Summer Placement

In

RAJIV GANDHI CANCER INSTITUTE AND RESEARCH CENTRE

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A Report on

Pre implementation phases of nursing order module in HIS at

RGCI&RC By

Name of Student(s)

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PG/18/076

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Simarjot Kaur

PG/18/076

TABLE OF CONTENTS

ACRONYMS/ABBREVIATIONS

- RGCI&RC - RAJIV GANDHI CANCER INSTITUTE AND RESEARCH CENTRE
- AGM - ASSISTANT GENERAL MANAGER
- HIS- HOSPITAL INFORMATION SYSTEM
- LIS- LAB INFORMATION SYSTEM
- IP - IN PATIENT
- OP - OUT PATIENT
- CPRS- COMPUTERIZED PATIENT RECORD SYSTEM
- CPOE-COMPUTER BASED PROVIDER ORDER ENTRY
- UAT-USER ACCEPTANCE TEST

ABSTRACT

Pre Implementation Phases of Nursing order module in HIS at RGCI&RC

For the successful implementation of any software, it is important to lay emphasis on the pre implementation phase. Pre implementation is often neglected which many a times is the root cause of failure for the implementation process. Pre implementation needs to be executed in a way that one can trace what issues can arrive and their causes during live phase. Software development life cycle is a systematic process which includes these phases- **requirement analysis,** feasibility study, designing, coding, testing, deployment, training and maintenance. It is so crucial to study and focus on each stage for the success of any implementation plan as it reduces the chances of errors and failure during going live phase of the implementation process. **Pre- requisite** must be determined before the project to start. In nursing order module, pre-requisites were computers with intranet connectivity, Barcode printing machine interfaced with computers & software, barcode printing roll, nursing user credentials. The study is observational and descriptive in nature and is all about understanding the nursing order workflow that will be implemented and observing the phases before implementation – requirement gathering, designing of the module, importing of masters into the software, testing scenarios; and issues and **errors** that occurred during the **functional testing** of the software. Apart from this, study aims to understand the need to implement the nursing order module in HIS which is currently done through CPRS, disadvantages of CPRS and what can be the **expected benefits** of implementing the nursing order, how it can improve the workflow and process. The challenges faced during pre-implementation, its limitation are explored towards the end of the study.

KEYWORDS- Requirement analysis, functional testing, pre-requisite, errors, expected benefits

ABOUT THE ORGANISATION

a. ORGANISATION PROFILE

Rajiv Gandhi Cancer Institute and Research Centre
A Unit of Indraprastha Cancer Society
Registered under "Societies Registration Act 1860"

RGCI&RC

Rajiv Gandhi Cancer Institute & Research Centre is today counted amongst Asia‟s premier exclusive cancer center that offers the unique advantage of cutting edge technology, put to use by renowned super specialists. This potent combination of man and machine ensures world- class cancer care to not only patients from India, but also from the neighboring SAARC countries and others. We are fortunate to have taken care of over 1.95 Lakh patients since inception in 1996. The Institute has been accredited by NABH and NABL for its quality of services, and holds ISO 9001 andISO14001certifications.
The Institute offers super specialized tertiary care services in Medical, Surgical and Radiation Oncology, streamlined into dedicated Site-Specific teams. Super Specialists at RGCIRC practice an organ specific multi-disciplinary approach to cancer diagnosis and treatment, with the Tumor Board acting as a second opinion clinic for cases that are more critical than others. Spread over nearly 2 lakh square feet area, with a current capacity of 300 beds, RGCIRC is one of the largest tertiary cancer care centers in the continent. The Institute‟s outpatient services are spread on three floors with 57 consultation rooms, and well-designed Radiation Therapy areas. RGCIRC has 9 state-of-the-art well equipped modular Operation Theatres with three stage air filtration and gas scavenging systems, and 2 Minor Operation Theatres for Day Care Surgeries. The Institute has 27 bedded Surgical ICU and an 11 bedded Medical ICU. RGCIRC has a dedicated Leukemia ward, and a separate Thyroid Ward. The Institute also boasts of an independent Bone Marrow Transplant unit that is credited with pioneering unrelated donor transplants, MUD transplants, and stem cell transplants.

RGCIRC is committed to bringing the benefits of cutting edge technology to its patients. The Institute offers best in class techniques such as whole-body robotic surgery, Intra-Operative Brachytherapy, True Beam (the next generation Image Guided Radiation Therapy), PET – MRI fusion, High Frequency Ultrasound, Tomosynthesis (first-of-its-kind revolutionary 3D mammography machine), Nucleic Acid Testing (for safest possible blood), and advanced diagnostic & imaging techniques, including PET CT, Circulating Tumor Cell testing, and Next Generation Sequencing. RGCIRC has executed strategic alliances with internationally renowned institutes such as Thomas Jefferson University. This has catapulted RGCIRC into a global league of select hospitals that are pioneers in new approaches to treating cancer.

RGCIRC has been ranked amongst 10 Best Oncology Hospitals of India (Week – Nielsen Survey 2014) and won the prestigious award for Best Oncology Hospital in India at Healthcare Achievers‟ Awards 2014.

b. MISSION, VISION AND VALUES VISION

"To Prevent and Treat Cancer by Providing Affordable Oncology Care of International Standards in India."
MISSION
To be the largest Cancer Care Provider in India by 2020

- Offering Comprehensive Services from Prevention to Palliation at an Affordable Price
- Based on Core Values of Quality, Ethics, Compassion and Respect to All

VALUES

Regarding Patients

- Hold patients in high esteem
- Transparency
- Proper Diagnosis
- Proper Treatment
- Correct advice to the patients

Regarding staff (Medical & Paramedical)

- Teamwork
- Mutual respect
- Trust

QUALITY POLICY

“To do things right first time, every time with empathy

c. KEY LEARNINGS DURING INTERNSHIP:

- Understanding of HIS
- Nursing order flow
- Lab workflow
- Chemo workflow
- Microsoft Excel
- Implementation process
- Training given to the users
- Handling, responding and delegating issues in bug list tracker
- Wireframe of OPD Workflow
- Introduction to SQL (structured query language)

OVERVIEW OF HIS

PARAS

Paras is the product of Shrishti Software Applications Pvt. Ltd.

PARAS – A Patient Centric Comprehensive & Integrated Healthcare Delivery Platform
Reinventing Health Care
Paras is an integrated delivery platform of healthcare which is very comprehensive along with being patient centric. It is primarily being used for administrative and clinical practices. PARAS is designed not only for hospitals but also for other healthcare providers such as diagnostics, laboratories, daycare centers, clinics, etc. Hence, the entire range of patient care is covered by paras thus enabling it to help run the hospitals profitably by making them paperless and filmless. This helps the health care providers to compete in the market.

Functional differentiators

- Not only comprehensive but also patient centric
- Two way integration in „Clinical" processes & „Business" processes
- Apart from English, a version of paras is also available in Chinese, Arabic and Vietnamese

Technical differentiators

- On Demand application scalability that ensures non-obsolescence of solutions as business grows
- It is completely Cloud ready and can be used remotely on web
- It is mobile friendly and available for various o/s such windows and browsers, VPN.

Organizational differentiators

- It can be centrally monitored leading to improved audit and controls.
- Managing RCM, SCM, FMS, HRMS, Governance, Leadership & Directions and Quality Improvement & Patient safety.

PROJECT OVERVIEW

PROJECT TITLE: Nursing order to be implemented for laboratory and radiology services in HIS at RGCIRC

OBJECTIVE:

GENERAL

- To understand the nursing order flow.

SPECIFIC

- To observe the pre implementation phases of nursing order in HIS (PARAS) before the final implementation.
- To know the limitations of the current software (CPRS) and expected benefits with the implementation of nursing order module in HIS.

METHODOLOGY:

- STUDY ORGANISATION - RGCIRC
- STUDY DESIGN- Observational and Descriptive Study
- DATA SOURCES-Secondary data- master data & hypothetical data through test patient (dummy registration) at UAT
- TOOLS USED- Flowchart Diagram, MS Excel

CURRENTLY USED SYSTEM FOR LABORATORY AND RADIOLOGY SERVICES

CPRS

The graphical interface for clinicians known as the computerized patient record system (CPRS), which was started in 1997. Also, VistA incorporates computerized order entry, electronic transfer of prescription and clinical policies. CPRS gives a customer server interface that permits health care providers to analyze and modify a patient's electronic medical record. This incorporates the facility to place orders, including those for drugs, clinical procedures, X-rays, nursing interventions, diet and lab tests. CPRS gives adaptability in a wide range of settings so that a steady, event based, Windows-style interface is exhibited to a wide range of health care workers. CPRS gives electronic information input, modifying and electronic sign for patient-provider encounters as well as providers. Its computer based provider order entry (CPOE) ability is a significant facilitator in the change from paper-based files to electronic medical records (EMRs)

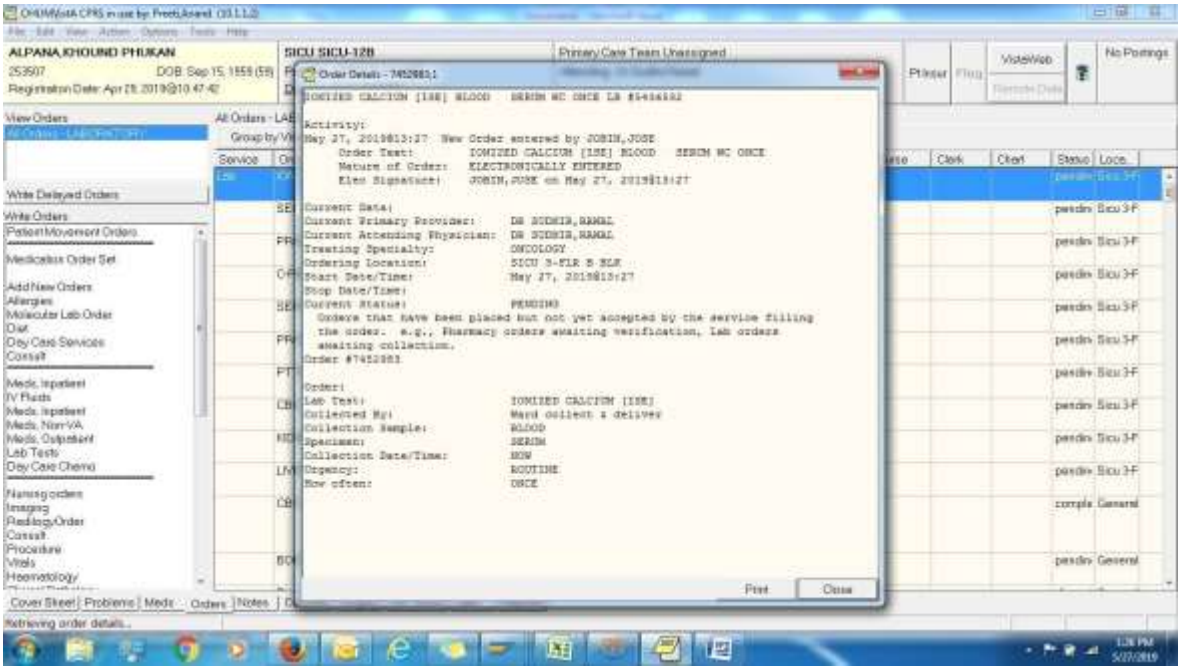
Mirth

Mirth is an open source Java-based integration engine sponsored and fundamentally created by Web Reach, Inc. Mirth was created based on the customer server style and the enterprise service bus architecture.

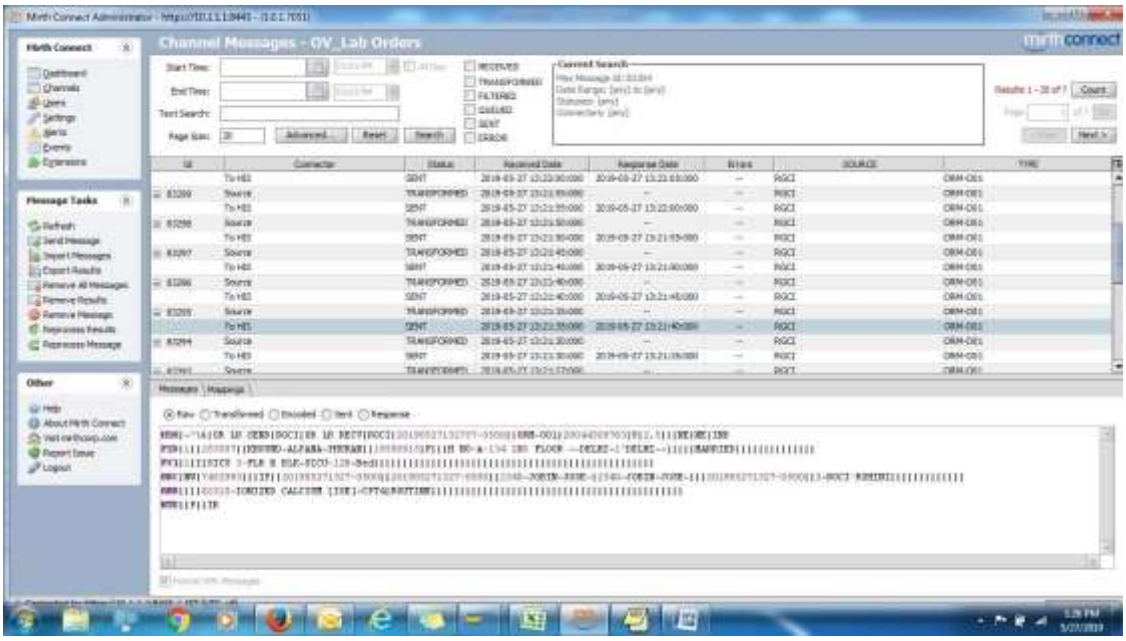
Mirth conveys the industry`s first free, open source Health Level 7(HL7) informing middleware. The standard based Mirth programming is intended to drastically lessen the time and cost required to accomplish health information system interoperability and information exchange , and to speed secure data sharing over networks of healthcare experts .

Mirth‟s capacity to help multi-channel informing modes, multi-convention connectors, multi-lingual for transformer scripting and a full supplement of end-point advancements make it an alluring interface engine for VistA-based solutions.

CPRS – LAB ORDER DETAIL



MIRTH – OV LAB ORDER SCREEN



HIS – HL 7 RECEIVED MESSAGE SCREEN

HIS – VALIDATE BILLS – BILLING

- Through CPRS, ordering for lab and radiology services is done, and then through MIRTH (an interface), information is sent to HIS and lab flow starts in HIS (PARAS), therefore 2 software's are used.
- To avoid this complexity, ordering part will be implemented in HIS as well

A. PRE IMPLEMENTATION PHASES OF NURSING ORDER IN HIS

Pre implementation is an important phase to study and focus for the successful implementation of any software as it reduces the chances of errors and failure during going live phase of the implementation process. Pre implementation needs to be executed in a way that one can trace what issues can arrive and their causes during live phase.

The phases are as follows:

1. Planning and requirement analysis:

In this phase, all the requirements are gathered for the development according to the customer`s needs; detailed information about the project is gathered and what is the need for this project and in depth understanding related to the project is examined. In this nursing module, software will be developed keeping in mind requirements given by hospital and the end users are nurses, and the purpose for this project is to merge the lab order in HIS for smooth functioning of lab process and workflow which is at present done through CPRS, and then integrated with LIS through Mirth (an interface engine) using HL7. The core purpose for this project to ensure smooth workflow by implementing order in LIS and reduce complexity. After requirement gathering is done, feasibility for the development of the project is examined and SRS (software requirement specification) documentation for the same has to be done and should be understood by the developers.
Solution mapping is done to give the best possible solution to client matching their requirement. It is done basically to fill the gaps between the requirements given by the client and best solution vendor can provide with.

2. Designing the project architecture:

In this phase, overall system architecture is designed according to SRS document. Brief description about the module, an outline about the functionality of the module, architect diagrams with technology details, functional logic of the module, inputs and outputs for the module, designing for the visuals of application, which includes template design & format, various tabs and buttons it should have, screen layouts i.e. how the particular template should look like-font & color, features &operations system should have and designing workflow that could be accomplished

3. Development :

In this phase, coding is done by the developer. The software design is translated into source code. In designing phase only blueprint of IT infrastructure is provided whereas in the developing phasing, the actual purchase and installation of software is done to support the IT infrastructure. Creation of database and coding is done on the basis of specific requirements. Developers build the system by writing codes using the programming language and they need to follow some predefined coding guidelines to implement the code.

4. Testing:

Once the software is developed, it is deployed in the testing environment i.e. UAT (replica of the production environment).Testing is a crucial part of the implementation process. To ensure quality software, regress testing is important and it is the next phase of the process. Testing scenarios are developed and testing is done in a systematic way to find the bugs and issues in the software to verify if the software developed is operating correctly. All the code flaws missed by the developer can be detected by testing and reported to the developer for fixing them. Testing process should be followed until the software workflow is stable.

5. Deployment:

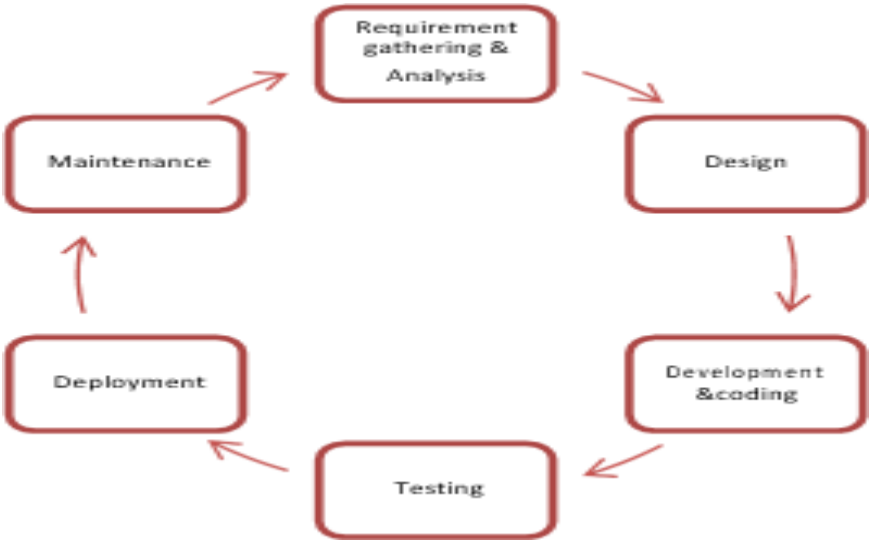
After the testing phase is over and no errors or issues are left then the deployment phase begins and the software is deployed in the production environment and testing is done to review the system. If the system is free of bugs and meets the expectations according to the requirement, then the sign off is provided to go live.

6. Training to the end users:

After the software is deployed, training is provided to the users for operating the system software .User training is also a crucial part of the implementation process. As implementing new software system is a big change for the staff, training the users about the software is necessary to be productive in long run and reduce human errors. Learning a new software system of their own can hinder the organization to see the efficiencies of the upgraded or new software system. Therefore investing in training can be highly beneficial. Training is necessary to avoid any kind of doubts, misunderstandings, errors and other problems; also it help the users who are hesitant of change to help with any kind of resistance.

7. Maintenance:

After the software is deployed and new system is in use, support is provided and software maintenance is done for the future reference. Software Improvement and enhancement i.e. adding new features is provided by the vendor.



PRE-REQUISTE FOR NURSING ORDER IMPLEMENTATION

- Computer with intranet connectivity
- Barcode printing machine interfaced with computers & software
- Barcode printing roll
- Nursing user credentials

REQUIREMENT SPECIFICATIONS FOR THE NURSING ORDER MODULE

- Nursing staff assigned to the particular ward will be able to see only the admitted patients in that ward after login
- After login, home page should be there, at home screen; all the admitted patients should be list with their CR ID.
- On clicking CR number, patient `s past nursing order record should appear.
- Nursing order tab/role should be there, on clicking that, nurse shall be able to select the particular laboratory or radiology services she wants for the patient, and also priority for the test must be there.i.e. Whether the test should be done on the normal or the urgent basis; and nurse shall be able to save it as IP order.
- After the ordering for the particular lab service is done, there should be nurse sample collection screen, at which, patients whose ordering is done must be listed with their CR ID & order ID.
- On clicking the order, screen with the particular orders must open so that nurse should click on the collect specimen button.
- After clicking on the collect specimen, page must be redirected to barcode generation page; every test should have unique barcode number. Tests with 2 different service groups must generate 2 different barcode numbers, for example, test under microbiology service group & test under biochemistry service group shall generate different reference number; and
- Tests with 2 same service group but different specimen type should also generate 2 different barcode numbers, for example, tests under biochemistry service group but one with specimen blood and other with urine must generate 2 different barcode numbers.
- Tests with same service group and specimen type must generate same barcode number.
- After the barcode is generated, nurse shall be able to give command for printing the barcode number and print button must be there at barcode generation page.
- Lastly, sample dispatch to lab page should be there, and tests should be listed with patient ID, nurse must be able to checklist test and sample must be dispatched to the laboratory.

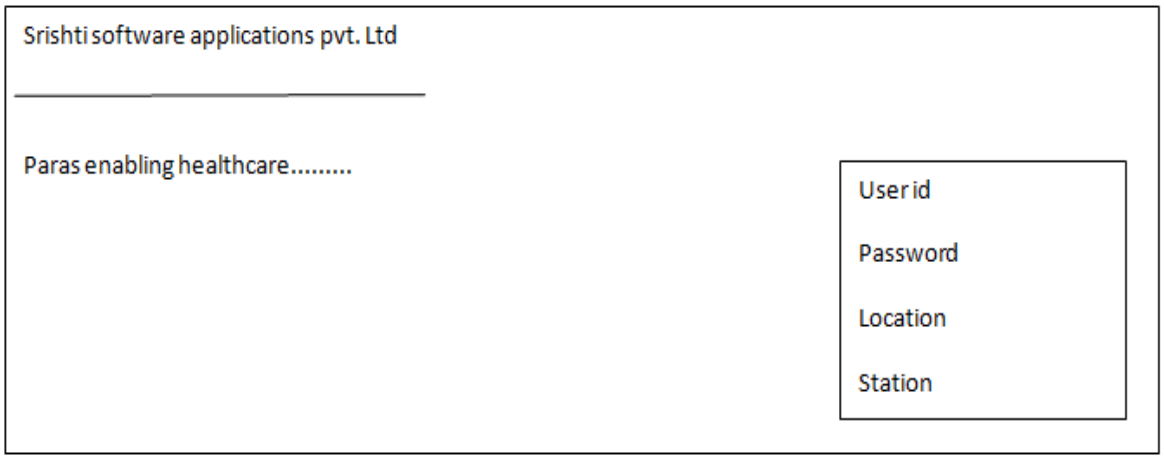
DESIGNING OF THE NURSING ORDER MODULE

a) HIGH LEVEL DESIGN: According to the requirement specifications, module design is as follows :

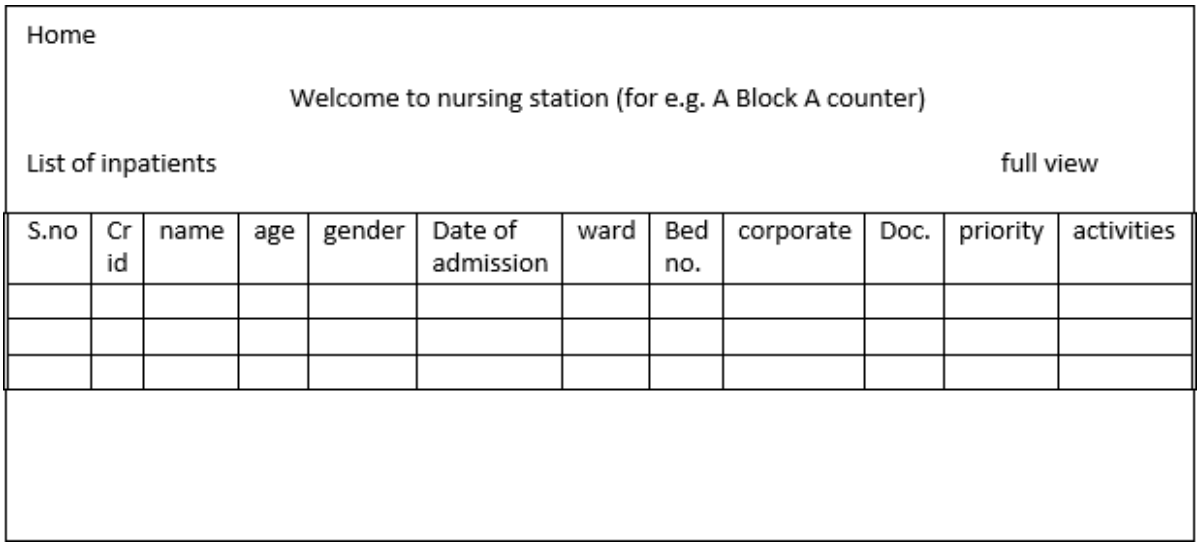
1) Login screen – company and HIS name, user id password login
2) Home screen - list of admitted patients with their CR id
3) Nursing order screen-services to be ordered
4) Nurse sample collection screen- list of patients with order ID
5) Nurse cross location- sample to be dispatch checkbox list

b) LOW LEVEL DESIGN: Description for the above mention screens is as follows:

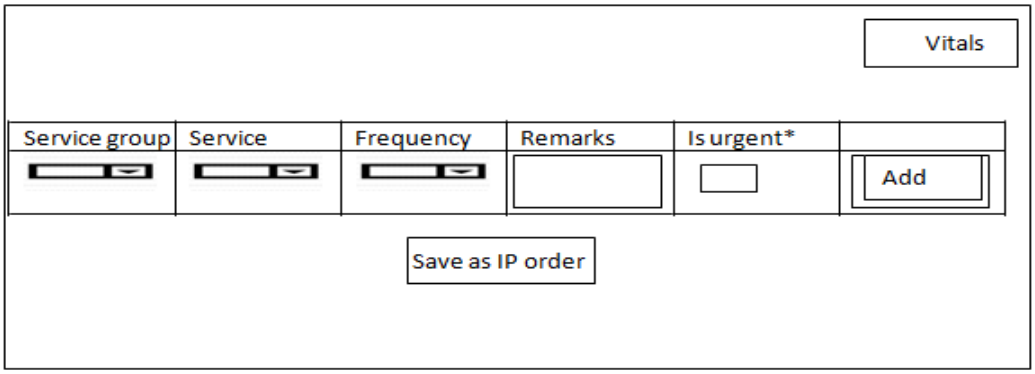
1. **Login Screen**.



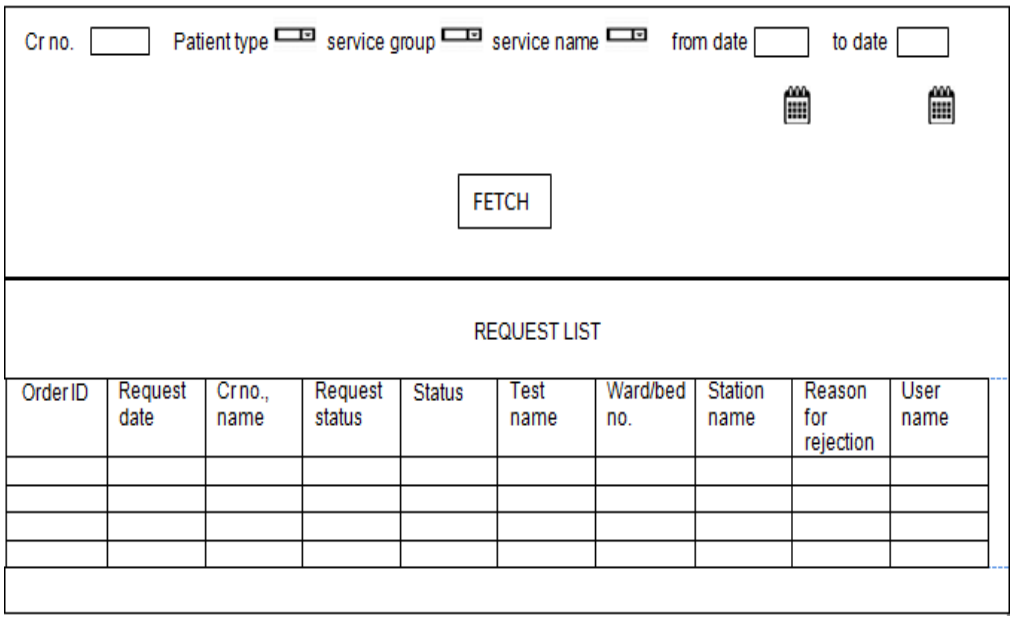
2. Home screen

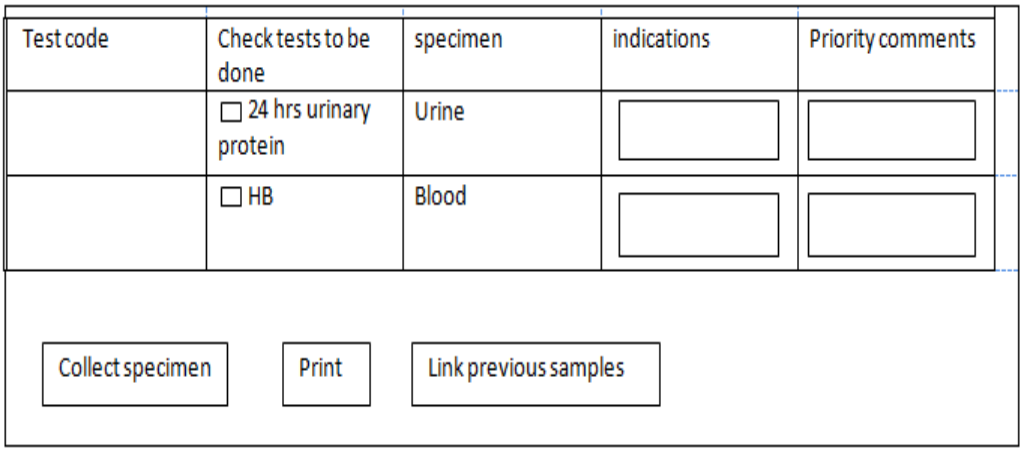


3. Nursing Order screen.

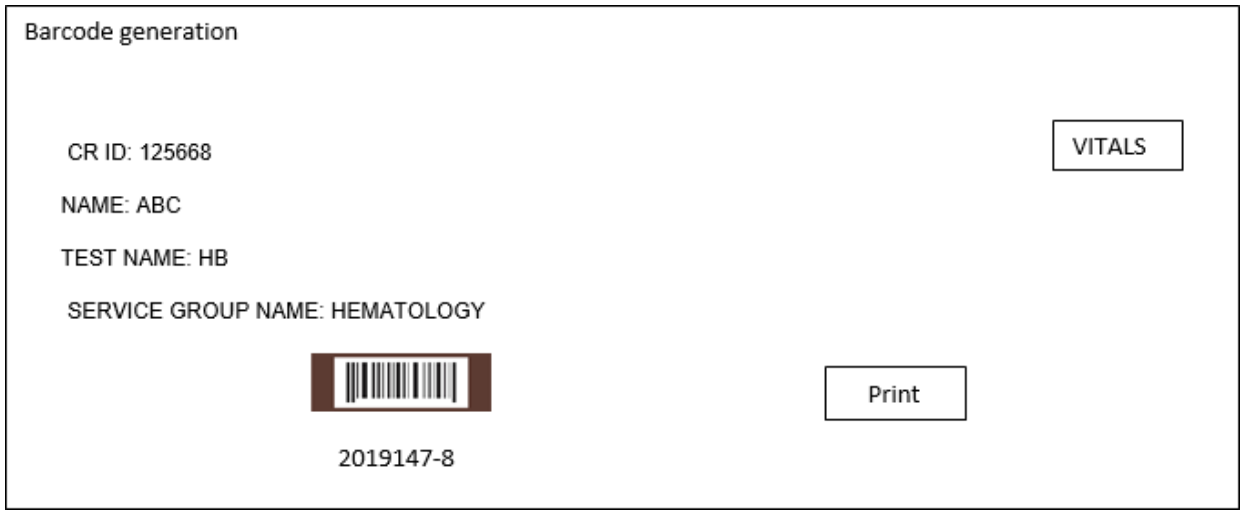


Nursing Sample Collection

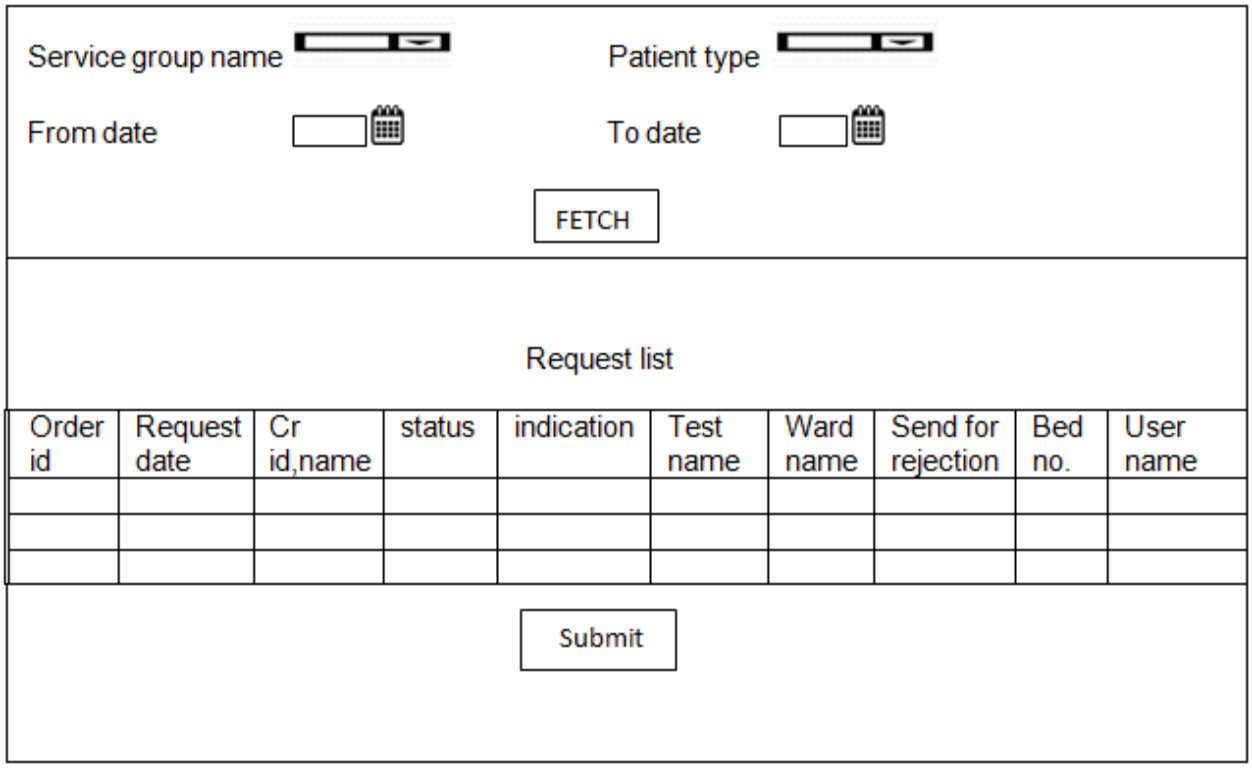




Barcode Generation screen



Nurse Cross Location screen



MASTER DATA MANAGEMENT AND MIGRATION

Master data is the one which does not change very often and is uniform and consistent throughout. This is the base data used by the hospital information system. A predefined format of excel sheet is used for creation of masters in which certain fields are used and the data is entered under the respective fields in the sheet.
For the nursing order module, master data include service group, name of services, parameters, and specimen type.
After the data is created in excel sheet and the application is ready for testing, it is imported into application and; then the master data is saved.

- **Service Groups**

CLINICAL INFORMATION SYSTEM	SERVICE GROUP
Lab management System	Biochemistry ,microbiology ,hematology ,histopathology, molecular
Image management system	Ct scan, x-ray, M.R.I, ultrasound, PET- CT

- **Services**

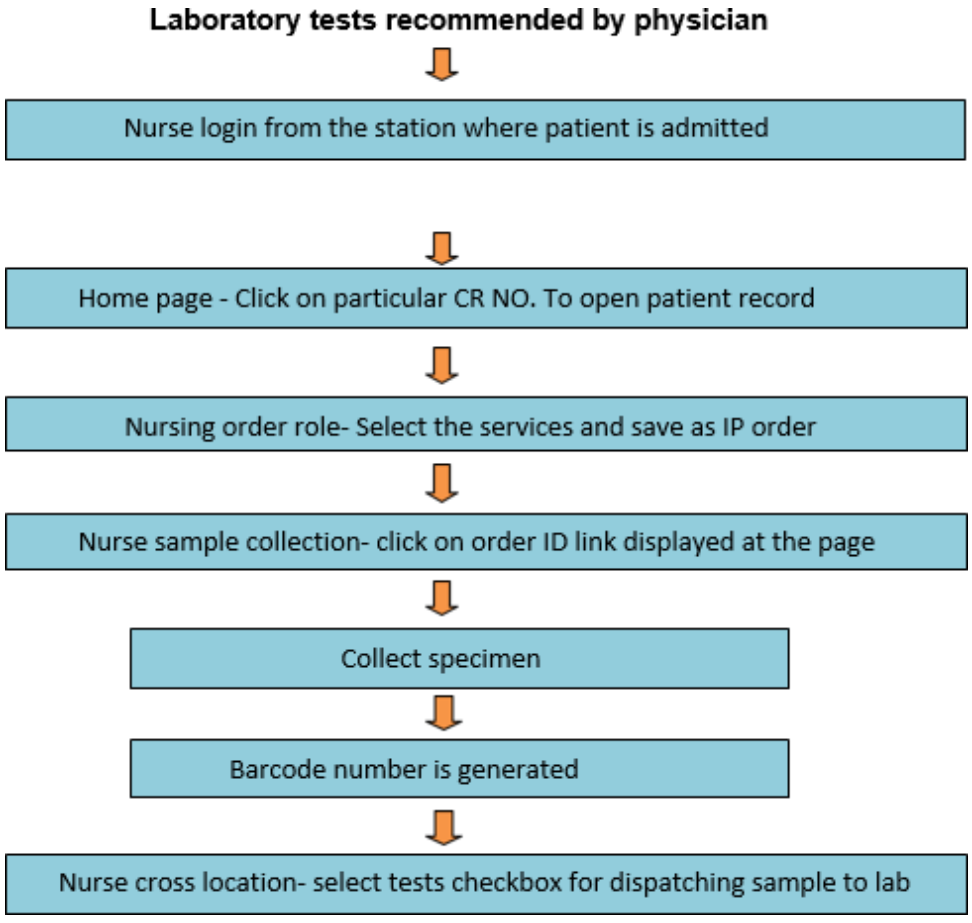
SERVICE GROUP	SERVICES
Biochemistry	Blood glucose, liver function test, etc.
Hematology	CBC, HB
Microbiology	Dengue NSI Antigen, HEPATITIS B SURFACE ANTIBODY (Anti-HBs)

- **Parameter (Service Units)**

SERVICE GROUP	SERVICES	PARAMETERS
Biochemistry	Liver function test	SGPT
Hematology	CBC	RBC Count

- Specimen - by default, specific
- Test mode - computed/ normal
- Report type - normal/culture/template
    - Normal type- biochemistry, hematology
    - Culture type- microbiology
    - Template type- histopathology
- Service charges - the payable amount to avail any service

B. Nursing Order Flow

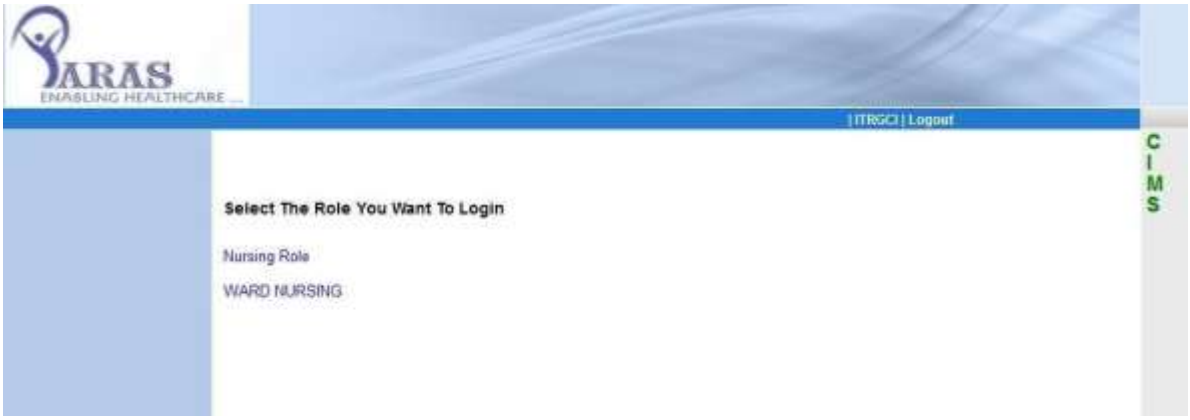


Screenshots for nursing order flow

• Login screen:

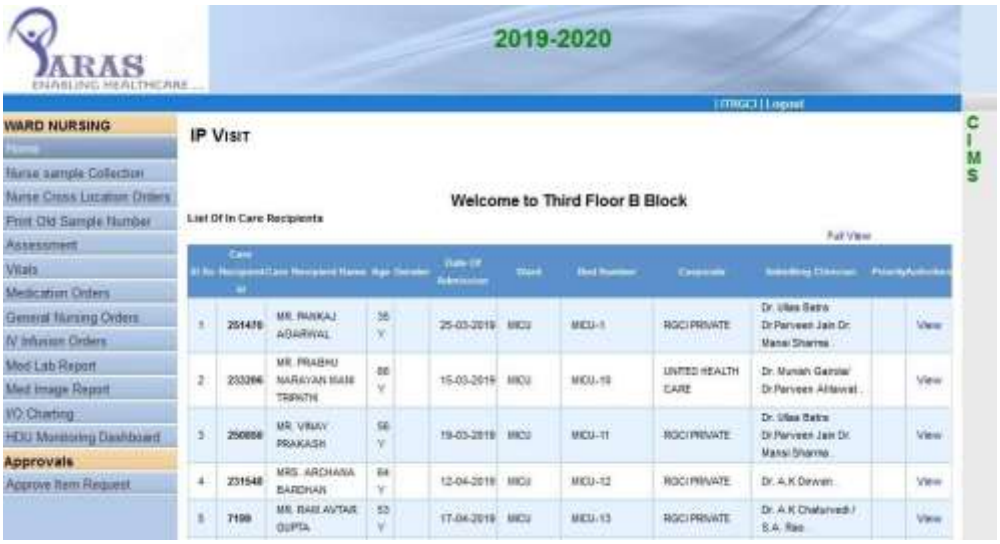
User will login to particular nursing station mapped according the allotted bed. For e.g. third floor b block

After login, user will have to select the ward nursing role .



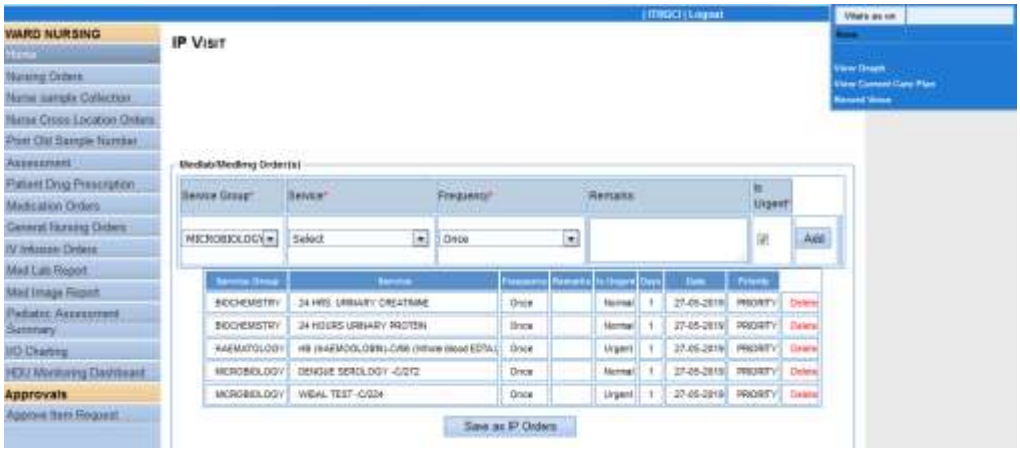
Home screen

Home screen will appear after clicking home and list of admitted patients will appear,

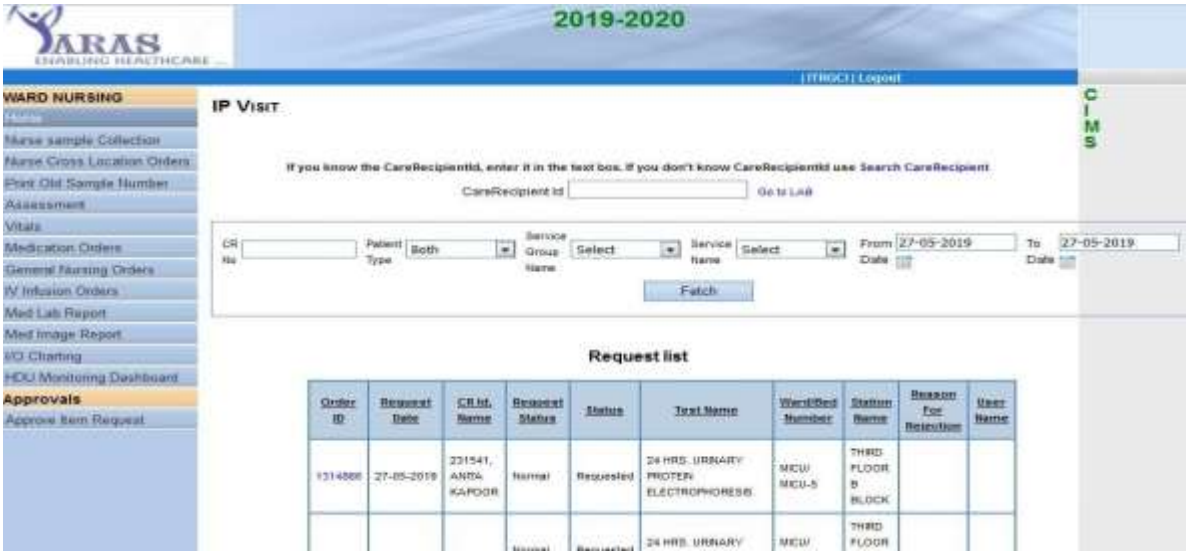


User will have to click on the particular patient ID for ordering.

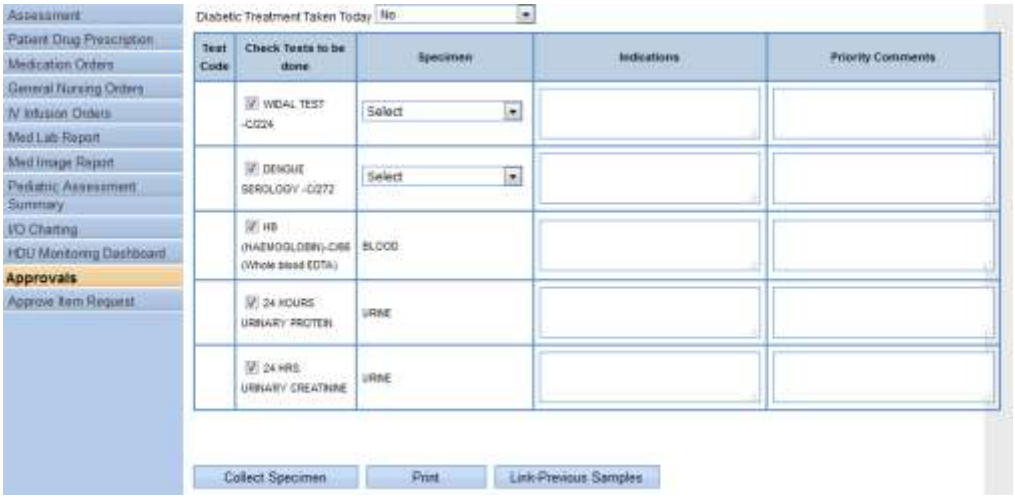
After clicking on nursing order , user can order laboratory and radiology services by adding services and saving as IP orders



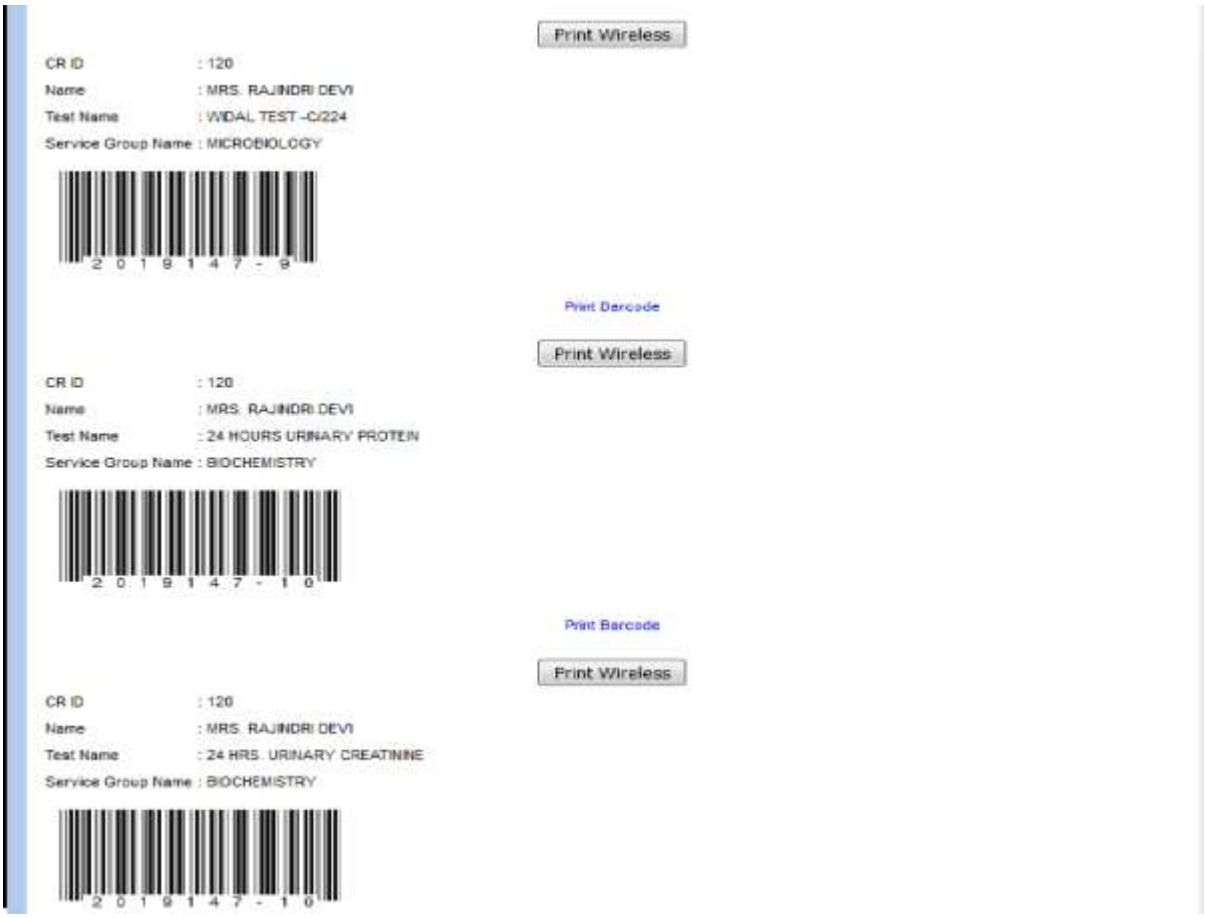
• **Nurse sample collection screen**:
After ordering, user has to select nurse sample collection, and click on order ID link.



On clicking Order ID, screen will appear where user will click on „Collect Specimen" button to collect the desired sample.

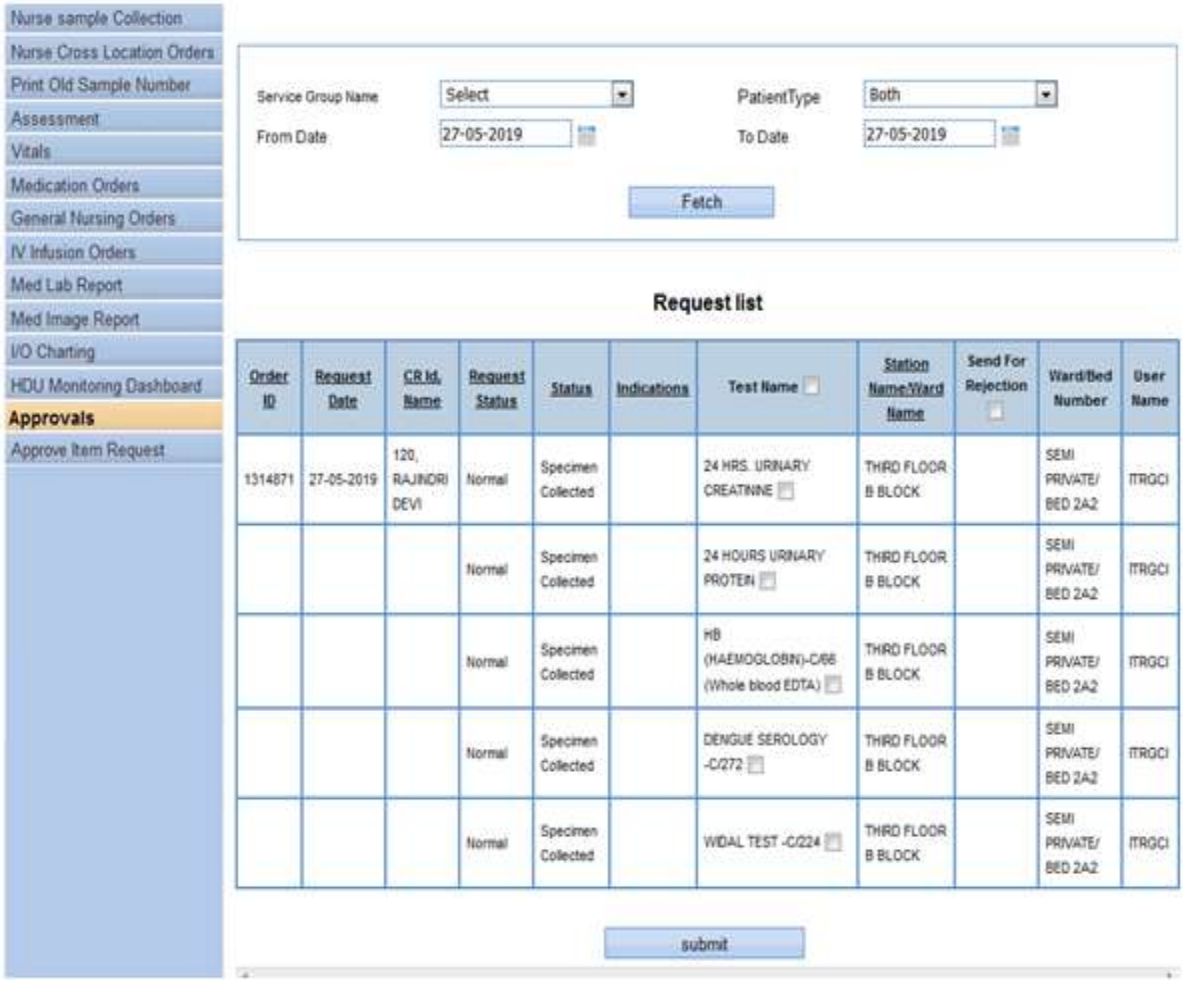


Barcode will generate after Sample collection. 2 different sample reference numbers will generate if service group are different, or if specimen type is different. If service groups are same with same specimen type, same barcode will generate.

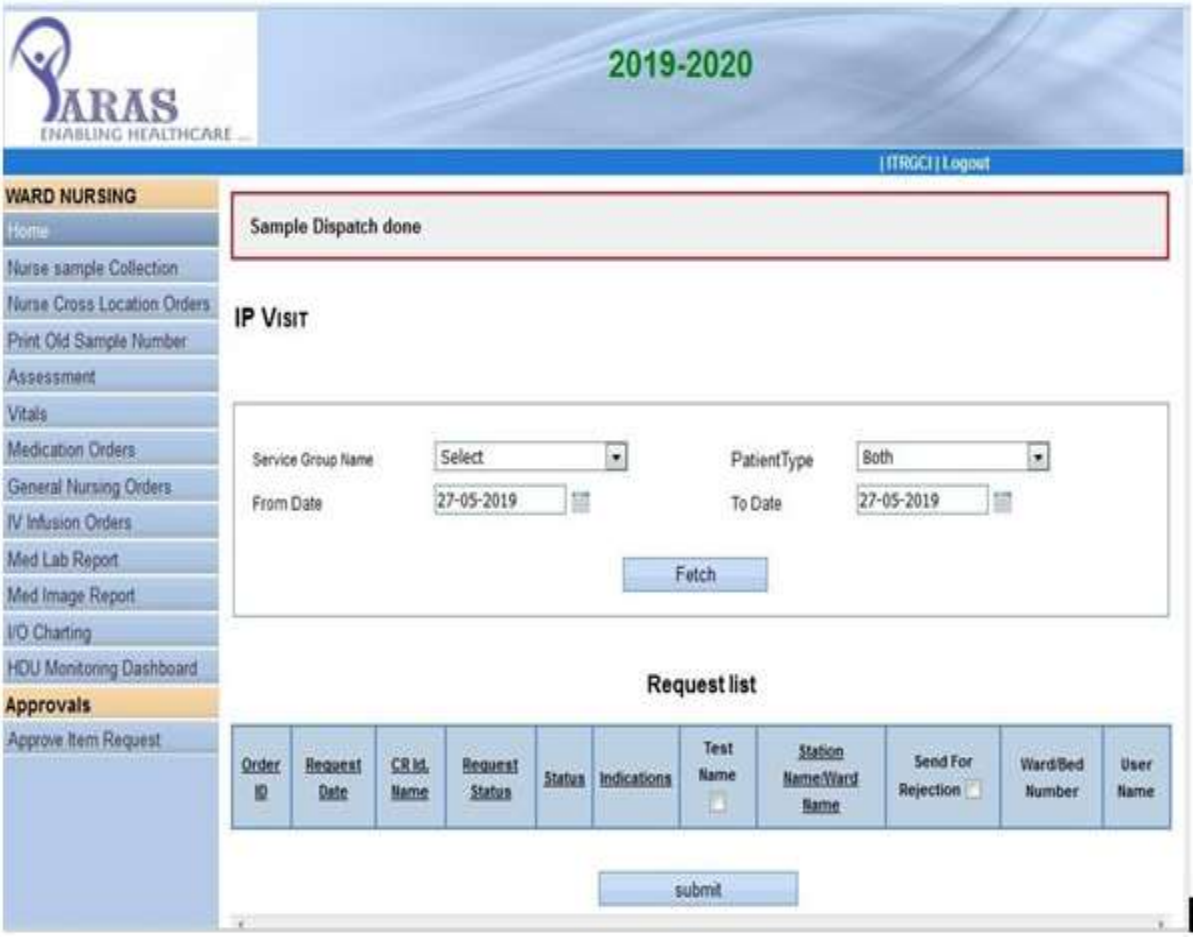

Print Wireless
CR ID : 120
Name : MRS. RAJINDRI DEVI
Test Name : WIDAL TEST -C/224
Service Group Name : MICROBIOLOGY
2019147-8
Print Barcode
Print Wireless
CR ID : 120
Name : MRS. RAJINDRI DEVI
Test Name : 24 HOURS URINARY PROTEIN
Service Group Name : BIOCHEMISTRY
2019147-10
Print Barcode
Print Wireless
CR ID : 120
Name : MRS. RAJINDRI DEVI
Test Name : 24 HRS. URINARY CREATININE
Service Group Name : BIOCHEMISTRY
2019147-10

Nurse cross location order

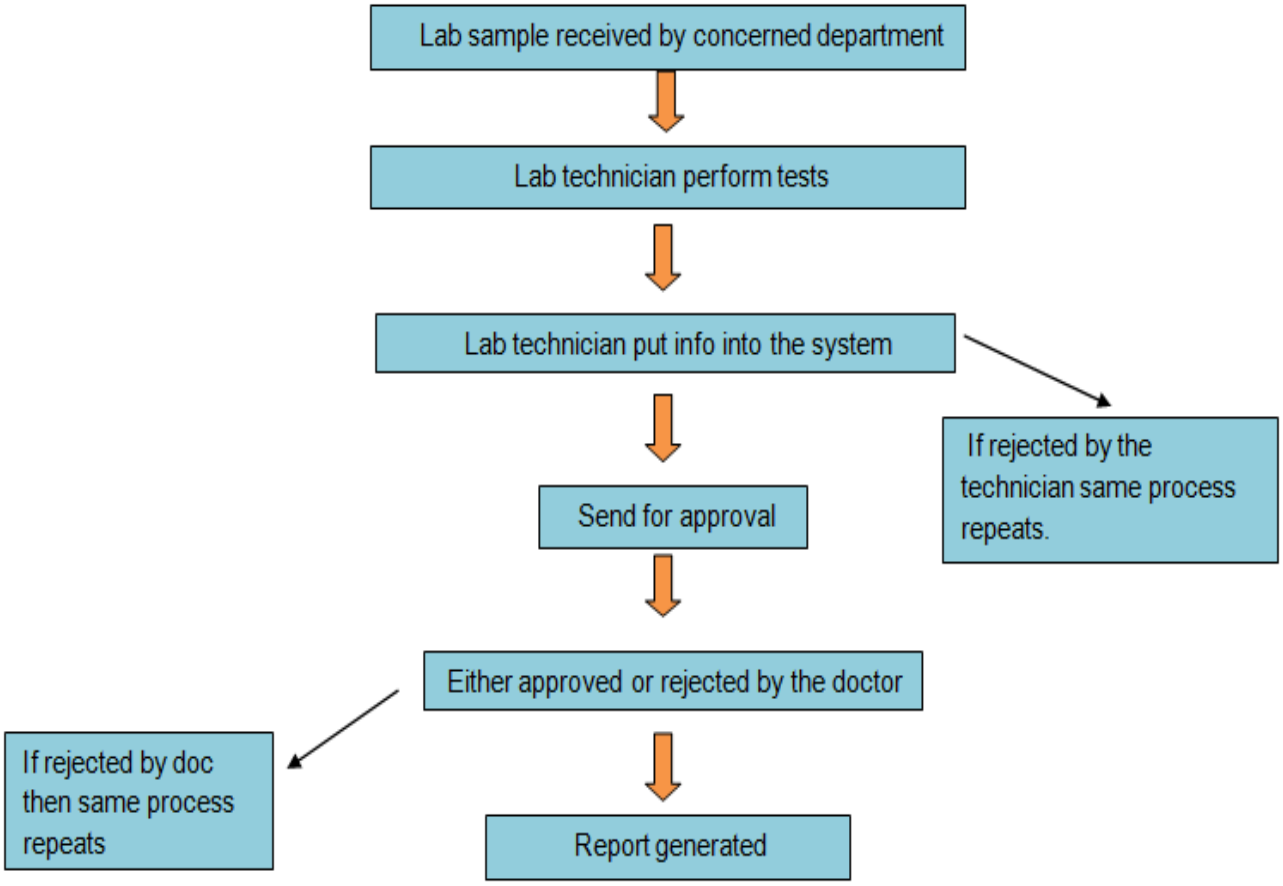
After that, user will select nurse cross location order, following screen will appear.
User will select test name and submit, sample will be dispatched to laboratory for further processing.



Sample dispatch done to laboratory



With this step, nursing order part ends and **LIS flow** will proceed.



C. Development of test scenarios

Document used for the functional testing is developed in which all possible scenarios i.e. normal as well as exceptional can be used for testing. Test cases are used to review the functionality of the application and each test case can have multiples test scenarios. The objective is to find if the expected outcome matches the actual outcome.

Scenario id	Test case id	Test case		Test step Description	Expected result	Actual result	Status	Comment
TS001	TC001	To test the Login functionality of the application Site	Pre-Requisite	Computer with intranet connectivity, login id Password				
			Step 1	Enter the URL	Login page will appear	Login page opened successfully	Pass	
			Step 2	Enter the valid username in user field	User field should be editable and accept the username	User input accepted	Pass	
			Step 3	Enter the valid password in password field	Password field should be editable and accept the password and should be displayed as star	Password is accepted and displayed as star	Pass	
			Step 4	Click on login button	User should login into the site and navigate to homepage	User navigated to home page	Pass	

TS002	TC002	To verify if listing of admitted patients is reflected on the home Page according to the assigned Nursing station	Pre-Requisite	Valid user Credentials				
			Step 1	Enter valid user id and password	Successful login and user should navigate to home page	User navigated to home page	Pass	
			Step 2	Click on ward nursing role	Admitted patients to be listed with CR no.	List of patients appear	Pass	
			Step 3	Review the page	All fields should correctly display information related to patient i.e CR no,name, age,gender,ward,bed no,corporate,admiting clinician,priority, activities	All the fields are are not displaying, information under gender field missing	Fail	

TS003	TC003	To test if the patient is able to add and save orders for the patients	Pre-Requisite	Successful navigation to home page after login				
			Step 1	Click on the particular CR no. at home page	Patient nursing order history should appear	Patient nursing record displayed	Pass	
			Step 2	Click on nursing order	Page displaying service group, services,frequency,priority,remarks will appear	All the fields are displayed on the page	Pass	
			Step 3	Select the particular service group	Services should display after selecting service group	Services successfully loaded after selecting the service group	Pass	
			Step 4	Unselecting the service group	Services should not load	Services not loaded	Pass	
			Step 5	Select services	Frequency of the test should be by default once	Frequency can be selected more than once	Fail	
			Step 6	Select the priority for the test	Urgent status should display	Urgent status not displaying	Fail	
			Step 7	Click to add button	Services selected should be displayed below	Services displaying	Pass	
			Step 8	Click on save order	Order must be saved successfully	Order saved	Pass	
TS004	TC004	To test if the orders for the patients are reflected on the nurse Sample collection Screen	Pre-Requisite	Successful ordering for the services at nursing order screen				
			Step 1	Click on nurse sample collection role	Nurse sample page should display order ID link for the patients whose ordering is done	Order id link displayed	Pass	
			Step 2	Click on order ID link	Page should redirect to collect specimen page	Page redirected to collect specimen page	Pass	
TS005	TC005	To test if the barcode no. is generated sequentially	Pre-requisite	1) Barcode Printing machine interfaced with computer and software				
				2) printing roll				
			Step 1	Click on collect specimen	Page should redirect to barcode generation page with unique barcode number	Page redirected to barcode generation page , barcode no. generated	Pass	
			Step 2	Review the barcode no.	Barcode no.should be generated sequentially i.e. according to the format (year wise,day wise,sequence) e.g- 2019159-44	Generating but not sequentially	Fail	

ERRORS REPORTED DURING THE FUNCTIONAL TESTING

Testing is done by dummy registration (i.e. taking test patient) at UAT:
Excel sheet was maintained in which all the bugs were reported. The bug list contains the following fields:

- Port / URL
- Module
- Screen name
- Bug description
- Status
- Priority
- Remarks

High priority errors	Medium priority errors	Low priority errors
2 different Barcode number generating for same service group having same specimen type	If a specimen is rejected for a urgent priority test, it is reflected at nurse sample collection screen but Rejected is not listed.	Frequency of test is not set once by default
Same barcode number is generating for 2 different service group	Test on urgent priority not showing urgent and red highlight not displaying	2 same service can be added and saved as IP order twice at the same time
Barcode locking not done , barcode number not generating sequentially	Gender field not displaying	
Ip charge slip generating after ordering only, it should generate after technician accepts the barcode Number.		
Billing issue- if order for 5 lab tests is done , in billing only 4 tests were showing		

Drawbacks of Current software in use- CPRS

CPRS is a windows based interface which incorporates computer based provider order entry (CPOE) which allows the user to electronically enter laboratory orders, radiology orders, medication orders, diet orders, and procedure orders. However, it faces technological issues and challenges

•Complex in nature because of multiple screens, it is *less user friend*ly. Also assigning role to users is the difficulty faced by the system.

• Since ordering for laboratory and radiology is done from CPRS but order request is retrieved in the PARAS through an interface, 2 softwares are used for the complete flow. Therefore *workflow is not linea*r rather it is distributive and complex and integrated through an interface. Using CPOE propels doctors to select inflexible and strict plan for orders that are not always be compatible with the practice

• Another drawback is that *data cannot be retrieved from CPRS.*

• *Lacks in many features* such as user cannot configure masters and other settings from the front end and customization as per user requirement is not easy as it is an old technology and not compatible with new technology.

•It is *not multi-lingual* and assigning role to users is the difficulty faced by CPRS.

•*High maintenance cost* -These systems are expensive to implement and maintain.

•*Poor support* from vendor as on priority tasks

Therefore, Paras has all the capabilities to fill the above gaps and the hospital to be completely online and to be paperless.

FOLLOWING OUTCOMES ARE EXPECTED AFTER THE NURSING ORDER WILL BE IMPLEMENTED

1. Smooth workflow:
Clinical workflow is much simpler due to single application.
As nursing order module for the laboratory and radiology services will be implemented in HIS (PARAS) and laboratory module is already implemented in PARAS, only single software will be in use from lab order to report generation. Therefore it will reduce the complexity of the workflow and smooth workflow will proceed.

2. **User friendly**:
On the basis of technical and functional aspects, PARAS has comparatively more user friendly features i.e. User can be assigned role easily whereas in CPRS, it"s a difficult task. Also less number of training sessions is required to understand its functionality, by reading captions and headings user can easily identify how to proceed further. User may successfully adopt the use of PARAS.

3. **Better technology**:
Integration of messages for SMS and email is easy in PARAS as compared to CPRS; and can be customized as per users demand. Also user can configure the masters and other settings at the front end, whereas, configuration feature is not available in CPRS. Apart from this, PARAS is multi lingual and its cloud based application and can be accessed through any browser.

4. **Support is available**:
Support from vendor for maintenance and enhancement i.e. addition of new features is available and User guide manual regarding instructions for operating each module is provided to help the users to understand the functionality of PARAS.

5. **Cost - effective**:
PARAS is more affordable software than CPRS. Affordable to implement and maintain
In a nutshell, it can be concluded that it is more beneficial to use PARAS because of its user friendly features, and by merging all the processes in one application it will contribute to produce more comprehensible order which may in turn reduce turnaround time and reduce complexity of workflow and that too at affordable maintenance cost.

Challenges and limitations:

• Synchronization of two database:
Currently lab module is in PARAS P4 version and nursing ordering will be implemented in PARAS P7 version, synchronization of data - billing: IP charge slip, barcode sequential generation and masters of P4 version with P7 version was a challenging task and took more time than expected.

• Lack of resources:
Due to insufficient resources i.e. less manpower than required in the development team due to other projects running in the hospital was also one of the major challenges encountered.

• Took more time than expected and still not implemented, actual results cannot be determined.

Recommendations:

•More manpower should be involved in development team.
•Consistency in decision making with respect to user requirement
•Scheduling of tasks to complete the project in time.
•Printer configuration should have been done while development of module in software.

CONCLUSION

The implementation of new module in HIS has a significant impact on the organization from technology point of view as well as from patient, staff, and process perspectives. Therefore, planning is the most important step for any projects` success. Based on the observations of the study it can be concluded that, User requirement is the base for designing any software. However, consistency in decision making with respect to the user requirement helps in clarity with product design and timely completion of the project. Furthermore feasibility study for the project in terms of economy, legally, operational feasibility, technically and scheduled time is an important aspect to consider. Rigorous testing after the development of software is necessary step to review the functionality of the software to meet the client expectations. Equal distribution of task allotment to team members is important for managing the workload balance. Every step before the final implementation has its own importance as it reduces the chances of failure for the implementation of the project.

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