X-RAY

159 *VA Menon*: PLANNING FOR X-RAY SECTION
NTI Newsletter 1965, 2, 38-41.

Insufficient technical understanding, poor selection and poor planning result in procurement of X-ray equipments that breakdown quickly. Some **guidelines** are given in this article for **planning** and procuring x-ray equipment for district level hospitals. First of all, it is essential to have an X-ray room and a dark room ready before ordering the equipment. Otherwise, the equipment would lie in the sun and moisture leading to early repairs. The X-ray room should be at least **16 feet 20 feet with a ceiling height of 10-16 feet**. It should be painted with light shade of colour. Wooden panel shutters are advisable. Flourescent light is not recommended as it leaves an after-glow. Dark room should be adjacent to X-ray room with light tight windows and an exhaust. Powerline also should be ready before equipment is ordered. It is extremely important to check the **voltage drop** and electrical requirements of the equipment before ordering. It is better to order a machine which can tolerate a higher voltage drop as it will function more reliably under poor line conditions than the one which tolerates only a low voltage drop.

KEY WORDS: X-RAY EQUIPMENTS, PLANNING.

160 *VA Menon*: PROBLEMS OF MAINTENANCE OF HOSPITAL EQUIPMENT
J Inst of Engineers 1969, 49, 73-77.

In an investigation carried out at the instance of Government of India, Mr Ernbourg, W.H.O. X-ray Technician, in 1960-61 found that between 40% and 50% X-ray equipment are idle in Government and quasi-government medical institutions all over the country. This paper deals with reasons and suggests a remedy for improving the situation because when society creates an institution for delivering health care to the community, it expects the institution to give fair returns on the investment of resources. When facilities made available to such an institution are not put to use, when required, then the community suffers. One of the main reasons for non-utilisation of available facilities is the **unserviceable condition** of equipments. The main cause for this state of affairs is poor distribution and **paucity of maintenance facilities** available. These two reasons made servicing of equipment very expensive. Administrative constraints under which the institution delivering health care works, makes the costly service inaccessible to them or creates considerable delay in its

availability. Comparing the loss to the community due to idle equipment and cost of creating and running a cheap service organisation for maintenance of equipment, the latter appears profitable. On the basis of experience of X-ray equipment maintenance in NTI during the preceding period, the average cost per maintenance or repair services is worked out. By comparing it with cost of similar service available to an average institution it is shown that to effectively cover institutions over a wide area, a **cheap service organization** which has units distributed very widely in the country is required.

The estimated loss of Rs. 71 million can be brought down to 11 million with annual expenditure of only 7 million. Thus, a community can **gain** to the extent of **53 million** every year by way of better facilities. For this purpose an investment of 3.5 million is required on capital account for creating a training centre for maintenance personnel and 0.8 million for running it. Such a centre can provide the man power required for running a country wide service organization.

KEY WORDS: HOSPITAL EQUIPMENT, MAINTENANCE.

161 *VA Menon:* SOME TECHNICAL PROBLEMS CONNECTED WITH EFFECTIVE UTILISATION OF X-RAY EQUIPMENT IN NATIONAL TUBERCULOSIS PROGRAMME
NTI Newsletter 1970, 8, 88-93.

This paper highlights some of the Technical, Economical and Operational problems encountered in 1955-60 when the National Tuberculosis Programme was being evolved wherein considerable importance was laid on diagnosis of patients using mass miniature radiography. Technological imperfections seen were: 1) High breakdown rates of X-ray units 2) Though power supply was available, the **quality of powerline** was such that X-ray could not work satisfactorily in 75% of them. Moreover, running cost of X-ray unit when using petrol generator was very high. This can be reduced by connecting the unit to power supply. Reduced sensitivity and specificity of the X-ray is another operational deficiency. The number of suspects diagnosed was 7 times the actual number of cases and probably 60% of cases were being missed also.

In order to solve these problems, the suggestions given were 1) X-ray equipment capable of working from **low capacity powerlines** without loss in standard of performance is desirable. 2) Flouroscopic **image intensifiers** using solid state panels which are easy to operate and maintain can probably improve the reliability of flouroscopic examinations without increasing the radiation dose. 3) **Electronic contrast enhancement** of films are possible and this could improve the diagnostic reliability. Research is needed to improve contrast perceptibility without

increase in radiation.

KEY WORDS: X-RAY EQUIPMENT, UTILIZATION, CONTROL PROGRAMME.

162 *P Chandrasekhar*: RADIOLOGY OF CHEST - A BRIEF REVIEW
NTI Newsletter 1986, 22, 89-94.

Radiography is a commonly used diagnostic tool for diagnosis of tuberculosis. It is still widely believed that tuberculosis of the lung can be diagnosed by chest radiography alone. However, practical experience and number of studies have proved beyond doubt that no radiographic picture or pattern is absolutely diagnostic or typical of tuberculosis. There are many conditions of the lung which show similar radiographic appearance and can easily be mistaken for tuberculosis. On the otherhand, in a substantial percentage of bacteriologically confirmed cases, radiological picture either did not show a shadow or was judged as non-tuberculosis. Lesions being hidden behind other shadows e.g., of the ribs etc. may be one of the reasons. A comparison of large X-ray with MMR indicates that **large X-rays** are easily readable and have **low radiation** dose but are more expensive and occupy more space. The paper critically discusses the reliability of chest radiography also. The concluding remarks are as follows: 1) 20% of lung fields are hidden behind bones, heart, soft tissues, etc. 2) Activity of an X-ray lesions cannot be determined on the basis of single X-ray picture. Even sequential X-rays or repeated serial X-rays of the patient over a period of time have their limitations and is not fool proof. 3) Inter-individual and intra-individual variations in interpretations seriously affect the diagnosis. Both over-reading and under-reading are substantial. The latter can be improved to some extent by constant practice and experience in X-ray reading but cannot be eliminated entirely.

KEY WORDS: CHEST RADIOLOGY, X-RAY DIAGNOSIS.

163 *P Chandrasekaran*: SOME ASPECTS OF DARK ROOM TECHNIQUE INFLUENCING THE QUALITY OF MINIATURE X-RAY PICTURE
NTI Newsletter 1988, 24, 81-84.

The quality of X-ray picture depends on various operational factors starting from storage and loading of films upto the end product i.e., X-ray picture presented for reading. This article discusses some of the operational problems faced in maintaining the quality of the X-ray picture and how to overcome them. Factors that influence the quality are 1) Equipment with proper controls 2) **developing time**-6minutes developing time at 20° c is ideal for MMR. 3) good quality of developer 4) use of **safe light** which should be kept 1 meter away from tank 5) processing of film with standard **timer** with a margin of +1mt and 6) use of

timer and thermometer (10°-30°). It is observed that in many institutions and hospitals accessories like dark room timer and **thermometer** are not available and films are developed by inspection method.

(i) By observing time and temperature control with the use of dark room timer which rings at a set time and a dark room thermometer, we are sure of the final quality of X-ray picture. (ii) Avoid the inspection method of viewing the film which carries active developer chemicals on the film during development. This method of development reduces the quality of X-ray picture. (iii) Regular use of dark room timer, dark room thermometer in the dark room ensures a good quality of X-ray picture and thus avoids retake which means cost, time, waste of man-power and additional radiation exposure.

KEY WORDS: X-RAY QUALITY, DARKROOM TECHNIQUE.

164 *P Krishna Reddy*: MASS MINIATURE RADIOGRAPHIC ROLL FILM CASSETTE- MAINTENANCE AND REPAIR
NTI Bulletin 1993, 29, 13-16.

This paper discusses briefly the scope for handling the roll film cassettes, its maintenance and repair, under the National Tuberculosis Programme (NTP). The District Tuberculosis Centre (DTC) use the roll film cassettes (RFC) which are hand operated. There are three models: RFC-1, RFC-2 and RFC-3. The roll film cassette is meant to accommodate 70mm and 3mts length of oneside coated film which is meant to take **40 exposures**. One can take 45-50 exposures by using the leader and trailer portion of the film. Two types of films are used:one is acetate base and the other polyester base. RFC-1 is an old model and is not used now. RFC-3 is an improvised version of RFC-2 where the film is pressed more firmly so that blurred images do not form. It also has a **microswitch to notify the operator about the presence or absence of film in the cassette**. RFC is divided into three parts 1) film magazine 2) cassette frame and 3) housing. RFC is a costly equipment and should be maintained with care: free from dust, dirt, chemicals etc,. After prolonged use, (ie) 8-10 years, parts can wear out. At that time, it would be useful to contact NTI regarding servicing, replacement of wornout parts and repairs.

Since many moving parts are accommodated in a small space, removal, replacement and servicing of the RFC is a highly skilled work. It requires special talent, a mechanical eye and a knack to use tools.

KEY WORDS: ROLL FILM CASSETTE, MAINTENANCE.