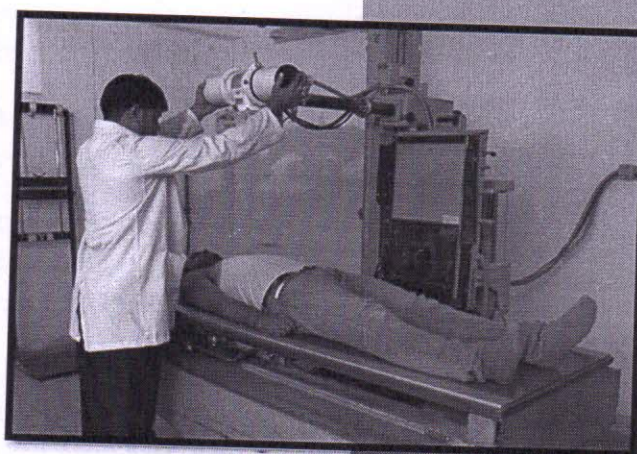




# Standard Operating Procedures for District Women Hospitals- Uttar Pradesh

## SOP-9 Radiology



X-Ray



USG

Quality Assurance Team

Name of facility	Standard Operating Procedure
Radiology	SOP/NQAS/ RAD - 1.0

## Objectives of Radiology

- ❖ Radiology services comply with all national standards and laws.
- ❖ Radiology services are provided to meet the needs of the patients.
- ❖ Radiology services are available 24 hours a day, 365 days in a year for all emergency investigations.
- ❖ Radiology services follow a comprehensive radiation safety program and this is incorporated into the Hospital safety program.
- ❖ Radiology services follow standard procedures for identifying and investigating patients.
- ❖ Radiology personnel are qualified and experienced as per the scope of services of the Radiology services.
- ❖ All tests done by the Radiology department are reported within time frames established in the Radiology SOP.
- ❖ Develop, implement and maintain a quality control program.

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## SOP 9: Radiology Department

### 1. Purpose:

To provide guideline instructions for the Radiology Workflow Processes with the aims that

- ❖ Needs and expectations of customers are established,
- ❖ Customer satisfaction is enhanced on continual basis, and
- ❖ Feedback loop is established for continuous improvements.

### 2. Scope:

It covers all patient care areas of hospital.

### 3. Responsibility:

Radiology Consultant / Technician

### 4. Procedures:

S.N.	Activity	Responsibility	Reference Document / Record
	<b>Out Patient Imaging Procedures:</b> <ul style="list-style-type: none"> <li>• OPD consultant writes up patient for investigations in prescription or patient file.</li> <li>• Radiology requisition form is filled.</li> <li>• Patient is directed to the Radiology department.</li> <li>• Requisition form is checked in the radiology department.</li> <li>• Patient is given a wait number for that particular imaging procedure.</li> <li>• Patient is directed to the appropriate imaging area.</li> <li>• Patient's wait number and name is called</li> </ul>	Consultant / Physician / OPD nurse / Technician/ OPD attendant or assistant / Radiology Consultant	

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<p>out.</p> <ul style="list-style-type: none"> <li>• Patient is taken into imaging area.</li> <li>• Imaging done as per standards set for each imaging procedure;</li> </ul> <p><b>Procedure for taking and handling X-ray</b></p> <ul style="list-style-type: none"> <li>• Required accessories are made ready.</li> <li>• Machine is kept ready with appropriate technical exposure.</li> <li>• Developer and fixer solution is prepared in advance.</li> <li>• Clean gowns are given to the patient and area of interest made free from metal objects.</li> <li>• TLD badges and Lead apron are worn for Radiation safety.</li> <li>• The privacy of the patient is ensured while taking the X-Ray.</li> </ul> <p><b>Procedure for receipt, labeling, processing and reporting of X-ray:</b></p> <ul style="list-style-type: none"> <li>• Patient is asked to wait until film is checked to be alright.</li> <li>• Films are developed. Patient's ID / Name / Date/ Side is displayed prominently on the film.</li> <li>• Patient is informed as to the time the report can be collected.</li> <li>• All films sent to the Radiologist (for X ray films).</li> <li>• Ultrasound reports are written by Radiologist performing the procedure.</li> </ul> <p><i>* The critical results or findings are intimated immediately to the consultant over telephone.</i></p>		
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Name of facility	Standard Operating Procedure
Radiology	SOP/NQAS/ RAD - 1.0

	<p><b>Identification and safe transportation of in-patients to Radiology:</b></p> <p>Patient admitted in ward / ICU is transported (internally) in a safe manner and is always accompanied by a hospital staff.</p> <ul style="list-style-type: none"> <li>• For stretcher bound patient – accompanied by ward boy/ aaya and attendant</li> <li>• For wheelchair bound / mobile patient – accompanied by ward boy</li> </ul> <p>The patient file is sent along with the patient wherever transported and handled by accompanying hospital.</p> <ul style="list-style-type: none"> <li>• All registered patients are identified by a unique identification no. / MRD number.</li> </ul> <p>All other steps are same as in OPD patients</p>	<p>Consultant / Physician / OPD nurse / Technician/ OPD attendant or assistant / Radiology Consultant</p>	
	<p><b>Processing and reporting of X-ray and USG:</b></p> <ul style="list-style-type: none"> <li>• Required accessories are made ready (Daily Calibration).</li> <li>• Machine is kept ready with appropriate technical exposure.</li> <li>• After exposure, film is processed &amp; dried and once ready, it is kept for reporting.</li> <li>• In digital X-ray, film is processed in Automatic film processor after exposure and once it is ready, it is kept for reporting.</li> </ul> <p>The reports of the Imaging tests are delivered or handed over to the patient / relatives / ward in-charge in the defined time frame.</p>		

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	<ul style="list-style-type: none"> <li>All the routine X-ray reports (outpatient as well as in-patients), ultrasound are delivered on the same day</li> <li><u>The emergency reports are intimated verbally to the Emergency Medical Officer</u></li> <li>The in-patient reports are dispatched to the respective wings on the same day</li> </ul> <p>All patients are informed about the time of reports dispatch at the time of procedure.</p>		
4.1.2	<p><b>Explaining the Procedure to Patient &amp; Recording of Patient details</b></p> <p>All the details of the patient (like name, age, procedure requested for etc.) are entered in diagnostic register.</p> <p>Technician informs the patient about the procedure and the duration.</p>	Technician	Diagnostic Register
4.1.3	<p><b>Procedure for Radiation safety of staff, patients and visitors:</b></p> <ul style="list-style-type: none"> <li>Radiology describes the area of medicine that utilizes X-ray, and ultrasonic waves and magnetic resonance imaging in order to detect, diagnose, and guide treatment of numerous diseases and injuries.</li> <li>Currently, the dynamic images that radiology provides are essential to both physicians and patients.</li> <li>LMP dates from Female patients of child bearing age are confirmed and appropriate Lead aprons / shields are provided to patients to cover non examining part.</li> </ul>	Radiology Consultant/ technician	

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<ul style="list-style-type: none"> <li>• Clean hospital gown is provided to patient to undress.</li> </ul> <p>A. X-ray machine operators (x-ray technician) wear radiation monitor devices (TLD badge) when on duty: The TLD badge is worn on chest.</p> <p>B. <b>Routine monitoring</b> of scattered radiation in the immediate vicinity of x-ray machine with appropriate Detector is done (<b>leakage radiation from tube housing should be less than 2 milligram per hr at 5 cm</b>) &amp; recorded in <b>Radiation safety log &amp; 101 MR/ hr at 1 meter.</b></p> <p>C. <b>Equipment has:</b></p> <ul style="list-style-type: none"> <li>• Safety interlocks for tube head port / shielding</li> <li>• Visual warnings that the x-ray tube is on or off.</li> </ul> <p>D. <b>Red warning light</b> with the notation "X-RAY ON" when the X-ray tube is activated.</p> <p>E. <b>Radiation symbol</b> "HIGH ENERGY X_RAY BEAM" placed adjacent to X -ray tube housing.</p> <p>F. Each room with an X-ray equipment is posted with a sign "<b>CAUTION- X-RAY EQUIPMENT</b>". (Radiation Symbol)</p> <p>G. <b>Annual In-service training</b> in Radiation safety for all operators of diagnostic X-ray equipments:</p> <ul style="list-style-type: none"> <li>• Operating and emergency procedures for</li> </ul>		
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<p>the machines.</p> <ul style="list-style-type: none"> <li>• Use of employee and patient protective devices including lead aprons, lead screens, thyroid shield, Gonad shield.</li> <li>• Use of personnel dosimeter (TLD)</li> <li>• Film processing procedures by Radiologist.</li> </ul> <p><b>H. Personnel dosimeters are:</b></p> <ul style="list-style-type: none"> <li>• Always used during examination</li> <li>• Stored in safe places away from sources of radiation under the nominated supervision of the department.</li> <li>• Never worn by another person.</li> <li>• If a lead apron is worn, dosimeter to be worn <b>underneath</b> the lead apron.</li> </ul> <p><b>I. Technique chart to be posted</b> at control panel specifying parameters for routine examinations:</p> <ul style="list-style-type: none"> <li>• Distance between X-ray tube and film.</li> <li>• Appropriate exposure factors for each Radiographic examination. <ul style="list-style-type: none"> <li>➤ (KV, mAs)</li> </ul> </li> </ul> <p><b>K. Maintain records in History sheet</b> of each radiological equipment:</p> <ul style="list-style-type: none"> <li>• Maintenance</li> <li>• Repairs</li> <li>• Modifications performed on each X-ray machine and Ultrasound Machine.</li> <li>• Name of the individual performing the service (Name of the Service Engineer)</li> </ul>		
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<ul style="list-style-type: none"> <li>• Date performed.</li> <li>• Calibration of equipment done with date and time.</li> <li>• Results</li> <li>• Area of interest is made free from metal objects.</li> <li>• Patient safety is at all times the highest priority. No action is undertaken which would knowingly be harmful or potentially harmful to the patient.</li> <li>• All patients receive the utmost care and attention from Hospital personnel.</li> <li>• All patients are assured of their privacy and dignity while on the unit.</li> <li>• No patient is left unattended while on the unit.</li> <li>• Appropriate emergency equipment is kept available at all times and personnel are trained in their use.</li> <li>• All stretcher patients are attended by at least one staff personnel.</li> <li>• When the lift gate is used for any patient, one staff person must be present on the lift.</li> <li>• Safety cables / rails are always in place when the lift gate is in operation.</li> <li>• Wheels are locked when the wheelchair is on the lift and while the patient is entering or exiting the wheel chair.</li> <li>• When a stretcher is used for patient transport, the side rails are always up and the safety belts are fastened.</li> <li>• Stretcher wheels are locked while it is on lift.</li> <li>• Transportation methods for outpatients are</li> </ul>		
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Name of facility	Standard Operating Procedure
Radiology	SOP/NQAS/ RAD - 1.0

	<p>based on the status of the patient when interviewed by Hospital staff prior to scanning.</p> <ul style="list-style-type: none"> <li>• An outpatient determined to be ambulatory is allowed to walk to the unit.</li> <li>• Ambulatory patients are to be accompanied from the Imaging Services Department to the scanner and back to the department by the patient's attendant.</li> <li>• No stretchers/ wheelchairs/ IV stands are allowed inside the MRI room</li> <li>• Ambulance patients not returning to the Imaging Services Department are to be escorted to the closest safe area (i.e. sidewalk, walkway, etc.). <i>In the case of MRI patients, this safe area must be outside the fringe field fencing.</i></li> </ul>		
4.1.4	<p><b>Preparation of the patient</b></p> <ul style="list-style-type: none"> <li>• Consent is taken from patient or relatives before procedure.</li> <li>• Clean patient gown is provided to patient to prepare for procedure</li> <li>• Patients are requested to remove all the jewellery and accessories before investigation.</li> </ul>	Staff nurse/ Technician	Consent form
4.1.5	<p><b>Repeat of X-ray</b></p> <ul style="list-style-type: none"> <li>• X-Ray is repeated as per the consultant's or Radiologist's advice</li> <li>• X-ray is repeated when there is any technical problems or non cooperation from the patient.</li> <li>• After reporting X-ray report is dispatched to the respective patient/ward</li> </ul>		
4.1.6	<p><b>Turn Around time for reports</b></p> <p>The report is sent to the concerned doctor/ department if the patient is admitted in IPD.</p>	Radiologist	X-Ray Report

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	<p>And through patient/ relative if patient is visiting in OPD/ as per turn around time.</p> <p><b>Procedure for taking X-ray in Emergency conditions:</b></p> <p>In case of an emergency report, the radiologist will see the film and give a verbal report to the treating physician.</p> <p>If the patient is referred or wants to go to some other hospital (on request or against medical advice), efforts and made to generate the reports on priority basis.</p>		
4.1.7	<p><b>Maintenance of Record:</b></p> <p>The record such as Requisition slips, Radiology Register, File of X-ray, Maintenance Record of X-ray Machine, consent form of patient is maintained by the technician.</p>	Radiologist/ Radiographer	List of Records
4.1.8	<p><b>Procedure for purchase of external services and supplies:</b></p> <ul style="list-style-type: none"> <li>• Non availability of X-ray films and consumables is verified and prepared by chief pharmacist and informed to the Facility in-charge.</li> <li>• As per the instructions and authorization by Facility in-charge purchase requisition is made by the chief pharmacist.</li> <li>• After purchasing the consumables Pharmacist intimates the radiographer.</li> <li>• Radiographer raises the indent to the Store in-charge.</li> </ul>		

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	<ul style="list-style-type: none"> <li>After receiving from the store, the radiographer enters the consumables in the stock register.</li> </ul>		
4.1.9	<p><b>Inventory Management</b></p> <p>Inventory of following items is maintained at all the time in sufficient no.</p> <ul style="list-style-type: none"> <li>Linen</li> <li>Cassettes</li> <li>Lead Apron</li> <li>Gloves</li> <li>Chemicals</li> <li>X-ray films</li> </ul> <p>As per daily OPD/IPD load, stock of the above items is maintained. It is ensured that these items are available in adequate number at all time.</p> <p>Based on lead time of procurement, minimum stock and average consumption the indent is sent to store in time.</p>	Staff nurse	List of Items in the department with minimum quantity in Stock Register
4.2	<b>Ultrasonography</b>		
4.2.1	The treating physician/ medical officers prescribe for the USG scan specifying the details of the type of investigation to be done in USG requisition slip.	Medical Officer	Requisition Slip
4.2.2	The staff nurse enters details of the patient in the USG Register.	Staff nurse	
4.2.3	Staff nurse explains & instructs the patient about pre-requisite for USG	Staff nurse	USG Appointment register
4.2.4	Patient arrives at the department complying with all instructions for preparation (as per appointment), and duty staff nurse/ sister forwards the patient scan details to the radiologist/ sonologist	Staff nurse	

Prepared by : Department In-charge	Approved by : Name :	Issue Date	Version No. : 1.0
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Name of facility	Standard Operating Procedure
Radiology	SOP/NQAS/ RAD - 1.0

4.2.5	Staff nurse assists the patient and prepares her / him for USG	Staff nurse	
4.2.6	The radiologist writes down the findings.	Radiologist	
4.2.7	The staff nurse cleans the patient's exposed body part after finishing the scan and tell the patient to wait in the waiting area for the report.	Staff nurse	
4.2.8	The report is prepared by radiologist and it is handed over to the patient	Radiologist and staff nurse	
4.2.9	In case of pregnancy, PC-PNDT form is filled before the scan.	Radiologist	PNDT form
4.3	<p><b>Procedure for Quality Control System:</b></p> <p>The facility quality assurance program includes means for evaluating the effectiveness of the program itself.</p> <p>Possible means include:</p> <ul style="list-style-type: none"> <li>• ongoing studies of the retake rate and the causes of the repeated radiographs, examination of equipment repair and replacement costs,</li> <li>• subjective evaluation of the radiographs being produced,</li> <li>• occurrence and reasons for complaints by radiologists,</li> <li>• analysis of trends in the results of monitoring procedures.</li> </ul> <p>Of these, ongoing studies of the retake rate (reject rate) and its causes are often the most useful and may provide information of value in the first level of evaluation.</p> <p>Such studies are used to evaluate potential for improvement, to make corrections, and to</p>		

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<p>determine whether the corrective actions were effective.</p> <p>The number of rejects are recorded daily or weekly, depending on the facility's analysis of its needs.</p> <p>The reasons for the rejection are also determined and recorded.</p> <p>In case where determining these reasons is impossible to perform on a regular basis with the available staff, the analysis is done for a 2-week period after major changes have occurred in diagnostic procedures or the X-ray system and at least semi-annually.</p> <p>The program includes provisions for the keeping of records on the results of the monitoring techniques, any difficulties detected, the corrective measures applied to these difficulties, and the effectiveness of these measures.</p> <p>The extent and form of these records are consistent with Rules &amp; Regulations of the state.</p> <p>The facility views these records as a tool for maintaining an effective quality assurance program and not view the data in them as an end in itself but rather as a beginning.</p> <p><u>Training:</u> The program includes provisions for appropriate training for all personnel with quality assurance responsibilities.</p> <p>The training is specific to the facility and the equipment.</p> <p>This includes both training provided before</p>		
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	the quality assurance responsibilities are assumed and continuing education to keep the personnel up-to-date.		
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## 5. Records:

Sl. No.	Record	Record No.	Minimum Retention Period
1	X-ray Nominal Register		5 years
2	X-Ray Film Stock Register		3 years
3	Ultrasound Scan Register		5 years
4	Ultrasound Film Stock Register		3 years

## 6. Process Efficiency Criteria:

Sl. No.	Activity	Process Efficiency Criteria	Benchmark/Standard/Target
1	Routine Testing	Turn Around Time	
2	Utilization	Lab test done per indoor patient	
3	Emergency Testing	Turn Around Time	
4	X-Ray Film Processes	Percentage of films wasted	
5	X-Ray reporting	Turn Around Time	
6	Proficiency	Z score in external validation	

## 7. Reference Documents

1. PC & PNDT Act 1996
2. Atomic Energy Act 1962, AERB guidelines
3. The Bio-Medical Waste (Management and Handling) Rules, 2016

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