Manpower Production for Radiographic Service with particular Reference to Basic Health Service

By: Mr. E. P. AKPAN, M.A., F.C.R., T.E. Fed. School of Radiography, Lagos.

1. INTRODUCTION:

Radiography in Medicine can be classified into three aspects namely:

(i) Diagnostic Radiography –
Administration of X-Rays and other forms of radiant energy to the patient in order to record diagnostic images of the internal structures and organs of the body for the purpose of aiding or confirming medical diagnosis. The recording media of the image may be X-Ray film, fluorescent screen, video tape, etc.

(ii) Therapeutic Radiography –
Administration of X and Gamma Rays and other ionising radiations to the patient so as to produce therepeutic effect in the diseased tissues.

(iii) Nuclear Medicine –
Use of radio nuclides (in vivo, in vitro) with related detectors to monitor the function and structures of the internal organs of the patient. The nuclides may also be used to produce therapeutic effect.

What is common to the three aspects, is the administration of ionising radiation to the living human body. This part of the practice forms the most responsible act in the art and science of radiography. In Nigeria, the diagnostic aspect is the most developed of the three. The therapeutic radiography is being developed and expanded in the Lagos University Teaching Hospital. Therapeutic Radiography can only be practised in large medical centres and cannot be considered for the Basic Health Service. I have no doubt that in future nuclear medicine will play a very useful role in Basic Health Service, but, at present, there are no facilities for the practice of nuclear medicine, even in our teaching hospitals.

I shall, therefore, restrict this paper to the Practice of Diagnostic Radiography.

2. SUMMARY OF JOB DESCRIPTION OF A RADIOGRAPHER AND REQUIRED SUPPORTING KNOWLEDGE:

The art of diagnostic radiography involves the following mechanics and sequence:

(i) **Reception of Patient and Interpretation of Written X-Ray Requests from Medical Practitioners –**

The knowledge required to perform these duties includes Human Pathology, Medical Terms and Medical Ethics.

(ii) **Identification and Anatomical Positioning of the Patient with a View to Examining Only the Part of the Body Indicated by the Condition of the Patient –**

The knowledge required to perform these duties, includes Anatomy, Physiology, Hosiptal Practice, Manipulation of the Equipment and Appreciation of associated Mechanical, Electrical and Radiation Hazards to Patients and how to eliminate or minimise these hazards.

(iii) **Calculation, Selection and Administration of Safe Level of Radiation Dosage to the Patients –**

The knowledge required includes Mathematics, Radiation Physics, Radio-Biology, Manipulation of potentially dangerous and very expensive Equipment and their measuring meters.

(iv) **Processing of the Exposed X-Ray Films, if X-Rays Films are used as the Recording Media –**

The knowledge required includes Photographic Chemistry, Darkroom Procedures and Operation of Darkroom Pieces of Equipment.

(v) **Assess the Diagnostic Value of the Radiographs (X-Ray Photographs) and Flouroscopic Image and to Carry out. Modified Examination if Necessary –**

The knowledge required includes Radiographic Anatomy, Radiographic Appearances, Pathology related to Radiography and Quality requirements of Radiography (Film Critique) and Pattern Recognition

(vi) **Assist in Administration of Contrast Agents during Specialised Procedures Including Intravenous Pyelography and Angiography –**

Knowledge required includes Human Physiology, Reaction to Contrast Agent, Nursing and First Aid.

(vii) **Care of the Equipment, Testing of the Equipment for Accurate and Safe Functioning and Recognition of Malfunctioning of the Equipment and their Accessories –**

Knowledge required includes the Principles of X-Ray and Electronic Circuitory and Principle of X-Ray Generation.

(viii) **Responsible for the Care of the Patients and Radiation Protection of the Patients, Staff and Members of the Public –**

Knowledge required includes Radio Biology, Radiation Dosimetry, Personnel and Equipment Radiation Monitoring Techniques and Radiation Physics.

(ix) **Take Charge of General Management of X-Ray Department Including Requisition for Equipment, etc., Stock Keeping, Documentation of Patients and Maintenance of Statistical Records –**

Knowledge of Departmental Administration, etc. is required.

3 RADIOGRAPHERS AND THEIR TRANING

Radiographers are generally trained to perform the duties listed in paragraph 2. If a Radiologist (a Medical Practitioner Specialised in Radiology) is not available, the Radiographer's duties and responsibilities are further increased, It is, therefore, necessary that whoever is called upon to accept these responsibilities must be adequately trained to perform most of the duties mentioned above efficiently and safely. I need not emphasise that radiation diseases are better prevented than be cured. The main object of any School of Radiography is to produce Radiographers with adequate theoretical knowledge and sufficient proficiency practical training as Radiography is a highly specialised practical subject. The less we know about the threshold dose that can cause genetic damage, the more there is need to make sure that there is no radiation abuse in the course of our work. Not only must the Radiographer be knowledgeable in Radiographic subjects, he must also be adequately educated to appreciate the limitations of his tools of profession and the possibility of increased population radiation dose should he be inefficient and negligent in his duties.

A number of countries such as Germany and other European countries authorised only registered medical practitioners to apply ionising radiations on patient and, until very recently, the medical profession resisted the establishment of Radiography as a recognised allied medical profession.

In Britain and all other Commonwealth countries, it had been accepted that Radiographers be adequately trained to administer radiations on the patients and were given the responsibility. Since Nigeria grew up educationally from Britain we have inherited her Radiographic training system, which has now been recognised as the best in the world.

With shortage of medical doctors in Nigeria I do not think it is wise to depart from the laid -down principle of training an educated person to perform the radiographic duties in the hospitals and clinics. Nobody should be shouldered with this responsibility unless he/she has acquired the necessary education and training. The present course of Radiography in the Federal School of Radiography aims at producing basic grade Radiographers with proficiency in diagnostics. The newly qualified Radiographers are expected to perform routine and basic radiographic techniques with minimum supervision. The practice of advanced techniques and procedures has to be supervised by more experienced Radiographers. The newly qualified cannot be proficient in all department of radiographic techniques. There is, therefore, the need for continuing education and training after the basic qualification.

(i) The Training of Radiographers can be Divided into Three Sections —
   (a) Theoretical Training.
   (b) Demonstrative Practical Training.
   (c) Proficiency Practical Training.

The three sections are undertaken simultaneously and, consequently, the practical work facilities, (demonstrative or proficiency) must be available to the School of Radiography To attain the standard of proficiency expected of a qualified basic grade Radiographer the student must produce at his final examination the proof of having performed a minimum of 1,000 radiographic examinations (aided and unaided) during the period of training. Radiographic educationists do not think that any lower standard of proficiency practical work is in the interest of patients and the population as a whole.

(ii) Summary of Entry Requirements to the Radiography Course—
   (a) Age — Must be 18 years of age in year of entry.
   (b) Education — G.C.E. passes in five subjects including two at Advanced Level. The five subjects must include English Language, Mathematics and One Science Subject preferably Physics or Chemistry.

OR

Equivalent in West African School Certificate (WASC) or Higher School Certificate (HSC).

   (c) Duration of Course — 36 months with 10 weeks holidays.
   (d) End of Course Certificate — Professional Diploma of the College of Radiographers, London (D.C.R.) and the Federal School of Radiography Certificate.

4. X-RAY TECHNICIANS AND THEIR TRAINING:

In late 1940s all Radiographers practising in Nigeria except one, were expatriates and with the expansion of Radiographic Service after the end of 2nd World War, the few available expatriate Radiographers could not cope with the service expansion. It was therefore, decided to start a local training to produce Radiography Assistants (X-Ray Technicians) to assist the few Radiographers. The candidates were recruited from Cambridge School Certificate holders with London Matriculation. There were few male nurses with less basic education, who received some radiographic training during the war and who were considered for the training also.

The facilities available in the country were inadequate for training fully fledged Radiographers. The School was therefore, treated as a Preliminary Radiography School for those with required entry qualifications into Radiography Course.

The training of an X-Ray Technician was designed to fit him into the role of "Assistant" and to work under intimate supervison of a qualified Radiographer. For example, he had no lectures in Pathology, Physics, Radiographic Anatomy and Appearances and, as such, he was not trained to interprete X-Ray request

forms, he could not assess the diagnostic value of his work and could not describe the radiographic appearances for anybody. He had intensive 6 months training followed by on the job practical training. He was, however, useful as an assistant after he had acquired adequate experience on the job and was never expected to take charge of X-Ray Departments or Installation.

He was very useful in the Darkroom. This type of training was discontinued in 1962 by the Federal Government in preference to producing fully-fledged Radiographers.

By 1962, it was accepted that Lagos and Ibadan had reasonable radiographic facilities to support one fully-fledged School of Radiography in Lagos or Ibadan. There were also Nigerian Radiographers capable of being trained to become Tutors in the School With establishment of the Medical College in Lagos, it was possible to obtain the services of rare personnel such as medical physicist, etc. It was also observed that the substandard training policy did not attract Nigerians eager to acquire life long profession with career prospect and, consequently, there was a very high wastage especially, when the Government could not obtain adequate places in United Kingdom Schools of Radiography for the able technicians to obtain full professional qualification. Infact, by 1962, out of 400 X-Ray Technicians trained since 1947 only 60 were left in service. The 60 included those technicians who had obtained the professional qualification and had been upgraded to rank of Radiographer. The effort in organising substandard training yielded very little result in provision of Radiographic Manpower.

It will be a retrograde step to go back to the training of the substandard trained "X-Ray Technicians". As can be seen their training cannot fit them into the role expected of the person to take charge of X-Ray Department in the remote hospitals or health centres.

In order to increase the productivity of X-Ray Departments it may be necessary to train specific technicians such as X-Ray Darkroom Technicians, Equipment Technicians and X-Ray Assistants, whose duties will be to relieve the Radiographers of those duties not carrying high risk and responsibility, such as film processing, equipment care and patient documentation. It will then be possible to recruit such trainees from Secondary Form Three up to West African School Certificate level and they can be trained on the job by qualified Radiographers.

5. TRAINING OF RADIOGRAPHIC PERSONNEL IN THE COLLEGE OF HEALTH TECHNOLOGY:

If the College of Health Technology is developed in centres with adequate "throughput" of radiographic examinations, the College can be used in trainingRadiographersand other radiographic personnel but if those Institutions are established outside centres with adequate radiographic facilities they can only be used for post-graduate or further education and training. I cannot say much about the use of this College in respect of production of radiographic personnel until the policy of the College is well explained. For example, it will be necessary to know the standard of entry qualification and the aim and object of the College as a whole.

My personnal view is that the funds should be used in training the highest grade of Radiographers. These Radiographers can, in turn, train their assistants, but it will be waste of funds if such investment is to produce "Assistants", who will have no trained personnel to assist and who may turn out to be a source of danger to the Nigerian populace.

6. BASIC HEALTH SERVICE AND RADIOGRAPHIC SERVICE

I understand that the reason for considering the retrograde step of re-starting the training of "Assistants" is to meet the demand in terms of manpower requiremets of the Basic Health Service. I feel that the manpower requirements could be met if the Government can be more serious in establishing Schools of Radiography in "fertile" centres of the country. I had suggested as far back as 1965 the establishment of "Group School" type of Schools of Radiography in Lagos, Ibadan, Kaduna and Enugu. Each of these Schools should be administratively autonomous and capable of using all radiographic facilities in its area, and should be adequately equipped and staffed to produce a minimum of 15 basic grade Radiographers a year and maximum of

60 a year. For example Lagos can support a 60 year basic grade Radiography Students and 10 a year post-graduate Radiography Students, while Ibadan can support a School of 30 basic grade students a year and Enugu and Kaduna may support 15 - 20 a year basic grade each, etc. There should be arrangement to exchange students where one School is inadequate in certain aspect of Radiography. Nigeria is radiographically too young to consider one hospital based School of Radiography. There is no single hospital in Nigeria that can support a 30 student a year School of Radiography. For example the Middlesex Hospital, London W.1. which has a student population of about 120 basic grade students and 20 post-graduate students had 177,000 radiographic patients in 1963. The number did not include examinations at satellite hospitals, such as Soho Hospital for Women, Royal National Orthopaedic Hospital, Institute of Research, and St. Mary's Hospital, Paddington, where the Middlesex Hospital School of Radiography send their students for practical work.

The largest single X-Ray Department in the country is Department of Radiology of University College Hospital, Ibadan and in 1974, the number of patients examined in the Department was about 60,000. Department of Radiodiagnosis in Lagos University Teaching Hospital handled about 40,000 patients in the same year.

To provide the Radiography Service for the proposed Basic Health Service, the Basic Health Service coverage should be mapped out and zoned out for Radiography Centres. Radiodiagnosis is of no use to any body unless the radiograph produced is of diagnostic value and can be interpreted. If the person in charge of X-Ray Equipment is "radiographically illiterate" and the Doctor in charge is relatively too inexperienced to appreciate the value of the radiographs produced, I wish to state that it will be unethical to subject the patients to irradiation. Rather than irradiate the patient to obtain inaccurate information, it is better to use conventional method of investigation.

There are many radiographic examinations being carried out in the country without the patient deriving any benefit from such examination, I feel the authority should discourage such practice. At present the whole population effect is minimal, but if we should instal 8,000 X-Ray Equipment in the basic health service the effect will be explosive and adverse.

If the centre is adequately equipped and staffed it will be possible to post a radiographer either at part-time or full-time basis to the centre. I do not contribute to the often repeated statement that a well trained Radiographer will object to working in the rural areas because he is well trained. The Radiographers object and rightly so, to being posted to a hospital with no electricity, no running water and consequently no infrastructure for the performance of his profession.

7. PROBLEMS MILITATING AGAINST TRAINING OF RADIOGRAPHIC PERSONNEL:

Besides lack of accommodation and practical work facilities the greatest constraint in training of radiographic personnel is lack of Tutors. Whether we decide to train X-Ray Technicians or Radiographers or both the problem of shortage of tutors must be solved.

In Radiography, to qualify and be certified as a Radiography Teacher a person must qualify and register as a Radiographer. After 4 - 5 years of post qualification hospital experience, he studies for the Fellowship Diploma Course. Since those courses are normally undertaken as in-service courses of training, most of the qualified teachers would have been promoted Senior or Superintendent Hospital Radiographers before acquiring the Teaching qualifications. In United Kingdom a Teacher is normally placed on the same salary as a Hospital Radiographer occupying the second promotion post e.g. Superintendent Radiographer. With Allowances, etc. the Principal of School of Radiography is normally ahead of Chief Hospital Radiographer in salary.

In Nigeria, the qualified tutor is placed on the same salary level as the newly qualified basic grade Hospital Radiographer. Even though this position has been improved in the University College Hospital School of Radiography by placing the Tutor on the same salary as the Superintendent Radiographer, the Federal Ministry of Health has refused to accept this relativity.

The salary grading has made it impossible to recruit Radiographers into the teaching service. The advanced qualification and increased experience expected of a Teacher must be recognised, if we are to produce the required number of Tutors for training the number of Radiographers this country needs.

8. ROLE OF THE UNIVERSITY IN TRAINING OF RADIOGRAPHERS AND RADIOGRAPHY TUTORS:

Britain started the training of Radiographers in single Hospital based Schools of Radiography in association with a chartered Professional Society, but that type of School had been developed to area Schools of Radiography. There are some Schools of Radiography located in Advanced Colleges of Technology, which had now been coverted to Universities. Whatever end of course certificate is obtained by the graduates in their individual School, the minimum professional qualification acceptable for employment as a Hospital Radiographer has continued to be the Professional Diploma of the College of Radiographers, London (D.C.R.), which is the recognised and national qualification in United Kingdom. This qualification has been adopted in all the Commonwealth countries including Nigeria. It is also recognised throughout the Radiography world.

Advanced courses leading to teaching qualification, administrative qualification and specialised qualification in such fields as Nuclear Medicine, Ultrasonics, Thermography and other specialised Procedures are available to Radiographers with minimum of 4 years of practice.

It may not be advisable for Nigerians to continue taking overseas qualifications. It is, therefore, necessary to set up a Statutory Board or Institute of Radiography in Nigeria, to certify and register Radiographers as well as maintain ethical standards in the Profession.

Owing to the attitude of Nigerian Civil Service Administrators, there is considerable agitation in all sections of Professions Allied to Medicine including Radiography that Professional Schools such as Schools of Radiography be merged with or related to Nigerian Univesities so that the graduates of such Schools can receive University degrees. Nigeria will not be the first to effect such arrangements. Examples can be found in United States, Canada, Australia, India, Ceylon, etc.

The agitation should not be ignored rather, the Nigerian Universities should look at the contents of both the Basic Diploma and the Higher Diploma Courses and grant them relative accreditation so that the holders of the qualification can benefit from University facilities and degree programmes as well as post-graduate teaching Diploma programmes. This may be a short cut to providing training programmes for Radiography Teachers locally.

With improvement in salary and job opportunity of Tutors, it should be possible to get the Universities to co-operate in training Tutors in sufficient numbers to staff our Schools of Radiography.

9. CONCLUSION.

I wish to conclude by saying that even United Kingdom with 10,000 Registered Radiographers will run short of Radiographers if there is a legislation to install X-Ray Equipment in every Surgery. We have to ask ourselves whether X-Ray examination with bed side portable unit is of any use to basic health practice. With my experience, I can state that such instalation is for satisfaction of sentiments and for statistical record and not for the interest of the patients.

The type of Radiographer for the basic health service should not only be well trained and qualified, but should have general post qualification experience and, in addition, be specially trained for basic health service work. I have in mind that such a Radiographer should be able to carry out minor repairs of his equipment, he should be able to carry out administration of certain contrast agents to patients and should be able to assist the relatively young doctors at the basic health centres to interprete the radiographs. I cannot see how untrained and a semi-illiterate person can fit into this role.

A Radiography Centre serving the basic health centre should never be equipped with only bedside portable X-Ray Units. The role of X-Ray service at the basic health centres is to assist in arriving at prompt and urgent diagnosis so as to guide the centre to either treat and discharge the patient or refer the patient to a larger hospital. In case of reference, the radiograph taken at the centre should be of such value that the patient will not be subjected to any more similar examinations, when he gets to the referred hospital.

The Radiographic Service should be able to relieve villagers of the trouble of going back to reference hospital for "follow up" medical

examination especially for such patients as Tuberculosis and Diabetic Patient, and patients with malnutritional complications.

The Radiographic Service should serve young children, and aged retired persons.

These duties cannot be efficiently carried out with a small portable X-Ray Unit meant to examine fingers, toes and those parts of the body where movements can be effectively controlled.