

# INTEGRATED PACS DEPLOYMENT AT AIIMS

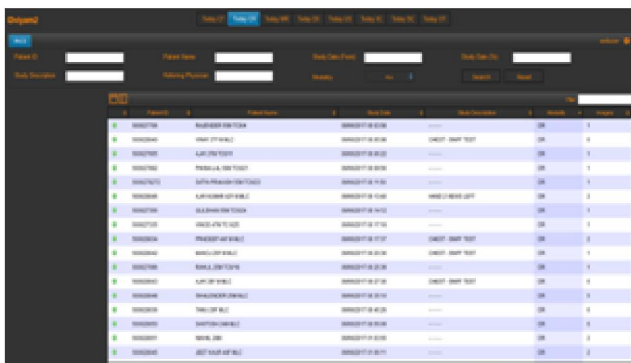
## INTRODUCTION

(PACS) is a medical imaging technology which provides economical storage and convenient access to radiological images from multiple modalities and enable interfacing with Hospital Information System(HIS), Electronic Medical record (EMR), and Radiology Information System(RIS).

Integration of Radiology services with PACS is yet another milestone in the digitization of AIIMS. Open PACS was made available throughout AIIMS in 2014. It has a storage space of 500 TB and radiological images like X-Ray, CT, MRI etc can be accessed through open PACS through all systems connected to the hospital network. Being a web based application, a doctor can view the images even in their hand held devices like smartphones, ipad, tablets etc once connected to the hospital WIFI.

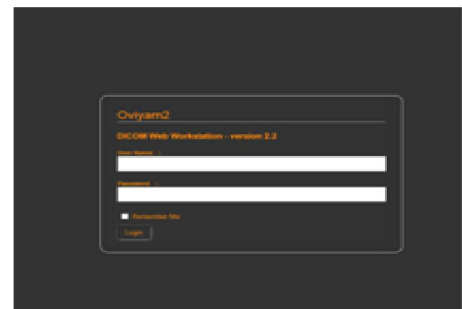
## FEATURES

- Only one with username and password can access the application
- Provision to search by UHID, date, modality, patient name etc available.



Patient ID	Patient Name	Study Date	Study Time	Modality	Status
10000001	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000002	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000003	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000004	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000005	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000006	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000007	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000008	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000009	ABHIRAM K S	2014-01-15	10:30	CT	OK
10000010	ABHIRAM K S	2014-01-15	10:30	CT	OK

Search Results in Oviyam



User Interface of Oviyam



X ray image in oviyam

- Various tools are available in the viewer like multiple windows, horizontal/vertical flip of the image, measurement tool, insert text, cine loop, comparison of multiple series of images side by side, zoom image etc.
- Unlimited licenses- not limited by number of simultaneous users.

## PROCESS OF INTEGRATION WITH OPEN PACS

### 1) MAIN HOSPITAL

Phase 1 (completed by Jan 2014) – Implemented by NIS.

- Possibility of integration of different modalities like X Ray, CT, MRI etc were assessed and all compatible machines were integrated with the open PACS.
- Integration with the existing applications in radiology department was done. All radiological images were automatically pushed into open PACS.
- Open PACS can be accessed through 192.168.15.23:8080/oviyam2 by logging in with given credentials.

## Phase 2 (completed by Mar 2016)

- Integration of e-hospital with existing RIS (Radiological Information System) was done.
- Online order entry in e-hospital for X Ray, USG, CT and other radiological investigations except for MRI (in process) was made mandatory.
- Scheduling of all radiological investigations were done online in e-hospital which was reflected in RIS.
- Reporting done in RIS was made available in e-hospital through integration.
- Provision to view both radiological images and reports in one particular link was enabled by NIC in e-hospital.

## How to View Reports in e-hospital:

- Login to ehospital- 192.168.15.8/ehospital with your credentials.
- Access link 'RIS Report' and enter UHID.
- Report and image link at one interface.



*ehospital interface-RIS Report*



*Radiology Report in ehospital*

## CURRENT STATUS OF INTEGRATION

All machines of radiology (18 nos including X-Ray, CT, MRI, USG, Mammography etc) have been integrated with Open PACS.

Certain other investigation reports like Pulmonary Function Tests reports and Sleep lab reports are also available in open PACS since June 2017.

## WORKFLOW

The radiological investigation is ordered online by the doctor through e-hospital. The test is then scheduled for a particular date at the single window exit counters functional at RAK Ground floor.

Once the test is done the radiological images are immediately send to the open PACS which can be then accessed through intranet with the particular credentials. The report of the same can be viewed in e-hospital against the UHID.

### **Plans in Pipeline:**

- Online reporting of investigations like IVP, RGU, USG, Barium dye studies etc.
- Integration of all portable images into open PACS.

### **2) IRCH ( Implemented by NIS, CF)**

- Possibility of integration of different modalities like X Ray, CT, USG and Mammography were assessed and all compatible machines were integrated with the open PACS.
- 5 out of 6 machines ( one USG machine not compatible for integration with PACS) in IRCH Radiology has been integrated with open PACS and one can view the images of X-Ray, CT, USG and Mammography online.

### **3) CDER- Centre for Dental Education and Research**

#### **Phase 1 ( completed in May 2017)**

- Centre for Dental Education and Research has an X Ray Department of their own where OPG, RVG, and IOPA images are taken.
- Assessment was done for integrating these machines and was found that they were not interfaceable.
- An alternative process was developed wherein the images would be saved against UHID in a desktop which would be automatically uploaded into open PACS.
- Training to the technicians were given regarding the process of uploading and has been functioning successfully since March 30th. All OPG and RVG images are available online against UHID of patients.
- Transfer of IOPA images to PACS is in process.

### **4) Dr. Rajendra Prasad Centre for Ophthalmic Sciences**

#### **Process of Integration**

- Radiology department of RPC has modalities like X-Ray, USG and CT scans performed in room no 53, RPC Ground Floor.
- Integration process started in March 2017in RPC. Possibilities to interface the machines in their radiology department were assessed and the vendors were called for making the changes required for interfacing.
- The process was completed by the end of May 2017.

- All images of X-Ray and CT are pushed into open PACS. One can view the images online in 192.168.15.23:8080/oviyam2 with their particular credentials. This has been live since June 2017.

## Future Plans

- Assessment for integration of USG machines is in process.
- Training to enter UHID instead of department number in the department to enable UHID search in PACS.

## 5) Cardio-Neurosciences Centre

Radiological images of X-Ray, CT, MRI of CN Centre is available internally (within CNC) in their own stand alone PACS. Integration with open PACS was not permitted by the department.

Images are available in GE PACS and can be accessed in <http://10.2.76.80/ami/html/> (in internet explorer) through the provided credentials.



Angiography Report in open PACS

Certain other investigations reports like reports of HOLTER, EEG, ECHO etc whose machines cannot be interfaced, are uploaded into open PACS through an application. All reports and images of HOLTER, EEG, ECHO, Cardiac Angiography, NCS, HUTT, and Ambulatory BP are available in PACS since Feb 2017.

## 6) Trauma Centre

All radiological images of X-Ray, CT, MRI and reports like pathology, TEG, and spirometry are available in trauma PACS against their UHID since March 2017. These are automatically pushed to AIIMS open PACS where they can be searched against UHID.

## 7) Nuclear Medicine

Integration of nuclear medicine with open PACS was not permitted by the department of Nuclear Medicine. The images are available in their local servers and not accessible outside the department.

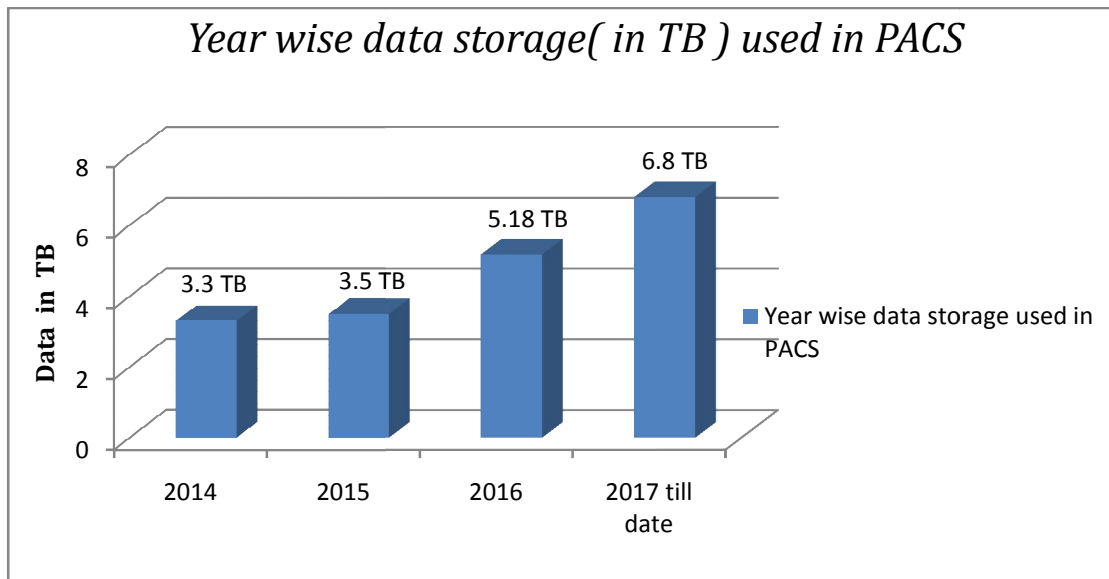
### CURRENT STATUS OF INTEGRATION WITH OPEN PACS IN A GLANCE

Modality	Main AIIMS	CNC	IRCH	RPC	CDER	Trauma
X Ray	Done ( both images and reports )	Integration not permitted by department. Images available only in their independent PACS	Done ( for images )	Done ( for images only)	Done ( for images only )	Done for images.
USG	Done only for images. Reports in next phase			In Process	NA	Not Done
CT	Done ( both images and reports )			NA	NA	Done for images
MRI			Test not available in Centre			Done for images
Other investigations* like IVP, Barium studies etc	Done ( for images ).. report integration in process	Test not available in Centre				
Sleep Lab Reports and PFT Reports	Done**	Test not available in Centre				
EEG, ECHO, HOLTER, Cardiac Angiography, NCS, HUTT, Ambulatory BP,	NA	Done. Images and reports available	Test not available in Centre			
Pathology Reports	Not done	NA	NA	NA	NA	Done
TEG	NA					
Spirometry	Not done					

\*Investigations include IVP, Barium/ Dye studies, RGU, Mammography.

NA- Test not available in centre.

## Year wise data storage space used in open PACS



**Figure 1**