

STANDARD OPERATING PROCEDURES (SOPs)

FOR
RADIOLOGY (08)



Department of Health & Family Welfare, GNCTD

SOP for Radiology
Ist Edition: August; 2016
Quality Assurance Cell
Delhi State Health Mission
Department of Health and Family Welfare
Government of NCT of Delhi

Compilation facilitated by : State QA Cell (Nodal Officer: Dr. Monika Rana , Consultant : Ramesh Pandey , Communitization Officer : Arvind Mishra , Statistical Officer : Shahadat Hussain), ARC (Maneesh and Md. Irshad Ansari).

Designed and Formatted by: Graphic Designer : Mansi Rana

This document has been prepared by the Expert Committee comprising of:

Sr. No.	Name	Designation	
1.	Dr. Anju Garg	Director Professor & HOD (Radiodiagnosis), Lok Nayak Hospital & Maulana Azad Medical College	Chairperson
2.	Dr. Poonam Narang	Director Professor (Radiodiagnosis), Govind Ballabh Pant Institute of Post Graduate Medical Education & Hospital	Member
3.	Dr. L R Richhele	Consultant (Radiodiagnosis) & HOD, Deen Dayal Upadhyae Hospital	Member
4.	Dr. Rashmi Dixit	Director Professor (Radiodiagnosis), Lok Nayak Hospital & Maulana Azad Medical College	Member

The SOPs have been prepared by a Committee of Experts and are being circulated for customization and adoption by all hospitals. These are by no means exhaustive or prescriptive. An effort has been made to document all dimensions / working aspects of common processes / procedures being implemented in provision of healthcare in different departments. This document pertains to Radiology. The individual hospital departments may customize / adapt / adopt the SOPs relevant to their settings and resources. The customized final SOPs prepared by the respective Departments must be approved by the Medical Director / Medical Superintendent and issued by the Head of the concerned department. HOD shall ensure that all stakeholders are trained and familiarized with the SOPs and the existing relevant technical guidelines / STGs / Manuals mentioned in the SOPs are made available to the stakeholders.

DETAILS OF THE DOCUMENT

-----HOSPITAL

Address:

Document Name:	
Document No.:	
No. of Pages:	
Date Created:	
Prepared By:	Designation : Name : Signature:
Approved By:	Designation : Name : Signature:
Responsibility of Updating:	Designation : Name : Signature:

INDEX

S. No.	Title	Pages
1	Radiology	8-23

AMENDMENTSHEET

S.N o.	Page no.	Date of amendme nt	Details of theamendme nt	Reaso ns	Signatureof thereviewi ng authority	Signatureoftheappro val authority

CONTROL OF THE DOCUMENT

The holder of the copy of this manual is responsible for maintaining it in good and safe condition and in a readily identifiable and retrievable form.

The holder of the copy of this manual shall maintain it in current status by inserting latest amendments as and when the amended versions are received.

The Manual is reviewed atleast once a year (or in between SOS if so required) and is updated as relevant to the Hospital policies and procedures.


The Authority over control of this manual is as follow:



Prepared By	Approved By	Issued By
Name: Designation : HOD /Dept. In charge Signature:	Medical Superintendent Name: Signature:	Quality – Nodal Officer Name: Signature:

The Original Procedure Manual with Signatures on the Title page is considered as **"Master Copy"**, and the photocopies of the master copy for the distribution are considered as **"Controlled Copy"**.

Distribution List of the Manual

Sr. No.	Officials	Signature of Officials receiving copy

	<p>institute/department/ equipment & personnel handling these equipment shall be done & maintained.</p> <p>b) Daily & monthly reporting on relevant formats to competent authority shall be done.</p> <p>c) All mandated relevant displays and signage shall be maintained as per PCPNDT guidelines.</p>		
2.	Signages	RSO/ PNDT Nodal Officer	
2.1	<p>Statutory Signages: All safety & statutory signages & displays as per AERB & PCPNDT guidelines shall be placed inside/outside all equipment rooms (as per guidelines).</p> <p>The displays shall be in languages & formats as per guidelines.</p> <p>For PCPNDT, copy of registration certificates & display regarding non declaration of sex of fetus in prescribed format, shall be done in every room where USG/ ECHO equipment is installed.</p> 	HOD	
2.2	<p>Informative signage – At the minimum following information signages shall be displayed (using appropriate languages, font sizes & format) at eye level. The signage shall be static & permanent (i.e., no standees, posters, running scripts):</p> <p>a) Services provided with room numbers.</p> <p>b) Timings</p> <p>c) Directions</p> <p>d) Safety related education signages</p> <p>X Ray rooms – as (2.1)& (2.3)</p> <p>US/Echo – as above (2.1)</p>		
2.3	<p>Safety signage – Radiation safety</p> <p>Radiations safety signages: Safety signage should be as recommended by AERB including restrictions of patient/attendant entry, hazard lights and pictorial signages appropriate for radiology services (Example picture given) outside of the radiation</p>		

	<p>rooms.</p> <p>At the minimum, following signage shall be used outside all rooms where X ray, fluro, CT equipments are installed.</p> <div style="display: flex; align-items: center; justify-content: center;">  and  </div> <p>MRI safety : Pictorial signages regarding absolute contra indications to MRI. MRI Pictorial display regarding absolute contraindications to MRI & warnings regarding hazards associated with metallic objects in MRI room.</p>		
2.4	<p>Display of telephone numbers to be contacted for respective safety codes e.g., code blue/code red/code violet in all rooms where I/V contrast is given.</p>		
3	<p>Equipment</p>	<p>HOD/Senior Technician In charge</p>	
	<p>3.1 Procurement & installation of equipments shall be as per government rules.</p> <p>3.2 Operation of equipment shall be by appropriate personnel qualified & trained for the specific jobs</p> <p>3.3 Daily calibration shall be performed by the operator technician at the time of switching on in the morning.</p> <p>3.4 Daily cleaning of cleanable parts of the equipment shall be ensured by the operator at the time of switching off.</p> <p>3.5 Periodic maintenance (preventive) & periodic calibration & QA shall be done by the service engineers from the AMC/CMC provider. The records shall be maintained by the Technical In charge.</p> <p>3.6 Department shall maintain an equipment log book with information regarding all equipment under the following categories:</p> <p>a) Main Imaging Equipment - e.g., X ray, US, CT, MRI machines, injectors, Boyles apparatus</p>		

	<p>b) Each unit shall be identifiable with a traceability number as reflected on the unit & in the log book.</p> <p>3.7 All equipment shall have dedicated history sheet where details regarding purchase, operation, functionality, maintenance & breakdown shall be maintained.</p> <p>3.8 Inventory of all accessory and ancillary equipment.</p>		
4	Staff/Personnel	HOD	
	<p>4.1 Availability of appropriately qualified and trained staffs as per the scope of services.</p> <p>4.2 Availability, job descriptions, rosters, leave records etc shall be ensured as per government guidelines/rules.</p> <p>4.3 Appropriate numbers and mix of the following staffs shall be available to provide patients services for routine & emergency imaging.</p> <p>a) Radiologists – Consultants & Resident doctors</p> <p>b) Technical Staff</p> <p>c) Nursing staff</p> <p>d) Ancillary staff</p> <p>e) Data Entry Operator</p> <p>4.4 Nursing staff may be required in the department, where contrast injections/sedation/invasive procedures are being carried out.</p> <p>4.5 All Staff shall be trained on respective core activity & work under supervision during induction period (1 week).</p> <p>4.6 Training of all staff shall also be periodically done for the following at the minimum:</p> <p>i. BLS</p> <p>ii. BMW waste rules</p> <p>iii. Radiation safety</p> <p>iv. Infection control practices</p>		
5	Materials	HOD/Technician I/C of store	
	<p>5.1 Consumables and non consumable materials required in the department shall be listed in a log book e.g., -</p>		

	<p>Consumables – Films, contrast media, signages, saline, injectors etc.</p> <p>Non Consumables – Protective devices (lead aprons), cassettes, screens, grids etc</p> <p>5.2 The procurement shall be as per government rules.</p> <p>5.3 Storage shall be in safe place with appropriate environment control.</p> <p>5.4 Appropriate stock & inventory shall be maintained to prevent stock outs, overstocking of slow moving items & expiry of items without utilization. Good inventory practices like Vital, Essential, Desirable (VED), First Expiry First Out (FEFO), ABC* etc shall be used.</p> <p>5.5 Record of issuing & consumption shall be maintained & periodically sent to appropriate authority.</p> <p>5.6 All instances of stock outs/non-moving stocks/expired stock shall be logged & analysed. It shall be reported to appropriate authority & Corrective and Preventive Action (CAPA) shall be suggested.</p>		
6	Drugs & Medication		
	<p>6.1 Medication shall include the following:</p> <ul style="list-style-type: none"> a) Contrast media – I/V – nonionic/ionic b) Contrast media – oral c) MR contrast media – I/V d) Medicines for patients preparation e.g., buscopan, Lasix, betablockers, GTN etc e) Medication for resuscitation in crash cart/ Emergency Tray f) Medicines for sedation/anesthesia g) Gases – piped gases, oxygen cylinders/nitrous oxide cylinder <p>6.2 Procurement shall be as per government rules</p> <p>6.3 Storage shall be in safe place with appropriate environment control.</p> <p>Appropriate stock & inventory shall be maintained to prevent, stock outs, overstocking of slow moving items & expiry of items without utilization. Good inventory practices like Vital,</p>	Staff nurse/Technician	

	<p>Essential, Desirable (VED), First Expiry First Out (FEFO), ABC* etc shall be used.</p> <p>6.4 Record of issuing & consumption shall be maintained & periodically sent to appropriate authority.</p> <p>6.5 All instances of stock outs/non-moving stocks/expired stock shall be logged & analysed. It shall be reported to appropriate authority & CAPA shall be suggested.</p>		
7	Patient workflow protocol		
	<p>Arrival of patient in radiology department:</p> <p>7.1 A central reception/help desk will register/schedule the patient for imaging as per the request form.</p> <p>7.2 Transport of patient from OPD/ IPD shall be the responsibility of the sender department.</p> <p>7.3 One trolley & wheel chair shall be available in the department to shift a critical patient to ICU/ward, in case of an adverse event.</p> <p>7.4 Central reception/help desk shall be responsible for providing the following information the to the patients –</p> <ol style="list-style-type: none"> Date & time of imaging Preparation like NPO, full bladder etc. List of items like towel/water bottle etc to be brought. Any patient coming for imaging requiring contrast injection/sedation/intervention shall be instructed to be accompanied by a responsible adult/next of kin. Case of queries regarding routine medication shall be addressed by/referred to available radiologist/doctor in the department. Method and time for collection of report 	Deptt. Staff/ Technician	
8	Appropriateness/justification:	Radiologist	
	<p>8.1 All imaging request forms will be duly filled by the referring clinician, with appropriate indication & clinical details, details of previous imaging, provisional diagnosis, current clinical questions (if relevant)</p> <p>8.2 These details shall be verified by a radiologists before scheduling the study.</p>		

	<p>8.3 Current best practices, availability of equipment and patient safety shall be kept in mind while choosing the appropriate imaging for a particular clinical situation.</p> <p>8.4 In case the imaging request is found unjustified/unsafe/unavailable, further clarification shall be sought from the referring doctor before accepting it.</p> <p>8.5 The above shall be re-verified on the day of imaging by the radiologist on duty at respective imaging stations.</p>		
9	Scheduling		
	<p>9.1 Scheduling shall be done on first come first scheduled basis taking into account the capability of the imaging services.</p> <p>9.2 Priority slots shall be kept for Emergent and Urgent studies, Indoor patients, Intensive care patients.</p> <p>9.3 Pediatric patients, senior citizens, other vulnerable patients, and patients on certain medication (e.g., Diabetics) shall be prioritized on the day of study by the operator in-charge.</p>		
10	Patient Information	Staff nurse/technician	
	<p>10.1 Instructions regarding NPO/ Full Bladder etc. Accompanying person shall be given in writing, at the time of scheduling</p> <p>10.2 All the details of the procedure will be explained to the patient by the staff nurse or technician.</p> <p>10.3 Prior to imaging radiologist shall confirm that informed consent has been taken.</p> <p>10.4 Information about report collection shall be given at the time of imaging. Help desk reception also shall be empowered to provide the information.</p> <p>10.5 Follow up imaging advice shall be provided by the radiologist verbally/documented in the report.</p>		
11	Informed Consent	Sister/Technician	
	11.1 Where there is contrast injection/sedation/invasive procedure, a		

	<p>formal Informed consent will be documented.</p> <p>11.2 The Consent will document the indications, benefits, risks and possible alternatives to the proposed procedure.</p> <p>11.3 It will be signed and dated by the Radiologist, Patient/guardian and an impartial witness.</p> <p>11.4 Pre entry risk assessment checklist can be included in the consent format.</p>		
12	Pre-entry safety check/risk assessment:		
	<p>12.1 For X-ray/plain CT , last menstrual period (LMP) shall be ascertained, and documented, wherever appropriate to ensure that unnecessary radiation exposure is not given to pregnant women.</p> <p>12.2 For contrast injection, a check list containing history of allergy, HT, DM, renal disease, cardiac disease, asthma, must be checked & documented; preferably as a part of consent. Recent Serum creatinine levels shall be documented to screen for renal dysfunction.</p> <p>12.3 For MRI a checklist containing risk of pace maker, magnetic material i.e., any operative iatrogenic implants (cochlea implant, orthopedic implant, aneurysm clip etc) must be checked & documented.</p> <p>12.4 For invasive/intervention procedures INR must be checked & documented in addition to risk of contrast, as part of consent.</p> <p>12.5 Separate consent shall be taken for sedation.</p>		
13	Patient Identification		
	<p>13.1 Correct patient must be identified for correct procedure at the time of performing the procedure, compiling the report and during dispatch of report. At least two identifiers shall be used to identify correct patient, one of which shall be UHID number.</p> <p>13.2 At the time of imaging , correct patient for correct imaging of correct side/site shall be ensured by the technician/radiologist performing the imaging.</p> <p>13.3 All images will be appropriately labeled for</p>	<p>Technician/Radiologist/ Nurse</p> <p>Radiologist/technician</p>	

	<p>patient ID, side marker & date of examination.</p> <p>13.4 At the time of compiling the report, patient ID shall be verified by the radiologist on the envelope, request form, imaging films & reports.</p> <p>13.5 At the time of report dispatch, the technician/dispatch desk person shall ensure correct report for correct patient by using at least 2 identifiers.</p>		
14	Patient preparation:		
	<p>14.1 Removal of metallic artifacts, change of clothing, wherever required.</p> <p>14.2 For ultrasound, change of clothing, filling or emptying of bladder wherever required.</p> <p>14.3 For CT, change of clothing, removal of metallic articles wherever required.</p> <p>14.4 For MRI, change of clothing, removal of metallic, magnetizable artifacts.</p> <p>14.5 Oral contrast water/air, rectal contrast/water/air, IV line wherever appropriate</p>	Nurse/technician	
15	Performance of the procedure:		
	<p>15.1 Procedure for taking plain X ray</p> <p>a) For most x-ray examinations(except x-ray of abdomen& spine) no special preparation is required.</p> <p>b) As with most other imaging procedures, jewelry and other metallic articles should be removed and handed over to the accompanying person.</p> <p>c) Patient is appropriately positioned and asked to hold breath/ be still while film is exposed.</p>		
	<p>15.2 Performing Barium studies</p> <p>a) NPO</p> <p>b) Preparation as advised at the time of booking depending on area to be examined.</p> <p>c) Change of clothes and removal of metallic articles/jewelry.</p> <p>d) Administration of barium suspension as</p>	Technician/Radiologist/ Reporting Nurse	

	<p>appropriate to examination.</p> <p>e) Patient appropriately positioned & images taken, keeping ALARA principle in mind.</p>		
	<p>15.3 Performing Urographic examinations</p> <p>a), b) & c) as above.</p> <p>d) informed consent as above of no.11</p> <p>e) IV line cannulation for injection of appropriate amount of contrast.</p> <p>f) Patient appropriately positioned & images taken, keeping ALARA principle in mind.</p>	<p>Technician/Radiologist/ Reporting Nurse</p>	
	<p>15.4 Performing USG/Doppler</p> <p>a) Patient arrives as scheduled with full bladder for pelvic area and NPO for abdominal examination.</p> <p>b) Radiologist performs the scan using appropriate transducer with assistance of staff nurse.</p> <p>c) Observations recorded and report generated by Radiologist.</p>	<p>Radiologist/Nurse</p>	
	<p>15.5 Performing CT Scan</p> <p>a) Patient arrives as scheduled with requisition form & preadvised preparation.</p> <p>b) Can be contrast or non contrast examination</p> <p>c) For contrast examination-informed consent as above</p> <p>d) All metallic objects removed from area of interest.</p> <p>e) Patient positioned for area to be examined</p> <p>f) IV contrast is injected in appropriate quantity.</p> <p>g) Scanning is to be done choosing appropriate protocol as per indication</p> <p>h) Post processing of acquired images.</p> <p>i) Filming in soft tissue, lung, bone window as appropriate in minimum of films in all requisite information.</p> <p>j) Reporting by Radiologist.</p>	<p>Technician/Radiologist/ Reporting Nurse</p>	

	<p>15.6 Performing MRI Scan</p> <p>a), b)& c) same as CT Scan</p> <p>d)contraindications to be checked</p> <p>e) Patient positioned for area to be examined.</p> <p>f) IV contrast if required</p> <p>g) Post contrast acquisition.</p> <p>h) Post processing if required.</p> <p>i) Filming of required sequences</p> <p>j) Reporting by Radiologist.</p>	Technician	
	<p>15.7 Performing interventions</p> <p>a) Ensure availability of attendant /referring doctor</p> <p>b) Proper procedure risk assessment & investigation as appropriate (BT/CT/INR etc)</p> <p>c) All aseptic precautions to be taken</p> <p>d) Universal precaution to be followed all the time</p> <p>e) Done under USG/Fluoro/CT guidance</p> <p>f) Proper labeling and identification of sample</p> <p>g) Appropriate dispatch of collected samples to be ensured by sister/radiologist to referring department/concerned lab.</p> <p>h) Patient to be monitored post procedure as required.</p> <p>i) Inform patient regarding report collection</p>		
16	Radiation protection:		
	<p>16.1 AERB guidelines and ALARA principle will be followed for all radiation exposures</p> <p>16.2 Patient Protection: Appropriate imaging, ascertaining pregnancy status of female patients, use of gonadal covers/lead shields wherever appropriate, use of low dose exposures, especially for children.</p> <p>16.3 Staff protection: Appropriate rosters/rotation of technical staff from radiation to non-radiation areas. Provision of radiation protection barriers/ lead apron/ thyroid shield, lead goggles/ gonadal shields wherever appropriate.</p>	<p>Technician/Radiologist</p> <p>Technician & RSO</p>	

	<p>Provision of TLD badges for monitoring of radiation exposures.</p> <p>Radiation workers shall mandatorily be wearing the TLD badges during working hours.</p> <p>16.4 Leakage surveys of installation sites of all radiation equipment to ensure that staff, patient & visitors to the department are protected. Entry to radiation rooms shall be restricted by suitable signages and red light. Attendants assisting the patient shall be preferably males. Female attendants shall be screened for pregnancy status.</p>		
17	Processing films/ images		
	<p>17.1 After exposure and completion of procedure, films will be processed by the available methods.</p> <p>Wet processing is discouraged. If still in use, the technician/ dark room assistant will ensure availability of required solutions at appropriate concentration & temperature, every day. Maintenance of automatic processor.</p> <p>17.2 Dry view /laser/computer methods of image processing are preferred. The choice will depend on the daily throughputs.</p> <p>17.3 The images will be checked for quality, patient identity, and urgency of reporting, at the time of compiling them for reporting in respective envelopes.</p> <p>17.4 The technician in charge shall ensure that these envelopes shall reach the reporting station in separate piles for 'urgent' & 'routine'.</p> <p>17.5 Processing of CT/MRI images shall be done by the radiologist to ensure that all findings and regions are represented on the films with appropriate annotations wherever necessary.</p>		
18	Report compilation:	Radiologist	
	18.1 Radiologist will ensure compilation of an 'in		

	<p>context' report taking into consideration the clinical details provided by the referring clinicians.</p> <p>18.2 Patient identity will be checked by the radiologist while compiling the report.</p> <p>18.3 Quality of X ray/ other images will be ensured to be of diagnostic value. Repeat scans will be ordered if deemed necessary.</p> <p>18.4 The timeline of reporting will be adhered to, as per the defined turn around time by the department.</p> <p>18.5 Turn around time for the report: The department/hospitals shall be required to define the turn around time of the radiology reports in two categories for each modalities –</p> <ul style="list-style-type: none"> a) Routine report (not more than 48 hours) b) Urgent (not more than 6 hours) <p>Emergency report will also be intimated to the treating physician verbally/telephonically.</p> <p>18.6 The contents of the report shall include the following, at the minimum--</p> <ul style="list-style-type: none"> a) Patient identification b) Type of study, region, projection c) Whether any I/V contrast/oral contrast given. Please indicate the name, dose, rate of contrast & whether any adverse events (AE) occurred. d) Details of any medical preparation/sedation, if given. e) Salient findings (positive & negative) f) Provisional diagnosis g) Differential diagnosis h) Follow up advice, if any. 		
19	Dispatch of report/ Handover	Staff/Technician	
	<p>19.1 The department will ensure separate dispatch of report for emergency, OPD and IPD patients.</p> <p>19.2 The patient/accompanying person shall be informed at the time of imaging, how, when & from where the dispatch of report will be</p>		

	<p>done</p> <p>19.3 For IPD patients, the departmental orderly will personally collect/dispatch the report For OPD patient, the dispatch will be done from a common dispatch center in the department.</p> <p>19.4 For ER patients the orderly from Radiology department shall personally deliver/collect the report.</p> <p>19.5 At the time of dispatch, it shall be ensured by checking patient identifiers that correct report is handed over to the correct patient.</p>		
20	<p>Maintenance of records</p> <p>20.1 All the departmental records shall be classified as under:</p> <ul style="list-style-type: none"> a) Office Files b) Leave records c) Equipment records d) Monitoring records e) Material & consumable records f) patient workload related data g) Records pertaining to patients (e.g., request forms, consent forms, reports and images (hard/soft copies) h) Others/miscellaneous <p>20.2 Records pertaining to patients shall be stored in retrievable conditions for at least 2 years.</p> <p>20.3 MLC records shall be in a separate cupboard under lock & key as per rules (in department/MRD section).</p> <p>20.4 All other office / maintenance records shall be retained as per GNCTD rules.</p> <p>20.5 Department will ensure that blank forms & format for reporting are available in the department.</p>	Technician / office staff	
21	<p>Codes</p>	HoD	
	<p>Display of contact number (rescue number) for all relevant codes.</p> <p>Code Blue: All staff in Radiology department</p>		

	<p>shall be trained on CPR at least 6 monthly. Doctors (radiologists shall be BLS/ACLS trained). Liaison with the hospitals code blue team shall be done for smooth rescue. Code blue teams shall be made. Mock drills shall be carried out at least 6 monthly to ensure compliance.</p> <p>Code Red & code violet: Desirable</p>		
22	Inventory Control	Technician/Store keeper	
	<p>22.1 Departmental inventory of material shall be maintained by the store In charge or technician incharge.</p> <p>The following shall be defined for each items</p> <ol style="list-style-type: none"> a) Buffer stock b) Reorder level <p>22.2 Issue register shall be maintained & kept up to date</p> <p>All instance of stock outs/ non moving stock/expired unused stock shall be logged & analysed in departmental committee for appropriate CAPA.</p>		
23	Equipment maintenance– repair & downtime management	PMS/Technician/Radiologist	
	<p>23.1 Downtime of equipment clause shall be incorporated in every equipment maintenance contract</p> <p>23.2 Contingency plan for downtime of each equipment shall be documented. It will ensure uninterrupted patient service.</p> <p>23.3 Periodic preventive maintenance calendar for all equipment shall be available along with contact details of each vendor.</p> <p>23.4 Response time for complaints shall be monitored for each equipment.</p> <p>23.5 Timely renewal of maintenance contract & statutory compliance shall be ensured.</p>		
24	Day to day working of the department	HOD Radiology	
	HoD shall ensure the following (at minimum) for smooth day to day functioning of the department		

	<ul style="list-style-type: none">a) Rostersb) Leave Recordsc) Grievance handlingd) Disciplinary proceduree) Facility Managementf) Housekeepingg) The HoD will take daily/weekly, scheduled and unscheduled rounds to ensure good facility management & housekeeping		
--	---	--	--

* ABC analysis divides an inventory into three categories- "A items" with very tight control and accurate records, "B items" with less tightly controlled and good records, and "C items" with the simplest controls possible and minimal records.

दिल्ली सरकार

आप की सरकार

Department of Health & Family Welfare, GNCTD