

Sudan University of Science and Technology

College of Graduate Studies



Evaluation of Diagnostic Radiologic Technology Services and Education in the Republic of Yemen

تقييم خدمات وتعليم تكنولوجيا الأشعة التشخيصية
بالجمهورية اليمنية

*A research Submitted for the Fulfillment of the Award of the Degree of Ph.D.
in Diagnostic Radiologic Technology.*

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Dedication

TO THE SPIRIT OF MY FATHER,

AS WELL AS MY MOTHER, WIFE, BROTHER AND

SISTERS

I DEDICATE THIS SEARCH

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Abstract

The importance of this study comes from being the first postgraduate study in Yemen at the field of Diagnostic Radiologic Technology (DRT). The purpose of this study is to evaluate the Diagnostic Radiologic Technology Services and Education in the General Governmental Hospitals (GGH) and Health Institutes. The study methods include the visits, the questionnaires, written examination and practical test.

It is clear from the health indicators the lack of health services in Yemen compared with low-income group countries, the number of available hospitals (55 hospital) is inconvenient with the population number, and found that Yemen need additional 17 hospitals, and the number of physicians/10,000 population equals 3, while the ratio in the low-income group countries equals 5, at the same time the number of beds /10,000 population in Yemen equals 7, although the proportion in low-income countries is equal to 10.

From the visits to the radiology departments in Sana'a, Aden, Taiz, Hodeida and Ibb GGH, the researcher found out that:

- The targeted GGH were 20 hospitals, these hospitals possess 120 medical imaging equipment, the large number of these machines are U/S machines (47 machines), followed by Radiographic machines, its number equals 35 machines. The focused GGH possess only 42 radiologists; 57%(24 radiologists) of the radiologists found in Sana'a. On other hand, it was

found that; the number of radiographers is 190 radiographers, 33% of them found in Sana'a, at the same time Diploma holders of them equals 121 radiographers (64% of the total number) and there is only one technologist with B.Sc. degree.

- The researcher found out that; in 43% (9 GGH) of the targeted GGH, there is no radiologists, and in 82% of the hospitals possess a radiologist, the radiologist don't diagnose radiographs. The radiologist in Yemen didn't take care in conventional radiography and concentrate his work in advance modalities especially U/S.
- At the same time 5% of the GGH (1 H.) without superintendent. And in the hospitals possess the superintendent, his responsibilities commonly didn't implement; for example 11% (2 H.) of them only follows and fills the records. Generally the administration procedures didn't implement in the selected hospitals; there is no administrative temple in all hospitals, box for opinions unavailable, in 9% of the hospitals (2 H.), the administration records and explanatory signs available.
- As the researcher found that; 72% (14H.) of the focused hospitals, there is no RP officer, but in all GGH the QA officer absent. By assessing the RP procedures, the researcher found out that; in 25% (5 H.) of the focused GPH, the TLDs unavailable, and in 30% (6 H.) of the GGH; the room shielding unsuitable. And during evaluation of the application of QA

procedures, the researcher found that; in all hospitals, there is no reject analysis, and QC tests absent.

The radiographers' evaluation which had done by written and practical tests, after a special agreement made with those who seat to these exams, the results of the exams were:

- 63.8% (44 radiographers) of the radiographers attended the written examinations, their number 69 radiographers, failed (gained less than 50 marks), and the least marks means were in RP, QA and radiologic physics. The examination attended by 43 Diploma holders, and 26 Intermediate Diploma holders, during assessing the marks mean for Diploma holders, the result was 51, while the marks mean for Intermediate Diploma holders was 23 only; there is significant statistical difference between Diploma and Intermediate Diploma holders results.
- Only 10% (3 radiographers) of the radiographers attended the practical assessment, their number equals 30 radiographers, failed (gained less than 50 marks). The practical assessment attended by 20 Diploma holders, and 10 low level certificates holders , by assessing the total marks mean for Diploma holders, it was equals 68, and the total marks mean for Intermediate Diploma holders was 50, and this means that; there was significant statistical difference between the Diploma holders and low level radiographers.

By evaluation the Institutes' Radiology Sections, the researcher found out that:

- The curriculum of Yemen institutes contains course specification, objectives, contents, reference, and describes the job description, but doesn't contain teaching and assessment methods. X-ray teaching department is absent in Ibb institute, but there is no phantoms for demonstration, the physics and QA lab are unavailable. Anatomy lab exists only in Hodeida and Aden institutes, while electronics and equipment labs exist in Sana'a institute. Sana'a institute is the ideal because it has a curriculum upgraded periodically, and it has adequate laboratories and libraries, at the same time the staff of the section have high qualifications and experience.

The researcher hopes that the research results of the study are taken into account to improve the diagnostic radiology services, which will reflect positively on the improvement of medical service in Yemen.

الخلاصة

تأتي أهمية هذه الدراسة من كونها أول دراسة عليا فوق البكالوريوس في اليمن في مجال تكنولوجيا الأشعة التشخيصية ، والغرض من هذه الدراسة هو تقييم خدمات وتعليم تكنولوجيا الأشعة التشخيصية بالمستشفيات الحكومية العامة والمعاهد الصحية ، وقد استخدمت أدوات مختلفة لجمع البيانات شملت الزيارات الميدانية باستخدام استمارات مسح وشطب خاصة بالإضافة إلى الاستبيانات والامتحانات الورقية والعملية.

وقد أوضحت المؤشرات الصحية نقص الخدمات الصحية في اليمن مقارنة بالدول قليلة الدخل، حيث أن عدد المستشفيات المتوفرة (55 مستشفى) لا يكفي مقارنة بعدد السكان ، واتضح حاجة اليمن لبناء وتجهيز 17 مستشفى إضافي ، كما أن نسبة الأطباء / 10000 مواطن تبلغ 3 ، مع العلم بأن النسبة في الدول قليلة الدخل تصل إلى 5، أما بالنسبة لعدد الأسرة / 10000 مواطن فيبلغ باليمن 7، بالرغم من أن النسبة في الدول قليلة الدخل تساوي 10.

ومن خلال زيارة أقسام الأشعة في المستشفيات الحكومية بالمدن المستهدفة (صنعاء ، عدن ، تعز ، الحديدة ، إب) ، وجد الباحث إلى ما يلي:

- عدد المستشفيات الحكومية بالمدن المستهدفة 20 مستشفى ، وهذه المستشفيات تحتوي على 120 جهاز أشعة ، واتضح أن العدد الأكبر منها هي أجهزة الموجات فوق الصوتية (عددها 47 جهاز) ، يليها أجهزة الأشعة السينية وعددها 35 جهاز، كما وجد الباحث أن عدد أخصائي الأشعة بالمستشفيات المستهدفة 42 أخصائي أشعة، 57% من هؤلاء الأخصائيين (24 أخصائي) متواجد في صنعاء . ومن جانب آخر وجد أن عدد الفنيين بالمستشفيات المستهدفة يساوي 190 فني أشعة ، 33% من هذا العدد موجود في صنعاء، وفي نفس الوقت اتضح أن 121 فني منهم من الحاصلين على الدبلوم في التصوير الإشعاعي كما لا يوجد إلا تقني واحد فقط من الحاصلين على البكالوريوس في المجال.

- وجد الباحث بأن 43% من المستشفيات المستهدفة لا يوجد بها أخصائي أشعة، ووجد أن نسبة 82% من المستشفيات التي يتواجد بها أخصائي أشعة لا يقوم فيها الأخصائي بتشخيص صور الأشعة السينية. و الواضح أن أخصائي الأشعة باليمن لا يهتم بالتصوير الإشعاعي ويركز بشكل رئيسي على وحدات التصوير المتقدمة وخصوصاً الموجات فوق الصوتية.

- وفي نفس الوقت وجد أن مستشفى واحد فقط (5% من المستشفيات المستهدفة) لا يتوفر به مراقب لقسم الأشعة، كما أن مسؤوليات المراقب في بقية المستشفيات وعددها 19 مستشفى لا ينفذ أغلب مسؤولياته، على سبيل المثال اتضح أن المراقب في 11% من المستشفيات (مستشفين) فقط يقوم بمتابعة السجلات وتعبئتها. كما وجد الباحث أيضاً أن الإجراءات الإدارية غير مطبقة بالمستشفيات المستهدفة، حيث لا يوجد هيكل تنظيمي للقسم في جميع المستشفيات كما لا يتوفر الصندوق الخاص بالآراء والشكاوى، كما أنه في 9% من المستشفيات المستهدفة وعددها 2 فقط تتوفر فيها السجلات الإدارية واللوحات الإرشادية.

- وجد الباحث أن مسئول الوقاية الإشعاعية موجود في 72% من المستشفيات وعددها 14 مستشفى، كما أن مسئول ضمان الجودة غير متواجد في جميع المستشفيات المستهدفة. وعند تقييم تطبيق إجراءات الوقاية الإشعاعية اتضح أن 25% من المستشفيات وعددها 5 لا يتوفر فيها أجهزة القياس الشخصية (TLDs)، كما أن 30% من المستشفيات وعددها 6 مستشفيات تشتكي من مشاكل في ترصيص غرف الأشعة. ومن خلال تقييم إجراءات ضمان الجودة فقد اتضح أنها غير مطبقة في جميع المستشفيات المستهدفة.

كما قام الباحث بتقييم معارف ومهارات فنيي الأشعة، وبعد استئذانهم وجد الباحث ما يلي:

- حضر الامتحان الورقي 69 فني أشعة ، وقد رسب منهم 44 فني (63,8%) حيث حصلوا على أقل من 50 درجة، وقد كانت أقل متوسطات درجاتهم في الوقاية الإشعاعية وضمان الجودة والفيزياء الإشعاعية. حضر الامتحان 43 فني أشعة من الحاصلين على الدبلوم في المجال و26 فني لديه دبلوم متوسط، وعند تقييم نتائجهم اتضح أن متوسط درجات الحاصلين على الدبلوم 51 درجة بينما متوسط درجات الحاصلين على الدبلوم المتوسط يساوي 23 درجة، وهذا يوضح وجود فارق إحصائي معنوي بين درجات المستويين المستهدفين.

- حضر الامتحان العملي 30 فني أشعة (44% من الحاضرين في الامتحان الورقي) ، وقد رسب منهم 3 فنيين فقط (10%) حيث حصلوا على أقل من 50 درجة. حضر الامتحان 43 فني أشعة من الحاصلين على الدبلوم في المجال و26 فني لديه مؤهل أقل من الدبلوم، وعند تقييم نتائجهم اتضح أن متوسط درجات الحاصلين على الدبلوم 68 درجة بينما متوسط درجات الحاصلين على الدبلوم المتوسط يساوي 50 درجة، وهذا يوضح وجود فارق إحصائي معنوي بين درجات المستويين المستهدفين.

وعند تقييم أقسام الأشعة بالمعاهد الصحية المستهدفة باليمن وجد الباحث ما يلي:

- مناهج المعاهد الصحية باليمن تحتوي على وصف المقرر وأهدافه ومحتوياته ومراجعته كما يذكر الوصف الوظيفي للحاصل على الدبلوم، لكن مناهجها تفتقر لذكر طرائق التدريس والتقييم، كما وجد أن معمل الأشعة السينية التعليمي متوفر في جميع المعاهد ما عدا معهد إب، كما أن الموديلات التشريحية المستخدمة في العرض العملي لمادة الأوضاع غير متوفرة في جميع المعاهد، كما أن جميع المعاهد تفتقر للمعامل الفيزيائية ومعامل ضمان الجودة، إلا أن معمل التشريح موجود في معهد الحديدة وعدن. و اتضح أن معهد صنعاء يعتبر المعهد المثالي حيث يمتلك مناهج يتم مراجعته وتطويره دورياً كما أنه يحتوي على معامل ومكتبة مناسبة، كما أن القسم يمتلك كوادر مؤهلة تمتلك خبرة تعليمية جيدة.

يتمنى الباحث أن يؤخذ بنتائج وتوصيات الدراسة لتطوير خدمات الأشعة التشخيصية، وهذا سينعكس إيجاباً على تطوير الخدمات الطبية باليمن.

Abbreviations

Abbreviations	Complete words
ARRT	American Registry of Radiologic Technologists
BSM	Barium Swallow and Meal
BSS	Basic Safety Standards
CPD	Continuing Professional Development
CT	Computed Tomography
DDR	Direct Digital Radiography
DRT	Diagnostic Radiologic Technology
GGH	General Governmental Hospitals
H.	Hospital
HIHS	High Institute of Health Sciences
HPC	Health Professions Council
IAEA	International Atomic Energy Agency
IT	Information Technologies
IVU	Intravenous Urography
JRCERT	Joint Review Committee on Education of Radiologic Technology
M.D.	Medical Doctor
MRI	Magnetic Resonance Imaging
NATEC	National Atomic Energy Company(Yemen)
NHS	National Health Service
NM	Nuclear Medicine
OSHA	Occupational Safety and Health Administration
PACS	Picture Archiving and Communication System
QA	Quality Assurance
QC	Quality control
RDPs	Radiology Department Physicians
RP	Radiation protection
RPAs	Radiology Practitioner Assistants
RRAs	Registered Radiologist Assistants
SRPE	Society of Radiology Physician Extenders
SUST	Sudan University of Science and Technology
TLD	Thermo-Luminous Detector
U/S	Ultrasound
UST	University of Science and Technology

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