Chapter XII

SUPPORTIVE AND UTILITY SERVICES

In a hospital, large number of supportive services play a very crucial part in the management of patient care. These are the diagnostic services like Radiodiagnosis and Clinical Pathology Services, other supportive services like Central Sterile Supply Services, Dietary Services, Linen and Laundry Services, Pharmacy Services, Blood Bank, Operation Theatres, Labour Room Services, Workshop, Fire fighting, Environmental Control etc. Due to limitation of time only some of the important services have been selected for the study. These are Laboratory Services, Radiology Services, Dietary Services, Central Sterile Supply Department and Linen and Laundry Services.

1. LABORATORY SERVICES

1. Introduction

The role of laboratory in health services by facilitating accurate diagnosis leading to effective therapy of sick patients has long been recognised. Through the techniques of laboratory medicine, it is possible to arrive at precise diagnosis in a short time which helps in reducing the period of morbidity and hospitalisation. Thus reduction
in the overall cost of treatment is also achieved. Diseases such as cancer and tuberculosis can be diagnosed much earlier with the help of the laboratory.\textsuperscript{1} This leads to more efficient utilization of the limited resources like hospital beds. It also helps in quality control of the professional care and physicians can measure and improve their clinical performances. These benefits are influencing almost all the medical personnel to demand for more and more sophisticated and advanced laboratory techniques in most of the large teaching hospitals. This increasing demand for laboratory services has led to tremendous progress in the laboratory medicine in the recent past.

Medical education also emphasises on modern laboratory techniques. Today the pattern of laboratory services in basically large hospitals are:

a) Routine outpatient services.

b) Ward services.

c) Emergency services, which could be the following:

i) 24 hours service.

ii) Restricted service.

a) **Routine OPD Services**

With the increasing awareness in the health care measures, the utilization of health care delivery system is tremendously increasing day by day. The increased attendance in the outpatient clinics in a general hospital is demanding more and more diagnostic services to facilitate the diagnosis and treatment for ambulatory patients.

b) **Ward Services**

The laboratory services for the admitted patients are centralised in the department of laboratory. These days, bedside clinical tests of routine haemogram, urine and stool examination, is not practiced. But in some hospitals, routine urine test for the presence of albumin and sugar is still being carried out by the nursing staff in the ward itself.

c) **Emergency Services**

Two types of emergency services are provided depending on the functional requirement of the hospital. Even though 24 hours of emergency services in 3 shifts should be provided in every large hospital the paucity of staff sometimes may restrict the functioning of the laboratory to only two shifts excluding Sundays and holidays.
In the Safdarjang Hospital, the laboratory service is provided by four main departments. These are the following:

1) Histopathology.
2) Biochemistry.
3) Microbiology.
4) Clinical Pathology.

The Biochemistry, Histopathology and Microbiology departments are located in a four storied building popularly known as 'CSR' (Central Sterile Room) block. The ground floor, the first floor and second floor of this building are occupied by the linen and laundry department, the CSSD and the blood bank respectively. The third floor accommodates all these three divisions of laboratory. The clinical pathology department is housed in a separate building near the main gate on Aurobindo Marg.

Due to limitation of time, only the clinical pathology Department which is most commonly used for general diagnosis of the cases, was studied in detail with the following aspects:

1) Physical set-up and working of the Department which facilitate the necessary laboratory investigations.
2) The existing staffing pattern of each unit of the Department.
3) The equipment necessary for conducting the tests.
4) The pattern and quantity of workload of the Clinical Pathology Department.
5) Training programme/courses conducted by the Department.

2. Physical Set-Up of the Department

Physical set up along with the physical facilities were studied through direct observation and by consultation with the persons incharge of all the sections. The basic screening department in the field of medicine is the Clinical Pathology. Clinical Pathology includes the following branches:

1) Hematology including immunology and serology,
2) Blood Banking-storage and transfusion services.
3) Clinical Biochemistry.
4) Parasitology including Immunology.
5) Cytodiagnosis-of all exudates and transudates.
6) Urinalysis.

However, the Clinical Pathology Department in the Safdarjang Hospital is doing part of clinical pathology investigations. These are:

1) Routine Hematology including Immunology.
2) Clinical urinalysis.
3) Clinical parasitology.
4) Cytodiagnosis (C.S.F. examination only).

This Department is situated in a single storeyed building. This whole building consists of a laboratory wing and an administrative wing. All the rooms where the laboratory investigations are carried out, are located in the laboratory wing. The laboratory wing consists of the following sections:

1) Immunology.
2) Special Haematology section.
3) Routine Haematology section.
4) Urine and stool examination section.
5) Emergency laboratory section.
6) Central Collection centre separated from the laboratory wing by a corridor.
7) Medical officer and residents room.
8) Enclosed corridor.

The eastern part of the building is known as administrative wing of the Department. The administrative head of this Department is a senior pathologist who is directly responsible to the Medical Superintendent of the hospital. The office of the head of the Department, the pathologist's room, store and the room for the secretarial
staff occupy the administrative wing. There is a wooden partition in the common corridor between the laboratory and administrative wings.

The administrative portion of the corridor is used as waiting room for the patients who need to consult the pathologist and another portion of the corridor in the laboratory wing is utilised as collection centre for urine and stool specimens. There are windows at this portion which function as counters. In the evening the reports are also distributed through one of these windows to the outpatients. There are two points of entry and exit one in the administrative wing facing the room of the pathologist and the other leading to the room of the emergency laboratory section. The corridor facing the emergency section of the laboratory extends upto the out-patient department of the hospital, and connects this laboratory to the OPDs of Medicine, Eye, ENT, Gynaecology, maternity and Pediatrics and makes it accessible to all the patients easily. The physical layout of this Department is given in Fig.18.

**Covered Area**

The total area of the building occupied by the laboratory services and the administrative services is 4889.51 sq.meters. This includes an area of 85.00 sq. meters
Fig. 18
LAYOUT PLAN OF CLINICAL PATHOLOGY DEPARTMENT

LEGEND:

ROOM NO 1 = EMERGENCY LABORATORY

ROOM NO 2 = PATHOLOGIST'S OFFICE

2 = URINALYSIS & STOOL EXAM.

3 = RESIDENTS' ROOM

4 = BLOOD PROCESSING ROOM

5 = SLIDE STAINING ROOM

6 = ROUTINE HAEMATOLOGY

7 = SPECIAL HAEMATOLOGY

8 = DARK ROOM

9 = MEDICAL OFFICER'S ROOM

10 = P.G. LAB. & IMMUNOLOGY

11 = ADMINISTRATIVE STAFF

12 = ADMINISTRATIVE STAFF

13 = STORE KEEPER

14 = STORE

15 = STORE

16 = ADMINISTRATIVE STAFF

17 = WASH BASIN (NO ROOF)

D = DOOR

T = TOILET

W = WINDOW
of the Central Collection Centre which is separated from main building complex by a corridor.

The area occupied by the administrative portion is 89.36 sq. meters. The pathologist occupies the room in between the administrative block and the laboratory block between the administrative block and the laboratory block which enables him to supervise the whole department effectively.

The laboratory service area occupies the major portion of the building covering 400.15 sq. meters. The area occupied by each of the sections of the laboratory service is given in Table No.54.

**Table 54**

*Servicewise Distribution Of Area In The Laboratory*

<table>
<thead>
<tr>
<th>SI. No.</th>
<th>Name of the Section</th>
<th>Area in Sq.Mt.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Emergency laboratory room</td>
<td>22.80</td>
</tr>
<tr>
<td>2</td>
<td>Urine and stool examination room</td>
<td>22.80</td>
</tr>
<tr>
<td>3</td>
<td>Resident's room</td>
<td>14.25</td>
</tr>
<tr>
<td>4</td>
<td>Blood processing room for specimens from wards</td>
<td>22.10</td>
</tr>
<tr>
<td>5</td>
<td>Routine haematology room</td>
<td>34.20</td>
</tr>
<tr>
<td>6</td>
<td>Blood slides staining room</td>
<td>17.25</td>
</tr>
<tr>
<td>7</td>
<td>Dark room</td>
<td>8.70</td>
</tr>
</tbody>
</table>

Contd ....
8. Special haematology room 31.25
9. Medical officer's room 14.25
10. Immunology and P.G.Lab. 22.80
11. Central collection centre 85.00
   (Blood specimens from OPD cases)
12. Enclosed corridor with arrangement 104.65
    for urine and stool collection centre etc.

**TOTAL AREA** 400.15

The building is naturally ventilated. During summer days to beat the extreme heat, room coolers are provided in each room. The room of the head of the Department is air conditioned. There is adequate lighting arrangement. There is continuous running water supply to the Department. Each section is adequately furnished as per the requirement.

3. **Working Routine**

The department has prepared its own departmental working routine on the line of hospital policy. Like any other department in the hospital this Department also functions five full days in a week and half day on Saturdays. The head of the Department is responsible for the administration and duty assignments etc. for the whole department. The senior most technician has been given the responsibility for preparing the duty roster for all the technical staff. However, the roster for the medical officers is prepared by the head of the Department.
Recording of each investigation is done in each section in separate registers. Monthly statistics are maintained in each section which are combined together and statistics for the whole department are prepared by the clerk under the supervision of the head of the Department. The format in which the statistics are maintained, is as follows:

<table>
<thead>
<tr>
<th>Section</th>
<th>OPD</th>
<th>Ward</th>
<th>CGHS</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Clinical pathological</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>laboratory-central services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Emergency clinical pathology services</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Working Hours

The working hours of this Department are from 9.00 am to 4.00 pm with a lunch break of 30 minutes. duration from 1.00 to 1.30 pm except on Saturdays. On Saturday it works only upto 1.00 pm. Registration and collection of samples in the Central Collection unit and at the center for urine and stool specimens is done on the following days:

From Monday to Friday: 9.00 - 11.00 am (For OPD patients)
9.00 - 11.30 am (For all inpatients)

On Saturday: 9.00 - 10.30 am (For OPD patients)
9.00 - 11.00 am (For all inpatients)
4. Working Procedure and Flow of Service

The department activities start with the assembling and checking of instruments, equipment, reagents, laboratory forms, registers etc. The sterilized instruments like syringes, tests-tubes etc. and materials are received from the Central Sterile Supply Department of the hospital on exchange basis. The first 10-15 minutes of the day are devoted to this type of preparation for the day's work. The working procedures and flow of the services include the following stages:

a) Specimen collection

Specimens from OPD patients and from admitted patients are collected separately by two different methods. The Central Collection Unit is established for the purpose of collecting blood samples of outpatient cases. A room used for this purpose is divided into two sections, one for registration and the other for collection, by a partition. The entry is from one and exit from the other. Patients enter the left hand side section and go straight to the registration counter. As a number of patients come at the same time, they stand in a queue in front of the counter. Each one, being registered, enter the collection section where blood samples are drawn by the technicians.
There are four laboratory technicians on duty who draw venous blood and capillary blood as required, label and process the blood samples and record in OPD tickets. The different samples with forms are sent to the respective laboratory sections by the attendants. The urine and stool specimens of the OPD patients and from the wards are collected in the counter of the enclosed corridor located near the urine and stool examination section. The layout of the Central Collection Centre is given in Fig.19.

The blood specimens from the ward are collected by the medical officers and are sent by the nurses on duty to the laboratory through a nursing orderly or aya. Empty specimen bottles are collected from the Laboratory according to their requirement. There is a separate blood processing room for the ward specimens in the Laboratory. The different specimens are sent to their respective working tables through the lab attendants.

(b) Laboratory Investigations

The technicians in charge of the specified duties receive the specimens and check the samples for identification. The arrangement and adjustment of microscopes, mixing of other reagent fluids are performed as required.
CENTRAL COLLECTION CENTRE

OPD WARDS

CORRIDOR

'Q' FOR REGISTRATION

WAITING FOR GIVING BLOOD

CORRIDOR

EMERGENCY

LABORATORY

FIG: No. 19
Preparation of slides and specified standard observations involved in a particular procedure are performed. Findings, microscopic or otherwise are performed. Findings, microscopic or otherwise are calculated and entered in the laboratory forms. Certain investigation like ESR and PCV taken up in batches are also carried out by those technicians who return to laboratory sections after performing the duties in the Central Collection Centre till 11.30 am. The details of the already completed investigations are also entered by them in the respective registers.

The laboratory forms duly filled with the results are submitted to the medical officers/pathologists on duty in the Laboratory for verification and counter signatures. A list of all the investigations carried in this department is given at Annexure XIII.

(c) Registration and Reporting

All cases from OPD are registered in the Registration Counter of laboratory before any investigation is done. The details of the patient are entered by the registration clerk and a report form along with the appropriate vial for collection of specimen is issued to each patient. After the investigations are done in the Laboratory the counter signed reports are sent back to the Registration Counter. The
person on duty separates the OPD reports from the reports of the ward patients. The ward reports are sent back to the respective wards on the same day and the OPD reports may also be collected by the patient on the same day from this Registration Counter between 3.30 pm to 4.00 pm, otherwise these are sent back to the next OPD day through messenger/attendants of the laboratory.

5. The Existing Staffing Pattern

The Head of the Clinical Pathology Department is a senior specialist of pathology in Grade I. A senior medical officer is also posted in the department alongwith one senior and one junior resident. They perform some special investigations themselves. These are like:

1. Peripheral bloodsmear examination.
2. Reticulocyte count.
3. Australia Antigen.
4. Bone marrow examination etc.

The pathologist is overall incharge of the supervision, staff control and functioning of the department. The laboratory reports are always countersigned by a medical office. The senior medical officer posted in the department assists the pathologist in supervision of the day to day functioning of department.
There are 19 laboratory technicians including 2 senior technicians, 4 nursing orderlies and 3 safaiwalas posted in this department. The assignment of these staff to various sections and to cover emergency section in evening and night shifts is done by the pathologist. Each of the evening shift i.e. from 2.00 pm to 8.00 pm and the night shift from 8.00 pm to 8.00 am is covered by one technician and one laboratory or nursing attendant. All these staff are assigned emergency duties on rotation basis. The details of the sectionwise distribution of these existing staff are given below:

1. Central Collection Centre

   a) Laboratory Technicians 4
   b) Laboratory Assistant 1
   c) Nursing Orderlies 2
   d) Laboratory Attendant 1
   e) Safaiwala 1

2. Routine Haematology Section

   a) Sr. Laboratory Technician 1
   b) Laboratory Technicians 4
   c) Laboratory Assistants 3
   d) Laboratory Attendant 1
   e) Safaiwala 1
   f) Malaria Technician 1
3. Urine and Stool Examination Section
   a) Laboratory Technicians 2
   b) Laboratory Attendant 1
   c) Safaiwala 1

4. Special Haematology Section
   a) Laboratory Technician 1

5. Immunology and PC Lab.
   a) Senior Laboratory Technician 1
   b) Laboratory Technician 1

6. Emergency Laboratory Section
   a) Laboratory Technicians 4
   b) Laboratory Attendant 1
   c) Nursing Orderly 1

7. Administrative Section
   a) Stenographer 1
   b) Lower Division Clerk 1
   c) Laboratory Technician (Store Keeper) 1

Placement of these staff is not rigidly fixed. They are changed if required. Particularly for emergency duties, for
covering evening and night shift all the staff are assigned in rotation.

6. The Equipment

Equipment provided for the different sections are generally of conventional types. The equipments and instruments are available in adequate supply. A list of important instruments provided to this department is given in Table No.55.

Table 55
List of Instruments

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of Instruments</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Autoclave</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Binocular Microscope</td>
<td>13</td>
</tr>
<tr>
<td>3.</td>
<td>Centrifuge Machine</td>
<td>13</td>
</tr>
<tr>
<td>4.</td>
<td>Colorimeter</td>
<td>13</td>
</tr>
<tr>
<td>5.</td>
<td>Densitometer</td>
<td>4</td>
</tr>
<tr>
<td>6.</td>
<td>Eystone</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Haemoglobinometer sytronics</td>
<td>1</td>
</tr>
<tr>
<td>8.</td>
<td>Hotair oven</td>
<td>1</td>
</tr>
<tr>
<td>9.</td>
<td>Incubator</td>
<td>2</td>
</tr>
<tr>
<td>10.</td>
<td>Monocular microscope</td>
<td>10</td>
</tr>
<tr>
<td>11.</td>
<td>Electronic Balance</td>
<td>2</td>
</tr>
<tr>
<td>12.</td>
<td>Reflomats</td>
<td>1</td>
</tr>
</tbody>
</table>

Contd ....
The special instruments are provided to each section at a time according to its requirement. It was found out from each section incharge and is as follows:

1) In urine stool section
   - Microscope: 2
   - Centrifuse: 2
   - Water: 1

2) In Haematology section
   - Microscope: 4
   - Centrifuse: 1
   - Haemoglobinometer Systronic: 1
3) **In Immunology section**

- Electro Phorise: 2
- PH Meter: 1
- Denisometer: 1
- Electronic Balance: 1
- Double Distillation Plant: 1
- Microscope: 1

Reagents are prepared by the technicians in charge of each section under the supervision of the pathologist.

7. **The Pattern and Quality of Workload**

The Clinical Pathology Department caters to the need of all the OPD cases, all the ward cases and CGHS beneficiaries. Besides accepting the samples from referred cases attending the CGHS wing in the Safdarjang Hospital, the samples from the following CGHS dispensaries are also accepted for investigations:

1. Netaji Nagar Dispensary.
2. Nauroji Nagar Dispensary.
3. Hauz Khas Dispensary.
4. Malviya Nagar Dispensary.

Each section of the Department maintains monthly statistics of OPD, CGHS and ward cases. These data are put together and monthly statistics of the department are...
maintained. The information for last three years, i.e., 1985, 1986 and 1987 were collected to examine the pattern of workload.

The total blood, special investigations, urine and stool examinations for last three years are given in Table No.56.

Table 56
Output Of Blood, Urine, Stool And Special Investigation In Last Three Years

<table>
<thead>
<tr>
<th>Year</th>
<th>Blood</th>
<th>Special</th>
<th>Urine</th>
<th>Stool</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>162980</td>
<td>30028</td>
<td>196925</td>
<td>31694</td>
<td>422627</td>
</tr>
<tr>
<td>1986</td>
<td>156203</td>
<td>22516</td>
<td>192745</td>
<td>41121</td>
<td>412585</td>
</tr>
<tr>
<td>1987</td>
<td>165254</td>
<td>9962</td>
<td>128490</td>
<td>37744</td>
<td>641450</td>
</tr>
</tbody>
</table>

There is a special laboratory technician posted in the Department for carrying out test for malaria parasites. The total blood samples tested during the last three years and number of positive cases found are given in Table No.57.

Table 57
Blood Test For Malaria Parasite During Last Three Years

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of slides tested</th>
<th>No. of positive cases found</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985</td>
<td>1849</td>
<td>73</td>
</tr>
<tr>
<td>1986</td>
<td>3877</td>
<td>90</td>
</tr>
<tr>
<td>1987</td>
<td>1072</td>
<td>12</td>
</tr>
</tbody>
</table>
8. Training Activities of the Department

The Department conducts one year Diploma course for laboratory technicians for the purpose of bringing uniformity and to impart education in the techniques of routine investigation to personnel working in various laboratories in the medical field.

The Medical Superintendent, Safdarjang Hospital was given the authority of conducting the course and examination by the DGHS, Ministry of Health and Family Welfare.

This course is of one year duration conducted in each financial year commencing from April to March. There are 25 seats in each batch. 5 seats are reserved for candidates from RML Hospital, UCMS, NICD, CCHS Labs. ESI, Delhi Administration etc. and from any other institute nominated by DGHS from time to time. If all the seats from the general quota are not filled, then candidates are taken from other institutes.

Eligibility.

All group 'c' and 'D' staff having qualification of matriculation/SSC/10+2 examination having experience of working in any clinical laboratory for 2 years.
Procedure for selection

The course is advertised in leading newspapers and applications are received directly from the private candidates and through the sponsoring agency for Central Government candidates. It is open for all candidates throughout the country. Selection of twenty five candidates is done on merit basis. No entrance examination is held.

Training

The training is imparted by the medical officers and the qualified laboratory technicians in the Department. There are 100 theory and 100 practical sessions in the course. The theory is taught by the medical officers whereas the practicals are done under the supervision of the laboratory technicians. The candidates undertaking the course are posted for the full time between 9.00 am to 4.00 pm on each working day. 80% attendance is compulsory.

Award of Certificate

A certificate is awarded to each successful candidate by the Directorate General of Health Services and the Safdarjang Hospital. All the candidates are subjected to written and practical examination which they have to clear to be declared as successful candidates.
9. Conclusions

Based on the analysis of the data gathered through direct observation, informal discussion and record study the following conclusions are drawn:

The building in which the Clinical Pathology Department is housed is of old type of planning and construction. It is definitely not very convenient building for a clinical laboratory. Lot of effort has been put in to accommodate all the service areas required for a clinical laboratory. Rapport A.E. conducted a joint survey with the American Pathologist and recommended the space requirement of technicians and laboratory staff as follows:

1. Sq. feet per technologist

It was recommended from the findings of the study that about 220-250 sq.ft. of area is required per technician in a clinical laboratory.

2. Square feet per staff

All the laboratory employees are considered as staff and the Study recommended about 170 sq. ft. of area should be allowed per employee in a clinical laboratory.
In the Clinical Pathology Department in Safdarjang Hospital, there are 22 technicians and three medical officers who perform laboratory investigations. The available laboratory service area was 400.15 sq. meters i.e., 4305.6 sq.ft. The laboratory area per technologist was therefore about 172.2 sq.ft. Comparing it with the recommended area it was found far less than desired. Similarly the total covered area for the Clinical Pathology Department was found 489.51 sq.ft. i.e., 5267.13 sq.ft. and the total number of staff in the Department was 38. Therefore the area allotted to each staff was found only about 138.6 sq.ft. which was also far less in comparison with the desired space.

There was no record room available where all the statistical compilation could be done. All the registers maintained in the laboratory are kept in a small room allotted to the steno and the clerical staff. Within the limitation of the building and space all the service areas were found accommodated conveniently with adequate provision of ventilation and lightings. The strength of the staff was found adequate.

Even though no quality control measure was found to be implemented, close supervision by the senior technicians and the head of the Department was appreciable.
The Department functions in a well organised manner giving rise to minimum of problems and inconvenience to the patients. The central collection system works very well and smoothly. The communication system to guide the patients was found inadequate. A social worker is engaged for this purpose but it was found that nobody was constantly available near the entrance of the laboratory to direct the patients to the respective counter. They either have to go to the Central Collection Centre for blood test or to the other counters for giving urine and stool specimens. However, it was noticed that most of the patients from OPD barring a few managed to go to the respective counter without much of inconvenience.

The registration time of OPD and that of the laboratory starts almost at the same time. The first hour in the laboratory is not utilised properly whereas the later half gets over crowded. Many patients have to go back without being able to give specimen as the registration time gets over. The same patients have to come back the next day just for the laboratory tests. Some patients need special preparation for particular tests like Fasting Blood sugar etc. for which they have to come back on the next day. These patients need not stand in queue in the central collection centre for just to be guided to come on the next day. From the workload data, no steady increase in the
total workload was found. However, from monthly statistics it was noted that during the summer months the workload was much more than in rest of the period.

II. RADIOLGY SERVICES

1. Introduction

Radiology which is one of the branches of medical science deals with diagnostic and therapeutic application of radiant energy, chiefly in the form of roentgen rays and radium. Organisation of radiological services implies provision of radiological facilities both for radiodiagnostic and radio therapeutic to the catering population of the hospital. These two specialities, radiodiagnosis and radiotherapy have to be considered separately. The diagnostic unit deals with Radiography and Fluoroscopy. The Radiography is photographic device whereas the Fluoroscopy is a screening device where the object is directly seen through the medium of X-ray. Radiography and Fluoroscopy constitute almost 90% of the workload in the average hospital.

Radiotherapy for malignant disease is a highly specialised service requiring expensive and sophisticated equipment.

Both these radiodiagnostic and radiotherapeutic services have advanced to such an extent that it is not possible for one person to master both these specialities which have nothing in common with each other. The Medical Council of India recommends separate departments for these specialities.

In Safdarjang Hospital also these two are organised as two different departments. Radiodiagnosis by its inherent nature supports many specialities like medicine, surgery, obstetrics, gynaecology, ophthalmology, dentistry and various other subspecialties of medicine and surgery. These specialities cannot be practiced effectively without the supportive services of Radiodiagnostic departments. Hence it is considered as one of the important supportive service in a hospital.

The Radiodiagnostic Department in the Safdarjang Hospital was studied with reference to the following areas:

1. General Description of the Radiology Department in the Safdarjang Hospital.
2. The departmental policies.
3. Layout of the department.
4. Physical conditions, facilities and equipment.
5. Staffing pattern of the department.
6. Procedure and patient activities.
7. Workload of the department.
2. Radiology Department

In the Safdarjang Hospital there is a well developed Radiology department headed by a qualified specialist in the discipline who is directly under the control of the Medical Superintendent of the hospital. Various categories of personnel working under the functional supervision of the head of the department. These categories include medical officers, staff nurses, nursing assistant/orderlies (male and female) and other group D workers. The other staff like radiographers (male and female) clerical staff, dark room assistant are under the administrative as well as supervisory control of the head of the department.

This department works for twenty-four hours a day and provides its services to the needy patients through three X-ray units viz., Main X-ray Unit, Central Institutes of Orthopaedic (CIO) Units and Casualty Unit. The Main X-ray unit functions during 9.00 am to 4.00 p.m. and caters to the need of inpatients, outpatients and CGHS beneficiaries. The casualty unit and the Central Institutes of Orthopaedic unit provide services for twenty-four hours working in three different shifts, i.e., morning shift from 9.00 am to 3.00 pm, evening shift 4.00 pm to 9.00 pm and night shift from 9.00 pm to 9.00 am. The medicolegal cases and special
investigations are carried out in the main unit during the normal working hours of the day.

The main X-ray unit of the Radiology Department is housed in the front part of 'H' block on the ground floor of the hospital and is connected to the general outpatient clinics by a long corridor. This unit is also approachable from the back from the wardside which is mainly used by the staff.

Another separate X-ray unit with two X-ray rooms and a common purpose room has been established in the Accident and Emergency Department. This unit also functions for twenty-four hours a day in three different shifts. The main approach to this unit for the patients is from the side of casualty entrance. The corridor in which the door of this unit opens connects the Out-Patient Department, Intensive Care Unit (ICU) etc. with Casualty Department. Both these C10 unit and casualty unit are quite far from the main X-ray unit and there is no direct connection in between the three units.

For studying the administration of the department, the head of the department, one of the specialist grade II posted in the department, one senior medical officer and two available senior residents were interviewed. A number of radiographers of the department were also consulted through
informal interview. Direct observations were made to ascertain how far the policies procedures including radiation protection measures were practiced and recorded.

All the staff is directly under the Head of the Department. Even the lowest level of personnel like group 'D' workers are also directly under the supervisory control of the departmental head. Some of the staff like nursing staff, group D etc. are administratively under the control of some other persons. For example, the nursing staff belong to nursing service under the charge of the Nursing Superintendent but posted in the Radiology Department under the functional supervision of the Radiologist specialist gr.l. Because of this dichotomy of the structure, supervision and control of the staff become difficult.

Among the X-ray technical staff, a selection grade is introduced among the radiographers on the basis of seniority but no controlling power over the junior technical staff has been authorised. All the administrative work of the department is centralized in the main X-ray unit block.

2.1 Departmental Policies

The Radiology Department works for five full days a week from Monday to Friday and for half day on Saturday. On the full working days it operates from 9.00 am to 4.00 pm with 1/2 hr. lunch break between 1.00 pm to 1.30 pm. On
Saturday it operates only from 9.00 am to 1.00 pm. The other two units i.e. CIO unit and casualty unit operates everyday covering twenty-four hours in three different shifts. The timings of these shifts are:–

Morning shift 9.00 am - 3.00 pm
Evening shift 3.00 pm - 9.00 pm
Night shift 9.00 pm - 9.00 am (next day)

During evening and night shifts and on holidays each of these two units is managed by only one radiographer, one nursing orderly and one dark room assistant. One radiologist remains on call duty, when required a message is sent either by telephone call or by a messenger.

The registration timings in the main unit on all the full working days are from 9.00 am to 11.00 am for outpatients and CGHS beneficiaries and 1.30 to 2.30 pm for inpatients and medicolegal cases. However, on Saturday it registers patients from OPD and CGHS wing only upto 10.00 am and from wards and medicolegal cases upto 10.30 am.

According to the Head of the Department there was a set of detailed Standing Orders for technical and administrative procedures pertaining to all categories of staff. But the staff had no knowledge about it. For documentation and
recording purposes only a register is being maintained in which all the registered cases in each shift are entered.

**Radiation Protection Measures**

The objective of the radiation protection is to prevent acute radiation effects and to limit the risks of late effects to an acceptable level. Acute effects are usually manifested within a few weeks after the exposure whereas the late effects may develop over a period of ten years.

**Principles of Operational Protection**

In a hospital, the authority in charge should identify a technically competent person to provide advice on all relevant aspects of radiation protection. It is recommended by the International Commission on Radiological Protection that the workers who have been identified as being in an operation where doses might exceed 3/0 of the annual maximum permissible doses, should be subjected to special health supervision and personal monitoring. Otherwise, individual monitoring is not required. There should be a well organised Radiation Protection Programme in every Radiology Department. The programme entails the following procedure:

a) All the workers should be suitably informed of the radiation hazards.
b) Necessary protective equipment should be provided and its appropriate use should be enforced.

c) Working conditions of equipment should be reviewed periodically to ensure that they remain as intended.

d) Assessment of the dose liable to be incurred should be done to determine whether improvement in the working conditions is necessary or not.

The assessment may be done by one or more of the following methods:

1. By examining the radiation sources involved in operations including the extent to which they are shielded or contained.

2. By monitoring the working environment.

3. By individual monitoring.

Today individual monitoring is done by both biological and physical monitoring methods. Biological monitoring includes:

- Routine blood count before appointment and periodically throughout the service period.

- Frequent urine analysis of the employee.
Physical method includes

- Film badges
- Quarter fibre electroscopes

In the Safdarjang Hospital the Head of the Radiology Department is also designated as Radiation Protection Officer (RPO). He being a specialist in the discipline, is a technically competent person to take up this responsibility. He supervises the work with the assistance of the Physicist and Engineer of the concerned firm. A periodic check up of the equipment is done by the RPO and the Physicist. But the technicians of the department seldom put on the film badges resulting in difficulties in assessment. Periodic physical and hematological examinations of all the categories of staff are not practiced for detection of the effects of radiation.

2.2 Physical layout of the Department

The physical layout of the Radiology Department and its various sub units were studies. The space provided for each kind of service in the main X-ray unit is given in Table no. 58.
Table 58

Servicewise Distribution of Space In the Main X-ray Unit

<table>
<thead>
<tr>
<th>Types of Rooms</th>
<th>Area in sq. ft.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. X-ray Rooms</td>
<td>3860</td>
</tr>
<tr>
<td>2. Film Processing room</td>
<td>1362</td>
</tr>
<tr>
<td>a) Dark Room</td>
<td>900</td>
</tr>
<tr>
<td>b) Film drying room</td>
<td>462</td>
</tr>
<tr>
<td>3. Doctors Room</td>
<td>1350</td>
</tr>
<tr>
<td>4. Waiting Space</td>
<td></td>
</tr>
<tr>
<td>a) Waiting space for</td>
<td></td>
</tr>
<tr>
<td>registration</td>
<td>948</td>
</tr>
<tr>
<td>b) Waiting space for</td>
<td></td>
</tr>
<tr>
<td>X-ray procedure</td>
<td></td>
</tr>
<tr>
<td>5. Store</td>
<td>736</td>
</tr>
<tr>
<td>6. Reception, Registration-</td>
<td></td>
</tr>
<tr>
<td>cum-Despatch Room</td>
<td>500</td>
</tr>
<tr>
<td>7. General Officer</td>
<td>238</td>
</tr>
<tr>
<td>8. Others</td>
<td>1212</td>
</tr>
<tr>
<td>TOTAL AREA</td>
<td>10,206</td>
</tr>
</tbody>
</table>

The rooms should have at least 9 ft. high ceiling and the X-ray rooms should not be less than 15 ft. x 20 ft. in size. The department should have at least an office for the Head of the Department, a viewing room, a waiting room, a dressing room, a dark room, and X-ray rooms. In a large hospital, these facilities can be grouped around a central
corridor from which access is made to the main corridor of the hospital building. In a teaching hospital, a conference room for the students, interns and residents is desirable. A general viewing room can be made where a number of physicians can study the film at a time. This viewing room should be close to the office of the specialist of radiology.

A waiting room for the patients must be provided if there is a long waiting time for registration there should be a waiting space near the registration counter. The waiting room for the patients waiting for X-rays to be taken should be well arranged and facilities like sitting arrangements, ceiling fans, drinking water, toilet should be provided. A dressing room for the patients, particularly for outpatients should be provided so that they can conveniently change into hospital gowns before the X-ray examination and into their own clothes after the X-ray is done. Besides these facilities, there should be one common room for the other doctors and retiring room for doctor and technician on night duty.

It was found in the Safdarjang Hospital that the main X-ray unit has got seven X-ray rooms, two dark rooms two drying rooms and a number of rooms for other purposes.
These rooms were found of different sizes which are given in Table No. 59.

Table 59

Size of Rooms in Radiology Department

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Rooms</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Reception, Registration-Cum Despatch Room</td>
<td>20' x 25'</td>
</tr>
<tr>
<td>2.</td>
<td>HOD's Room</td>
<td>17' x 14'</td>
</tr>
<tr>
<td>3.</td>
<td>Sr. Radiographer's Room</td>
<td>8' x 4'</td>
</tr>
<tr>
<td>4.</td>
<td>Postgraduate students Room</td>
<td>12' x 25'</td>
</tr>
<tr>
<td>5.</td>
<td>Doctors Room (3 rooms)</td>
<td>14' x 14' (Two)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>12' x 14' (one)</td>
</tr>
<tr>
<td>6.</td>
<td>Nurses Room</td>
<td>(14' x 14')</td>
</tr>
<tr>
<td>7.</td>
<td>Senior Residents Room</td>
<td>16' x 14'</td>
</tr>
<tr>
<td>8.</td>
<td>Radiographers Room</td>
<td>14' x 14'</td>
</tr>
<tr>
<td>9.</td>
<td>General Office</td>
<td>17' x 14'</td>
</tr>
<tr>
<td>10.</td>
<td>Store Room</td>
<td>12' x 24'</td>
</tr>
<tr>
<td>11.</td>
<td>X-ray Room for Head, Face and Extremities</td>
<td>46' x 25'</td>
</tr>
<tr>
<td>12.</td>
<td>Seminar Room</td>
<td>12' x 24'</td>
</tr>
<tr>
<td>13.</td>
<td>X-ray Room for Abdomen and Spine</td>
<td>22' x 25'</td>
</tr>
<tr>
<td>14.</td>
<td>Room for Chest X-ray Procedures</td>
<td>22' x 25'</td>
</tr>
<tr>
<td>15.</td>
<td>X-ray Room for General Procedures (2 rooms)</td>
<td>24' x 24'</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8' x 14'</td>
</tr>
<tr>
<td>16.</td>
<td>X-ray Rooms for Dental Procedure</td>
<td>14' x 14'</td>
</tr>
</tbody>
</table>

Contd...
The total space occupied by the main X-ray unit was found to be 10,206 sq.ft.

2.3 Physical Condition and Equipment

The physical conditions and other facilities like ventilation, temperature, lighting, cleanliness, the nature of the floors, toilets, retiring room, drinking water, noise, work space etc. are physically examined and necessary observations noted.

As M.T. MacEachern emphasised the personnel of the department spend much of their time in dark-rooms and the X-rays have a harmful effect on some functions of the body, the department must be located with due consideration to adequate light and fresh air. There must be sufficient
number of windows to provide natural light and fresh air. Cross ventilation should be maintained properly if not possible naturally then mechanical device may be used.

In the Safdarjang Hospital, these facilities in the main radiology department were found satisfactory. The staff working in this unit expressed no complaint regarding the facilities provided to them.

The list of all the special equipment with the number of each category installed in the Department is given in Table No.60.

Table 60

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Name of the Equipment</th>
<th>No held</th>
<th>No. of years held</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mobile and Portable</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>800 MA Tridoros 6R 1986</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>500 MA Heliophos 4M 1986</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>10 MA Dental X-Ray Unit (Philps)</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>4.</td>
<td>100 MA Mobile X-Ray Unit (Escort)</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>5.</td>
<td>30 MA Portable X-Ray Unit (Escort)</td>
<td>1</td>
<td>NA</td>
</tr>
<tr>
<td>6.</td>
<td>10 MA Portable Philips</td>
<td>1</td>
<td>NA</td>
</tr>
</tbody>
</table>

Cont...

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Automatic Processing Tank</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>30 MA UNIMEX PORTABLES (Siemen)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>60 MA Stallin Portable (I.G.E.)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>20 MA Stallin Portable (I.G.E.)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Automatic Procession Tank (Hindustan Photo)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>200 MA Urology X-Ray Table (MOT)</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>500 MA Miner H₄s TV Image in (inoT-4)</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>10 MA Portable Heliodent</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
</tbody>
</table>

**FIXED**

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>500 MVA Helophos H$s Bucky Table-X</td>
<td>1</td>
<td>12 Yrs.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Tomography Table (Siemens)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>500 MA Srescop H₄s</td>
<td>1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>500 MA Kalinescop H₄R</td>
<td>1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>300 MA Plesphos₄</td>
<td>1</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>200 MA E⁴E Palyscop (Siemens)</td>
<td>1</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>300 MA K R D X-Ray unit (G.E.)</td>
<td>1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>500 MA H₄s Klinscop (Siemens)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>200 MA Gencon (J.G.E)</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>100 MA Radon Hons (Not Working)</td>
<td>1</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Odelca camera</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
There are 16 portable and mobile X-ray machines and 10 fixed machines. From the information available it was found that 6 machines were as old as 11 years or more.

2.4 The Staffing Pattern of the Department

According to J.K. Owen, the department should be under the direction of certified medical officer specialised in Radiology. It had been estimated that one certified radiologist should be available for every 25 revenue patients per day and a very large department may have separate divisions for radio diagnosis and radiotherapy. ³.

The number of technicians required for 25 patients per day varies from two to three depending upon the physical condition of the patients and the amount of non-technical help available in transporting, preparing the patient etc. Two secretarial or clerical staff are required for 25 patients. J.McGibony estimated the number of Radiographer according to bed strength in every type of hospital. ⁴ This is given in Table No.61.


### Table 61
The Number of X-ray Technicians in Non-Federal Short-term Hospitals

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Number of Beds</th>
<th>1953</th>
<th>1962</th>
<th>1972</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>50</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>2.</td>
<td>100</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>200</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>300</td>
<td>5</td>
<td>7</td>
<td>9</td>
</tr>
<tr>
<td>5.</td>
<td>400</td>
<td>7</td>
<td>10</td>
<td>13</td>
</tr>
<tr>
<td>6.</td>
<td>500</td>
<td>9</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>7.</td>
<td>600</td>
<td>10</td>
<td>14</td>
<td>18</td>
</tr>
<tr>
<td>8.</td>
<td>700</td>
<td>10</td>
<td>15</td>
<td>20</td>
</tr>
</tbody>
</table>

The staffing pattern recommended by the study group on Hospitals (1968) New Delhi is given in the Table No.62.

### Table 62
Staffing Pattern For Radiology in Non-Teaching Hospitals

<table>
<thead>
<tr>
<th>Beds</th>
<th>Radiologist</th>
<th>Radiographer</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>100</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>200</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>300</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>
ii) For Teaching Hospitals (Minimum requirements)

Associate Professor/Reader 1
Lecturer 2
Registrar 2
Radiographer 4

The existing staffing pattern of the Department is given in Table No.63.

Table 63
Staffing Pattern Of Radiology Department

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the post</th>
<th>Total No. of sanctioned post</th>
<th>No. of post filled up</th>
<th>No. of vacant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctors</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Sp.gr.I. (Sr. Radiologist)</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>2. Sp.gr.II/Lecturer (in CIO unit)</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3. Sr. Medical Officer</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4. Pool Officer</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5. Sr. Residents</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>6. P.G. Students</td>
<td>6</td>
<td>5</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>7. House Surgeon</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>15</td>
<td>14</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Contd....
<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nursing Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Staff Nurse</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Technical Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Technical Assistant Radiographer</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Selection grade Radiographers</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Radiographers</td>
<td>17</td>
<td>14</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. X-ray Assistants</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Dark Room Assistants</td>
<td>15</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>42</td>
<td>37</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Administrative Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Store-Keeper</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. L.D.C.s</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>4</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Auxiliary Staff</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Nursing Orderlies</td>
<td>11</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Sweepers</td>
<td>3</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>14</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
2.5 Procedure and patient flow

The Ministry of Health and Family Welfare prepared a Manual (1976) in which it was determined that the radiology department in a Central Government Hospital should provide the following services:

1. The department should work for 24 hours in shifts to cater to the needs of the people.
2. For all cases except the emergencies, appointment system for radiological services should preferably be introduced.
3. Duties of all categories of staff working in the Department should be clearly written in a form of job Description and it should be circulated to each one of all functional staff.
4. Duty Roster should be prepared by the Senior Technician designated for the purpose by the officer in charge of the department.
5. There should be a female technician or a female nurses while female patients are being X-rayed or examined.
6. Requisition for radiological services should be with either by a Senior resident, registrar or a medical officer and not by a house surgeon or intern. Clinical notes of the patient should invariably be written on the form.

7. The officer in charge of radiological service should give clear cut instructions in easily understandable language regarding preparation of patients for examination and x-ray.

8. The officer in charge should have control of all the installed portable machines and ensure that these are in working order all the time.

9. The technicians should have knowledge about the routine maintenance of the machines.

10. The senior technician should have an effective control of receipt and issue of x-ray films to every technician.

11. The medical officer viewing the x-ray films should report in writing whether the exposure was satisfactory or not.

12. The Officer in charge of the Department should evolve a procedure for distribution of the patients x-ray films to various wards/units so that incidence of missing X-ray films can be eliminated.

13. Storage of exposed x-ray films should be done in such a manner that retrieval of the required film is easy and quick. It is advisable to prepare a time limit for destruction of unwanted x-ray films taking local requirement into consideration.
14. A physicist should be closely associated with this Department whenever possible.

15. Refresher courses for all technical staff working in this department should be organised periodically.

16. Wet films should be made available to clinicians on request at the quickest possible time.

17. Clinicians should be closely associated with this Department, so that they all function in a coordinated manner for the welfare of the people.

18. The following documents should be maintained in the department:
   a) X-ray register.
   b) Inventory of non-expendible items and requirements.
   c) Linen inventory.
   d) Films account.
   e) Expendible item account
   f) Indent books.

In the Department of Radiology, Safdarjang Hospital the procedure for radiology service provided and the flow of the patient in the main unit were studied through direct observation.

Every X-ray room of the main unit starts functioning after a brief period of 15 minutes from the scheduled time of 9.00 am. This time of 15 minutes is devoted for
assembling, checking and cleaning of respective machines indenting and procurement of X-ray films etc. The X-ray examinations are usually done till 3.30 pm leaving half an hour time for further processing of the films. The patient is usually given a serial number, date and room number of X-ray to be taken in on the requisition slip at the time of registration in the radiology department. With this numbered requisition slip the patient goes and reports to the prescribed room where he is given a call number by the radiographer. He/she then waits in the waiting hall for his/her number to be called and get the X-ray done. Normally all the patients are X-rayed on the same day. The films, after being entered in the register, are sent to the doctors for reading and reporting. After this, the films with registration slips are returned to the office for scrutiny and final dissemination to respective outpatient departments and wards. In routine cases, this whole procedure takes about 3 days and the report is received on 4th day. However, in emergency cases the reports are given on the same day.

The procedure for special investigation is entirely different. For each special investigation appointment is given by the head of the department after a thorough examination of the requisition slip which may give rise to cross references between the clinicians and radiologist.
The waiting time for all categories of special investigations was found out. It was noted that for certain types of examinations such as Barium Meal, Barium Enema, IVP, waiting time was not less than 30 days. For some examinations only, the minimum time was less than 15 days. Waiting time/appointments for special investigations for outpatients is given in the Table No.64.

Table 64
Waiting Time for Special Investigation

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Name of the investigations for outpatient cases</th>
<th>Period of delay for appointment in days</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Intravenous pyelography (IVP)</td>
<td>30-40</td>
</tr>
<tr>
<td>2.</td>
<td>Barium meal, BMFT, BMUCIT</td>
<td>45-60</td>
</tr>
<tr>
<td>3.</td>
<td>Barium swallow</td>
<td>15-20</td>
</tr>
<tr>
<td>4.</td>
<td>Barium Enema</td>
<td>45-60</td>
</tr>
<tr>
<td>5.</td>
<td>Fluroscopy/Screening</td>
<td>10-15</td>
</tr>
<tr>
<td>6.</td>
<td>OCG DDOCG IVC</td>
<td>5-6</td>
</tr>
<tr>
<td>7.</td>
<td>H.S.C.</td>
<td>7-10</td>
</tr>
<tr>
<td>8.</td>
<td>Cystogram, Cystourethrogram</td>
<td>15-20</td>
</tr>
<tr>
<td>9.</td>
<td>Brochogram/Laryngogram/ Laryngography</td>
<td>20-30</td>
</tr>
<tr>
<td>10.</td>
<td>Angiogram, Angiography, Ventriculogram etc.</td>
<td>3-4 days or on urgent basis</td>
</tr>
<tr>
<td>11.</td>
<td>Myelogram</td>
<td>15-20</td>
</tr>
<tr>
<td>12.</td>
<td>Sinogram, Sailogram, Balmiki test, MCU, Cologram etc.</td>
<td>15-20</td>
</tr>
</tbody>
</table>
The X-ray films are given to the patients on their discharge except for medicolegal cases. For MLC's in X-ray films are handed over to the casualty constable on duty who sends these to the court through concerned police stations. In case patients do not take X-ray films, these are destroyed. There is no storage system of X-ray films either in the Radiology department or Medical Records Department except for some disciplines like Orthopedic, Neurology, Haematology, Radiotherapy and Rehabilitation where there is provision for storage of old patients X-ray films in the respective OPD for facilitating the follow-up of the treatment.

2.6 Workload

In order to study the workload of the department data for last 4 years (1986-1989) were collected from the records maintained in the department and in the medical records department. For the year 1986, 1987 and 1988 the recording system was found similar. The number of X-rays taken in each unit as well as all the special investigations and for MLCs were recorded under separate headings. Since February 1989 there was a change in the policy and all the medicolegal cases are done in the casualty X-ray instead of the main X-ray unit. And all the special investigations were also merged with the general X-rays taken in the main X-ray
Therefore, for 1989 no separate record of special investigation and MLC were obtained. Month wise workload data for 1986, 1987, 1988 and 1989 are given in Table No.65.

Table 65

Workload of X-Ray Department During Last Four Years
(1986-1989)

<table>
<thead>
<tr>
<th>J</th>
<th>F</th>
<th>M</th>
<th>A</th>
<th>M</th>
<th>J</th>
<th>J</th>
<th>A</th>
<th>S</th>
<th>O</th>
<th>N</th>
<th>D</th>
</tr>
</thead>
<tbody>
<tr>
<td>1986 Main X-ray unit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gen. X-ray</td>
<td>5596</td>
<td>5173</td>
<td>5490</td>
<td>5904</td>
<td>5811</td>
<td>5389</td>
<td>5745</td>
<td>5600</td>
<td>5914</td>
<td>5437</td>
<td>4807</td>
</tr>
<tr>
<td>Special</td>
<td>320</td>
<td>285</td>
<td>293</td>
<td>325</td>
<td>278</td>
<td>261</td>
<td>323</td>
<td>297</td>
<td>320</td>
<td>317</td>
<td>283</td>
</tr>
<tr>
<td>M£C</td>
<td>294</td>
<td>362</td>
<td>361</td>
<td>262</td>
<td>437</td>
<td>276</td>
<td>315</td>
<td>350</td>
<td>340</td>
<td>367</td>
<td>397</td>
</tr>
<tr>
<td>C I O</td>
<td>4564</td>
<td>4221</td>
<td>3671</td>
<td>4225</td>
<td>4540</td>
<td>4546</td>
<td>6733</td>
<td>4724</td>
<td>4923</td>
<td>5149</td>
<td>3938</td>
</tr>
<tr>
<td>Casualty</td>
<td>1324</td>
<td>662</td>
<td>1215</td>
<td>583</td>
<td>334</td>
<td>374</td>
<td>350</td>
<td>542</td>
<td>419</td>
<td>270</td>
<td>601</td>
</tr>
<tr>
<td>Total</td>
<td>12084</td>
<td>10703</td>
<td>11030</td>
<td>11299</td>
<td>11400</td>
<td>10846</td>
<td>13466</td>
<td>11513</td>
<td>11916</td>
<td>11540</td>
<td>10026</td>
</tr>
</tbody>
</table>

1987 Main X-ray unit

| Gen. X-ray | 4497 | 4399 | 6340 | 5571 | 5774 | 5172 | 4029 | 5600 | 6809 | 5336 | 5129 | 5122 |
| Special | 287  | 242  | 327  | 201  | 150  | 181  | 115  | 259  | 285  | 275  | 288  | 262  |
| M£C | 356  | 275  | 467  | 326  | 382  | 276  | 50   | 326  | 332  | 377  | 385  | 341  |
| C I O | 3696 | 3602 | 4267 | 4795 | 3924 | 4259 | 3829 | 3917 | 4151 | 4196 | 4051 | 3624 |
| Casualty | 603  | 610  | 1882 | 1721 | 1831 | 1851 | 1281 | 1452 | 1616 | 1788 | 1764 | 2239 |
| Total | 9439 | 9128 | 13283 | 12620 | 12070 | 11739 | 9304 | 11554 | 13193 | 11972 | 11617 | 11588 |
3. Conclusions

In view of the detailed study of the department it is concluded that the organisation of this department is done on a peculiar pattern by placing all the staff directly under the Head of the Department. For a large department like the one in Safdarjang Hospital, this type of organisation is not suitable for effective supervision and
control. As different levels are not created, the authority to various senior staff is not assigned for controlling other junior staff. However, the professional status is respected in the practical field. For example any work assigned by any other radiologist rather than the Head of the Department, to any radiographer, or to an assistant, it is usually carried out.

For day-to-day administration of the ward, no written policy was available in the Department. However, it was found that a routine was followed by all the staff for smooth functioning of the Department.

Each staff of every category knew their jobs and duties but no formal job description was prepared and given to them. On enquiring from the staff it was learnt that they knew about their job.

Regarding 'Radiation Protection', a fair amount of negligence was noticed in the behaviour of all the staff.

Even though the Radiation hazard and the protective measures to be taken was in their knowledge, they have adopted a casual attitude towards it. The technical staff seldom use their film badges. No regular periodic health check up including Haematology and urinal analysis is done for the staff.
It was found that there was a Radiation Safety Committee in the hospital but no standing orders or measures against the risk of radiation hazard was circulated among the staff. From the information available, it was found that many X-ray machines are as old as 10 years or more and may not be efficient enough to take the load of such a busy unit.

The waiting time for the special examinations particularly barium meal, barium enema, Intravenous Pyelography (IVP) is too long. The patients have to wait for more than 3 months at times for getting these examinations done. The diagnosis is made on the basis of their examinations which indicate the line of treatment. This results in delay in the treatment and the disease get more and more serious leading to various complications. Ultimately a patient requires more intensive and complex type of treatment consuming more resources of the hospital.

From the workload data it was found that workload on the casualty X-ray unit has been perpetually increasing. Besides, whenever there was a strike in the hospital the main X-ray unit did not function on those days and patients had to be referred to casualty X-ray unit.
III. DIETARY - SERVICE

1. Introduction

Dietary service in hospitals is as important as therapeutic services. It plays an important role in patient care provided by a hospital, by contributing directly to treatment through scientifically prepared, nutrition diets aimed at specific disease conditions\(^1\). The main objective of the dietary service is to provide better patient care through properly planned and executed diets. Today the dietary department ranks as one of the major departments of the hospital headed by a specialist, the dietitian, who is an administrative officer of the hospital. In Safdarjang Hospital there is a well organised Dietetic Department headed by a senior dietician. For administrative purpose this Department is assigned to an assistant medical superintendent.

2. Dietary Department

The Dietetic Department is administratively under the control of an assistant medical superintendent who is accountable to the Deputy Medical Superintendent and then to the Medical Superintendent of the hospital. For day-to-day

functioning of the Department there is a senior dietician who is incharge of the unit.

The main food for all the patients admitted in hospital is prepared in this Dietetic Department and distributed from there to all the units of the hospital.

Dish washing is yet to be centralised in this area. Decentralized system of dish washing in the respective unit is still being practiced.

2.1 Location

It is desirable that the Department should be on ground floor as far as possible in centrally located place. In Safdarjhang Hospital, this Department is ideally located on ground floor and is easily accessible.

2.2 Physical Layout

The dietetic department is established on an area of 450 square meter. There are three entrances to this Department:

Entrance - I is used by the patients and visitors
Entrance - II is meant for trolleys
Entrance - III is for receiving supplies

The physical layout of the Dietatric Department is shown in Fig.20.
PHYSICAL LAYOUT OF THE DIETETIC DEPARTMENT

Sr. DIETICIAN'S OFFICE

ENT-I

DIETICIAN'S & STEWARDS

LDC

ENT-III

ENTREANCE FOR VANS

DRY RATION STORE

OPEN SPACE

TROLLEY LOADING AREA

POTWASHING AREA

REFRIGERATION

VEGETABLE STORE

FIG. No. 20
The whole area is distributed in the following functional areas:

(1) **Receiving Area**

This area is accessible by all types of vehicles and located on rear drive way. Entrance - Ill is open to this area. The raw material is received in this area and physical verification of each item is done here.

(2) **Office for the receiving clerk**

A small office is located just near the receiving area. All the stock registers and ledgers maintained in this department are kept in this office.

(3) **Storage**

The store is located just on the other side of receiving area so that the material after physical verification can be easily carried to the store for storage. The total area of the main ration store and for non-perishable items is 45 sq. mts. and ration items can be stored for 5 days. Grocery items like pulses, ghee, condiments are stored for one month.

The four small stores approximately of 31 sq. mts. in size are used for storing different kind of material. One of these stores is utilized for storing perishable items like
eggs, butter and fresh fruits. The butter is stored in the deep-freezer. On an average 60 kg. butter 1200 eggs and 125 loaves of bread and a day's supply of fruits about 700 bananas, 200 oranges are stored here. One of these rooms is used for storing of vegetables are done. There is no separate cold storage room. Two big refrigerators are kept for storage of the items need to be stored at cool temperature. No meat is preserved or cooked in this kitchen.

(4) For CAS

An area of 11.96 sq.mt. is used as gas room. It is fitted with 2 tier pipe line system which can hold 20 cylinders in each line. One line operates at a time and the other is kept as a reserve. There are 37 cylinders, 18 in one line and 19 in the other line.

(5) Preparation Room and Cooking area

In Safdarjang Hospital there is a common place for both precooking preparation and cooking. The whole cooking area is divided in two portions one is used for general diet preparation and the other is used for preparation of therapeutic diets. The general kitchen is further divided in three specific areas, one portion is used for cooking vegetable, dal, rice etc. and second portion is used for baking chapatis. The third portion is used as washing unit.
where all the pots and utensils are washed. There are four large ovens fixed in cooking area, two for making chapattis and the other two for cooking other items.

(6) **Modified diet unit or special diet room**

Some portion of cooking area is separated for preparation of special therapeutic diets. But the common item like rice, chapatis, etc. are prepared with normal diet.

(7) **Service and Trolley area**

At the opposite side of the ovens in this common hall, the trolleys are loaded for distribution to various units in the hospital. For each ward there is a separate trolley. The special diets are served in separate cans.

(8) **Trolley Way**

The trolley loading area opens to the trolley way which makes the Entrance II of the Dietetics Department.

(9) **Potwashing area**

Some portion of the common hall is separated as a demarcated potwashing area, which was found inadequate for the purpose.
There are two offices for dieticians and stewards in this kitchen. One office is used by the Senior Dietician and the other is used by the other two dieticians and two stewards. There is one small office which accommodates the LDC. The offices for the Senior Dietician and other dieticians and stewards are so close to the special diet preparation and general working areas that they can constantly supervise cooking preparations.

2.3 Staffing

(a) Dieticians

There are three dieticians posted in this Department. One of them is a senior dietician who supervises the overall functioning of the diet kitchen. The other two dieticians are junior dieticians.

Functions of Dieticians

The functions of the dieticians are mainly of three types viz., Administrative, Therapeutic and Educational.

Administrative Role

The dieticians play a vital role in the following administrative functions:

1. **Planning**: Planning for food services according to the needs of all the admitted patients giving special emphasis on the special therapeutic diets. Menu planning, budget planning and cost-accounting.

2. **Organising**: Organising the activities of the diet kitchen department, assignments of duties to all categories of staff maintaining their duty roster as they need to work in shifts.

3. **Staffing**: Staffing; Planning for the staff requirement of the unit and making proposals for recruitment and transfer of some staff to and from other units. Making arrangements for periodic health checkup of all the kitchen staff. Organising for in-service training programmes for group D employee is another responsibility of the dieticians.

4. **Directing**: Directing; The dieticians direct all the other kitchen staff in preparation of normal diet, preparation of special diet, in maintenance of food hygiene so that they are able to perform their job in desired manner. Direction is given for house-keeping and sanitation.

5. **Controlling**: The senior dietician is directly involved in selection and purchase of raw materials, storage of these materials and distribution of food to all the
patients. The dietician is expected to supervise all the staff who are involved and responsible for performing these tasks. The dieticians directly supervise these activities. Preparation of demand estimation for procurement of materials and preparation of preliminary budget is also done by the senior dietician.

Therapeutic Role

The dieticians participate in the treatment of the patients by providing therapeutic diet which has an important role in treatment of all the patients. For some patients a special diet is absolutely essential for the medical care needed by them. For others, a good balanced diet is absolutely necessary for meeting the normal nutritional requirement of the body which helps in recovery and promotion of health.

The dieticians play this role by:

a) Implementing dietary prescription,
b) collaborating with physicians,
c) counselling patients,
d) providing nutritional advice and
e) carrying out research.
Educational role

The dietician play an educational role in making the patient aware of the nutritive values of all the local and seasonal foods so that they can develop healthy food habits. They also educate the patients to maintain personal hygiene, particularly washing of hands before eating any food. They not only provide education to all the inpatients but also to the outpatients particularly who are referred from special clinic for advice and counselling. The dieticians participate in the following special clinics.

1) Diabetic clinic.
2) Cardiac clinic.
3) Daily Nutrition clinic.
4) Nutrition-Rehabilitation clinic.
5) Juvenile Diabetic clinic.

Their educational role is not only limited to the education of the patients but extended to the students of various training programmes.

The education flow for these trainees is given in Fig.21.
b) **Stewards**

There are two stewards appointed in the dietetic department of the Safdarjang Hospital. Stewards are responsible for the supervision of the food preparation in the kitchen and loading of the trolleys as per indents sent from the wards. Following are the duties assigned to the stewards:

1. To receive diet sheets from the wards and prepare a consolidated demand.
2. To record all the correspondence relating to diet sheet, diet indents, diet and census etc.
3. To carry out daily inspection of the kitchen staff for appearance, cleanliness and uniforms etc. and take appropriate action on the following.

   a) The amount of ration issued is properly utilised.
b) To check dietary equipment whether they are functioning properly and are in use.

c) To supervise distribution of food to the wards.

d) To see to the handling and disposing off the garbage.

e) To maintain hygiene of the entire kitchen specially in wash basin area and toilet.

f) To visit wards with dietician and look into complaints about diets.

g) Any other duty that may be assigned by the senior dietician from time to time.

c) Cooks

There are twelve cooks and three head-cooks appointed in this department. One of the head cooks is placed in the nurses hostel; two are working in this diet kitchen. The cooks work in shift duties and rotate from one shift to another. The functions of the head cook are listed below:

Functions of the head cook

1. To take care of and maintain the equipment.

2. To supervise sanitation and cleanliness of the kitchen.

3. To maintain and improve standard of food preparation and services.

4. To open and close the kitchen.

5. To receive supplies of milk, bread etc. in the absence of store-keeper.
6. To check wastage adulteration, spoilage of food.
7. To report about empty gas cylinder to the store-keeper.
8. To maintain punctuality in supply of meals at the specified times to the patients admitted to the hospital.
9. To take special care with regard to therapeutic (special diet kitchen).
10. To represent grievances of the kitchen staff to the Senior Dietician.

d) Store keeper

One store-keeper is appointed in this Department for the maintenance of the kitchen stores. The job responsibilities of the store-keeper are the following:
1. To receive all goods and sign various receipts for the Department subject to the approval of the dietician.
2. To verify the various accounts of stores including LPG cylinders received by the Head Cook in his absence.
3. To place goods in proper bins, shelves and other storing places.
4. To keep store room clean and in order.
5. To issue supplies according to requisitions.
6. To check bills, verify and submit to the senior dietician.
7. To maintain records and stock books etc. upto date.
8. Any other duty that may be assigned from time to time.
e) Masalchies

Ten masalchies are posted for the assistance to the cooks. They do all the precooking preparation of food items including cutting vegetables, grinding masalas, kneading flour into dough etc. Duties of the masalchies are the following:

1. To prepare precooked food items.
2. To transfer soiled dishes and pots from the kitchen to the washing area.
3. To scrap and wash pots and pans thoroughly.
4. To use proper detergents and methods for cleaning as per instructions.

f) Trolley Bearers

Thirty-six trolley bearers are working in this Department. Some of them are appointed as trolley bearers and the rest are appointed as nursing orderlies, khidmatgar and mates. But they all are assigned the main duties of distribution of food to various wards/units in the hospital for the whole day. They all work in shift duties. Job responsibilities are as following:

1. To carry food from the kitchen in the trolleys to the various wards/units and get proper receipts.
2. To use clean and proper utensils for taking the food, milk and tea to the wards.
3. To help the cooks in cleaning, cutting and washing
vegetables, rice pulses etc.

4. To help the Store-Keeper in weighing ration items to be issued.

5. Any other duty that may be assigned by the Head Cook and the Dieticians from time to time.

g) Safaiwala

There are five safaiwala working in this department. Two are posted for the morning shift and two for the evening shift. The fifth one works as a reliever.

The staffing pattern of this department is shown in the Table No. 66.

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Category of Staff</th>
<th>Number of Staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Senior Dietician</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Junior Dietician</td>
<td>2</td>
</tr>
<tr>
<td>3.</td>
<td>Stewards</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Head-cook</td>
<td>3 (2 posted in the diet kitchen, 1 posted in nurses hostel)</td>
</tr>
<tr>
<td>5.</td>
<td>Store-keeper</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>Cooks</td>
<td>12</td>
</tr>
<tr>
<td>7.</td>
<td>Masalchi</td>
<td>10</td>
</tr>
<tr>
<td>8.</td>
<td>Trolley bearers</td>
<td>36</td>
</tr>
<tr>
<td>9.</td>
<td>Safaiwala</td>
<td>5</td>
</tr>
</tbody>
</table>
2.4 Purchase of Raw Material

The raw material is purchased from government agencies or from agencies approved by the DCS&D viz., milk is purchased from Delhi Milk Scheme, bread from Modern Bakeries, groceries either from Kendriya Bhandar or Super Bazar and eggs, fruits and vegetables are purchased from NAFED. Mother Dairy also provides fruits and vegetables. These agencies supply fruits vegetables in plastic bags.

The rate list is provided by the agencies and then the item is selected. The supply order is prepared in four copies. One copy is sent to the agency/firm, second copy is sent to accounts section, third copy to the pay and accounts and the fourth copy is kept with the dietician. If the supply order exceeds Rs.5000/- then the bill has to be signed by Senior Dietician and the Deputy Medical Superintendent being incharge of the Department.

If the bill is less than Rs.5000/- then only the Senior Dietician signs and forwards it to the accounts section directly.

Diet scale is fixed by the DGHS/Ministry of Health which acts as a guideline for calculation of ration for the patients. This scale is of course prepared on the basis of the recommendation made by the Senior Dietician.
2.5 Preparation of diet

The indent for diet for the admitted patient is prepared by the sister-in-charge of the particular ward unit. She prepares the indent to the number of patients present in the ward at midnight. That means the midnight census is used as the base for the amount of diet to be prepared. Procedure for diet indent/issue as followed in the Safdarjang Hospital is described here.

To facilitate the calculation of ration, diet indents received from the various wards are consolidated in the morning at about 9.00 am. The calculation of ration is done on the basis of these indents and is worked out by 12.00 Noon to 1.00 pm. Fifty percent of this ration is for utilising the next morning. Ration for the next evening is calculated from the latest demand after deducting the ration utilised for the morning. As the difference is not significant it does not involve any change in the distribution slips but enables the dietician to utilise the ration for the indents made for the same day.

Indents received at 9.00 am on the previous day is sent back to the wards along with the morning tea and the latest midnight census figures and the actual number of patients present in the respective wards are collected. Breakfast/lunch/dinner distribution is done according to the
actual number of patients in the hospital. This modified procedure reduces the percentage of errors and mistakes likely to be committed by the indenting sister and also makes provision for checking at the kitchen level.

Three types of general diet are prepared in the diet-kitchen in Safdarjang Hospital.

Type-I is vegetarian diet I. In this type of diet the main base of the meal is chappati.

Type-II is vegetarian diet II in which the main base is rice. In both these types, the other items are just the same.

Type-III is khichri diet in which khichri is served alongwith, dal, curds and some soup.

In the type-II and type-III diet the distribution of food items is done according to the patients choice. Unless the patient is prescribed only to eat soft diet, he/she is given chapati or rice or both. Problem of shortage of one particular item is not a common feature.

Approximately 1400 number of chappatis are prepared by three cooks in each shift. For the therapeutic diet sister prepares a separate indent and mentions clearly the type of diet prescribed for each patient on therapeutic diet. The dieticians receive these indents and give instructions to the cooks. These preparations are personally supervised by one of the dieticians.
2.6 Distribution of food to the patients

In general wards vegetarian diet is served to each patient containing 2370 calories and 66 gm of protein. The amount of each food item given to each patient is given in the Table No. 67.

Table 67

Quantity Of Food Item Given To Each Patient

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Quantity in Grams</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atta/rice</td>
<td>300</td>
</tr>
<tr>
<td>Bread</td>
<td>60</td>
</tr>
<tr>
<td>Dal</td>
<td>50</td>
</tr>
<tr>
<td>Vegetable</td>
<td>300</td>
</tr>
<tr>
<td>Potatoes</td>
<td>100</td>
</tr>
<tr>
<td>Milk</td>
<td>250</td>
</tr>
<tr>
<td>Curd</td>
<td>150</td>
</tr>
<tr>
<td>Milk for tea</td>
<td>75</td>
</tr>
<tr>
<td>Egg/milk/paneer</td>
<td>one/150 ml milk/30 gm paneer</td>
</tr>
<tr>
<td>Fat - ghee</td>
<td>20</td>
</tr>
<tr>
<td>Fat - butter</td>
<td>10</td>
</tr>
<tr>
<td>Salt</td>
<td>5</td>
</tr>
<tr>
<td>Condiments</td>
<td>5</td>
</tr>
<tr>
<td>Tea</td>
<td>5-10</td>
</tr>
<tr>
<td>Sugar</td>
<td>30</td>
</tr>
</tbody>
</table>
Earlier no fruit was given to the patients in general ward but at present one seasonal fruit is added in the diet. The distribution of food starts with breakfast, then lunch, tea in the evening around 4:00 p.m. and dinner at 6-7 p.m. A sample menu for a vegetable full diet is given below:

**Breakfast:**

- Tea (240 ml/1 glass)
- Milk 250 ml.
- 2 slices of bread (60gm)
- Butter 10 gm.
- Sugar 15 gm.
- Eggs/paneer/extra milk - one/130 gm/150 ml.
- or porridge (allowance from cereals).

**Lunch:**

- Dal - 25 gm.
- Chappatis/Rice - 150 150 gm. (4 in Nos.)
- Vegetables - 200 gm. (raw weight)
- Curd - 75 gm.
- Cooking oil/fat - 10 gm.
- Fruit (seasonal) - 100 gm.

**Tea:**

- Tea - 240 ml/1 glass

**Dinner:**

- Chappatis/Rice
- Dal - 25 gm.
- Vegetables - 200 gms (raw weight)
- Cooking oil/fat - 10 gm.
- - 150 gm. (4 in Nos.)

For children's ward a vegetarian diet contains 2113 calories and 60 gm of protein. The amount of food items given for the children in general paediatric ward is given in Table No.68.
### Table 68
#### Childrens Vegetarian Full Diet

<table>
<thead>
<tr>
<th>Food Item</th>
<th>Amount in gm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atta/rice</td>
<td>250 gm.</td>
</tr>
<tr>
<td>Bread</td>
<td>100 gm.</td>
</tr>
<tr>
<td>Dal</td>
<td>25</td>
</tr>
<tr>
<td>Vegetables</td>
<td>150</td>
</tr>
<tr>
<td>Potatoes</td>
<td>50</td>
</tr>
<tr>
<td>Fruit (Seasonal)</td>
<td>1 portion 100 gm.</td>
</tr>
<tr>
<td>Milk</td>
<td>500</td>
</tr>
<tr>
<td>Curd</td>
<td></td>
</tr>
<tr>
<td>Ghee/oil</td>
<td>10</td>
</tr>
<tr>
<td>Butter</td>
<td>10</td>
</tr>
<tr>
<td>Condiments</td>
<td>5</td>
</tr>
<tr>
<td>Sugar</td>
<td>50</td>
</tr>
<tr>
<td>Egg/paneer/milk</td>
<td>1/30 gm 1/150 ml.</td>
</tr>
</tbody>
</table>

#### 2.7 Expenditure

Budget is prepared on the basis of cost per diet and average number of patients admitted during the last financial year. The cost has been estimated for each vegetarian diet and each type of special diet. For adult, vegetarian diet per day costs Rs. 3.79 and for children, each vegetarian costs about Rs. 3.59.
The budget for the dietetic Department during last four years was allocated as the following:

<table>
<thead>
<tr>
<th>Year</th>
<th>Budget</th>
</tr>
</thead>
<tbody>
<tr>
<td>1985-86</td>
<td>Rs.24,00,000</td>
</tr>
<tr>
<td>1986-87</td>
<td>Rs.28,00,000</td>
</tr>
<tr>
<td>1987-88</td>
<td>Rs.35,00,000</td>
</tr>
<tr>
<td>1988-89</td>
<td>Rs.38,00,000</td>
</tr>
</tbody>
</table>

All the bills are cleared or paid by the Financial Section. No cash is handled by the dieticians.

2.8 Equipment

The following equipments are installed in the kitchen:

1. Dormant platform scale 1
2. Portable platform scale 1
3. Refrigerators 2
4. Potato peeler (small) 1
5. Food Trolleys 1 in each ward
6. Cooking range with oven 1
7. Chappati plate and puffer 1
8. Chappati plate 1
9. Chappati puffer 1
10. Geyser 1
11. Deep Freezer 1
12. Water cooler 1
13. Bainmarie 1
3. Conclusion

Based on the study of the department, the following conclusions are drawn:

Timings

The Dietetic Department functions in two shifts. The morning shift starts at 6.00 am and continues till 1.00 pm. The second shift which is known as evening shift functions from 1.00 pm to 8.00 pm. It was found that the morning tea is ready quite late i.e., at about 7.30 am. After that the bearers take it to all the wards for distribution and come back to kitchen by 8.30 am.

The breakfast is not ready before 8.30 to 9.00 am. The same bearers prepare their trolleys, load them with breakfast cans, bread, egg, cheese etc. and leave again for the wards for distribution. One bearer is supposed to take food to 5 wards. Therefore, by the time he reaches the last one, it becomes quite late for breakfast and food get cold. The preparation of lunch starts as early as 7.00 am. Four persons are engaged in making chappatis. And the other cooks start preparation of the items and special therapeutic diet. The head cooks are responsible for the preparation of food and dieticians supervise preparation of food items particularly the therapeutic diet very closely. The lunch is
The evening tea is prepared after the lunch hours of the kitchen staff which is ready by 3.30 to 4.00 pm. The evening duty start preparing food for dinner which is normally ready by 7.00 pm. The evening tea and dinner is prepared and distributed by the evening shift staff.

Distribution

Even though the preparation of diet for the whole hospital is centralised in the diet kitchen department the distribution of food to the patients is not fully centralised. The bearers from the kitchen carry food item as per the indent of each ward and handover that food to the sister in charge of the ward. The food then gets distributed to the patients in the ward by the ward boys and ayas on duty in that particular ward. Under this system, it was found that about 25% of the diet was wasted as some of the patients either take very little food or do not take at all because they get it from home. Fully centralised system of distribution of diet would have prevented this wastage.

At present patients are asked to bring their own plates
etc. for getting food. No hospital utensil/Thali is available for distribution of food in it.

**Physical Facilities**

There is no proper changing room for the kitchen staff. Ideally all the kitchen staff before entering the kitchen should take shower and change into fresh laundered uniform clothes. But there is no such facility available in the Department. Washing unit is also too small and inadequate for the washing large vessels and utensils. There is no proper record room resulting in inefficient storage and retrieval of records. No room is available for the interns and other trainees who are posted in the Diet Kitchen Department as part of their clinical experience. Even though a large number of patients from OPD are referred to the dieticians, no proper dietetic OPD is organised.

**Quality of Cooking**

The quality of cooking was found unsatisfactory, particularly of chappatis. As the chappatis are puffed on very high flames, the upper layer of the chappatis gets burnt while from inside these remain uncooked.

**Storage**

Proper storage especially for the fresh fruits and
vegetables was found lacking. NO cold storage is available for storing perishable items like milk, paneer etc. and only two refrigerators are provided for this purpose. Before storing, the physical verification for the quality of raw materials particularly for vegetables and fruits is not done adequately.

IV. CENTRAL STERILE SUPPLY DEPARTMENT

1. Introduction

The basic discoveries of causation and transmission of diseases by bacteria led to the development of aseptic techniques in the handling and sterilisation of equipment used in the surgical and medical treatment of patients. Sometimes in late twenties, the American College of Surgeons first started centralising all the surgical supplies and dressing in one unit for supply to the entire hospital.

The concept of centralised sterilisation took practical shape during the World War II when the need was felt in order to cater the requirements of sterile supplies for the mobile surgical units working in the forward areas.

Central Supply had to be instituted either as a independent unit or as an attached unit to large Base Hospital. The British Army established a surgical dressing
sterilising unit in Cairo as early as 1942 during the World War II. The first regular Central Sterile Supply Department in England was started at Cambridge in 1955. In America the development of CSSD took place much earlier than that in U.K.

In 1956, Government of India proposed to start a Central Sterile Supply Department in the Safdarjung Hospital. But it was started in the year 1957 under the guidance of Mrs. Bishop who was instrumental in establishing this CSSD.

Today the Central Sterile Supply Department is the most vital and important area of a modern hospital. It is responsible for processing, issuing and controlling of supply of sterilised materials to all the consumer units of the hospital.

Aims and objectives of this Department

The aim of a central sterilising department is to ensure that every sterile article used in for providing patient care in a hospital is, in fact sterile. The objectives are:

1. To promote and provide an efficient, economic and uniform source of sterile and other equipment.

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2. To assist the purchasing department in the selection and pretesting of goods.

3. To act as an adviser to the standardisation department testing efficiency and conformity to the prescribed standard.

4. To maintain and repair the equipment handled in the department.

5. To supply equipment to highly specialised units.

6. To provide training and education to the student nurses and other ancillary personnel and orientation to the newly appointed staff nurses.

7. To institute quality control measures and research.

8. To facilitate research activities for improving technique and quality.

Need for a CSSD in a Hospital

Centralisation of preparing packs for aseptic techniques and of sterilisation process has a number of advantages such as nursing time is saved, sterilisation is safer, can be more effectively controlled, reduction in cross infection may also be achieved etc.² The average can be mentioned as:

a) Increasing incidence of Hospital infection i.e.

infection acquired by the patients while they are in hospital, is a major problem encountered by present day hospitals particularly in the developing countries. It has been a steady drain on hospital purse and efficiency. Hospital infection can be divided into the following types:

1. Infections contained outside hospital and needed admission.
2. Infections acquired outside but clinically evident during patient's stay in hospital.
3. Infections contacted and clinically developed inside the hospital.

Every good hospital administrator tries to bring down the hospital infection rate.

In 1958, the Joint Commission of Accreditation of Hospitals and the American Hospital Association recommended that each hospital appoint a committee on infection invested with responsibility to investigate infections, establish surveillance programme and provide leadership and guidance.


for the prevention and control of infection. In the 1960's infection control committees were formed in many institutions and various approaches to infection surveillance were advanced. In 1970, the first international conference on Nosocomial Infections encouraged the development of infection surveillance programmes. During the subsequent period microbiologic environmental surveillance declined and almost disappeared from infection surveillance programmes. The WHO recently has undertaken a major initiative in the area of hospital infection control.

Hospital infection control programme is based on the three main elements viz.,

i) the development of an effective surveillance system,

ii) the development of policies to reduce risk of hospital acquired infection, particularly establishment of a well organised CSSD,

iii) and the maintenance of a continuing education programme for hospital personnel.


Maintenance of strict aseptic technique by using properly sterilised equipment in all diagnostic and therapeutic procedures including major and minor operations carried out in a hospital is an important step. A well organised central sterile supply department in a hospital would make it feasible.

b) By centralising the sterilisation of the equipment and material, the practice of sterilisation in respective wards/units would be stopped and the nursing staff would be relieved from this enormous workload resulting in substantial improvement in patient care.

c) Quality of sterilisation can be improved by establishing a centralised sterilisation system and standardised sterilisation techniques would be ensured. It is easier to monitor and keep strict quality control for a centralized department.

d) It is possible to ensure that handling of sophisticated equipment required for sterilization will be done only by specially trained persons if these are kept at one place.

e) In a long term perspective, CSSD will prove to be economical and cost-effective in many ways viz., reducing infection rate, the length of stay will be reduced, treatment will be cheaper and simpler requiring less resources etc.
2. **Location**

The CSSD should be so located that the major users e.g. wards, OTs, Labour Room and Laboratories etc. should be near or have a direct access to it. Inside the hospital, location should be selected in such a place where sanitary system is reasonably good and reasonably free with good lightings and ventilation. There should be easy access to the lifts and staircases and scope for expansion in future if required.

In the Safdarjang Hospital, the CSSD is located almost at one end of the campus and being a very large hospital and having a huge area, the distance between the CSSD and some units like the Emergency Department, Out Patient Department, some wards etc. is quite long. The Department is housed in a multistoried building on first floor. But there is a lift in the building which is mainly used for transportation of sterile and unsterile material from and to the CSSD.

3. **Space Requirement**

The minimum area requirement per bed is as follows:

<table>
<thead>
<tr>
<th>Bed Strength</th>
<th>Area sq.ft./bed</th>
</tr>
</thead>
<tbody>
<tr>
<td>75-99</td>
<td>10</td>
</tr>
<tr>
<td>100-149</td>
<td>9</td>
</tr>
<tr>
<td>150-199</td>
<td>8</td>
</tr>
<tr>
<td>200-249</td>
<td>8</td>
</tr>
<tr>
<td>250-300</td>
<td>7(^\frac{1}{2})</td>
</tr>
<tr>
<td>300 and above</td>
<td>7</td>
</tr>
</tbody>
</table>

---


9. Ibid., p. 399.
So in 500 bedded hospital the actual space requirement is 3,500 sq.ft. And for a hospital of about 1200 bed strength an area of about 8,400 sq.ft. would be required for establishing a well organised CSSD.

In Safdarjang hospital the covered area is of 10545 sq.ft. having dimension of 8 sq.ft. per bed for 1387 beds.

As per the minimum requirement given by J.R. McGibony 9,709 sq.ft. of area for this department would suffice. Therefore, the area of 10545 sq. ft. allotted to the Department is adequate.

This whole area is divided into various functional areas as follows:

1. Unsterile storage area.
2. Receiving counter and clean up area.
3. Needle and syringe processing area.
4. Lecture Hall.
5. Gloves assembly area.
6. Clean work and preparation area.
7. Special trays and preparation area.
8. Sterilization area.
9. Sterile storage area with issuing area.

The Physical layout of these areas is given in Fig.22.
FIG. No. 22.

PHYSICAL LAYOUT OF CSSD

- Unsterile Storage
- Needle and Syringe Processing Area
- Gloves Assembly Area
- Clean Work and Preparation Area
- Lecture Hall
- Special Trays and Preparation Area
- Issuing Counter
- Sterile Storage Area
- Sterilisation Area
- Changing
- Gauze Cutter
4. **Staffing Pattern**

The following factors were considered while preparing the staff requirement of the department:

a) Three shifts working pattern covering twenty-four hours of the day.

b) Leave reserve.

c) Maintenance Service.

d) Messenger Service.

e) Basic division and functional areas.

Categories of the personnel to be employed in CSSD are the following:

a) Supervisor with training and experience in CSSD

b) CSSD Technicians.

c) CSSD Attendants.

d) Messengers for wards and OT delivery.

e) Boiler attendants.

f) Clerk.

g) Safaikaramcharis.

In this department in Safdarjang hospital the present staffing pattern is given as follows:

1. Senior Technician Incharge 1

2. Technicians 7

3. Assistants 14
4. Nursing orderlies 12
5. Safaikaramcharis 5
6. Typist-cum-clerk 1

The overall managerial responsibility of the Department is on Deputy Medical Superintendent who is assisted in this job by an Assistant Medical Superintendent and advised by a senior anaesthetist.

5. Equipments

The equipments and machines installed and are in use in the CSSD are -

1. German Autoclaves 1
2. Rectangular sterilizers 2
   Automatic with timer control
3. Dry heat sterilizer 1
4. Gauze cutting machine 1
5. Needle sharpening machine 1
6. Suction machines 71
7. Boiler 1

6. Functioning

The CSSD in Safdarjang Hospital functions for twenty-four hours in three shifts. This Department prepares and caters almost all the necessary equipment to the concerned
unit of the hospital. All these are packed in disposable wrappers. These are mainly:

- Syringes 2, 5, 10, 20 and T.S.
- Dressing sets
- Dressing sets with sinus forceps
- Clip remover
- Eye sets
- Suture scissors
- Dressing bowls
- Ryle's tube
- Polythelin tube & Gloves pair

In addition to these, special trays for diagnostic and therapeutic procedures are prepared, sterilised and supplied to the concerned units. A list of all these special trays is given at Annexure XIV.

The approximate supply of sterile items per day to the concerned Department is as follows:

1. Syringes of all types 8000
2. Special trays of all types 300
3. Gloves pair of all sizes 1000
4. Dressing sets of all types 300
5. Dressing bowls 150
6. Scissors 100
7. Ryle's tubes 100
In addition to these the Department also carries out basic repairs of suction machines etc. to avoid work from being hampered.

Materials to all OTs including CGHS dispensaries and wards are sterilised in this Department everyday. The messenger service to the following departments is ensured everyday in both morning and evening shifts:

1. ICU.
2. Recovery room.
3. Injection room.
4. Children OPD.
5. Labour Room.
7. Emergency OT.

Besides these two shifts, at night the material can also be obtained if necessary.

In addition to the functions of supplying sterile material and equipments to the hospital, the CSSD also organises training programmes for the following:

- CSSD technicians
- OT technicians
- CSSD attendants etc.

It also organises refresher courses for nurses and
other staff members. It accommodates the students of Diploma in Hospital Administration course organised by the Institute of Management, YMCA, participants of one month Hospital Administration training courses organised by the NIHFW, B.Sc. and M.Sc. students of RAK College of Nursing, New Delhi etc.

7. Conclusions

On the basis of the informations gathered from the detailed study of the Department the following conclusions are drawn.

The location of the CSSD in Safdarjang Hospital is in one corner of the hospital with a long distance between the CSSD and some units. The sterile articles even though are packed get exposed to the environment while being carried from the CSSD to such units.

The physical layout of the department is done ideally on a horse shoe shaped design having reception counter for unsterile material on one end and the distribution counter for sterile material on the other end. But this effort of non-mixing sterile material with unsterile one goes in vain as these are transported by a common lift. Sometimes unsterile material brought to the CSSD for exchange with sterile one is not accepted by the CSSD and in that case the same messenger from the ward takes it back along with the
sterile supplies given to him, in the same trolley. The technicians and workers are supposed to wear a sterile gown over their clothes on entering the CSSD. But it was found that very few of them followed this system. Maximum negligence was found in packing drums. The materials for example Syringes, needles are not checked properly whether in working condition or not.

The quality of materials particularly the linen like towels, cover-sheet, gowns etc. which are sterilised and supplied to various units was not found satisfactory and upto the mark. Very often these are found wet inside the drums.

V. LINEN AND LAUNDRY SERVICES

1. Introduction

The importance of providing clean, adequate linen at regular interval at acceptable and reasonable cost to the patient by a hospital need to be emphasised. Attention to the personal needs and comfort of the patient is equally important as any other therapeutic measure including food service. Not only the general cleanliness, sanitation and upkeep of the hospital are maintained by providing properly washed and pressed linen, the comfort and cheerfulness of

the patients can also be achieved in the process. This creates an impressive appearance and generally adds to the reputation of the hospital. Besides aesthetic consideration, frequent change of linen and its effective washing considerably decreases the risk of infection in the hospital. Today, it is considered as one of the most essential service in a hospital. The Dhobi washing system has been proved to be poor, unhygienic, erratic and falsely economical. The mechanised laundry system is gradually replacing the dhobi system in most the hospitals.

2. Linen and Laundry Department

In Safdarjung Hospital, there is an established mechanical laundry for catering to the needs of the whole hospital.

Types of Linen

Mainly two types of linen is washed in the hospital laundry.

a) Linen used in critical and most sensitive areas like OTs, burns wards, new born nursery etc. which have got to be washed and sterilised.

b) Linen used in the wards, OPDs, clinics, kitchen etc. which has got to be washed and disinfected but need not be sterilised.
Objectives

To evolve a 'smooth linen supply' system to ensure supply of proper quality linen at the right place at the right time is the objective of this Department.

2.1 Physical Set-up

The Linen and Laundry Department in the Safdarjung Hospital is quite a large and busy one, handling about three to four thousand items per day. This number includes the number of dirty linen coming into the laundry for washing per day and the number of washed linen going out to the wards and various units in the hospital. Quantitywise, about two to two and half kilograms of linen per bed is washed everyday in the Laundry.

The executive responsibility of this Department is given to a Chief Medical Officer who is accountable to the Medical Superintendent. There is a functional supervisor who supervises the performance of all these staff and gets the work done in the Department. He is known as laundry supervisor.

According to Dr. J.R. McGibony the area for laundry for teaching hospital of 500 beds in India should be at least 6000 sq. ft.\(^2\) The space requirement for laundry department

\(2\) Ibid., p. 317.
is 12 to 18 sq. ft. per bed which comes to about 16,644 sq.ft. of area for the Safdarjang Hospital of 1387 bed strength. The area allocated to the linen and laundry department is about 10545 sq.ft. having dimension of 8 sq.ft. per bed. This is a big hall with two entrances from both sides. At one entrance on west gate is the reception centre for receiving dirty linen.

The Department is divided in two separate zones, the Dirty Zone and the Clean Zone. The Dirty Zone includes the area and functions of receiving dirty linen, sorting and classification of these linen, disinfection and preparation for washing. The dirty linen is received through the entrance to Dirty Zone and dumped for sorting. The sorted linen are classified as under:

a) Soiled linen.
b) Infected linen.
c) Fouled linen.
d) Infected fouled linen.

Each class of linen is further sorted and cottons are separated from woollens. All the linen are treated with chemicals for disinfection before put into the washing machines.

The area where the washing machines are installed is considered as the landmark between the dirty and clean zone.
The linen from the washing machines are transferred to the Clean Zone. The Clean Zone starts with the area where the calendar press and hand irons, the hydro extractor and drying chambers, the calender press and hand irons are installed. The linen, from the washing machine comes into these hydro extractor and drying machines. Some of the linen are put out in sun for drying in the backyard of the Department. After drying, the linen are checked for any hole or damages etc. If it is repairable then given to the tailor for mending and after mending the linen is sent back to dirty zone for rewashing. In case of irreparable damages are found, the linen are sorted for condemnation. The rest of useable linen are calendered and ironed as necessary. Normally the flat linen like bed sheets are ironed by calender press, the rest is done by manual ironing. Once the linen are ready for use, these are stored in a clean zone and distributed from the store to various units in the hospital. The distribution is done through the other gate at the opposite end of the receiving gate.

2.2 **Staff/Personnel**

There are various categories of trained personnel required to run a mechanised laundry. The company which supplies these laundry machines train the staff as operators.
for 6 months. Other helping hands posted in the laundry get trained while they are working in this Department.

There should be a technically trained laundry manager for an efficient operation of a laundry. In addition to the laundry manager, adequate number of personnel should be appointed to handle the anticipated work load. Numerous studies have shown that an average worker can take up the laundry work at the rate of 150 to 225 lbs. in the course of each 8 hrs shift.

In the Safdarjang Hospital there are nineteen operators for operating these machines in two shifts. One of them is head operator who is seniormost among them. Four laundry helpers are there to assist the operators in running the machines. For functioning of a mechanical laundry continuous supply of steam is necessary. To meet this requirement a boiler plant is installed within the laundry Department. For running this boiler plant four attendants are posted. In addition to these special staff one disinfectant operator, one aya, one orderly and three daily wages group D workers are posted in this Department. There are two supervisors for supervising their work. One of them is designated as assistant supervisor. A laundry mechanic is also appointed so that maintenance of these machines is done properly and
adequately. The staffing pattern of this Department is given in the Table No. 69.

Table 69

**Staffing Pattern in Linen and Laundry Department**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Staff</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Officer in charge</td>
<td>Chief Medical officer</td>
</tr>
<tr>
<td>2.</td>
<td>Laundry Supervisor</td>
<td>1</td>
</tr>
<tr>
<td>3.</td>
<td>Asstt. Laundry Supervisor</td>
<td>1</td>
</tr>
<tr>
<td>4.</td>
<td>Head Operator</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Operators (machine)</td>
<td>18</td>
</tr>
<tr>
<td>6.</td>
<td>Laundry mechanic</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Laundry helpers</td>
<td>12</td>
</tr>
<tr>
<td>8.</td>
<td>Boilers Attendants</td>
<td>4</td>
</tr>
<tr>
<td>9.</td>
<td>Disinfectant operator</td>
<td>1</td>
</tr>
<tr>
<td>10.</td>
<td>Aya</td>
<td>1</td>
</tr>
<tr>
<td>11.</td>
<td>Orderly</td>
<td>1</td>
</tr>
<tr>
<td>12.</td>
<td>Tailors</td>
<td>4</td>
</tr>
<tr>
<td>13.</td>
<td>Daily wages workers</td>
<td>3</td>
</tr>
</tbody>
</table>

2.3 **Equipment and Machines**

For an effective mechanical laundry, various machines performing different functions are absolutely necessary. The requirement of machines of different capacities has to be
calculated according to the weight of linen needed to be washed. It is always better to have washing machines of different capacities specially for larger hospitals. But it is economical to have 200 to 300 lbs of washer rather than smaller machines. Bigger machines give double output in the same working time. In the Safdarjang Hospital, washing machines and hydro extracting machines of different capacities are installed. The following machines are working in this laundry:

1. Washing machines
   - 200 lbs machine - 1
   - 150 lbs machines - 4

2. Hydro Extracting Machines
   - 50 lbs machines - 3

3. Drying machines
   a) Drying Tumbler (100 lbs) - 6
   b) One calender press 70"-80" roller
   c) Ironing machines ------ 4
      Steampress ------- 2
      Flat iron machines - 2

4. Sewing machine 2
5. Boiler 2
6. Disinfectant Plant 1
7. Water softening Plant 1
2.4 Functions

The laundry department functions in two shifts only. Morning shift works from 7.00 am - 2.00 pm the second shift works from 2.00 pm - 9.00 pm. At night it remains closed and no linen is supplied to any unit.

To the special units like OT, ICU, Burns & Plastic, Recovery Room etc. fresh washed and sterilised linen is supplied every day and to the other units it is supplied on alternate days.

The washing materials prescribed for washing 100 pieces of mixed clothes are -

- Soap 3 kgs
- Soda ash 6 kgs
- Bleaching Powder 200 gms
- Neel 60 gms
- Tinopal 5-10 gms

In case the linens are stained these must be removed at the time of washing.

2.5 Documentation of the Department

A number of registers are maintained for documentation of the work performed by the Department. These registers
provide useful information for the maintenance and planning for future. These registers are as follows:

1. Receipt register.
2. Distribution register.
7. Handling and taking over register.

2.6 Rules and Regulations

The Laundry Department functions only for two shifts. The ward linens are changed twice a week and the linens from special departments are changed daily.

The laundry bearers supply washed linen in exchange of dirty linen to ward No. 11, 12, 13, 14, 15, 16, 17 and to ward No. 2, 3, 4, 5, 6, 7, 8, 9, 10. For Ward No. 18 to 21 (Paediatrics wards), ward boys/ayas take the dirty linen to the Laundry Department and get them exchanged for washed linen daily.

3. Conclusions

During the study of the Linen and Laundry Department in Safdarjang Hospital it was observed that the laundry service in this hospital was not adequate for catering the
needs of such a large number of patients. The following aspects were revealed:

1. The quality of washing is very poor.
2. A very small number of linen is calendared.
3. Only a few of items are pressed.
4. Some of the machines are not fully utilised due to shortage of trained manpower. The maintenance of the machines is not satisfactory.
5. Automation is adopted partially.
6. The space allotted for this service is highly inadequate.

Besides these, the biggest flaw was that the dirty zone and clean zone are not separated or even demarcated clearly. The receiving area is so small that practically the dirty linens are sorted and classified in the main hall which is supposed to be clean zone. Washing machines are also installed along with the other machines in a common area. Not much attention was paid by any of the workers to prevent mixing up of dirty linen with the clean zone.

There is insufficient supervision and control over the staff working during various shifts. Even the ward sisters complained that very often the linen gets changed in the Laundry Department. Most of the time, torn damaged linen
are supplied. Darning and mending of the torn linen is very sparingly done.

The washing material prescribed for 100 pieces of clothes is absolutely inadequate both in quality and in quantity for hospital linen which get badly soiled.

Supply of washed linen to all the wards is done only twice a week, which is very inadequate and does not enable the sisters to change patients' linen as required. Most of the patients lie in dirty sheets. The bed linen for the patients are hardly changed in 7 to 10 days time.

The number of drying tumblers are not enough for drying the whole lot of linen washed everyday. The staff found the solution in drying the washed linen outside, which contaminates the washed linen as the environment within the hospital is not absolutely clean. During rainy season this problem gets so acute that to most of the wards, linen is not supplied for days together.

More manpower is required in laundry where complete automation is not adopted. The laundry supervisor-cum-manager is given dual responsibilities of Linen and Laundry and the CSSD of the hospital. Having such vast areas for supervision he is not able to do justice to the actual supervision of the staff.
The stock of linen is not centralised in the Linen and Laundry Department. Washed Linens are supplied only on exchange basis. The maintenance of linen is not taken care of by the laundry staff. No body checks the washed linens for any damage.