional ) free text                       |
          | guarantors      | Full name, address, phone number ( optional ) |
          | referred by     | Doctor or institution; name and contacts     |
        And click on "Save Patient"
        Then I should see a "Patient added" success message
        And a patient record number should be assigned automatically
        And I should be redirected to the patient listing
            with the new patient's record showing on top

    Scenario: Trigger validation errors when registering a patient
        Validation errors should display as soon as the field is 'blurred'.
        They should also inactivate the "Save Patient" button. The user should
        not have to wait for a failed server side "save" to be informed of
        validation errors.

        It should not be possible to save a patient record without any of the
        mandatory fields.

        Given that I have logged in and navigated to the front desk
        And I navigate to the "Patients" listing
        And I click on "Add New Patient"
        When I fill in wrong / non-existent values for each of these fields:
          | field           | explanation                                  |
          | title           | Title of address e.g Mr, Dr, Prof.           |
          | name            | Name: family, give and middle components     |
          | gender          | Administrative gender                        |
          | sex             | Birth sex                                    |
```

```
      | birth date      | Date of birth, **can be estimated**          |
      | ID documents    | e.g ID or passport; can be more than one     |
      | photo           | A photograph of the patient                  |
      | telecom(s)      | Current phone and email contacts             |
      | addresses       | Postal and physical addresses                |
      | marital status  | Civil / marital status                       |
      | contacts        | Family or emergency contacts e.g guardians   |
      | payment method  | Default payment method e.g insurance         |
      | payment details | e.g NHIF number, insurance details           |
    Then I should see a field-specific validation message for each value
    And the "Save Patient" button should be inactive


  Scenario: Attempt registration of a patient who already **has** a record
    The government issued ID documents are used to identify 'true
    duplicates'.

    This de-duplication should work across an entire organization e.g every
    branch in a multi-branch hospital.

    Given that I have logged in and navigated to the front desk
    And I navigate to the "Patients" listing
    And I click on "Add New Patient"
    When I fill in the following data, with an existing ID type & number
      | field           | explanation                                  |
      | title           | Title of address e.g Mr, Dr, Prof.           |
      | name            | Name: family, give and middle components     |
      | gender          | Administrative gender                        |
      | sex             | Birth sex                                    |
      | birth date      | Date of birth, **can be estimated**          |
      | ID documents    | e.g ID or passport; can be more than one     |
      | photo           | A photograph of the patient                  |
      | telecom(s)      | Current phone and email contacts             |
      | addresses       | Postal and physical addresses                |
      | marital status  | Civil / marital status                       |
      | contacts        | Family or emergency contacts e.g guardians   |
      | payment method  | Default payment method e.g insurance         |
      | payment details | e.g NHIF number, insurance details           |
    And click on "Save Patient"
    Then I should see a "Patient already exists" error message
    And I should be prompted to click through to the existing record
    And I should be able to edit the existing patient record

  Scenario: Attempt registration of a patient who **might** have an existing
    record. The combination of name, gender, sex and birth date
    is used to provide a 'potential duplicate' warning.

    This de-duplication should work across an entire organization e.g every
    branch in a multi-branch hospital.

    Given that I have logged in and navigated to the front desk
    And I navigate to the "Patients" listing
    And I click on "Add New Patient"
    When I fill in the following data, with an existing ID type & number
      | field           | explanation                                  |
      | title           | Title of address e.g Mr, Dr, Prof.           |
      | name            | Name: family, give and middle components     |
      | gender          | Administrative gender                        |
      | sex             | Birth sex                                    |
      | birth date      | Date of birth, **can be estimated**          |
      | ID documents    | e.g ID or passport; can be more than one     |
      | photo           | A photograph of the patient                  |
      | telecom(s)      | Current phone and email contacts             |
```

```
          | addresses       | Postal and physical addresses                  |
          | marital status  | Civil / marital status                         |
          | contacts        | Family or emergency contacts e.g guardians     |
          | payment method  | Default payment method e.g insurance           |
          | payment details | e.g NHIF number, insurance details             |
        And click on "Save Patient"
        Then I should see a "Did you mean to update ..." warning message
        And I should be prompted to navigate to the existing record OR save
        And I should be able to navigate to editing the existing record
        And I should be able to click "Save" and get a success message

    Scenario: Cancel a patient registration
        It should be possible to abort a patient registration at any time

        Given that I have logged in and navigated to the front desk
        And I navigate to the "Patients" listing
        And I click on "Add New Patient"
        When I click on the "Cancel" button
        Then I should be navigated back to the patient list

    Scenario: Register a John Doe in the emergency room
        A 'John Doe' or 'Jane Doe' is a patient - usually an unconscious
        emergency - about whom little or nothing is known. They still need to
        have a patient record created in order for treatment to proceed.

        Given that I have logged in and navigated to the front desk
        And I navigate to the "Patients" listing
        And I click on "Register Emergency Patient ( John Doe )"
        Then I should be prompted to enter as plain text descriptive and
            context information e.g scars, eye color or other unique descriptions
        And I should be able to click "OK" and get a confirmation message
        And I should be navigated back to the patient listing, with the new
            record appearing near the top
```

Story: Edit patient record

Listing 1.3: **Edit patient record**

```
Feature: Find existing patient record
    Patient details e.g contacts change, and they need to be kept up to date.

    Scenario: Open but do not edit a patient record
        When navigating away from a patient record that is not "dirty", the
        user should not be presented with any prompts.

        Given that I am logged in as "a front desk user>"
        And I navigate to the patient listing
        And I 'Search for a patient record from a patient list'
        And I select a single patient record by clicking "Edit Details"
        And I see an editing form with the patient's details shown
        When I click on "Cancel Editing"
        Then I should be navigated back to the patients listing

    Scenario: Edit an existing patient record
        Any patient record that is retrieved can be updated. This includes
        John/Jane doe patients and infants initially registered under a
        'placeholder' name.

        Given that I am logged in as "a front desk user>"
        And I navigate to the patient listing
```

```
        And I 'Search for a patient record from a patient list'
        And I select a single patient record by clicking
        And I see an editing form with the patient's details shown
        When I change any value on the form
        Then I should see a visual indication that the form is 'dirty'
        When I click "Update Patient Details"
        Then I should see a "Patient details updated" success message
        And I should be navigated back to the patient listing


    Scenario: Navigating away from a "dirty" record and discarding
        When attempting to navigate away from a "dirty" record, a user should
        be prompted to save or discard. If they choose to discard, they should
        be navigated back to the patient listing with no further prompting.

        Given that I am logged in as "a front desk user>"
        And I navigate to the patient listing
        And I 'Search for a patient record from a patient list'
        And I select a single patient record by clicking "Edit Details"
        And I see an editing form with the patient's details shown
        And I make some changes to the patient record
        When I click on "Cancel Editing"
        Then I should be prompted to "Save" or "Discard" the changes
        And I click on "Discard"
        Then I should be navigated back to the patients listing

    Scenario: Navigating away from a "dirty" record and saving
        When attempting to navigate away from a "dirty" record, a user should
        be prompted to save or discard. If they choose to save, the changes
        should be saved.

        Given that I am logged in as "a front desk user>"
        And I navigate to the patient listing
        And I 'Search for a patient record from a patient list'
        And I select a single patient record by clicking "Edit Details"
        And I see an editing form with the patient's details shown
        And I make some changes to the patient record
        When I click on "Cancel Editing"
        Then I should be prompted to "Save" or "Discard" the changes
        And I click on "Save"
        Then I should see a success confirmation message
        And I should be navigated back to the patients listing

    Scenario: Trigger validation errors with invalid edits
        When an invalid edit is made, the error should be fed back in a field
        specific manner right away. The "Update Patient Details" button should
        also be disabled.

        Given that I am logged in as "a front desk user>"
        And I navigate to the patient listing
        And I 'Search for a patient record from a patient list'
        And I select a single patient record by clicking
        And I see an editing form with the patient's details shown
        And I make some invalid change to any of these fields:
          | field           | explanation                                |
          | title           | Title of address e.g Mr, Dr, Prof.         |
          | name            | Name: family, give and middle components   |
          | gender          | Administrative gender                      |
          | sex             | Birth sex                                  |
          | birth date      | Date of birth, **can be estimated**        |
          | ID documents    | e.g ID or passport; can be more than one   |
          | photo           | A photograph of the patient                |
          | telecom(s)      | Current phone and email contacts           |
```

```
          | addresses       | Postal and physical addresses                 |
          | marital status  | Civil / marital status                        |
          | contacts        | Family or emergency contacts e.g guardians    |
          | payment method  | Default payment method e.g insurance          |
          | payment details | e.g NHIF number, insurance details            |
        Then I should see a field-specific error message next to the field
        And the "Update Patient Details" button should be disabled
```

Epic: Visit start

Every billing and clinical action is tied to a visit.

Story: Start out-patient cash visit

Listing 1.4: **Starting cash visits**

```
Feature: Start a visit for a cash patient
    For cash patient, a deposit or consultation fee is often ( but not always )
    needed up-front.

    This story depends upon the patient registration and patient search stories
    i.e. you must have found or registered a patient and clicked on their record

    Scenario: Start an outpatient visit for a cash patient, payment received
        Given that I am viewing a single patient's record
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the 'Queue' where the patient will go next
        And I have selected 'Cash' as the visit payment method
        And I select the initial service e.g consultation, a lab test
        And I receive the amount that the system indicates as due
        When I click on "Start Visit"
        Then a receipt should be sent to the printer automatically
        And I should see a "Visit Started" confirmation message
        And I should be navigated back to the active visits list
        And the visit should get a visit number auto-assigned

    Scenario: Start an outpatient visit for a cash patient, payment not received
        The system will not stop visits from being started with no payment,
        because that can become a blocker in emergency scenarios. The design
        should however make payment information very easy to spot, so that the
        staff member operating the front-desk always has enough information to
        make a good judgement.

        Given that I am viewing a single patient's record
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the 'Queue' where the patient will go next
        And I have selected 'Cash' as the visit payment method
        And I select the initial service e.g consultation, a lab test
        When I click on "Start Visit"
        Then I should see a "Visit Started" confirmation message
        And I should be navigated back to the active visits list
        And the visit should get a visit number auto-assigned
        And the balance / amount owed should show on the visits listing

    Scenario: Receive non-service cash payment e.g copay or deposit
        This scenario **does not supersede the dedicated billing scenarios**.

        Given that I am viewing a single patient's billing record
        And I have selected the type of visit e.g emergency, routine, ambulance
```

```
        And I have selected the 'Queue' where the patient will go next
        And I click on 'Receive Payment' to open a payment form
        When I enter the amount to be received
        And indicate what it is received for e.g deposit, copay
        And click on 'Record Payment'
        Then the system should print a receipt
        And the payment status shown on the patient banner should update
```

Story: Start out-patient insurance visit

Listing 1.5: **Starting insurance visits**

```
Feature: Start Insurance Visit
    Scenario: Start a visit for an insurance patient ,first time to use insurance
        In order for this story to stay this 'simple', we will have to develop
        a mechanism by which all insurance customers - EDI and non EDI - are
        pre-registered. Non EDI customers can be pre-registered by uploading of
        Excel files. This particular scenario will need to be a little permissive
        i.e it should not prevent a user from starting a visit merely because
        there is no eligibility information. This edge case will typically arise
        in two circumstances: customers of foreign insurance companies and
        beneficiaries added since the last 'update' of beneficiary information.

        Given that I am viewing a single patient's record
        And I have selected 'Insurance' as the visit payment method
        And I have entered insurance details - company, scheme, member number
        And I have clicked on "Check Eligibility"
        And I have examined the eligibility breakdown that shows
        And the patient has valid insurance
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the 'Queue' where the patient will go next
        And I can see an "Eligibility checked" message
        When I click on "Start Visit"
        Then I should see a "Visit Started" confirmation message
        And I should be navigated back to the active visits list
        And the visit should get a visit number auto-assigned

    Scenario: Should not look up insurance eligibility, for cash patients
        Given that I am viewing a single cash patient's billing record
        When I examine the patient 'banner' on top
        Then I should not see a "View Eligibility" button

    Scenario: Should not start a visit for a patient with invalid insurance
        Given that I am viewing a single patient's record
        And I have selected 'Insurance' as the visit payment method
        And I have entered insurance details - company, scheme, member number
        And I have clicked on "Check Eligibility"
        And I have examined the eligibility breakdown that shows
        And the patient **does not** have valid insurance
        Then the "Start Visit" button should be inactivated
        And I should see a message "Please select another payment method.
            The indicated insurance is not valid."
```

Story: Start out-patient credit visit

Listing 1.6: **Starting credit visits**

```
Feature: Start a visit for a credit patient
    The tricky part of this implementation will be determining that a
    patient is a valid scheme member AND the scheme is valid AND they
    are eligible for care under the visit type indicated.

    The 'credit schemes' envisioned by this are things like employer managed
    medical schemes.

    This story depends upon the patient registration and patient search stories
    i.e. you must have found or registered a patient and clicked on their record

    Scenario: Start an outpatient visit for a credit patient successfully
        Given that I am viewing a single patient's record
        And I have selected 'Credit' as the visit payment method
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the credit scheme to use from a shortlist
        And I can see a "Credit Eligibility Confirmed" message on the screen
        And I have selected the 'Queue' where the patient will go next
        When I click on "Start Visit"
        Then I should see a "Visit Started" confirmation message
        And I should be navigated back to the active visits list
        And the visit should get a visit number auto-assigned

    Scenario: Fail to start a visit for an ineligible credit patient
        Given that I am viewing a single patient's record
        And I have selected 'Credit' as the visit payment method
        And I have selected the type of visit e.g emergency, routine, ambulance
        And the patient is not pre-registered for credit
        Then I should not see a credit scheme shortlist to pick from
        And the "Start Visit" button should be disabled
        And I should see a "Patient not found in credit scheme" message

```

Story: Start capitation credit visit

Listing 1.7: **Starting capitation visits**

```
Feature: Start a visit for a capitation patient
    The tricky part of this implementation will be determining that a
    patient is a valid capitation member AND the scheme is valid AND they
    are eligible for care under the visit type indicated.

    This story depends upon the patient registration and patient search stories
    i.e. you must have found or registered a patient and clicked on their record

    Scenario: Start an outpatient visit for a capitation patient successfully
        Given that I am viewing a single patient's record
        And I have selected 'Capitation' as the visit payment method
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the 'Queue' where the patient will go next
        And I have selected the capitation scheme to use from a shortlist
        And I can see a "Capitation Eligibility Confirmed" message on the screen
        When I click on "Start Visit"
        Then I should see a "Visit Started" confirmation message
        And I should be navigated back to the active visits list
        And the visit should get a visit number auto-assigned

    Scenario: Fail to start a visit for an ineligible capitation patient
        Given that I am viewing a single patient's record
```

```
        And I have selected 'Capitation' as the visit payment method
        And I have selected the type of visit e.g emergency, routine, ambulance
        And I have selected the 'Queue' where the patient will go next
        And the patient is not pre-registered for capitation
        Then I should not see a capitation scheme shortlist to pick from
        And the "Start Visit" button should be disabled
        And I should see a "Patient not found in capitation scheme" message

```

Story: Access the visits listing and individual visit pages

Listing 1.8: **Visits listing and individual visits pages**

```
Feature: Visits listing and visit detail page
    All clinical and billing activities are tied in to a visit. It follows then
    that this listing should be available from all clinical and billing points
    of service. Key status information ( e.g preauth status, copay status and
    visit status ) should be shown as highly visible 'badges'.

    Scenario: Navigate to the visits listing
        The visits listing will show "Active Visits" by default, but allow the
        user to navigate to visits in other statuses via a tab mechanism.

        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        Then I should see a listing of visits for my location and department

        Examples:
            |Role                                                              |
            |Registration                                                      |
            |Triage                                                            |
            |Pharmacy                                                          |
            |Radiology                                                         |
            |Lab                                                               |

    Scenario: View the patient's billing information by opening the visit
        Given that I am logged in as a <Role> worker
        And I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        Then I should see a listing of visits for my location and department
        When I click on a visit to open it
        Then I should see a page relevant patient billing information
            | Type              | Explanation                                  |
            | Copays            | Amount or percentage due per visit           |
            | Insurers          | One or more insurers                         |
            | Eligibility       | An always accessible eligibility lookup      |
            | Capitation m.ship | Membership in capitation scheme(s)           |
            | Credit scheme     | Membership in capitation scheme(s)           |
            | Preauthorizations | All visit-linked preauths and their status   |
            | Preauth status    | A status badge with current preauth status   |
            | Charges           | A summary of amount owing and breakdown      |
            | Statements        | A detailed entry of every charge, by visit   |
            | Adjustments       | e.g account credits, writedowns              |
            | Payments          | By invoice and visit                         |
            | Prepayments       | e.g pre-paid delivery packages               |
            | Deposits          | e.g cash deposits                            |
        And I should see a note recommending the next logical action e.g to
            pay a deposit or to seek eligibility
        And I should see a clear indication of the need or lack of need for a
            copay
```

```
        Examples:
            |Role                                                                |
            |Registration                                                        |
            |Triage                                                              |
            |Pharmacy                                                            |
            |Radiology                                                           |
            |Lab                                                                 |

    Scenario: Cannot start a visit for a patient with an ongoing visit
        Inpatient visits will be closed upon discharge or transfer. Out-patient
        visits will be closed after a **configured** time period. A sensible
        default for this time period is 48 hours. After due consideration, it
        is the author's opinion that a "Close Visit" function would add
        complexity without a significant gain in utility.

        Given that I am logged in as a <Role> worker
        And I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        Then I should see a listing of visits for my location and department
        When I click on a visit to open it
        Then I should see a page relevant patient billing information
        And there should be no "Start Visit" button
```

Story: Receive payments

Listing 1.9: **Payments receipts in visit**

```
Feature: Patient billing and payments

    Scenario: Determine that a copay is due and not paid
        Given that I am logged in as a <Role> worker
        And I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And Isee a listing of visits for my location and department
        And I click on a visit to open it
        Given that I am viewing a single insurance patient's billing record
        And the patient's plan needs a copay
        And the patient has not paid the copay
        Then I should see a "COPAY NOT RECEIVED" badge
        And the "Start Visit" button should be disabled

        Examples:
            |Role                                                                |
            |Registration                                                        |
            |Triage                                                              |
            |Pharmacy                                                            |
            |Radiology                                                           |
            |Lab                                                                 |

    Scenario: Determine that a copay is due and paid
        Given that I am logged in as a <Role> worker
        And I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And Isee a listing of visits for my location and department
        And I click on a visit to open it
        And I see a page with relevant patient billing information
        And the patient's plan needs a copay
        And the patient has paid it
        When I look at the patient 'banner' on top
        Then I should see a muted 'COPAY RECEIVED' badge
```

```
        And I should be able to click on the 'Start Visit' button

        Examples:
            |Role                                                   |
            |Registration                                           |
            |Triage                                                 |
            |Pharmacy                                               |
            |Radiology                                              |
            |Lab                                                    |

    Scenario: Print and reprint patient's receipt
        Given that I am logged in as a <Role> worker
        And I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And Isee a listing of visits for my location and department
        And I click on a visit to open it
        And I see a page with relevant patient billing information
        And I see a listing of the patient's most recent payments
        And I click on any paymen
        Then I should see the payment details
        And I should see a "Print Receipt" button
        When I click on the "Print Receipt" button
        Then the receipt should be sent to the printer

        Examples:
            |Role                                                   |
            |Registration                                           |
            |Triage                                                 |
            |Pharmacy                                               |
            |Radiology                                              |
            |Lab                                                    |

```

Story: Pre-authorizations

Listing 1.10: **Preauthorization**

```
Feature: Preauthorizations
    Pre-authorization requests are needed for some classes of visits ( e.g all
    inpatient ) and on the basis of payer specific business rules ( e.g all
    visits with an expected charge above KES 10,000 ). The design goal here is
    to get the system to do most of the heavy lifting in answering the question
    "Do we need a pre-authorization for this patient?"

    Scenario: Show pre-authorization status when it is relevant
        In this scenario, the user opens a 'visit sheet'. The need for a
        pre-auth request should be communicated in a prominent 'badge' on a
        'banner' that brings together all relevant visit information.

        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And I click on a visit that should require preauthorization e.g inpatient
        Then I should see a page that summarizes that visit's information
        And I should be see a "Pre-authorization Status" section in its banner
        And I should see a "Pre-authorization needed" badge in that section
        And I should see a "Request pre-authorization" button next to that badge

        Examples:
            |Role                                                   |
            |Registration                                           |
```

```
            |Triage                                                    |
            |Pharmacy                                                  |
            |Radiology                                                 |
            |Lab                                                       |

    Scenario: Do not show a pre-authorization section when it is not needed
        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And I click on a visit that should NOT require preauthorization
        Then I should see a page that summarizes that visit's information
        And I should NOT be see a "Pre-authorization Status" section

        Examples:
            |Role                                                      |
            |Registration                                              |
            |Triage                                                    |
            |Pharmacy                                                  |
            |Radiology                                                 |
            |Lab                                                       |

    Scenario: View preauth status from the patient listing
        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Patients"
        And I find the patients of interest by typing into the search box
        Then I should see a pre-authorization status badge for each patient
            that has or needs pre-authorization

        Examples:
            |Role                                                      |
            |Registration                                              |
            |Triage                                                    |
            |Pharmacy                                                  |
            |Radiology                                                 |
            |Lab                                                       |

    Scenario: View preauth status from the visit listing
        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And I find a specific visit by typing into the search box
        Then I should see a pre-authorization status badge in each visit
            that has or needs pre-authorization

        Examples:
            |Role                                                      |
            |Registration                                              |
            |Triage                                                    |
            |Pharmacy                                                  |
            |Radiology                                                 |
            |Lab                                                       |

    Scenario: Request pre-authorization, for insurance patients
        Given that I am logged in as a <Role> worker
        When I click on <Role> in the main navigation
        And I click on "Visits" in the secondary navigation
        And I click on a visit that should require preauthorization e.g inpatient
        Then I should see a page that summarizes that visit's information
        And I should be see a "Pre-authorization Status" section in its banner
        And I should see a "Pre-authorization needed" badge in that section
        And I should see a "Request pre-authorization" button next to that badge
        When I click on "Request Pre-authorization"
```

```
        Then I should see a pre-authorization request form
        And the form should have pre-filled with all details already present in
            the visit
        And I should edit and fill out the rest of the form
        And I should press "Submit"
        And I should see a "Pre-authorization request sent" message
        And I should be navigated back to the visits listing

        Examples:
            |Role                                                          |
            |Registration                                                  |
            |Triage                                                        |
            |Pharmacy                                                      |
            |Radiology                                                     |
            |Lab                                                           |

    Scenario: Receive notification of pre-authorization approval
        Given that I am logged in
        And I had previously entered a request for pre-authorization
        When a pre-authorization is approved
        Then I should get a notification in the application notification area
        And I should also get a native notification on my device
        And I should be able to click on the notification to view the preauth

    Scenario: Receive notification of pre-authorization rejection
        Given that I am logged in
        And I had previously entered a request for pre-authorization
        When a pre-authorization is rejected
        Then I should get a notification in the application notification area
        And I should also get a native notification on my device
        And I should be able to click on the notification to view the preauth

    Scenario: Receive notification of pre-authorization clarification request
        Given that I am logged in
        And I had previously entered a request for pre-authorization
        When a pre-authorization clarification is requested
        Then I should get a notification in the application notification area
        And I should also get a native notification on my device
        And I should be able to click on the notification to respond to the request

    Scenario: View preauth status from the patient listing
        Given that I am logged in as a front-/ corporate- / admissions- worker
        When I access the patient listing
        Then I should see pre-authorization status badges for every patient
        And patients with recent activity should appear at the top of the list

    Scenario: View preauth status from the visits listing
        Given that I am logged in as a front-/ corporate- / admissions- worker
        When I access the patient listing
        Then I should see pre-authorization status badges for every patient
        And patients with recent activity should appear at the top of the list

    Scenario: Determine a patient's preauth status
        Given that I am viewing a single insurance patient's billing record
        And the patient has a pre-authorization request(s)
        When I look at the patient 'banner' on top
        Then I should see a summary of the status of the pre-auth requests
        And I should be able to click on each request to view it in full
```

1.1.2 Theme: Purchasing

This covers routine purchasing and acquisition of assets.

Epic: Purchasing

This is focused on 'routine purchasing' i.e purchasing of supplies that are re-sold or used as direct inputs in service delivery. Purchasing may be centralized (in a purchasing department) or decentralized (with each service delivery department carrying out part or all of the process).

All purchasing documents go through a maker-checker (issuer / approver) cycle.

Note:

As a:

- purchasing or stores employee

I need to:

- set up **vendors**
- set up **payment terms**
- set up **product information**. In healthcare, product information might include specialized data fields e.g for Pharmacy, it includes: generic names, stock codes, strengths, units of issue e.g tablet or vial, unit pack sizes, manufacturer information, storage requirements, supplier, product categories, notes, category, storage instructions, dosing information etc
- product status - active, obsolete, phased out, expired
- define maximum and minimum reorder levels and critical stock levels
- define minimum and maximum stock cover days
- checking of back-orders, with deactivation after a time threshold
- automatic rounding off the the nearest pack size during reorder
- issue **purchase orders**, which derive from **requisitions** / requests
- split orders between different suppliers
- receive **goods deliveries** - noting **batch numbers** and **expiries** at this stage
- note delivery details e.g vehicle number and driver when receiving goods
- **check** the goods deliveries before accepting them into the store(s) and issuing a **goods receipt note**
- **receiving donations**
- accepting promotional stocks and prizes
- **return goods** that are not accepted - before or after they are stocked
- **transfer goods** to other stores, at cost
- enter **invoices**. While entering invoices, I expect *discounts and due dates to be computed automatically*, on the basis of payment terms. When accessing invoice listings, I should be able to sort or filter invoices by vendor, date etc. **Potentially duplicated invoices should be flagged.** An invoice may be assigned to a **future accounting date**.
- set up **recurring invoices**, for recurring vendor payments
- enter **credit and debit memos**
- make **payments** against purchase invoices, with the ability to: apply **account credits** to future purchases, **pay in full or in part** and add or remove vendor invoices from payment schedules. **Potentially**

duplicated payments should be flagged as should payments to vendors who owe us money (from credits or as customers).

- generate **vendor statements** that can be used to reconcile their accounts
- access a **dashboard** that has: listings of invoices that are due for payment, aging analyses, cash requirements projections
- access the following **reports**: inventory by store, low inventory, slow moving inventory, batch and expiry tracking, purchases by vendor
- alert / flag when ordering items that are already in stock
- highlight the last supplier of an item and the price paid
- support requisitions with: current stock, stock cover days, lead time, forecasts
- **requests for quotation**

1.1.3 Theme: Billing

This write-up is to be read in conjunction with the **positive ID** specifications.

Epic: Billing dashboard

The billing dashboard should focus on the most important and actionable bits of summary information.

Note:

As a:

- billing manager

I need to:

- quickly **analyze receivables** - aging, days in accounts receivable by insurance group / provider / visit type / diagnosis etc, aggregate days in accounts receivable
- quicly **analyze denials**, by reason, payer, condition, procedure etc
- access **top n lists** - service / procedure, payer etc
- quickly **analyze revenue** - by procedure, by payer, by diagnosis
- have access to a dashboard that **tracks all my claims by status** e.g paid, pending, late, returned, re-submitted
- view the **audit trail** of all transactions
- view current **cash availability**
- forecast cash sources against cash users
- track follow-up conversations e.g in collections
-

Epic: Preauthorizations

As an employee at any point of service that needs pre-authorization e.g the admissions desk, I need to be able to requests and track pre-authorizations.

Note:

As a:

- point of service staff member

I need to:

- be able to **request pre-authorization** - both *elective* and *emergency* preauths
- be **notified when a pre-authorization changes status** e.g is approved or rejected, so that I can inform waiting patients and move the process along
- be able to **respond to clarification requests on pre-authorizations**
- be able to **check on the status** of any pre-authorization and have a simple dashboard that gives visibility into the status of all preauthorizations that are **in flight**

Epic: Cashiering

This feature covers both cash and credit invoices - what we'd conventionally call 'tills' or 'pay points'.

Note:

As a:

- cashier

I need to:

- be able to log in to **my own cashiering 'site'**, with its own cash drawer, receipt etc
- have my own **shift**, with a **'day book report'** that is produced at the end
- **post payments** singly and in batch
- access **cash balancing reports**, within and at the end of a shift
- accept **MPESA** payments
- accept **card** and other electronic payments
- show a warning if a customer payment will put the customer account into credit

---

Epic: Billing back-office

As a billing clerk, I need to quickly distinguish tasks that need special attention. For each patient, the operating analogy is that of a 'cockpit' that is focused on a single patient's billing. The activities described here should be designed for 'a world with EDI' and 'a world without EDI'.

Financial 'class codes' on patient accounts are things like 'ensuite', 'private' etc.

Note:

As a:

- billing clerk

I need to:

- have quick access to a **worklist** (alternative names: task list, queue)
- be able to **hold (suspend processing of) bills** that need some special action e.g a consultation with my boss, a confirmation etc
- be able to access a **listing of held bills** and a simple summary of the status of held / pending / processed bills for a particular day

- easily **send out payment reminders** for both individuals and corporate payers
- be able to look up a patient's insurance **eligibility** - for those from EDI linked payers - at any moment
- have **access to patient summary clinical information** (discharge summary, problem list)
- be able to view all the billings and payments on a patient's account. This includes deposits, charges, adjustments, corrections and refunds.
- have quick and obvious access to patients' **deductibles / copayment obligations** and whether they have been met or not
- be able to see a patient's insurance details and look up **eligibility** on demand (a patient may be on multiple insurance schemes)
- be able to generate an **interim invoice** for a patient with an active inpatient or outpatient visit on demand
- access a queue of **requests for interim bills** from insurance care managers (from the payer portal) then review and respond (accept / reject) those requests; for the ones that I accept, an interim bill is automatically sent to the requester
- be able to **consolidate bills** at the end of a patient's stay to produce a 'super bill'; this consolidated bill may be grouped by department
- make **adjustments** on patient bill
- support **multiple prices** e.g by patient type, insurance
- support **percentage discounts and allowances** for third party contracts e.g volume and prompt payment discounts
- get **alerts when patient cover is about to be depleted**
- enter price and description for **miscellaneous charges**
- entry of late charges - with different **cut off periods**
- produce **daily and monthly** later charge reports
- be able to generate a **final bill** for a patient whose visit has been completed e.g a discharged patient; the patient's bill may be printed in summary or detailed form
- be able to **reprint** any final bill on demand
- be able to **process a cash refund** for a patient who is billed less than their deposit
- be able to **split a bill** between the patient and their insurer / employer / sponsor
- be able to generate a **split bill for a second payer**
- be able to support **rebilling for late charges** and changes in financial class after billing
- be able to **retroactively change financial class** and rebil
- be able to **post a supplementary bill** to a patient e.g posting charges to the patient post-discharge, even after the late charge threshold
- be able to generate and print or send a **patient statement**
- be able to **bill guarantors** or family
- be able to **view prominent flags / warnings** for patients who may present collection problems
- be able to **submit claims via EDI**
- be able to group invoices destined for a specific payer, generate cover sheets and dispatch them in bulk , batch and dispach them (**dispatch paper claims**)
- be able to **track the status of all claims**, including denials, those that need additional information, low pay claims etc
- be able to **respond to requests for clarification** on claims and effect the necessary claims edits

- be **notified via the claims section of my message inbox when a claim changes status** e.g is paid, there is an incoming remittance advice etc
- be able to **enter non EDI remittance advices manually**
- billing for non-patient accounts e.g guest beds
- **batch printing** of bills
- print **free format text messages** on all bills in a financial class
- **each bill has the following:**
  - header: patient name, guarantor name and address, date and type of bill (interim or final), hospital service, physician(s), financial class, admit and discharge diagnosis, visit diagnosis for outpatients (including ICD 10 code)
  - lines: service code, date, description, quantity, amount, total
- a bill may have a summary (grouping) of charges
- a bill may have comments

- collections - standard form letters on demand e.g for 30 day old accounts, 60 day old accounts etc
- aging of undispatched claims
- generate reminder letters for overdue invoices
- write off small remaining balances based on user defined tolerance

---

The 'conveyor belt' analogy is a good one, for billing clerks. Keep the belt movin'.

Epic: Aged trial balance

Note:

As an:

- accounting user

I need to:

- print an aged trial balance, with account number, name, dates of service and last statement
- include number of statements, last payment date and amount, current credits
- print separate aged trial balance for inpatient and outpatient
- sort the aged trial balance by patient last name, descending order of account balance, financial class, bill date, guarantor, age,
- compare aging trial balance in summary or at the detail level
- print aged trial balance summary with multiple aging categories, showing amounts and percentages
- user definable aging
- generate aging by activity date, due date, effective date etc
- manage dispute items
- generate guarantor aged trial balance
- generate doctor aged trial balance

Epic: Hospital administered schemes

This includes the like of internally managed staff schemes and employer credit schemes.

Note:

As a:

- billing administrator

I need to:

- **set up the following details for principal members:**
  - name
  - gender
  - age
  - ID no / passport number
  - contact details - address, telephone, email
  - photo
  - date of employment (optional)
  - payroll number
  - division
  - department
  - cover limit
  - entitlement
  - exclusions
  - auto-generated hospital patient number (pre-registration)
- **set up the following details for dependants:**
  - name
  - gender
  - age
  - contact details i.e address, telephone number, email
  - ID no / passport number
  - photo
  - auto-generated hospital patient number (pre-registration)
- add dependants
- remove dependants
- control validity / expiry
- set cover limits, entitlements and exclusions

Epic: Corporate Schemes

Note:

As a:

- billing administrator

I need to:

- open and close corporate accounts: each with a code, start date, end date
- auto-suspend corporate accounts on end date
- activate or inactivate corporate accounts
- define if an account uses a medical benefit management system e.g biometrics
- define the scope of cover: outpatient vs inpatient, maternity, optical, dental
- define max. credit limit
- warn the user if the credit limit is reached
- maintain exclusions
- manage services that need pre-authorization
- manage copay details: may be linked to specific benefits, and be amount or percentage
- manage contact persons
- attach reference documents
- list exclusions (coded)
- define active, suspended, terminated entitlements, with dates
- define panel of doctors
- real time beneficiary database
- corporate basic details: name, addresses, email, contact person, internal account manager
- status management: active, inactive, pending, merged, unavailable
- define the scope of the contract: open ended or specified
- indicate bank guarantee and deposit status
- manage deposits

Epic: Billing setup

This includes price-list setup along with setup of prepaid schemes and capitation.

Note:

As a:

- billing administrator

I need to:

- be able to set up a **'charge master'** with all billable items
- be able to **associate a single item with multiple codes** e.g a billing code, a LOINC code for lab services, a drug code for a medication
- be able to **package multiple items and services together as a single billing item** (package billing)

- be able to **set up multiple prices with different effective times** for each billable item
- create **prepaid schemes** - including setting up limits, members and dependants. Prepaid scheme beneficiaries are registered as patients.
- create **capitation schemes** - with limits, members and dependants Capitation scheme members are registered as patients.

Scheme and capitation setup will need to be a maker-checker process.

Epic: Managing consultants and locums

External doctors (specialist and non specialist) present special payment allocation challenges for hospitals.

Locum doctors need to be paid on a regular (e.g monthly) basis for service rendered and hours worked. External specialists often 'pass their bills through' the hospital.

Note:

As a:

- clinic or hospital manager

I need to:

- enroll specialists into our panel
- enroll locum doctors (who are paid by the hour and a fee for select services) into our panel
- allocate payments to specialists - with those that derive from insurance being paid when the claims are paid and those that derive from cash billings being paid on a schedule
- compute and pay locum doctors dues on a schedule
- deduct the appropriate withholding taxes from all payments
- link specialists, locums and full-time resources to queues, workflows, rooms etc

Because:

- the hospitals service delivery is influenced by the quality of the relationship with our doctors - both internal and external

---

These external doctors should also be 'schedulable resources'.

Epic: Printing

It should be easy to print **pixel perfect** output e.g lab reports, even from tablets or phones. It should not involve the usual 'download PDF, open PDF, print' cycle, or the poor precision of in-browser printing. The implementers should evaluate Google Cloud Printing and similar solutions. The 'printers' in question might be very varied - from a departmental copy printer to a little label printer.

Note:

As a:

- user (any user)

I need to:

- be able to click 'Print' and print any transaction or output document that I have access to e.g a patient invoice or a patient's visit summary
- be able to easily choose from a selection of printers

Scenario: Send a patient bill to the printer

Patient bills are some of the most frequently printed documents in a hospital setting.

Note:

Given:

- that I am logged in to the system

And:

- I want to print a patient bill

When:

- I click on an easy to locate print button / icon / control

And:

- Select the printer from the pop over / pop up dialog that results

Then:

- The document should be sent to the selected printer

And:

- Print with the precision I expect / as it looks on the screen / with proper headers, page numbers etc

---

The 'big deal' here is the combination of pixel-perfect printing, mobility and simplicity. Stock browser printing does not cut it.

1.2 Product: Ambulatory Clinical

This product focuses on the needs of outpatient clinical care settings. It meets a **subset** of the needs of larger hospitals and healhcare chains.

Patient care is **multi-disciplinary**. The *circle of care* for a patient may involve doctors, nurses, clinical support staff e.g admissions clerks, case managers, payors, guarantors, pharmacists and others. This multidisciplinary role setup is made harder by the need to **balance between access and confidentiality** - what does each party need to know in order to do their job? This is made even tougher by the need for **mobility**.

Note: Information Security

This guide assumes that there shall be **fine grained** role based access control. The permissions used shall be *granular*, so that is shall be possible to grant or deny access to any screen or section of a screen. It shall also be possible to grant view only rights.

Access shall be restricted on the basis of:

- user groups
- user types
- individual patient charts
- locations e.g nursing floors, clinics
- patient type e.g VIP, confidential patients
- a combination of all of the above

Logged in sessions shall be timed out after 10 minutes. The user shall be locked out from further login attempts after three incorrect login attempts. Each lockout shall be an hour long.

All entries shall be **time stamped** and **audit trailed**.

The system will need to support **secure logon** - with hardware tokens.

Note: Online Help

The system should embed online 'help' and first-use tutorials.

For clinical services, the need to **design for high distraction environments** and for task efficiency is paramount. Many of the existing products have failed to gain adoption in clinical settings in part because they are perceived to be more cumbersome than paper.

1.2.1 Theme: Scheduling

The scheduler will be available to administrative staff (e.g registration clerks), clinical staff (e.g doctors and nurses) and even to patients themselves.

This feature should work for both single clinics and large multi-site healthcare businesses. For a multi-site operation, the calendar should be synchronized enterprise-wide.

A medium- to large- provider will typically have many concurrently scheduled **routine** clinics e.g paediatric, antenatal, postnatal, family health, diabetes, chest, well baby, child welfare, immunization, lamaze etc. There will also be a sizable number of **specialist** clinics e.g neurosurgical, obstetric, cardiology, neurology etc

Epic: Booking appointments

Most bookings will be done by administrative or nursing staff. It should still be possible to individual providers to book their own appointments.

The business goal for scheduling is to **increase schedule density**. *Every missed appointment is a double revenue loss - an opportunity cost loss and a direct loss*. In order to succeed at this, the scheduler needs to recognize that **appointments are not all the same**; some appointments e.g a specialist second opinion consultation take a long time; other appointments e.g a routine post-surgery checkup could take a shorter time.

The scheduling implementation should be "network aware" i.e it should be possible to book appointments at other in-network facilities or in other departments.

Note:

As a:

- user

I need to:

- schedule physicians, technicians, radiologists, rooms, equipment etc; one appointment can have multiple exams or procedures scheduled
- capture patient name, contacts, date, time and requesting doctor when ordering for investigations or procedures
- check for conflicts when scheduling staff; factoring in preparation time and procedure duration; this also includes flagging patients who have been flagged for multiple exams at the same time
- automatically finding the next available time slot for inpatient / outpatient
- enter orders when scheduling appointments. This requires a link between the appointment screen and the patient record.

- **view** existing schedules and appointments on a calendar; color coding shall be used to identify specific providers, and augmented with initials. For example - it should be easy to discern which physicians and rooms are available to take appointment times in certain slots. Clicking on an appointment in the calendar should show the appointment details.
- view a schedule of all **appointments by patient** - over a specified date range
- in a multi-location healthcare network, see only the appointments for **providers within my facility**
- **drag and drop** appointments
- send **reminders** to patients, with configurable time frames. These reminders can be emailed, sent by text message or even printed. All patient communications are tracked - as part of the patient's record.
- **transfer** appointments between resource schedules, singly or in bulk e.g from one doctor to another
- view and edit my **own schedule**
- be able to **opt in / opt out** of viewing specific calendars e.g to see a particular clinic's calendar and not see other clinics' calendars; this means that I can view multiple provider schedules
- **print** a specific resource (e.g doctor, theater, CT scan machine)'s schedule / appointment list; also able to filter printed schedule by appointment type
- print daily department schedules for inpatients and outpatients
- print patient schedules for exams and procedures on demand
- print provider schedules on demand
- print a schedule of all appointments by date
- print a schedule of appointments by time
- print a schedule of appointments by nursing station
- print transport request slips based on schedule needs e.g trolleys, wheel chair
- print transport cards with notices, data, equipment required for transport, patient location, condition, comments
- print notices with hospital registration number, patients name, date of birth, physician, patient ID and date of procedure
- print no-show, exam canellation, unauthorized, scheduled, completed, cancelled appintment analyses
- **add appointments** for a specific date and time
- get notified of appointment **conflicts /** overlaps when scheduling; with proper authorization, I should be able to forcefully override conflict warnings or availability warnings
- add **multiple resources** in a single appointment e.g multiple doctors in a single appointment slot
- ability to schedule **multiple patients** for an appointment e.g group therapy
- add a **note** with each new appointment; this note can be a comment or instruction
- **search** for appointments using e.g the patient number, doctor, day of week, time of day; exclude days or time frames from search; exclude resources from search
- **register a patient** on the fly when creating appointments for a walk in patient; before adding a new patient, search to see if the patient is already registered. Where data on a patient already exists (e.g data from previous visits), the system should use that data to pre-fill slots / make suggestions
- **update demographic and payment information in the patient record** while scheduling; this could also include applying flags to the patient record e.g VIP, Debt Default Risk etc
- look up **eligibility** when registering a patient or searching for an appointment
- **search for an appointment slot** on the basis of a patient's availabilty (search within defined date / time bounds); schedule the patient for the next available time slot
- assign **priorities** to appointments e.g urgent

- display a **color coded calendar** view of appointments
- allow **cancellation** of appointments - with the need to specify the reason for cancellation; the system may have a predefined pick list of reasons for cancellation
- send **cancellation notices**
- send **follow-up questionnaires** after appointments
- allow **recurring appointments** to be both added and removed
- different **appointment profiles** e.g a profile for back pain, fever, well child, well woman,. Each appointment profile is linked to a color coded appointment type and may be associated with a duration, consent forms, a chief complaint and a billing code. Different appointment profiles may be associated with different patient instructions.
- maintain a **wait list** of patients waiting for an appointment; in the event of a cancellation, it should be straight forward to move a patient from the wait list to the newly freed slot. The wait list includes a call back number, priority and appointment type. It also has: hospital registration number, patient number, patient name, ID/Passport, referring physician, attending physician, patient status (inpatient, outpatient), diagnostic procedure
- access a **list of all patients needing to be rescheduled**, in the event of a resource becoming unavailable; this list should include contact details so that I can contact the patients
- authorized users can **overbook**, in order to cover for the possibility that some appointments will be no shows or to take advantage of time freed from appointments that take a shorter duration of time
- determine visually whether the patient to whom an appointment relates has arrived, been seen or departed (**appointment status**)
- create a **sequence of appointments** - that could recur at a regular interval or have an irregular interval between them. These future appointments can be scheduled up to a year in advance; the system should help with the creation of a best fit schedule in this case. The system should support business rules that constrain the spacing between the appointments e.g prevening them from being spaced less than <x> days apart or indicating how many in the series are left
- track arrival times, exam or procedure begin / end times and departure times
- handle **no shows** - generate a no show list for each day, transfer no show appointments to a waitlist and generate no show letters / emails
- schedule **future investigation orders** or **prescriptions** e.g scheduling a sequence of HbA1c tests for a diabetic patient on long term follow up
- schedule multiple services per day for a single patient, with automatic generation of best-fit schedule and options
- scheduling groups e.g therapy groups
- attach free form notes to 'reason for visit' codes
- enter special instructions into schedules
- configurable limit for the number of times a physician can be scheduled for a procedure
- logic e.g cancellation of orders also causes cancellation of the scheduled review with the doctor
- link to insurance eligibility
- link to pre-authorization when required: prevent finalization before approval
- link and print patient preparation instructions e.g diet instructions for scheduled exam
- enter and display transport requests - patient, transport mode etc
- substitute staff, equipment and resources, with system suggestions
- monitor and switch resources in an emergency
- appointment search by ID / Passport, appointment number, cell number, name, phonetic search

- display schedules by patient, room, procedure, staff, consultants, department, location
- color code based on status e.g confirmed, paid, booked etc

Because:

- I need to get maximum value from available resource hours while also providing good customer service (low and predicatable wait times)

Epic: Setting up schedules

These features describe the 'back-office' maitenance of scheduling e.g creating schedules for schedulable resources, availability rotas etc

Schedules can be created for many kinds of 'resources' in healthcare - people (e.g doctors, nurses, pharmacists etc), machines (e.g MRI and CT scan machines), locations (e.g rooms) etc.

Note:

As a:

- user with administrative rights (could be departmental administrative rights)

I need to:

- be able to create **new schedules** for resources under my administration
- be able to establish availability **time blocks**, with the ability to determine how many appointments are fit into a single appointment block
- block **non working hours** e.g vacations or hours during which the office practice is closed (this can also be seen as defining office start and end times)
- define different **appointment types**, with each appointment type having different time lengths
- for equipment schedules, block periods of **non-availability** due to maintenance
- define **templates** for the notes that accompany appointments
- **link resources to locations** e.g link an ultrasound machine to a particular consulting room
- place resources in **resource groups**
- customize **reminder profiles** and messages e.g email a week before the appointment, call a fortnight before the appointment, SMS a day before the appointment (all with customizable messages)
- scheduling logic e.g diabetics should not be scheduled at mealtime

Because:

- every department needs its own custom schedule

1.2.2 Theme: The patient record

An individual patient's record shall be accessed via a dashboard that 'brings together' all of a single patient's clinical records.

Clinical and billing information should be displayed in **reverse chronological order** by default; more recent events are of greater interest than remote ones.

All patient records shall be accessed via the same interface, whether current or historical. "Archiving" is a back-end level concern that should be auto-managed.

The coded sections of each patient record shall use the following terminologies:

- ICD-10 (provisional and final diagnoses)

- ICD-O (oncology)
- LOINC (investigation orders and results)
- SNOMED (the detail of the clinical record itself)

In addition to having SMART apps for custom templates, custom visualizations etc, the system should support an arbitrary number of custom print templates.

Epic: Patient dashboard

An analogy: this is the 'cockpit' of the clinical part of the EMR. Some EMRs - mostly American - call this the 'face sheet'.

Note:

As a:

- clinical user

I need to access a patient summary dashboard that:

- puts the patient's **allergies** in prominent view; it should be easy to **capture or edit allergy information** from here
- places **vitals** - recent vitals and trends from past vitals - in view. Key vitals include: weight, height, BMI, BP, temperature, head circumference (paediatric), oxygen saturation, pulse, respiration rate, head circumference (paediatric), mean upper arm circumference (paediatric) and pain scales. The paediatric measurements are usually plotted against percentile charts. Vital signs that are out of range should be **flagged**. Future iterations might consider capturing vitals directly from bedside monitors.
- access **flow sheets** that plot vitals and other numeric observations over time; the flow sheets should also include graph / chart views
- places the patient's **diagnoses or problem list** in prominent view. *Diagnoses can be primary or secondary, confirmed or presumed. Problems can have different chronicities (e.g acute, chronic) linked to them. Problems can also be active or inactive - with the possibility of reactivating previously inactivated problems.*
- provides access to a patient's **medication list**
- allows **sticky notes** and **flags** and **search tags** to be placed on individual patient records
- allows patient records to be marked as confidential e.g staff records, HIV patients etc
- allows patient demise information to be recorded quickly
- allows **click through to the detailed patient record** - where full information line notes, orders, results, reports, assessments, medications etc can be found
- can be **exported or printed** e.g for purposes of communication with colleagues who are not able to constantly check the EMR
- can be **sorted or grouped in different ways** e.g reverse chronological, chronological, by problem, by discipline etc
- shows the practitioners who have worked with a patient before
- allows click through to the patient's billing, claim and scheduling / appointments information
- allows me to **capture charges** e.g for procedures and have the charges appear in the patient bill
- capture dietary orders and restrictions
- record consents, authorizations and directives

Epic: Detailed patient chart

All documentation in the patient record is automatically user and date-time stamped. One patient may be assigned to multiple physicians, nurses etc

A patient chart may have **flags** e.g Do Not Resuscitate.

Note: The system shall provide input-time decision support e.g checking diagnoses against gender and age, checking procedures against diagnoses, checking that dates make chronological sense e.g discharge after admission etc.

It should also support authoring and entry of Clinical Practice Guidelines, and ship with well known CPGs.

Note:

As a:

- clinical user

I need to:

- access templates related to the patient's chief complaint and my specialty
- have automatic **expansion of abbreviations** in the clinical templates
- I should be able to see all of the patient's notes, test orders and results, medications, observations (including vitals) etc
- I should be able to write triage notes - these are clinical notes that will be a mix of structured and unstructured input, and that may be augmented by diagrams e.g annotated anatomical drawings. When entering these notes, I expect to have time saving conveniences e.g macros, voice input, templates etc. **The triage nurse may conduct a review of systems, in addition to 'the usual' vitals.**
- enter **coded** but readable clinical notes. Clinical notes sections include the history of present illness, medical history, family history, social history, review of systems, physical exam, assessment, plan, billing, medications and allergies. This also includes consultation notes from ancillary professions e.g nutritionists, physiotherapists, speech therapists, psychologists, counsellors, social workers etc
- I should be able to enter additional notes (with all appropriate input acceleration conveniences e.g voice input, macros, templates). **All notes should be signed / authenticated by the author and time stamped.** These notes could be doctors notes or nursing assessments.
- I should be able to enter a plan of care
- I should be able to manually enter vital signs. Abnormal vital signs should be flagged.
- The system should be able to read vital signs directly from point of care monitors
- I should be able to examine vitals and numeric observations (e.g lab results) on flow sheets
- I should be able to see a graphical representation of the data that is on the flow sheets
- I should be able to place orders for assessments e.g imaging and lab tests. The orders or order sets suggested by the system should correlate with the patient's complaints.
- I should be able to prescribe medicines electronically. I expect the system to help me with dosage calculations, interaction checking (drug-drug, drug-allergy, drug-disease), duplicate therapy checks, disease contraindication checks, formulary checks, dosage checks (by age, weight, disease) etc
- input and output tracking - with tracking and charting on flowsheets
- quickly enter progress / update notes for follow up patients (both inpatient and outpatient)
- quickly enter assessments e.g a nutritionists or physiotherapists assessments
- carry out **medication reconciliation** (see 'Inspired EHRs' for a good treatment of this subject)
- track **adverse reactions**

- copy previous notes when making updates
- **sign**, **lock** and **unlock** clinical notes. Every unlock or modification needs to have a reason indicated. All changes appear in the audit log.
- **view** and **export or print** the patient record - in full or in part - on demand; this could be a nursing sheet, a referral file etc. Some of the sections that could be printed include: current demographic information, current insurance information, current allergies list, current medication list, radiology reports and images, scanned documents e.g scanned consent forms etc
- access patient specific **plans of care**
- prescribe special or normal diets for patients
- add **attachments** e.g scanned documents to the patient chart
- get **contextual access** to decision support resources
- capture **temporary addresses** for emergency patients
- store **risk factors**
- social history - marital status, occupation, religious preference, socioeconomic status, native language, translator needed (Y/N)
- linking to family member records
- genograms
- health surveys
- measures of functional level
- capture patient referral and consultation information
- problem oriented progress notes
- accounting for valuables
- notifications for medico-legal e.g trauma, accidents, rape, brough in dead, gunshot wounds

1.2.3 Theme: CPOE

Computerized ordering covers the domains of pharmacy, lab (pathology, microbiology, hematology etc), radiology / imaging, diet, nursing care, procedures (e.g specialized assessments), physiotherapy, occupational herapy, catering, transport, theater etc

Orders share the following characteristics:

- time and user stamped
- 'signed' by the ordering clinician or on behalf of the ordering clinician

Some orders (e.g those entered by medical students) may need verification before they are fulfilled.

Results share the following characteristics:

- time and user stamped
- 'signed' by the issuer
- patient name
- hospital number
- date and time of order
- date and time results were last updated
- alerts for changes / amendments

- test name
- visual cues for abnormal results

It should be possible to define custom result templates.

Epic: Medication orders

The CPOE system should support the following types of orders: medication, chemotherapy, large volume IVs, alternating IVs, total parenteral nutrition, piggyback IVs, compound medications, standing orders, medication protocols, medications with different strengths combined, medications from home etc

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Note:

As a:

- doctor, nurse, clinical officer

I need:

- to view the patient record as I make orders e.g ordering side by side with the patient chart (see Practice Fusion for a good implementation); current test results and vitals should be visible
- enter orders that include:
  - all the essential elements of a 'sig' e.g route, dose, duration, administration time / frequency, IV volume, drip rates, additives etc
  - a link to the visit and the patient
  - date and time
  - diagnosis / episode summary
  - medication(s) - trade name and generic name
  - indication(s) - selected from the patient chart
  - status
  - priority e.g routine, STAT, now, morning, timed
  - route
  - frequency
  - start
  - duration / end
  - treatment goal
  - instructions for the patient
  - free text comments for nurses and pharmacists
  - signed by or signed on behalf
  - name, designation, location and contacts of prescriber
  - flow rates for IV meds
  - dose
  - quantity
  - expiry or validity
- enter medication orders, including one time doses - with the system interacting with a formulary service to help me:
  - check for duplicate orders - by class, generic ingredient etc

  - check that a medication is on the approved formulary
  - check for age / gender / disease conflicts e.g medications contraindicated in children below a particular age, medications contraindicated in pregnancy, medications contraindicated in kidney or liver failure
  - calculate normal dosages - based on age, height, weight, body surface area etc
  - calculate dosages for patients with reduced or increased needs e.g in renal failure, hepatic failure
  - check for interactions - drug to drug, allergy, drug to disease, contraindicationes etc. Interactions should have severity levels. It should be possible to override an interaction warning - with a signed note needed for all moderate or severe interactions.
  - check for dose limits - by height, weight, body surface area etc
  - cumulative dose alerts e.g for chemotherapy
  - work out tapered dosing and alternate day dosing schedules
  - calculate number of dispensing units e.g number of tablets to dispense
  - check against lab test results
  - integrate suggestions for less expensive generic alternatives
- view formulary information within the context of ordering
- display cost information as part of the order template
- flag special orders for additional review e.g chemotherapy orders
- define order associated messages e.g drug is a restricted antibiotic that needs infectious disease approval
- generate an alert if an "on hold" item has been on hold for a while
- facilitate review of all on-hold items at a time interval
- define intervals at which on hold orders must be reviewed
- resume held orders
- discontinue orders - based on stop dates/times, expiration; with reason
- flag orders due for renewal
- view stock availability within the context of ordering
- mark orders that need review e.g Pharmacist review
- view overridden alerts clearly in order summary
- maintain **favorite medication lists** that can be edited on the fly
- create custom alert rules. CDS alerts can match what the patient has or what the patient does not have. They contain the following elements:
  - ID
  - Description
  - Age range (optional)
  - Gender (optional)
  - Race and ethnicity (optional)
  - Problems (diagnostic codes)
  - Medications (codes)
  - Allergies (codes)
  - Lab results (codes)

  - Active or inactive
  - A contextual label
- overidden alerts visible on order
- have order suggestions - brought up by diagnostic, age or gender triggers
- mark relevant orders as refillable, and get alerts when a refill is needed
- mark orders as discharge orders - mamaging the transition from inpatient to outpatient
- do conditional ordering
- renewal of flagged patient orders
- create future dated orders - will be dispensed or administered when die
- send prescriptions to the pharmacy; drugs from one order can be sent to more than one pharmacy e.g due to availability or payer restrictions. The following is the minimum information that should be printed on a prescription:
  - prescriber name and department
  - prescription date
  - prescription number
  - medication prescribed
  - product name
  - strength
  - form for medicine e.g tablet, capsule, injection, suspension
  - quantity
  - dosage (dose, frequency, duration, regimen)
  - route of administration
  - instructions for use
  - any other relevant information e. gprgnancy status
  - patient name
  - medical record number
  - sex
  - height
  - weight
- mark preferred Pharmacies
- print prescriptions for manual transmission / email prescriptions
- record continuing over the counter or outpatient medications
- track all changes or additions to orders - visually highlighted in the patient's medication list
- orders for surgical supplies by theater staff / anaesthesiologists
- request for documentation when prescribing controlled medications
- scanning of hard copy prescriptions
- change drug brand when doing refills
- detect early refills e.g for suspected overuse

Epic: Investigation orders

Investigation orders include lab, imaging, clinical assessment (e.g speech assessment) etc

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Note:

As a:

- ward nurse or doctor
- lab employee (lab clerk)

I need to:

- enter investigation orders. A proper investigation order has similar elements to those listed for a prescription before.
  - ordering provider
  - send to (internal or external lab)
  - order date
  - free text notes
  - priority
  - status
  - internal comments / free text notes
  - specimen collected - on lab or on site
  - bill to (patient, third party, facility)
  - patient instructions
  - diagnoses (one or more, coded in ICD 10 or SNOMED)
  - location of the patient
- be able to order any test or panel from LOINC, and also custom tests / panels
- have the system check for - and flag - duplicate orders; there should be a prompt to verify or cancel the duplicate
- override duplicate order warnings with a reason
- charge for tests - with the ability to handle multiple pricing schemes, prevent charges for redraws, place multiple charges per test and add comments
- enter no charge tests
- sign orders; with the ability for a junior provider to enter orders on behalf of a senior e.g verbal orders and sign on behalf of
- have order suggestions - brought up by diagnostic (ICD 10 and SNOMED), age or gender triggers, results of previous tests etc
- have flags from medical necessity checks e.g orders which do not correspond to the primary diagnosis
- view the patient record, including current test results and vital signs in the context of ordering
- print a patient's orders - current, discontinued; chronological and reverse order
- view previous results on the order screen, with abnormal results clearly flagged; these orders could be summarized on a flowsheet or a 24 hour panel
- assign priorities to orders
- suspend, reinstate, cancel or amend existing orders - with automatic credit for cancelled tests
- pick from community and custom / practice level order sets

- save favorite order sets
- create user order sets - linked to diagnoses, specialties, patient events, facilities, departments, clinical pathways etc
- copy and edit order sets; changes should be highlighted and tracked
- print orders e.g for sharing with external labs
- print specimen labels
- send orders - in whole or in part, even split - to diagnostic partners
- mark favorite diagnostic partners e.g favorite labs
- alerts for time bound diagnostics e.g glucose tolerance tests, cortisol levels etc
- warnings and reports for uncollected orders
- alert on patient discharge of orders needing action or completion

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Epic: Imaging orders

Note:

As an:

- imaging employee

I need to:

- enter orders that are linked to imaging appointments
- support emergency order entry (name, age, sex, reason for order, physician name) to expedite examination followed by full registration including insurance information at a later time
- each order has: patient details, medical record number, ordering doctor's, details, diagnosis, exam type, isolation type, reason for ordering, patient current condition e.g pregnancy, patient allergies, date and time ordered, free text or coded comments
- prevent use of abbreviations in order entry - known error sources
- automatically require scheduling for some orders
- entry and charging of backdated orders e.g after downtime
- display procedure description at order entry for verification
- rank procedures by priority when multiple procedures are ordered for the same visit
- assign unique exam numbers to each order; which will also appear in bar coded form when printed
- assign priorities to orders e.g STAT, urgent, routine
- place multiple exams in a single order for a patient
- match orders with associated procedures, tests or preparations
- notify the ordering physician and the nursing department of preparation procedures or instructions regarding a test during order entry
- display and print order-associated preparation procedures
- modify orders wwith comments - by authorized personnel
- cancel orders - specific orders, orders for a date/time range, all orders; supply a reason
- notify ordering unit of order cancellation

- retrieval of orders by: order number, date range, order status, patient, ordering physician, department (most recent orders first)
- **perform the following checks on orders:**
  - checks for conflicts e.g pregnancy
  - checks for duplication
  - checks for allergies - contrast interactions
  - checks for proper exam sequence
  - checks for previous exams e.g Barium
  - check for patient having another order in a similar modality for the day

1.2.4 Theme: Radiology

This chapter focuses on features that are unique to radiology.

Epic: Radiologists' and radiographers' dashboards

Note:

As a:

- radiologist or radiographer

I need to:

- view a list of all scheduled exams, with exam status and the ability to filter by radiologist / radiographer, room, modality, order time, exam time etc
- track patients through the radiology department
- track patient check-in and departure times, exam start and stop, rooms, name, results report start and sop
- show status of exams: scheduled, imaging done, dictated, transcribed, authenticated, sent etc
- split ordered exams into more than one exam request
- view a log of completed exams
- view unsigned reports under my name
- track waiting and turnaround times; by mnitoring arrival times, exam times and departure times
- view my workload and colleagues' workloads; organized by modality and procedure
- print schedules by room, radiologist, technician, nursing station, department, equipment, patient etc
- click through to patient records, which include a log of their current and past orders
- alerts for patients who have staid for longer than the normal waiting time
- receipts and tracking of films from outside entities e.g other hospitals
- tracking of film movement using bar codes

Epic: Capturing the radiology exam

All exam notes are user and date/time stamped. In imaging, more than one radiographer / radiologist may be involved in a single exam.

Note:

As a:

- radiologist or radiographer

I need to:

- work through a **pre-examination checklist** that also includes **consent**
- access the patient's **full medical record**
- scanning and attachment of documents
- display information to technologists: special instructions, equipment needed, number of repeats
- enter imaging reports using **reporting templates** that: support rich text formatting, have spell checking and can auto-populate demographic data. Some of these reports may be predefined e.g reports for normal findings
- enter **comments**, **diagnostic codes** in results
- use **graphical templates** (schematics, diagrams)
- support a workflow that has **transcriptionists** enter dictated reports
- document **adverse incidents**
- **review reports** e.g in a maker-checker workflow
- electronically **sign** reports and **send** them to the correct department e.g the requesting department
- preview and **print** reports
- record **supplies used**, decrement stocks and charge for the supplies
- **charge** patients for the procedures - with the ability to apply relevant discounts
- record **charges from independent radiologists**
- perform **retakes** (repeat exams) without charging the patient
- automatically **update order status** after entering results
- track follow-up for abnormal results
- support transcription workflows: with word processing, spell checking, glossary, medical dictionary
- support batch reporting: by physician, medical record number, modality, patient location etc
- automatic printing and sending of stat reports to remote sites
- remote reporting
- dictation
- voice recognition
- co-reporting
- notify nursing of abnormal results or emergencies
- capture preliminary and final report timestamps
- replace preliminary report with final report when ready
- attachment of addenda to the final report
- listing of reports, filterable by patient, MRN, sex, age, test, location etc

- printing of final reports after approval
- listing of reports pending final approval
- on-demand re-printing of patient reports
- retrieve reports by: radiologist, transcriptionist
- release or restriction of unverified or un-approved reports
- link multiple procedures to one report
- alerts to patients and ordering doctors

Epic: Image management

The 'party trick' here is the integration of **PACS** into a **teleradiology** ecosystem. The images that can be shared over PACS run the full gamut of imaging modalities - from echosonographs to ECGs; from angiographic images to MRIs; from endoscopic images to CT scans.

Note:

As a:

- radiographer or radiologist

I need to:

- track the locations of all films
- print labels for films and jackets
- interface with **PACS** to view images online and link reports to images
- receive images from local and remote PACS

Epic: Imaging operations management

Note:

As a:

- team leader in an imaging department

I need to:

- set up the schedule - designate times when staff, rooms, equipment etc are not available
- manage equipment maintenance schedules
- get alerts on expired films
- track quality control data e.g number of repeats and reasons for repeat
- analyze workload / utilization - by exam type, patient type, radiologist, technician, requester, department, equipment / device etc
- monitor inventory levels - with auto-restock notifications when supplies fall below a user specified threshold
- monitor departmental financial performance at a summary level

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The implementation will need to be benchmarked against a commercial RIS/PACS e.g the Philips eXtended Internet Radiology Information System (XIRIS)

1.2.5 Theme: Laboratory

The domain of laboratory medicine includes:

- hematology and blood transfusion
- clinical pathology - with *histopathology* and *cytology*
- clinical chemistry / biochemistry - includes serology
- special chemistry - applies elaborate techniques e.g electrophoresis, immunoassays etc
- microbiology - including TB

Some hospitals may place the blood transfusion department under the lab, while run it as an independent department. However the administrative setup is done - there will always be an intimate interplay between the laboratory and the blood transfusion unit e.g screening of all blood donations.

Within a lab, there are multiple roles. A partial list includes:

- clients or patients - who may need to access results online in a patient portal
- clerks - front desk administrators who handle sample receipt, billing etc
- analysts - technical lab staff
- supervisors - review results before publishing
- regulatory inspectors
- system administrators

The domain is regulated by a variety of standards, with ISO 17025 being one of the more important ones.

Epic: Laboratory user dashboard

The laboratory user dashboard is focused on 'task visibility'.

Standard access control usually prevents analysts from seeing patient identification details, and clerks from seeing results.

Note:

As a:

- laboratory user

I need to:

- have visibility into **my** worklist; this includes my pending tasks
- have visibility into my colleagues worklists
- filter or sort the worklist by patient
- see a summary of incomplete orders, abnormal results, recent activity, consult status ec
- see my scheduled / recurring tasks e.g recording observations on a blood culture daily
- print or share/send any worklist on demand
- transfer a case to a colleague's queue - for additional consultation or to balance workload
- allocate pending tasks to myself / colleagues
- reschedule pending tasks
- track instrument workloads
- track turnaround times
- assign priorities to worklist items

Epic: Investigation sample collection

Investigation samples may be collected in the clinical areas - wards, clinics, casualty etc - or at the lab itself. The samples may also be collected by laboratory staff or by clinical staff.

All collections are user and date/time stamped. These 'stamps' must be displayed everywhere the sample is displayed.

For quantitative tests (e.g an electrolyte asseay), the input worksheet closely resembles a spreadsheet. For semi-quantitative tests (e.g culture and sensitivity in microbiology), the results are entered using a mix of pre-defined pick-lists and free text comments. For purely qualititive results (e.g reporting on the morphology of a blood film), the system should provide the same template driven input mechanisms available to doctors.

Note:

As a:

- lab or clinical user

I need to:

- access a **sample collection worklist** that I can sort and filter by test type, test, technologist, time etc. The collection list includes the test name, code, priority, accession number, patient allergies, comments, scheduled draw time, sample size, tube type, patient location and associated practitioner(s)
- merge items from multiple worklists into a new worklist
- generate collection labels - with bar and QR codes - and print them
- access a log of pending collections
- access a log of uncollected specimens, with alerts for overdue collections
- have **auto assigned accession numbers** for each sample. These numbers shall be bar and QR coded on sample labels
- view payment status before sample collection; charge tests that are uncharged and require payment for cash patients before tests
- **register** samples with the following information:
  - number / ID
  - requester
  - collection date/time
  - type e.g blood, urie, serum, stool, semen, CSF, sputum, pus, synovial fluid, slit skin, pleural fluid, pericardial fluid, peritoneal fluid, QA test samples, others
  - source - IPD, OPD, emergency, sub center, community program
  - priority
  - a special mark for outbreak specimens
- get **flags / warnings** when sample types are linked to the wrong tests
- issue sample receipts for accepted samples; with the ability to print
- track the chain of custody of every sample; a sample could be in the following statuses - pending, sampled, preserved, received, assigned, cancelled, to be verified, verified, invalid, published
- support partitioning and storage of samples
- reject samples - with reasons picked from a predefined picklist and plain text reasons; an alert should be sent back to the responsible practitioner(s) for action

- register and track specimens in batch

Epic: Investigation results entry

Laboratory results can be entered manually or captured directly from analyzers. For the manual entry scenarios, design so that the results can be entered in multiple passes.

The system should provide rich text editing for qualitative reports e.g pathology reports.

Note:

As a:

- lab analyst

I need to:

- enter results via test type specific **worksheets**. Worksheets are spreadsheet like and should support configurable automatic calculations, rouding and adjustment factors. They should also support graphing / visualization. Results may be quantitative, semi-quantititative or qualitative. Quantitative results have values, units, reference ranges, flags [high / low / critical high / critical low / normal] and comments. Large changes / deltas in a test series should be flagged.
- export worksheets to Excel
- import worksheet data from Excel
- add comments at the worksheet level or for individual entries
- attach versioned documents to results e.g images, MS word reports etc
- edit results on unsaved worksheets; no editing after the worksheet is processed
- fill a worksheet in via a **bidirectional link to lab equipment**
- **publish** results (could be access controlled in a maker-checker setup)
- **retract** or invalidate results
- send alerts to practitioners for panic values
- mark some results as classified and control access to named people e.g VIP patient results, HIV
- preview and print / send / email results; the requester and requesting department should get automatic alerts

---

Epic: Laboratory operations management

Note:

As a:

- lab manager

I need to:

- manage equipment maintenance schedules
- track expiry dates and inventory for culture media, regents, stains and other laboratory supplies
- keep track of licensing inspections and reinspections
- access quality control information - including non-conformities, PT and IQA results

- keep track of quality documents - SOPs, instrument calibration certificates, certificates of analysis, QC reports, reference specifications etc
- analyze workload - by analyst, instrument, procedure, diagnosis etc
- do case management - disease tracking, trend analysis etc
- generate surveillance reports - e.g notifiable positive test results

1.2.6 Theme: Clinical dashboards

Each clinical worker (e.g nurse, doctor) shall have their own **individually customizable** dashboard. This dashboard is focused solely on their own tasks. Each practitioner can work in multiple stations e.g multiple nursing desks or wards for nurses, multiple consulting rooms or wards for doctors.

Note: The messaging system shall send notifications to these points of service whenever there is a new unit of work e.g notifications to pharmacy when there is a new prescription or a newly discharged patient who needs discharge meds and inpatient drug returns

When the number of patients in a point-of-service queue exceeds a set threshold, an alert should be generated. This condition should also be displayed prominently on the dashboard.

The dashboards should clearly distinguish 'information that is new to me' from 'information that I have already seen before'. This should occur on a user by user basis.

Epic: My messages

Messaging - between care team members, between the care team and the patient, between provider and payers etc - shall be the backbone of 'care coordination' and 'telemedicine'.

If you want a mental metaphor, think 'a secure / confidential Slack for Healthcare' and you'll not be far off. The system shall support the following kinds of messaging:

- communication between care providers in the same healthcare organization or practice
- communication between care providers and patients
- communication between care providers in different organizations e,g in referrals
- communication with payers
- communiation with service providers e.g labs, imaging centers

This is literally the 'backbone' or care coordination and telemedicine (repetition for emphasis). We cannot afford to do this in a half-assed manner.

The user should be able to **opt in** to desktop and background push (service worker) based alerts.

Note:

As a:

- clinical or administrative user

I need to:

- communicate with my colleagues e.g primary care physician to specialist
- communicate with the patient
- communicate with service providers e.g labs and imaging centers that we work with, sending post discharge communication to post-acute care centers
- communicate with partners e.g referral centers that we collaborate with

- communicate with payers e.g insurers and employers
- conduct televisits, with access to voice, video, text and image communication modalities
- access a log of all patient specific communications (e.g teleconsultation notes) in the patient chart
- record charges for teleconsultations, where applicable

Because:

- I need to pass on important patient care information - information that is safety or outcome critical
- I need to pass on scheduling information - which will help me attain high utilization levels and increased revenue
- I need to get important updates as soon as they are available e.g when an insurer authorizes an admission and my patient is waiting
- I need to get life-saving information as quickly as I can e.g a patient with lab results that should prompt immediate life saving interventions

---

Scenario: Receive lab results update

This scenario is merely representative; the same thing could be said of any time critical update e.g an incoming insurance approval / rejection, an incoming referral from a lower level health facility etc

---

Note:

Given:

- that I am logged in to the system

And:

- the lab (internal or external) posts results for a patient under my care

When:

- I look at any open application window, I should be able to see an alert and visual indication of my new messages

And:

- upon clicking on the message indication

Then:

- I should be able to access the message
- I should have be able to reply to a **message thread**, in the same way that I am accustomed to doing on Google Hangous, Slack, WhatsApp, Facebook etc
- I should be able to link a patient in for context or view the record of the patient that has already been linked in for context

And:

- interact with its contents

The main 'metaphor' going on here is the 'rich inbox'. It is not enough to see a message, it should be possible to **act** on it, right from the inbox.

Scenario: Task inbox

With all the messages that need action flying around, the 'task specific inbox' is a key metaphor. For example: here are all the claims that need to be reviewed, here are all the imaging reports that need to be reviewed etc

---

Note:

Given:

- that I am logged in to the system

And:

- I have any screen open

When:

- I look at the top of the screen, I should be able to see a clear indication of what tasks I have pending, including a sense of how many new tasks of each category I have

And:

- Upon clicking on any task type

Then:

- I should be able to view further detail on the task
- I should be able to click on a shortcut that takes me to the relevant task window e.g to review the results if the task is to review lab results

And:

- the number of pending tasks should decrease automatically whenever I interact with a task e.g act on a pre-authorization that needed review

---

This task inbox is complicated by the fact that **tasks may be shared between several individuals in a group**.

Scenario: Contact support from within the product

For a SAAS product, support cannot afford to be 'distant' or 'remote'.

The system shall provide a constant (permanent in the user interface) mechanism to access help (the knowledge base) and contact human support. The user interface design shall also focus on 'teaching', esp. for the first use interfaces or new users.

Note:

Given:

- that I am logged in to the system

And:

- I have a question or need help with a system task

When:

- I look at the bottom of the screen

And:

- Click on the support button / popup / link

Then:

- I should be able to initiate a chat session (text, audio or video) with a support person

And:

- Get help with my question or problem

Scenario: Access online help

The system should provide guidance each time the user accesses an unfamiliar page. This help should be contextually relevant.

Note:

Given:

- that I am logged in to the system

And:

- I have accessed a page that I am not familiar with

When:

- I look at the bottom of the screen

And:

- Click on the help icon / popup / link / icon

Then:

- I should be able to access simple guidance that is relevant to the screen that I am on

And:

- Use the information so gained to complete my task

Scenario: Setup wizard

We should strive to avoid a 'blank' experience on first setup.

Note:

Given:

- that I am a new user logged in to the system

And:

- I have not completed my system setup

When:

- I access the default / home page

And:

- Interact with the dashboard

Then:

- I should see an indication of how far I have gone with my setup / onboarding
- I should be able to access setup / onboarding information
- I should be able to click on a shortcut to the next step on my setup / onboarding

And:

- I should be guided gently to complete my orientation / onboarding / setup

---

One thing that may not be obvious when reading the scenario above - it is user / role specific.

Epic: Triage dashboard

'Triage' is the name given to the clinical process of assessing incoming patients and separating them into different queues based on the urgency with which they need to be attended to. In common practice, 'triage nurses' also collect vital signs and document the chief complaint / presenting problem.

In a typical outpatient department / casualty, the triage nurses manage the flow of patients and staff. They 'make the call' on which patients are so sick the need to be seen NOW and which patients can wait for their turn on the queue.

In order for an emergency room to offer an acceptable standard of care, the staff should have continous visibility over the status and location of all patients.

The patient display should be **color coded** e.g by urgency and waiting time. It is not just patients that are tracked - providers (e.g nurses and doctors) are also tracked. This tracking interface should be **mobile friendly**, so that it can be used from tablets and other portable displays.

Note:

As a:

- emergency room worker (nurse, doctor, adminisrator, records employee etc)

I need to:

- capture code and time of triage; triage codes can be customized
- see a color coded display of all patient and provider locations that is updated in real time. This display should be graphical. It should be easy to filter e.g status of all patients with imaging orders, bed requests etc
- see a clear indication of **patient wait times**, with patients that have not been attended to for longer than a departmentally defined task duration threshold clearly flagged
- see a clear indication of **patients awaiting attention or transfer to other departments**
- see **notifications** of incoming results, patients awaiting triage etc. In addition to notifications, there should be a permanently visible task inbox / queue. Results that are flagged as critical or abnormal should be clearly marked.
- filter or sort my patient location dashboard by patient type, diagnosis, triage status, provider and arrival mode
- have visibility into ambulance status for both own and third party ambulances
- enter and receive notifications of remotely entered requests
- book patients for ambulance services
- book multiple patients for the same ambulance e.g for transfers
- cancellation of ambulance bookings
- capture requirements when booking ambulances e.g mechanical ventilation
- charging for ambulances e.g on distance / mileage
- show where ambulance booking was made from
- booking outsourced ambulances; tracking and reporting
- ambulance logs - driver, patient,
- ambulance inventory e.g ventilators

- update vitals and other data prior to arrival; requests pre-arrival
- dispatch ambulances
- record arrival of ambulances
- track ambulances

Because:

- I need to keep the patients / tasks moving; prompt visibility into delays will allow me to intervene in time‘
- I need to filter the large volume of information that I get, and opt in to what I need only
- I should be able to respond promptly to urgent or critical results - it could save lives

---

Note:

Given:

- that I am a logged in triage nurse

And:

- I am at the triage ‘dashboard’ or home page

When:

- I look at my summary / dashboard

Then:

- I should be able to see the queue of patients awaiting triage
- I should be able to **prioritize** patients on the basis of of their acutity level
- I should be able to see the queues (with color coded statuses) for the patients that I have already triaged and e.g. sent to a specific consulting room
- I should be able to see the queue of patients awaiting re-consults e.g after lab results are in, and the status of their pending tests
- I should be able to move patients around between queues
- I should be able to remove patients from the queue e.g patients who have already left
- I should be able to assign patients in specific rooms to particular care providers e.g to particular doctors or nurses
- I should be able to see a particular doctor or nurse’s (or other care team member’s) queue
- I should be able to manage observation rooms for outpatients

---

Story: Triage

Listing 1.11: **Triage**

```
Feature: Triage
    Triage controls the flow of patients. The primary roles are: prioritization,
    observation of vitals and 'pre-clerking' ( updating the problem list and
    performing a routine review of systems ).

    Every entry made here is date/time- and user- stamped. The identity of the
    user that last updated it and the exact time of that event MUST always be
    shown.
```

```
    The complaints search box should have "predictive" or "learning" behavior
    i.e common conditions in the local practice / hospital and for the patient
    should be suggested before less common ones.

    Background: Find a visit through the listing of active visits
        Given that I am logged in via the triage role
        And I navigate to the "Active Visits" queue
        When I type into the search box any of the following:
            | field          | explanation                                  |
            | name           | any of the patient's name or a fragment of it |
            | visit number   | a full or partial visit number               |
            | patient number | a full or partial visit number               |
            | priority       | triage priority status                       |
        Then I should see a filtered list of visits that match the query
        And the list should become more specific as I type more
        And I should be able to click on one of the visits to see the patient's
            face sheet

    Scenario: Add a complaint
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing complaint(s) if any
        Then I should see an "Add Complaint" control
        When I click on "Add complaint"
        And type a complaint name or fragment into the search box that appears
        Then the search box should show matches for the typed input
        And I should be able to select one match
        And The selected match should then appear in the patient's problem list

    Scenario: Dismiss the complaint form
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing complaint(s) if any
        Then I should see an "Add Complaint" control
        When I click on "Add complaint"
        Then I click on the "X" or "Cancel" controls
        Then the form should dismiss and I should be taken back to the patient
            face sheet

    Scenario: Remove a complaint
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing complaint(s) if any
        And I should see a "Remove" button next to each complaint
        When I click on the "Remove" button
        Then the complaint should be removed from the "Active Complaints" list
        And added to the "Inactive Complaints" list

    Scenario: Record vitals successfully
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing vital signs for the visit in a
            tabular 'flowsheet' and graphical form
        And I should see a "Note New Vitals" button
        When I click on the "Note New Vitals" button
        Then I should see a form that allows me to input vitals
        And I should be able to fill in the form with normal values and click
            "Save Vitals"
        And I should see a "Vitals Saved" success message
        And I should be navigated back to the patient's face sheet

    Scenario: Record vitals that are abnormal but feasible
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing vital signs for the visit in a
            tabular 'flowsheet' and graphical form
        And I should see a "Note New Vitals" button
```

```
        When I click on the "Note New Vitals" button
        Then I should see a form that allows me to input vitals
        And I should be able to fill in the form with abnormal values and click
            "Save Vitals"
        And I should see a "Vitals Saved" success message
        And I should be navigated back to the patient's face sheet
        And I should see the abnormal values clearly flagged on the
            color coded flowsheet

    Scenario: Record vitals that are incompatible with life
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing vital signs for the visit in a
            tabular 'flowsheet' and graphical form
        And I should see a "Note New Vitals" button
        When I click on the "Note New Vitals" button
        Then I should see a form that allows me to input vitals
        And I should be able to fill in the form with infeasible values and click
            "Save Vitals"
        And I should see an on-screen prompt that highlights the infeasible
            values
        And the "Save Vitals" button should be disabled until those values are
            corrected

    Scenario: Dismiss the vitals form
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing complaint(s) if any
        Then I should see an "Note New Vitals" button
        When I click on "Note New Vitals"
        Then I click on the "X" or "Cancel" controls
        Then the form should dismiss and I should be taken back to the patient
            face sheet

    Scenario: Record the review of systems
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing review of systems
        And I should see a "Review of systems" button
        When I click on the "Review of systems" button
        Then I should see a checklist style form that allows me to input ROS
            responses
        And I should be able to fill in the form and click "Save Vitals"
        And I should see a "Review of Systems Saved" success message
        And I should be navigated back to the patient's face sheet

    Scenario: Dismiss the review of systems form
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's existing review of systems
        And I should see a "Review of systems" button
        When I click on the "Review of systems" button
        Then I should see a checklist style form that allows me to input ROS
            responses
        Then I click on the "X" or "Cancel" controls
        Then the form should dismiss and I should be taken back to the patient
            face sheet

    Scenario: Assign a priority to the patient
        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's color-coded current "Priority" in the
            patient banner
        When I click on the priority badge
        Then I should see a pop up control with a listing of priorities
        When I click on a new priority
        Then the new priority should immediately show on the patient banner
        And the new priority should be seen when I navigate back to the visit
```

```
            listing

    Scenario: Assign the patient to a queue
        Queue are one of the primary constructs of the EMR workflow. Queues are
        attached to resources e.g doctors, consulting rooms, diagnostic machine
        etc ( any schedulable resource ).

        Some queues will be unconstrained / unbounded in size e.g orders
        awaiting processing at a lab. Some queues will be limited in capacity
        e.g patients assigned to an observation room.

        Given that I have opened a single patient's visit / face sheet
        Then I should see the patient's color-coded current "Queue" in the
            patient banner
        When I click on the queue badge
        Then I should see a pop up control with a listing of downstream queues
        When I click on a new queue
        Then the new queue should immediately show on the patient banner
        And the new queue should be seen when I navigate back to the visit
            listing
```

Epic: Doctors' and nurses dashboard

This dashboard should be **mobile friendly** - the ability to access and update the EMR when on the go or in between shifts is an important efficiency booster.

Clinical templates allow us to strike a balance between detail and user convenience. They can be thought of as 'documentation accelerators'.

Templates **contain rich text formatting** within them. They may also support keyboard shortcuts (see Practice Fusion for a good example in practice). They can take many forms, for example:

- a checklist for review of systems
- orthopaedic charts
- dental charts
- growth charts - CDC, WHO
- psychiatry - DSM 4 and global assessment of functioning
- diabetic patient insulin history tracking
- standardized wound description templates e.g templates that describe wound appearance and drainage
- immunization records - schedule, consent, refusal with reasons etc
- obstetric history forms - recording e.g foetal heart rates, fundal heights, weight, urinalysis, blood pressure, notification dates - EDD, scheduled delivery, date to start ART etc, auto calculation of EDD from LMP or ultrasound EGA etc

Clinical templates will be a common ongoing customization. We should design a 'plugin' architecture for templates. We might want to take a good look at SMART on FHIR. **The practitioner portal will include this functionality**.

Note:

As a:

- doctor or nurse

I need my dashboard to:

- access a personalized calendar that has my appointments and tasks, and can be toggled between day / week / month or agenda views; the schedule should include the reason for visit and symptoms documented during the intake process
- book new appointments; scheduling patients by time, type of appointment, location etc
- cancel appointments
- confirm or remind patients of appointment times via automated email, text and phone notifications
- add reminders that are not tied to appointment slots
- add and view tasks / TODOs, also not tied to appointment slots
- be able to opt in to email / mobile push / SMS reminders and set the times when the reminders are sent
- be able to opt in to daily agenda emails and set the time when the emails are sent
- able to access (and search, filter, sort) listings of my patients
- click through to each patient's detailed patient record
- view orders and results / reports for each patient
- view pending medication refills and refill / cancel
- write and send prescriptions
- show me my patients - name, contacts, emergency contacts, medical history, demographic and diagnostic data, current orders, current results, images
- show me my worklist - with the ability to export or print on demand
- show me my **urgent tasks and priority items** e.g unacknowledged results, unsigned documents, incomplete tasks; new tasks should be flagged
- show a quicklist of procedures to be performed during a shift
- provide easy access to specimen collection lists, with the ability to rapidly print bar coded labels
- allow me to **prioritize** the tasks on my worklist
- alert me when there are overdue tasks
- alert me when there are new tasks
- show me a list of **my** patients, with those that I have interacted with recently appearing earlier in the list
- allow me to click through and see my patients medical records - with their medications, history, orders, results, images etc - along with the ability to edit and input new clinical notes. The actions that can be performed on each patient record are defined in further detail in a 'My patients' feature below.
- access theatre lists for patients under my care and monitor progress across pre-operative checklists (that work towards transfer to operating theaters)
- show me alerts for incoming investigation reports and results that need review
- request consults and view the status of pending consults
- allow me to click through to the patient tracking and bed board pages
- enter charges for ward and clinic procedures
- process birth and death notifications
- browse a **template library** that is organized by specialty and has featured templates, template preview and ratings
- create **custom templates** or custom template sections and link them to the appropriate sections of the patient chart. The template builder should provide at least the following field types: short text fields, yes/no fields (always generate text), on/off fields (generate text only if off), single selects, multiple selects, diagrams, fractions, headers, sub-headers and blank fields / spacers

- create custom templates by saving notes as a template (placeholders or variables?)
- **sharing templates** with specific users

Epic: Dispensing dashboard

In addition to dispensing medications - for inpatients and outpatients - many hospital pharmacies also maintain a poison information center.

Note:

As a:

- pharmacist, pharmaceutical technologist or nurse with a dispensing role

I need to:

- view a worklist - medications pending dispense, filterable by station or pharmacy; the patient should be cleared from the worklist only when fully dispensed
- dispensing statuses: not atended, in processing, ready for dispensing, partially dispensed, dispensed
- listing of patients waiting at various locations / pharmacies
- distinguish between inpatient and outpatient orders
- process discharge drugs - returns of inpatient medicines, issuance of discharge medicines
- get alerts on new location when a patient is transferred / moved
- perform price checks (quotations) without the need to register the patient in advance
- management of pre-packaged kits / packages
- produce Patient Information Leaflets
- record patient arrival at the counter and departure after dispensing
- monitor turnaround times from receiving orders to final dispensation
- show average waiting time at the display monitor
- clearly identify orders that need a Pharmacists' review
- print labels. General labels should contain the following information:
  - name of the patient
  - name of the medicine (generic and trade)
  - strength
  - form of medicine e.g tablet, capsule, injection, suspension
  - expiry date
  - quantity
  - instructions for use e.g avoid alcohol
  - dispensing date
  - storage requirements
  - name of the dispensing facility and department

  IV labels have the following additional information:
  - start time
  - solution and volume

  - time to run
  - drip rate
  - initials of the pharmacist or technician that compounded the solution
  - administration insructions

  Label types are:

    - inpatient
    - outpatient
    - discharge
    - pack

- reprinting of labels, as necessary
- ISMP (Institute of Safe Medication) compliant labels
- generate and print compounding worksheets: preparer, checker, components used, manufacturers, lot numbers, expiration date, volume, weight
- automatic pricing of compound items, including the compounding fee
- susbstitute generic drugs - except where there is a do not substitute order
- dispense a prescription in full or in part
- charge dispensing fees
- print prescriptions for medications not dispensed e.g to send to third party pharmacy
- place prescriptions on hold (with a comment)
- acknowledge / ignore alerts

Epic: Medication administration dashboard

Note:

As a:

- ward nurse or doctor

I need to:

- access a medication administration list; printable for easier communication during handovers. It includes: patient, drug, dose, age, cart filler name / cart checker name, total units dispensed
- access a summary area that includes a renewal notice list, expired treatment list, alerts on patients who missed medications and medication errors
- be warned about potential interactions e.g drug-drug, drug-allergy, drug-food, duplicate drug; I can override warnings by writing an note that is **prominently displayed** on the patient record
- be notified of abnormal lab results or vitals prior to medication administration
- be able to check medication labels against patient wrist bands
- place orders on hold
- receive notice of orders that are near expiry
- document why a medication was not administered
- add administration notes to the medication adminisration record
- record adverse drug reactions

- synchronize the medication administration list with a dispensing system
- automatically decrease inventory during cart filling
- print a specific patient's medication administration record on demand

1.3 Product: Inpatient clinical

Patient care is **multi-disciplinary**. The *circle of care* for a patient may involve doctors, nurses, clinical support staff e.g admissions clerks, case managers, payors, guarantors, pharmacists and others. This multidisciplinary role setup is made harder by the need to **balance between access and confidentiality** - what does each party need to know in order to do their job? This is made even tougher by the need for **mobility**.

Note: Information Security

This guide assumes that there shall be **fine grained** role based access control. The permissions used shall be *granular*, so that is shall be possible to grant or deny access to any screen or section of a screen. It shall also be possible to grant view only rights.

Access shall be restricted on the basis of:

- user groups
- user types
- individual patient charts
- locations e.g nursing floors, clinics
- patient type e.g VIP, confidential patients
- a combination of all of the above

Logged in sessions shall be timed out after 10 minutes. The user shall be locked out from further login attempts after three incorrect login attempts. Each lockout shall be an hour long.

All entries shall be **time stamped** and **audit trailed**.

The system will need to support **secure logon** - with hardware tokens.

Note: Online Help

The system should embed online 'help' and first-use tutorials.

For clinical services, the need to **design for high distraction environments** and for task efficiency is paramount. Many of the existing products have failed to gain adoption in clinical settings in part because they are perceived to be more cumbersome than paper.

1.3.1 Theme: Scheduling

The scheduler will be available to administrative staff (e.g registration clerks), clinical staff (e.g doctors and nurses) and even to patients themselves.

This feature should work for both single clinics and large multi-site healthcare businesses. For a multi-site operation, the calendar should be synchronized enterprise-wide.

A medium- to large- provider will typically have many concurrently scheduled **routine** clinics e.g paediatric, antenatal, postnatal, family health, diabetes, chest, well baby, child welfare, immunization, lamaze etc. There will also be a sizable number of **specialist** clinics e.g neurosurgical, obstetric, cardiology, neurology etc

Epic: Operating room (theater) scheduling

This, too, can operate in a centralized or decentralized manner.

Some departments that are not classically thought of as 'surgical' e.g cardiac catheterization, interventional radiology and endoscopy will use scheduling facilities that are similar to what is described for operating rooms.

Preference cards for surgical and anaesthetic staff define the supplies needed for each case.

Note:

As a:

- user with OR scheduling duties e.g surgeon, theatre nurse, ward doctor

I need to:

- view daily and weekly schedules by operating room, department, surgeon, anaesthesiologist, patient etc
- capture the following scheduling data: patient name, age, gender, ward and bed number, medical record number, contact details, diagnosis / indication, planned operation / procedure, surgeon, booking date and time, name of scheduler, estimated time of surgery, anaesthetist / anaesthesiologist, type of anaesthesia, assisting surgeon(s), scrub nurse, special requirements, known allergies, comorbidities, physician, special requirements e.g implants
- scheduling of recovery locations
- shift start times automatically when surgeries are added
- swap cases - individual or entire rooms - without reentry of data
- automatically shift start times when cases are cancelled
- speed scheduling - next five available conflict free time slots
- scheduling of multiple procedures for the same patient cases
- scheduling of multiple procedure and multiple surgeons for one case
- re-sequence the cases in the final list, as necessary
- surgeon's verification of the operating list before it starts
- color coded status of the operating list - provisional, verified, final
- printing of operating lists
- transfer patients from one surgeon to another
- online waiting list and reservations, with priorities
- standard turnover and setup times per case - added to case duration
- manually override standard turnover or setup time per case
- automatically use surgeon's average case time when scheduling a case
- OR status whiteboard
- book slots - with the following conveniences:
  - drag and drop rescheduling e.g swapping cases between rooms
  - automatically locating the next available time slot
  - wait lists
  - ability to select durations based on the case, surgeon etc
  - moving cases between surgeons and operating rooms e.g due to schedule changes
  - cancelling or holding cases, with reasons indicated

  - free text notes for bookings - comments for OR staff
  - automatic checks for resource conflicts
  - override conflict checks and availability block conflicts - with a reason given
  - associate bookings with orders

A booking may involve multiple surgeons and multiple rooms (e.g OR and recovery)

- edit bookings
- manage equipment availability / unavailability
- schedule equipment for use in surgeries
- manage operating rooms e.g set rooms aside for specific procedures
- define availability blocks for surgeons, rooms, anaesthesiologists, support staff (scrub nurses etc)
- define surgeon preferences - allergies (e.g allergies to latex), hand size, handedness (left or right)
- reschedule e.g because an emergency operation took precedence over the scheduled operations (common occurrence)
- reschedule cases that have not started within a defined threshold e.g 30 min
- reactivate a cancelled case, with retrieval of all previous data
- surgical packages - with the ability to charge for extra items and theatre time

1.3.2 Theme: The patient record

An individual patient's record shall be accessed via a dashboard that 'brings together' all of a single patient's clinical records.

Clinical and billing information should be displayed in **reverse chronological order** by default; more recent events are of greater interest than remote ones.

All patient records shall be accessed via the same interface, whether current or historical. "Archiving" is a back-end level concern that should be auto-managed.

The coded sections of each patient record shall use the following terminologies:

- ICD-10 (provisional and final diagnoses)
- ICD-O (oncology)
- LOINC (investigation orders and results)
- SNOMED (the detail of the clinical record itself)

In addition to having SMART apps for custom templates, custom visualizations etc, the system should support an arbitrary number of custom print templates.

Epic: Care plans

Plans of care range from medication or procedure plans to lifestyle interventions. Many of these plans of care will be multi-disciplinary e.g involving physiotherapists, occupational therapists and speech therapists.

Nursing care plans might include risk factors, signs and symptoms, outcome criteria, nursing interventions and discharge criteria.

Note:

As a:

- clinical user

I need to:

- define individualized plans of care - that might be **multi-disciplinary**. The system should assist this process by providing **critical pathway guidance** and **decision support**
- document care goals and outcomes
- define acuity levels and early warning signs - track, filter by patient / nursing unit, date, shift, care level
- edit or discontinue all or part of any plan of care
- note target dates for interventions on care plans
- access previous plans
- record interventions (date, practitioner, intervention notes)
- assessment at variu=ous stages depending on condition and level of nursing care e.g on admission, on change of condition, post-op, every 24 hours, on discharge etc
- reminders, checklists and planning documents
- standard care plans - linked to diagnosis
- define nursing checklists e.g change of shift, nursing round, pre-op
- alerts for planned care when the time elapses
- fluid chart automated cumulative balances
- free text entry of non-standard care plans
- nursing progress notes and observations; progress notes may be SOAPIER - Subjective, Objective, Analysis, Plan, Intervention, Evaluation and Review
- entry of all medical equipment that has been connected to the patient
- define and support patient call system
- define high priority patients
- chaplaincy service requests, alerts, request list, notes, follow up (pre-supposes capture of patient religion)
- shift handover summary
- print care summaries for patients
- print active care plans by patient

Epic: Operating room documentation

Operating room documentation is multidisciplinary. There are surgeons, surgeons' assistants, anaesthesiologists, various nursing roles...

Note:

As a:

- operating room nurse or doctor

I need to:

- access the complete patient record
- work through pre-operative checklists - consent, investigations, blood requests, pre-anasethesia checks etc

- enter pre-, intra- and post- operative documentation using templates. This includes text, outcomes, anaesthetic medications, implants, explants, items used, medication administration record, transfusion administration record, pre-operative diagnosis, post-operative diagnosis, indications, specimens, complications, findings, notes etc
- anaesthetic documentation includes: anaesthesiologist, start and stop times, anaesthesia types and agents, complication codes, free text
- add addenda to documentation that has already been finalized
- register specimens and dispatch them to the relevant labs
- track usage of consumables and services and submit charges to billing as they are added; this also updates floor inventories. Bar code scanning or similar methods could be used.
- track implants and explants - for purposes of tracking in the event of a recall

Epic: Peri-operative care

Note:

As a:

- operating room nurse or doctor
- anaesthesiologist or anaesthetist

I need to:

- access the complete patient record
- generate and print patient collection cards
- record the exit of the patient from the ward / department and notify theater
- verify the pre-op checklist
- admit, acknowledge and document patient arrival in the holding bay, OR, recovery bay and checkout (with bar code scanning)
- support verification of patient identity and procedure to be performed
- validate the identity of the patient by scanning the bar code
- record the start time of reach avigity - patient arrival, administration of anaesthesia, start of surgery etc
- color coded tracking display: checked in, awaiting procedure, procedure in progress, procedure completed, in recovery, checked out
- cancellation, with reasons
- WHO surgical checklist
- **peri-operative data:**
  - pre-op and post-op diagnosis
  - time in and time out
  - delay time and reason
  - allergies
  - meds and/or IV, dose, time
  - prep performed
  - pre-op and post-op free text notes
  - type of anaesthesia and anaesthesia agents

    - X-ray takens
    - implant log data e.g serial number, lot number, size
    - specimen data
    - blood loss
    - assistant surgeon(s) name
    - circulator nurse(s) name
    - scrub nurse(s) name
    - start and stop times for anaesthesia
    - start and stop times for surgery
    - complications
- specimen dispatch list
- consistent and organ disposal
- requirements per procedure (basket) - to request from theater store
- interface with CSSD for sets
- return of unused supplies
- documentation in death registry

1.3.3 Theme: CPOE

Computerized ordering covers the domains of pharmacy, lab (pathology, microbiology, hematology etc), radiology / imaging, diet, nursing care, procedures (e.g specialized assessments), physiotherapy, occupational herapy, catering, transport, theater etc

Orders share the following characteristics:

- time and user stamped
- 'signed' by the ordering clinician or on behalf of the ordering clinician

Some orders (e.g those entered by medical students) may need verification before they are fulfilled.

Results share the following characteristics:

- time and user stamped
- 'signed' by the issuer
- patient name
- hospital number
- date and time of order
- date and time results were last updated
- alerts for changes / amendments
- test name
- visual cues for abnormal results

It should be possible to define custom result templates.

Epic: Patient diet orders

Diet orders could be entered by nursing staff, kitchen staff or clinical staff.

Note:

As a:

- nurse, kitchen staff member or clinical staff member

I need to:

- prescribe diet for inpatients, outpatients, visitors, hospital staff etc
- record patient specific diet preferences, which should be displayed to anyone involved in making or modifying diet orders
- easily prescribe special diets e.g cardiac diet, normal diet, diabetic diet, renal diet
- prescribe therapeutic diets e.g total parenteral nutrition, tube feeding or supplemental feeding
- view meal requests, by day and mealtime
- cancel meal requests manually; the completion of a discharge process or the recording of a patient demise should trigger auto-cancellation
- view ingredients and calorie values for any available meal

Epic: Blood orders

Orders for blood can come from any of the clinical areas.

Note:

As a:

- doctor or nurse

I need to:

- make requests for blood or blood products for my patients. Each request indicates: reason, urgency, patient's blood and rhesus types, patient location, date needed, location needed etc
- receive notifications on availability / non-availability and issuance of requested blood / blood products
- perform electronic specimen cross-matching

1.3.4 Theme: Admissions, discharges and transfers

This set of features covers both 'conventional' (e.g surgical, medical, paediatric and specialized wards) and short stay (e.g day surgery, some endoscopy and some in-vitro fertilization) admissions.

Every ward will be set up with: name, status, number of beds, specialty and gender. Rooms will have varied occupancy - single, double, ward bed, deluxe, suite etc. They will also have different charges. Beds will have different status codes e.g occupied, available, reserved, empty etc.

Epic: Real time bed board

The bed board is a real-time graphical representation of bed availability / status across the healthcare enterprise. It is the digital world equivalent of the traditional whiteboard that is often found near the nursing desk in hospitals - only better, by being realtime and hospital / enterprise wide.

The bed board shall be visible from every point of care that participates in the admission, discharge and transfer processes.

Note:

As a:

- user with an admissions role (e.g admissions clerk, nurse)

I need to:

- have access to a realtime bed board that shows patient names, patient numbers, visit (IP) numbers, age, status, type, gender, bed typem insurance information, clincial needs (e.g oxygen or isolation), expected length of stay / discharge date, leave of absence status, confidentiality status, admitting diagnosis and location
- be able to filter the bed board by department, ward, room, patient type etc
- be able to generate a printable patient census on demand, filterably by ward, nursing station, practitioner, expected discharge date etc
- be able to view the bed status of other facilities in the enterprise
- be able to distinguish occupied from unoccupied beds
- be able to distinguish admitted patients from others in patient listings e.g by a bed icon
- be able to quickly see unoccupied beds, and the corresponding wards / rooms
- be able to block out periods of time when beds are unavailable; these periods will have lower and upper date / time bounds
- be able to predict bed shortages
- be able to track a single patient's movements during their stay
- be able to quickly access pending transfers, discharges, emergency registrations, demises etc
- be able to set up custom floor plans and designate certain beds as being for certain patients e.g gender specific rooms / beds, beds for infectious disease patients etc
- be able to set aside beds / rooms for observation patients; these rooms could potentially be billed by the hour
- be able to generate an interim bill for any patient that is currently admitted, right from the bed board
- produce and in-patient therapeutic procedures list

Because:

- I need to be able to give my patients quick and accurate answers as I guide them through the admission process
- I need to have accurate patient censuses at shift handover times
- I need to quickly access information on bed status at other in-network hospitals when I am planning a referral or admission there
- I need to be forewarned on impending bed shortages so that alternative arrangements can be made
- I need to eliminate time wastages from placing patients in beds that are not usable e.g in a room that is undergoing maintenance
- I need to be able to adapt to developments in my hospital e.g a new ward / wing, an outbreak that causes an improptu isolation ward to be set up etc

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Epic: Outpatient 'discharge'

This is the case for most patients - all who needed simple outpatient care or even mere reassurance.

'Discharge' from the emergency room could involve:

- sending the patient home / back into the community (the traditional meaning of discharge)
- sending the patient to a ward (admission to hospital for further care)
- sending the patent to another facility for further care (usually called referral)

The details of these three 'modes' of discharge are covered in the sections of this document that deal with ADT (Admision - Discharge - Transfer).

Note:

As a:

- emergency room clinical worker (doctor, nurse)

I need to:

- be able to discharge a patient who only needed outpatient care once their care plan has been implemented
- print discharge instructions that the patient can take home with them. These discharge instructions can be customized for each patient, by picking relevant instructions from the patient's record. The system should provide for multiple customizable discharge templates.
- generate a discharge prescription and send it to the Pharmacy
- schedule a follow up appointment
- generate a return to work or school letter for the patient on request
- generate a patient survey and send it to the patient portal

Because:

- most patients who come to the emergency room will be discharged home in a matter of hours
- patients who get clear instructions on discharge do better / follow their treatment plan better
- most patients will be discharged with an prescription for home drugs
- some patients may need to come back, esp. if we have decided on 'empiric therapy' (treat on a presumed diagnosis, not a definitive / confirmed diagnosis)
- some patients will need to get a doctors' letter for their workplace and school

---

This feature interacts heavily with billing - the discharge cannot be completed unless the patients bill is settled or all the details needed to claim it from a corporate payer (insurer / employer) are captured.

Epic: Admissions

The pre-admission process is focused on information capture.

Admissions can be triggered from several points of care e.g A&E, theater, clinics etc. It follows then that these features will be exposed to multiple user roles.

There should be continuity between the emergency room and the inpatient departments i.e the same patient record should be used after the patient is admitted.

Note:

As a:

- user with admission responsibilities e.g an admissions clerk or a nurse
- emergency room clinical worker (doctor, nurse)

I need to:

- view a queue of patients awaiting admission / admission requests
- be able to request an admission for the patient
- view ward / room / bed availability
- request pre-authorization for insured patients that need admission
- have instant access to the billing status of each patient in my queue
- be able to send patients to the billing clerk's queue for the payment of their deposits
- be stopped by the system from re-admitting a patient whose previous bill is not settled
- be stopped by the system from allocating a bed for a cash patient whose deposit is not paid
- capture all vital information for patients who are due to be admitted. This information includes room preferences e.g 'Prefers Standard Room' / 'Prefers Private Room'. It might also involve updating the existing patient record
- admission data includes: date and time, medical record number, admitting physician, attending physician, admitting diagnosis, last inpatient date, text, primary and secondary insurance, VIP status,
- verify eligibility for insured patients and obtain a pre-authorization where one is needed
- reserve a room for a patient that is going through the pre-admission process; this could be a room or bed that is currently occupied but can be reasonably expected to be available at the time the admission completes
- pre-admission reservation number
- assign an inpatient number at the start of the pre-admission process
- enter clinical notes
- enter orders e.g lab and medication orders
- access a listing of pre-admitted patients that can be filtered by date and time, location etc
- cancel a pre-admission process
- reschedule / change the target admission time for a pre-admitted patient
- admit newborns

Because:

- capturing all the information up-front will lead to a smoother admissions process
- insurance authorizations usually take time; it is best if they are done early
- rooms can be scarce or ephemeral in a busy hospital; I need to reserve it in order to be reasonably sure that my patient will get a room
- the inpatient number is used to tie together the patient's inpatient records, including any orders that may be made in the pre-admission period
- the patient could already be under active management e.g in the emergency department, hence the need for ongoing clinical notes
- it is essential to have visibility into the pre-admission queue / workload, for optimization and planning
- pre-admissions can be aborted e.g in the event of a patient's demise
- pre-admissions can be delayed, e.g in the case of an elective surgical procedure that is moved to another date after a surgeon's or anaesthetists' review
- for most patients, the admission process starts at the casualty / emergency department

- I need to be able to deal with the two most common hold ups in the process: ward / room / bed availaibility and billing problems
- I need to quickly advice my patient - or my caregiver - on whether they need to go through billing first OR on the status of their insurance pre-authorizations
- I need the system to help me avoid errors that could cause revenue leakage

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Epic: Assigning a bed to a patient

The ward / bed / room assignment has billing implications; for example, private suites are more expensive than shared standard rooms, per day. Some patients may have high end insurance that entitles them to expensive rooms; others might only be able to afford cheaper ones.

This is the last step in the 'admission' process - it is the point at which the whole admission 'crystallizes'.

Note:

As a:

- user with admissions responsibilities (admissions clerk or nurse)

I need to:

- assign a bed to a patient, based on their preferences and ability to pay (deposit paid, insurance category)
- be able to charge a lower rate to a patient who is placed in an expensive room / bed because of lack of availability of cheaper rooms / beds
- be able to assign confidential / VIP status to certain patients; their records get sealed for access by only a select (named) list of caregivers
- print patient labels
- enter the expected length of stay - which can be used to give alerts when the patient is near the end of that lenght of stay
- assign a patient to an overflow bed if their assigned room / bed is occupied
- alert porters and ward staff when a patient needs to be transported to the ward
- admit a newly born baby to the mother's bed; the baby should be able to get their own record and inpatient number later
- rely on the system to check for conflicts for me e.g prevent me from assigning a female patient to a male bed
- be able to overrride system conflict warnings (with a reason kept on record)
- be able to transfer patients between wards and beds, noting the reason for transfer each time. The transfers may or may not trigger new rates.
- be able to swap patients between two beds
- assign beds to observation patients - who are not actually in-patients
- transitioning patients from observation to inpatient and v. versa

Because:

- it is my job to meet patients' needs as well as I can
- I need to solve emergent problems e.g temporary capacity problems that can be worked around by admitting some patients into more expensive rooms without prejudice to the patient
- I need to communicate efficiently with ward staff and porters

- I need to be able to correct errors or undo temporary choices that were made due to capacity challenges
- I need to be able to make judgement calls e.g in times of emergencies such as outbreaks, when a female room could be used for male patients or vice versa

---

Epic: Discharge from inpatient or day case admission

This feature's scope runs from discharge planning to post=discharge actions e.g housekeeping.

The discharge process is one of the processes that is most commonly 'broken' in today's healthcare settings. The norm is for it to be a disorganized mess, with the patients / caregivers tossed between offices and taking hours for what should be a routine process.

Note:

As a:

- user with discharge responsibilities (e.g discharge clerk or nurse)

I need to:

- receive relevant (to my location or job station) discharge planning alerts based on expected discharge dates
- receive confirmed discharge alerts after the doctors make the discharge decision; these include information on the discharge e.g doctor , reason (normal, against medical advice, absconded, demise), dischage diagnosis, date and time of discharge, clinical discharge notes / summary
- be able to view pending discharges by nursing station
- be able to work through a discharge checklist - nursing actions, patient / billing actions, discharge medications and equipment, post-discharge care instructions e.g wound dressings
- customize discharge checklists / discharge plans - by patient, diagnosis, surgery, physician
- be able to process unused drug returns from the patient
- be able to cancel undone investigations and have them removed from the patient bill
- automatically discontinue inpatient medications upon discharge
- be able to schedule follow up appointments
- be able to cancel the discharge and notify relevant departments (e,g Pharmacy, kitchen, lab, ward nursing desks) of the cancelled discharge
- be able to notify housekeeping after the discharge - to prepare the bed for another patient
- be able to notify other relevant departments e.g cancel kitchen orders
- be able to re-admit patients whose discharge is rescinded before they leave the ward
- be able to initiate a 'leave of absence' - essentially a 'soft discharge' where the patient is sent elsewhere (e.g ICU) but is expected back
- be able to view a summary of the discharge queue / pending workload, by station
- print patient discharge instructions - educational and functional e.g drug monographs
- send patient post-discharge surveys to the patient portal
- handle death notifications
- handle discharge against medical advise

Because:

- the process will be more efficient if all involved parties have advance information

- if I can see the points at which a discharge process has stalled, I can make targeted interventions
- the post-discharge care process is as important as the intra-hospital care process; I need to set my patients up for success by equiping them with the right information and scheduling follow-on appointments
- housekeeping need to turn the bed around quickly so that another patient can be admitted into the same bed
- a discharge may be cancelled because of emergent clinical or administrative problems
- other departments e.g the kitchen may need to adjust their workplans as a result of the discharge

---

Epic: Refer the patient to another facility

These referrals occur for these common reasons:

- the patient is unable to pay e.g referral from an expensive private hospital to a public facility
- the level of care needed is unavailable e.g referral from a smaller hospital to a teaching and referral hospital

---

Note:

As a:

- emergency room clinical worker (doctor, nurse)
- ward nurse or ADT officer

I need to:

- be able to discharge and transfer a patient to another facility
- generate discharge / transfer notes - containing clinical information picked from the patient's record
- view billing status, so that I can advice the patient or their care givers accordingly - e.g. to clear their bill

Because:

- we commonly transfer patients who need more specialized care
- we commonly transfer patients who are unable to pay, after delivering the legally mandated emergency care

---

The referral information could be printed (common case in our context) or sent via a health information exchange (what we are building towards).

Epic: Automatic charges

In a hospital, there are a lot of automatically added charge items e.g charging for inpatient beds each day, automatically charging for every test that is ordered etc

Even though these charges are automatic, there still needs to be some level of human oversight.

Note:

As a:

- billing user

I need to:

- see room and bed charges that have been calculated automatically every day

- see charges that have been added as a result of provider orders or nursing activities
- see charges that have been added as a result of a workflow step e.g a standard admissions charge
- see automatically calculated rebates e.g NHIF bed rebate
- with authority (maker - checker), remove or reverse charges

Because:

- adding these routine charges or rebates manually would quickly overwhelm the billing team

---

1.3.5 Theme: Blood Bank

The blood bank supports inpatient, surgical and emergency departments.

Epic: Blood bank dashboard

Note:

As a:

- blood bank employee with coordination duties

I need to:

- access listings of blood requests for clinicians
- enter manual requests (request that come as paper instead of 'online')
- be notified when a new request is received via CPOE
- prioritize requests for blood e.g higher priority for surgical emergencies
- conduct cross-matching for incoming patient requests
- issue blood and blood products to fill requests
- accept returns of unused blood that is in restockable condition
- perform transfusion reaction workups
- see a patient's blood bank history when ordering

Because:

- responding quickly to blood requests can save lives

Epic: Donor register

Note:

As a:

- blood bank employee with donor registration duties

I need to:

- maintain a **donor register** - which will have, among other details, contact details, donor types (patient / relative / autologous / platelets etc), donor vitals, donor lab readings e.g Haemoglobin, donor notes, donation history etc. The donor register will allow for search by blood group, gender, date of birth etc. For each donor, track name, sex, date of birth, marital status, contacts, occupation, blood group, blood type, antibody profile, donation dates, comments

- link to donor medical history
- display donors full history of donations, tests, results
- consent for donors
- mark permanently deferred donors e.g due to sero status
- mark temporary deferral e.g weight, age, menses, time lapse period
- warn the user during registration if the user is on a deferral list
- generate an alert when a donor attempts to donate while deferred
- trace all recipients of a particular donor
- trace all donors of a particular recipient
- recall donors who are due for next donation via automatic notification
- list of regular donors for rare blood groups
- track minimum / maximum donation levels and generate alerts when necessary
- support donor inquiries
- generate birthday / anniversary new year/ Christmas wishes for donors and reminders for next donation

Because:

- the blood bank needs to have accurate information for emergency blood outreach
- donor tracking information will help the department plan blood drives

---

Epic: Handling blood donations

Note:

As a:

- blood bank employee with blood donation duties

I need to:

- receive donations - with the ability to maintain bleeding data, blood bag data, blood bag expiry, amounts drawn, time in and out
- tag blood bags with RFID tags and bar codes; the bar codes should be ISBT 128
- conduct standard tests on donated blood, as per national guidelines e.g BP, HB, weight, temp, pulse
- conduct rhesus typing and antibody screening on donated blood
- process donated blood - in whole or separated form - into bar coded blood bags
- dispose of unacceptable blood
- carry out repacking
- carry out aliquoting / pooling
- scanning and printing of ISBT128 labels
- maintain an audit trail of all processes from the vein of the donor to the recipient
- manage autologous and directed donations
- link directed and autologous donations to the intended recipient even if the intended recipient is not yet registered
- screening and compatibility tests

- phlebotomy - facilitate sample collectionn and processing
- entry of phlebotomy information, including start and end
- track specimens through transport, receipt, testing, storage, testing, final disposition
- generate bar coded labels and collection lists
- log specimens into storage and quickly locate them by rack, position and refrigerator when additional testing is required
- provide a list of specimens to be discarded according to a lab defined retention period
- entry of blood bag types and lot numbers
- antibody, antigen and serology specimens
- capture and provide reagent log details e.g lot number, batch number, expiry date and manufacturer
- quarantine non-conforming blood and blood components
- quarantine products from prior doations wtih HIV , HEP C HBV, syphilis
- all tests on a donated unit must be completed before transfer to stock inventory
- generate and print black and white ABO/Rh labels on demand
- notify donors of test results
- authorized override of cross-match restrictions in emergencies

Because:

- blood donations are the primary way in which the blood bank receives 'new stock'

Epic: Management of blood and blood product inventory

Note:

As a:

- blood bank employee with supervisory duties

I need to:

- access inventory information for blood and blood products
- track each blood product from donation through receipt into inventory, testing, modification, transfers to other facilities and final disposition
- be alerted on reorder levels
- be alerted on critical / panic levels
- be able to reserve blood / blood products for anticipated uses
- access donation and screening reports
- be able to receive blood and blood products from other centers

Because:

- avoiding stockouts helps avoid unnecessarily suffering or death

---

Epic: Blood Component Preparation

Examples of blood components are fresh frozen plasma, packed red cells, platelets, cryoprecipitate etc

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Note:

As a:

- blood bank user

I need to:

- support blood component preparation: capture the date of preparation, date of expiry, storage of each component, link to donor profile
- track deviations and unexpected events during manufacture of a finished product
- generate a list of donor units waiting to be label verified
- maintain a reference table of blood components and batch products with label bar codes
- print color coded ABO labels (O - Blue, A - Yellow, B - Pink, AB - White)
- automatically update the donor / patient records once test results are reviewed and verified

---

Blood storage and distribution

Note:

As a:

- blood bank user

I need to:

- capture the following information for each individual unit: donation number, ABO and RhD group, component code, expiry date, expiry time
- allow entry of the component information above by scanning of the bar codes
- allow the following component characteristics to be retained against each component: antigen typing, CMV antibody status, gamma / X-ray irradiation, Hb S status, high titre flags, volume, comments
- allow the system to generate an alert if freezing time requirements are not met for cryoprecipitate
- ability of the system to generate an alert if a unit of blood is not leukoreduced within the appropriate time frame
- ability of the system to provide component inventor control, processing and tracking
- manage and automatically update inventory based on donated units and units issued
- prompt for the following before issuance of units: identity of the individual collecting the units, patient's MRN, destination of the unit, barcodes of the units
- mark specific units that should not be used
- modify expiration date and time for products
- allow expiration date to be overridden with proper clearance
- track expiry dates and manage issuance of units based on this
- track expiry dates of units in stock and generate an alert when about to expire
- generate a list of units in order of remaining shelf time for any unit type and ABO group

- record unit movements, including transfer between reserved and unreserved stock, transfer to and from satellite refrigerators, issus to users, transfers to other departments
- return of unused products
- recall of units, with reasons
- log the amount of time a unit was out of the blood bank for returns and recalls; alert if above policy threshold
- recall, with reasons
- prevent dispense of incompatible blood and components
- match needs to units e.g patients who need irradiated or antigen negative blood
- allow emergency issue
- automatic cancellation for discharged patients
- display patient specific blood bank info: units held for the patient, current specimen status, ABO/Rh, antibodies and antigens, transfusion needs, current testing status / results, current order status, transfusion reactions
- **reports:**
  - daily transfusion log
  - units received by donor
  - units issued per patient based on component type and blood group
  - cross match requests - by location, diagnosis, doctor etc
  - transfusion reactions
  - disposition
  - donor units ready to be label-verified
  - stock
  - request and demand
  - expired blood products
  - reserved, recalled, returned units

1.3.6 Theme: Support services

Epic: Kitchen management

The kitchen contributes directly to patient care, especially for inpatients. It is also a significant cost and revenue center - making it relevant to overall profitability.

Large hospital kitchens may want to conform to ISO 22005.

Note:

As a:

- kitchen supervisor

I need to:

- define different menus: regular, renal, low cholesterol, diabetic, light and gastric, children's (above 9 months), children's (below 9 months), toddler;s menu, a la carte, special diet request, kitchen feed, banqueting

- access listings of patient meal requests for each meal - with the ability to group similar meal requests together for easier use in meal production planning; this list includes: patient age, physician, diet type, isolation indicator, current diet order and effective date, diet order history, food allergies, preferences, date last seen by dietician, next visit with dietitican, nutritional assessment score, dietitian comments, NPO status
- define site specific recipes - portion sizes, preparation area and time, equipment and serving utensils, recipe category, ingredients, directions for preparation, nutritional values etc
- define multiple meal and menu cycles, including planning for holidays
- forecast meal demands
- access a diet cancellation report for each meal - e.g for patients who have been discharged or passed on. This information should also be updated in the listing of meal requests
- prepare meal distribution lists - for each meal, it should be clear where it is to be delivered, to whom and when. The meals should be accompanied by delivery labels / slips. These slips may be referred to as diet cards or tray tickets.
- access a dashboard / reports with the following information: analysis of served meals, additional meals, cost per meal, tube feeding cost, supplemental feeding cost, staffing etc
- manage inventory and cost of raw ingredients; forecast, requisition, purchase, receive, issue
- access a late admission report / dashboard and notifications - with meal requests arising from admissions that occur close to meal time
- support group ordering e.g meals ordered for seminars
- document and communicate drug-food interaction

Epic: Housekeeping management

The housekeeping team cleans and maintains all public and private areas. Some cleaning tasks are scheduled e.g low traffic public areas may be cleaned daily. Some cleaning tasks are performed on demand e.g cleaning spillages in high traffic patient areas or cleaning a room after its occupant is discharged. Sometimes a location may be cleaned on both schedules - every room is cleaned daily, regardless of whether the occupant is discharged or not.

Note:

As a:

- housekeeping supervisor

I need to:

- maintain schedules for day to day housekeeping activities e.g routine cleaning
- receive notifications for new tasks e.g post-discharge cleaning. These notifications may be from automated events e.g post discharge hooks. They may also be entered manually by nursing staff.
- manually enter and allocate requests for ad-hoc cleaning
- have a dashboard that shows all of the workload, staff and locations in a manner that is easy to process
- maintain cleaning supplies inventory - requisitions, receipts, issues, stock reports etc
- monitor task completion for staff under me
- update task status for staff under me e.g when rooms are cleaned
- mark locations that need prolonged housekeeping work (e.g wards that are temporarily closed for fumigation) as unavailable

---

Epic: Management of central sterile services

CSSD coordinates the cleaning / disinfection / sterilization of hospital linen and reusable equipment e.g surgical packs

---

Note:

As a:

- CSSD supervisor

I need to:

- define the CSSD store, with items, sets and packs
- define instruments and consumables in each pack
- maintain inventory
- charge user departments for consumption
- generate and print bar code labels for items: name, expiry data, batch number, department / specialty
- autoclaving schedule for all equipment and items
- recognize items consumed in patient care and mark them as due for stelilization
- request for sterilization from outside services
- alerts at CSSD for items due from various points of service
- alerts for items whose expiry date is due for resterilization
- capture broken and lost items
- recall issued items / packs / sets from the user department
- billing for sterilization services
- loaning of equipment to points of consumption
- planned preventative maintenance
- receive contaminated items from wards, outpatient departments and theaters
- exchange those items with clean or sterile ones
- prepare work lists, segregated by sterilization method
- transfer cleaned items to wards, outpatient or surgical departments
- send items to external cleaning agencies
- receive back items from external cleaning agencies
- access a dashboard / reports with inventory, location and transaction information

---

Epic: Biomedical equipment maintenance

Equipment maintenance may be scheduled or ad hoc.

Note:

As a:

- maintenance supervisor

I need to:

- maintain an equipment-location register, with each piece of equipment uniquely coded

- manage a maintenance schedule
- receive alerts for ad-hoc maintenance requests
- allocate staff for maintenance tasks / issue job cards
- manage external annual maintenance contracts
- request maintenance work from external maintenance partner
- manage warranties - including warranty work job cards
- manage equipment availability for scheduling

Epic: Morgue management

Note:

As a:

- morgue manager

I need to:

- receive bodies - from own hospital and from outside sources (admission)
- register deaths - including issuance of relevant legal documents
- charge morgue fees - including preservation fees
- manage preservations - work lists
- manage post-mortems - including entry of post-mortem reports
- manage morgue discharge and body collection
- access reports on unclaimed bodies
- dispose off unclaimed bodies - following the due legal process

---

This particular feature should be designed in a 'bare bones' manner.

1.4 Product: Network, mobility and telemedicine

Good analytics demands a very different mindset from operational system design. Slade clinical analytics shall be offered as **a companion product**.

Some of the portals that are likely to be in the backlog are:

- a **supplier portal**
- an **employer portal**

1.4.1 Theme:Patient Portal

Epic: Patient portal enrollment

There are two 'paths' to patient portal enrollment: self enrollment and enrollment via a provider's invitation.

Note:

As a:

- patient

I need to:

- receive portal invitations from providers
- respond to invitations from providers, with email and date of birth verification; if I already had an account on the provider portal, a new one should not be created
- enroll myself into the provider portal, without an invitation
- set up my preferred providers and practitioners
- reset my own password
- update my own profile e.g contact details
- enroll dependants / family members e.g children
- **pre-register** myself and share demographic data with the hospital

---

The 'dependants' functionality is likely to be very tricky, esp. when it comes to privacy and confidentiality angles.

Epic: Patient calendar

This calendar is focused on a single patient's health related schedule, tasks and reminders. These may be linked to different providers or practitioners.

Note:

As a:

- patient

I need to:

- view my own appointments; both those sourced from in-network provider EMRs and those that I input myself
- toggle between day, week, month and agenda views (the agenda view has compressed appointments, reminders and tasks)
- add appointments - noting locations, times, people as needed and color coding them as needed
- opt in to appointment reminders, with the ability to choose the method of communication and timing
- receive billing, preventive and follow up care reminders
- receive chronic disease management plan linked reminders e.g reminder to a diabetic to do their blood sugars
- request appointments - check availability, receive confirmation on booking
- communicate with providers to request appointments for those that have no enabled online appointment booking

---

Epic: Patient medical profile

The 'medical profile' brings together information about a patient's health that they are entitled to from all in-network healthcare providers.

The health log allows patients to log their own observations - manually or via connected devices - and share them on an opt-in basis with their providers and practitioners.

The patient portal can be used to deliver **targeted and relevant** health information to patients e.g pregnancy related information to female patients who are currently pregnant.

Note:

As a:

- patient

I need to:

- view a log of my past medical visits
- view my chronic problems
- view and update my allergies
- view and update my family and personal medical history
- view and update current and previous medications; both those sourced from connected EMRs and those that I input myself; when updating medications, I should be able to note the names, reason for medication, times / dates / doses, who prescribed etc. Over the counter medications should be part of this.
- view and update my immunization history
- view the detail of each visit - with the detail including tests, results, discharge / visit summaries, medications, discharge information packets etc
- view and update my bio-data (including weight, height etc)
- maintain a log of my health issues
- share my health log with specific providers - when I choose to
- connnect my fitness tracker or mobile devices to my health log for personal fitness tracking
- access relevant health related articles and education resources e.g videos, infographics etc
- access fitness calculators
- access treatment guidance and symptom checkers

Epic: Cover information

This includes: visibility into insurance, employer benefits, health savings plans etc

As written, this focuses largely on the needs of insurance customers.

Note:

As a:

- patient

I need to:

- access clear information on my insurance cover - including validity, packages, benefits, exclusions, rider packages, provider panels, dependants etc
- view a timeline of visits, claims and preauthorizations that have been linked to my cover
- click through to detail on visits, claims and preauthorizations
- receive notifications whenever there are changes in my cover or new visits, claims and preauthorizations

---

Epic: Communicating with my providers and practitioners

Telemedicine is 'woven into' the communications infrastructure. Some of the telemedicine services may be billable.

Note:

As a:

- patient

I need to:

- access and filter / search through listings of providers and practitioners; with those that I have dealt with in the past or added to my 'preferred' lists being easier to find
- exchange secure messages with the care team via threaded messages and a rich inbox. These messages should be routed to the correct team / team members e.g refill requests go to doctors, billing questions go to billing staff e.g
  - requesting prescriptions or refills
  - sharing documents or images with the provider / practitioner
  - sharing my health history and/or health log with the provider / practitioner
- make voice calls via the patient portal to the provider / practitioner
- make video calls via the patient poral to the provider / practitioner
- capture images with my mobile device camera and share them with the provider / practitioner
- control my presence / availability
- respond to requests from the provider e.g filling in questionnaires, filling in practice forms, self check-in
- request or schedule appointments
- receive alerts when there are results or reports awaiting review in the portal; the provider / practitioner should be alerted when they are reviewed
- receive clear information on what charges are due, for what services
- be able to pay online via card or mobile money
- be able to opt to pay on arrival for services delivered in person

---

1.4.2 Theme: Practitioner Portal

The practitioner portal provides access to the 'Clinical Workers Dashboard' (described before in other features) and to the records of patients that the practitioner in question has interacted with.

The remote visits features that are part of the 'main EMR' will also be enabled here.

Epic: Practitioner portal sign up

Practitioners can self-enroll in the practitioner portal. They can also be enrolled by invitation from collaborating hospitals.

It is important to note that **a practitioner may be working in more than one clinic or hospital**.

Note:

As a:

- practitioner e.g doctor, dentist, counselling psychologist, physiotherapist etc

I need to:

- be able to enroll myself in the practitioner portal (self service)
- enroll by responding to an email invitation from a provider (hospital, clinic etc) that I work with
- set up the providers that I work at e.g the hospitals where I have admitting rights
- set up the locations at those providers that I work at
- set up my preferences e.g e-Consultation

Because:

- for the portal to be useful, it needs to reflect the fact that I might be working at more than one provider at the same time e.g on a locum basis at multiple facilities
- I need targeted information e.g for locations that I care about

---

Epic: Manage my own profile as a practitioner

An individual provider has complete control over what appears in their profile. This profile may be shown in public listing pages and in the patient portal.

Note:

As a:

- practitioner

I need to:

- add, view and edit my basic details e.g name, license information, locations of practice, contacts, about me (descriptive text), specialty or specialties, affiliations (professional and hospital affiliations), availability (hours, days and locations) ec
- view my ratings and reviews from patients and engage with the reviewers (reputation management)
- view and update my practice listing as seen on the patient portal and other practice marketing tools

---

Epic: Find locums

Locums are temporary positions - often filled on an ad-hoc basis by younger practitioners - that pay by the hour or a fraction of specified billable items e.g consultations, procedures etc

Finding locums is presently a 'human' process. A locum finder is likely to be a 'hook' for younger doctors.

Note:

As a:

- practitioner

I need to:

- set up my locum settings - specialties, preferred providers, hours, days, locations etc
- browse through upcoming locums, auto-filtered by my preferences e.g my hours and days of availability, preferred providers, preferred towns / locations etc
- receive notifications of locums that match my preferences
- click through to the detail of any locum - view the provider, desription, duration

- skip locums that do not interest me and apply to positions that interest me
- receive notifications of accepted / declined applications

Epic: My billings

As a provider - especially one that has multiple locums and e.g admitting rights in multiple hospitals - I want to have a single unified view of my billings.

Note:

As a:

- provider

I need to:

- access a unified cross-provider listings of my billings, sorted by date with more recent ones first
- filter or sort the billings list by date range, provider etc
- click through to detailed invoices
- add and send invoices - linked to specific patients and visits - to providers e.g to charge for my consultations fees after discharging a patient

Epic: My televisits

The practitioner portal and EMR will offer the 'supply end' of telemedicine. It is important to note that teleconsultations will not be just patient-provider, but also provider-provider.

Note:

As a:

- practitioner

I need to:

- browse and search through the contacts of providers and patients that I can communicate with
- manage my availability / presence e.g available, busy, do not disturb, unavailable between specified dates and times etc
- communicate via text (threaded chat) with patients and colleagues
- communicate via voice (IP voice call) with patients and colleagues
- communicate via video (browser or mobile based video call) with patients and colleagues
- use my phone cameras to capture still images that can be sent to patients or colleagues
- charge for televisits - where applicable
- access all my communications via a rich and smart inbox

1.4.3 Theme: Payer portal

Epic: Case Management

Note:

As a:

- case manager at a payer

I need to:

- access real time admissions information for beneficiaries from my company for the providers that are on the Slade network
- access real time discharge information from beneficiaries from my company for the providers on the Slade network
- easily request and receive interim bills for inpatient beneficiaries from my company
- receive and respond to pre-authorization requests from network providers
- **update pre-authorizations** with new information e.g revised limits
- access incoming claims from an online interface
- request and receive clarifications on claims

Because:

- I need to monitor utilization in realtime, to manage risks
- I need to communicate efficiently with providers in our panel in order to shorten claims assessment times, even for claims with potential problems

1.5 Product: Informed decisions

Good analytics demands a very different mindset from operational system design. Slade clinical analytics shall be offered as **a companion product**.

1.5.1 Theme: Reporting

One of our project goals is to facilitate 'informed decisions' in healthcare.

Epic: Clinical analytics

The mix of summaries and reports that a single user sees shall be determined by a mix of access control (what they are allowed to see) and opt-in controls (what they want to see).

Note:

As a:

- clinical analytics user

I need to perform the following analyses:

- identification of patients that need care management e.g high risk, chronic disease, frequent flyers, high utilization
- alerts and listings of notifiable conditions e.g those that should be reported under Kenya IDSR guidelines
- case mix analyses e.g case mix by physician, case mix by department, workload by surgeon etc
- volume analyses e.g outpatients by service and department, top N diagnoses, top N procedures

- length of stay analyses for inpatients
- clinical study eligibility and recruitment - calling up matching patient records from the registry
- patient satisfaction analyses - informed by patient surveys
- drug and device recalls
- service utilization trends
- adverse outcomes analysis - mortality reviews, surgical morbidity, adverse drug reactions, medication interactions, allergic reactions, medication errors etc
- network referral analysis, including network leakage reports for out of network referrals
- operating room utilization analysis - activity, overruns, delayed cases, rescheduling, cancellations, requests etc
- monthly, quarterly and annual surgical volume reports
- surgical supplies utilization
- surgical equipment maintenance and downtime
- turnaround times from support services e.g CSSD, blood bank, maintenance
- drug utlization statistics - by drug, class, physician, service, location, diagnosis etc
- issuance and usage of controlled substances - by patient, department, date, location etc
- inpatient, outpatient and emergency department abstracts
- DRGs - before, during and after inpatient stay
- case mix analysis based on DRGs
- retrieve patient demographic data and diagnoses
- productivity - work completed, time spent
- birth log
- death log
- generate DHIS 2 reports
- age standardized death rates e.g 0-5 years, 5 - 10 years
- reporting trends e.g total admissions, bed occupancy over a user define period
-

Epic: Hospital reporting

This covers administrative-style hospital reporting

Note:

As a:

- hospital administration user

I need to perform the following analyses:

- workload and utilization e.g by theatres, nursing staff etc
- end of shift reports
- statististical reports on casualties, attendance and admission from A&E
- turnaround times, by point of service

- daily (midnight) ward statistical report: name of the ward, actual vs occupied capacity for each room type, admissions, discharges, transfers in, transfers out, deaths, vacant / available beds, turnover per bed, average length of stay, patient days
- daily (midnight) clinic activity report: clinic name, number of new patients for the day, number of old patients for the day, total number of patients (new / old / reviews) seen for the day
- daily (midnight) admissions statistics: analyzed by admitting department, specialty, department, hospital, doctor etc (in aggregage and listing)
- running monthly report generated daily: day, total admissions, average length of stay, deaths, percentage bed occupancy, bed turnover interval, total patients seen at A&E, percentage of A&E admissions, cumulative and average statistics
- monthly morbidity summary sheet from MOH for children under 5 - disease, day of the month, cases reported for each day, cumulative cases for the month to date, total cases reported each day for all diseases, gender of patients, new or existing / old case
- monthly morbidity summary sheet from MOH for patients over 5 yrs- disease, day of the month, cases reported for each day, cumulative cases for the month to date, total cases reported each day for all diseases, gender of patients, new or existing / old case
- inpatient statistics: specialty, admissions (admissions under 5, admissions over 5, paroles, occupied bed days - cash and NHIF, well), discharges, average length of stay, patient days, turnover per bed, deaths, abscondees, beds - authorized and actual, cots - authorized and actual
- maternity services statistics - normal deliveries, caesarean deliveries, breech deliveries, assisted vaginal deliveries - vacuum and forceps, born before arrival (BBA), maternal deaths, audited maternal deaths, live births, still births, neonatal deaths, low birth weight babies (under 2500gms), total new born discharges, date of birth, time of birth, infant mortality, perinatal mortality, immunization schedules and coverage (in pediatrics), child growth and malnutrition
- surgical statistical reports - minor surgeries by type, emergencies by type. cold cases, circimcision, major surgeries by type
- ICD-10 statistics: injury cases, sports injury among children and adults, general accident statistics, cancer incidence rates, mortality rates, patient survival rates, incidences of vaccine preventable diseases, infectious disease statistics, communicable disease statistics. tropical diseases, non-communicable diseases, child health related diagnoses e.g acute respiratory infections, HIV/AIDS, Asthma, sexually transmitted diseases, other diseases e.g TB, causes of health, causes of infant death, suicide statistics, blindness and deafness, mental health
- disease control and prevention statistics
- clinical service visit statistics by department, days on list by unit and treating doctor, elective admissions, actual time of procedure vs planned, cancellations with reason
- waiting list survey for different time periods or services / procedures
- services scheduled, cancelled, completed etc by department
- patints on waiting list
- days on list by unit and treating doctor
- elective admissions report
- **nursing reports:**
  - KPIs, training, special procedures, patient satisfaction
  - critical patients from wards
  - occupancy report
  - discharge summary report
  - duty rotas and allocation
  - incidents

- patient complaints
- discharge against medical advice
- admissions
- sick off
- readmissions within a month
- readmissions to CCU
- readmissions after outpatient visit
- unplanned CCU admission
- unanticipated cardiac arrests
- unexpected medical outcomes
- unexpected surgical outcomes
- unexpected anaesthetic outcomes
- unexpected obsteric outcomes
- maternal deaths
- fetal deaths
- neonatal deaths
- surgical REDOs
- priority patients e.g VIP, critically ill, long stay, major surgery
- medication errors
- near misses
- self extubations
- failure to rescue cardiac arrests
- property loss
- missed diagnosis
- declined intervention
- missed radiological diagnosis
- laboratory incidences
- finance indidences
- ADT incidences e.g insurance fraud
- security incidences
- physical medicine incidences
- food handlers report
- catering hygiene
- clinical audits

Epic: Pharmacy reporting

Note:

As a:

- pharmacy adminisrator

I need to perform the following analyses:

- billing summaries, by patient, date, drugs etc
- medication summaries, by patient
- drug usage / utilization
- goods in transit
- revenue analysis
- drug pricing
- controlled substances
- statistics: most used drugs, slow moving drugs, workload, stock usage, departmental usage
- items above maximum stock level

1.6 Backlog

This work is **not scheduled**. There are no immediate plans to schedule it.

1.6.1 Theme: Asset Register

This covers routine purchasing and acquisition of assets.

Epic: Asset Register

The asset register tracks assets - e.g expensive clinical equipment - and their cost, depreciation, maintenance, insurance, improvements, sale, retirement, writing off etc. It interacts with the balance sheet (assets appear on the balance sheet). Some assets are 'devices' in the FHIR sense.

Note:

As a:

- asset manager

I need to:

- maintain an **asset register** that tracks asset names, location, descriptions, costs, tag and serial numbers, purchase dates, in service dates, depreciation methods, book lifes, disposal methods, disposal dates, salvage values, vendors and vendor invoices, purchase order numbers, property types, funding types and old vs new indicators
- place assets in **categories** e.g buildings, leasehold improvements, medical equipment, furniture and fittings, other equipment, motor vehicles
- asset **sub-categories**
- define asset types as: Tangible - Fixed, Tangible - Moveable, Intangible

- access **historical asset data**, even that relating to retired assets
- record asset **acquisitions**
- record asset **sales** or **disposals**
- **transfer assets** between organizations and locations
- track **leased assets**
- manage lease payments
- **retire** assets
- record asset **improvement costs**
- **reinstate** retired assets
- view **depreciation** - by time period, life to date etc
- maintain **warranty information**
- change **operating status** e.g out of service
- issue **work orders for warranty and non warranty maitenance**

1.6.2 Theme: Voice support

This covers routine purchasing and acquisition of assets.

Epic: Dictation of clinical notes

Clinical voice recognition shall be used in order to make clinical notetaking less cumbersome, especially on mobile platforms.

The dictation feature will be appreciated most by busy clinical workers e.g doctors, radiologists, pathologists, nurses and lab technicians.

Note:

As a:

- clinical user (e.g doctor, nurse, pathologist, lab technician)

I need to:

- dictate notes using my voice on my computer and on my mobile devices

Because:

- my workload is high - I need speed
- I want to be able to make notes as I wait or move around

Scenario: Dictating Pathology Reports

This scenario is merely representative; there will be dozens of scenarios in which voice input applies.

Note:

Given:

- a completed pathology investigation that I wish to report, as a pathologist

And:

- a voice capable device e.g my phone, tablet or laptop

When:

- I click or tap on the microphone icon

And:

- dictate into the device

Then:

- text that is at least 95% accurate is entered into the template, with potential spelling errors highlighted / underlined

And:

- I am able to correct the few errors and quickly save the completed report