

Comparison of Nuclear Medicine Radiographer and Nuclear Medicine Physician Reporting on ^{99m}Tc Pertechnetate Thyroid Scans: An Experience from Sudan

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Abstract: The growth in radiographer reporting practice over the past four decades has been necessary to deliver effective clinical imaging services, particularly in developing countries where there is a shortage of health-care personnel. The objective of this study was to assess nuclear medicine (NM) radiographer reports of ^{99m}Tc pertechnetate thyroid scans, with NM physician reports as the gold standard. The study involved statistical assessment of NM radiographer reports of 100 patients who underwent ^{99m}Tc thyroid imaging at the Department of Nuclear Medicine at the National Cancer Institute, University of Gezira, Sudan. Patients included 96 women and 4 men aged between 20 and 80 years. This study revealed that 96% of NM radiographer reports totally agreed, 2% partially agreed, and 2% did not agree with the gold standard. This study concluded that NM radiographer reporting on thyroid scans is accurate compared with NM physician reporting.

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1. Introduction

The increased role of the radiographer in image interpretation and reporting over the past four decades has been necessary to deliver and expand effective clinical imaging services in many countries, particularly in developing countries. It has been shown that there is a trend towards extension of the radiographer (technologist) role in many countries such as the United Kingdom (UK), Australia, and the USA (Smith, 2002; Swinburne, 1971; Robinson & Jackson, 1996; Price, 2001; Brayley, 2000; Cook et al, 2004). In the USA, development of the role of the radiologic technologist has been established since the American College of Radiologists (ACR) and the American Society of Radiologic Technologists (ASRT) established a joint statement, recognizing radiologist assistants (RAs) in 2003 (Paul et al, 2007; Williams & Short, 2004; ASRT Advanced Practice Advisory Panel, 2007).

The extension of the role of the radiographer is commonly occurring in three broad areas within the profession of radiography: radiographic administration, image reporting, and research (Cook, Oliver and Ramsay, 2004; Jones, 2000).

The image interpretation and reporting role has been recognized for a long time in diagnostic radiography (Price, 2001) since British radiologists suggested that radiographers report on radiographic images. Swinburne agreed with this and added that radiographer reporting would reduce radiologic service workload and increase job satisfaction, but

that formal training and education are essential to fulfill this role (Swinburne, 1971).

A “red dot” system was initially introduced in the radiographic reporting process, whereby abnormal radiological findings are marked by radiographers with a red dot to alert radiologists of potential pathology (Cheyne et al, 1987). Many published studies showed a high correlation between radiographer “red dot” results and radiologist reports (Kleeman & Egan, 1999; Haiart & Henderson, 1991; Tasker & Coulden, 2001).

In the UK radiographer reporting experience, radiologists were able to delegate reporting to radiographers (RCR, 1995; COR, 1997). This delegation was officially supported in a joint statement by both the Royal College of Radiologists and the College of Radiographers (RCR & COR, 1998). According to the joint statement, the delegated radiographer must receive adequate training and be competent before delegation can be applied (RCR & COR, 1998).

As is the case with diagnostic radiographers, nuclear medicine radiographers have been involved in reporting on nuclear medicine radiographs at varying levels of ability in routine nuclear medicine image procedures such as thyroid, bone, lung, and renal scans (Hogg, 1993; University of Sydney, 2001; Cowell, 2002).

Sudan has been a leading country in the region in training and education of radiography since the first school of radiography was established in 1932. The College of Medical Radiologic Sciences offers

BSc, MSc, and PhD degrees in diagnostic radiography, nuclear medicine, radiotherapy, and ultrasonography (www.sustech.edu). Ultrasonography was the field of radiography in which image interpretation started. Most of the graduates of this program are serving in rural areas, accounting for about 80% of the population (Ferraioli & Meloni, 2010; Kawooya, 2012; www.sustech.edu, 2014).

The purpose of this study was to assess nuclear medicine radiographer reporting on thyroid scans, compared to nuclear medicine physician reporting as the gold standard.

2. Material and Methods

The study was conducted at the Department of Nuclear Medicine at the National Cancer Institute, University of Gezira, Sudan, from September through December 2007, and involved 100 ^{99m}Tc pertechnetate thyroid scans from 96 female and 4 male patients aged 20–80 years.

The radiographer involved in the thyroid scan reporting was trained in Sudan, South Africa, and the UK. He had 10 years of radiographic experience and was awarded an MSc degree in nuclear medicine technology at the time of the study. He also completed a postgraduate certificate in nuclear medicine reporting at Salford University in the UK during the period March 2007 to December 2007; the present study was completed as part of an assignment required to successfully complete the program of the nuclear medicine reporting certificate. In this study, the candidate (the author) was required to complete reporting of 100 MDP bone scans, 100 thyroid scan, and 100 DTPA renal scan cases. The comparison of the radiographer's reporting on thyroid scans was started six months after the beginning of the course on nuclear medicine reporting.

The nuclear medicine radiographer involved in the study described the features of every thyroid image, indicated if the radiographs were normal or abnormal, and drew conclusions (Figure 1).

The nuclear medicine radiographer's report was compared with the gold standard, and comparisons were tabulated and analyzed. Reports benchmarked against the gold standard were classified into three groups: total agreement, partial agreement, and no agreement with the gold standard. Data were analyzed using SPSS software for obtaining frequency.

Formal ethics approval was not obtained, because there was no access to personal information of the participants.

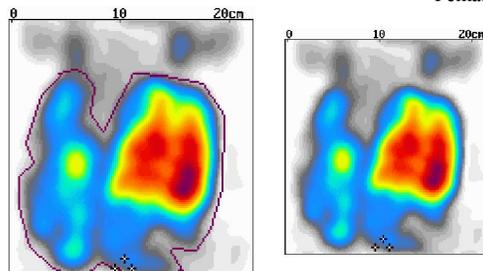
Study justification:

Clinical History and Justification of Procedure:

The patient is a 60-year-old woman with a history of thyroid goiter. The indication for requesting thyroid scan is thyroid nodular goiter.

THYROID SCAN

Age	60 yrs	Dosage	80.88 Ml
Code no.	T07-144	Date	99m
		Gender	2007.06.
			Female



THYROID UPTAKE: 2.95%

Nuclear Medicine Physician Report (Gold Standard):

Thyroid scan was performed with 80 MBq Tc-99m pertechnetate. Static view of the neck was acquired in the anterior projection about 20 minutes post-injection.

Scan shows hugely enlarged thyroid gland with irregular outlines and nonuniform radioisotope distribution. Retrosternal goiter noted. Whole-organ radiotracer uptake is within the normal range.

Opinion: Simple multinodular goiter.

Nuclear Medicine Technologist Report:

Thyroid scan was performed with 80 MBq Tc-99m pertechnetate. Anterior view was obtained about 20 minutes post-injection.

Scan shows enlarged gland, irregular outlines, and patchy distribution of radioisotope extending inferiorly. Whole-organ radiotracer uptake is within the normal range.

Conclusion: Simple multinodular goiter with retrosternal extension.

Figure 1. Sample of nuclear medicine physician report and nuclear medicine radiographer report on thyroid scan

3. Results

The 100 thyroid scans were perused by the nuclear medicine radiographer (technologist) and the reports compared with the nuclear medicine physician reports. Comparative analysis revealed that 96% of the NM radiographer reports totally agreed,

2% partially agreed, and 2% did not agree with the gold standard (Table 1).

Table 1. Nuclear medicine radiographer reporting on 100 thyroids scans compared with gold standard nuclear medicine physician reporting.

Nuclear medicine thyroid scan reports	Frequency of total agreement with gold standard	Frequency of partial agreement with gold standard	Frequency of no agreement with gold standard
	n (%)	n (%)	n (%)
	96 (96%)	2 (2%)	2 (2%)

4. Discussions

In assessing the nuclear medicine radiographer reporting on thyroid scans compared with nuclear medicine physician reporting as the gold standard, the results of this study showed a high accuracy (96%) (Table 1). Studies of many nuclear medicine and general radiography experts, such as those of Hogg, Ware et al., and Parkin et al., support these findings and have shown that radiographers are competent reporters. The College of Radiographers "Radiographer Reporting: A Vision Paper" states that the wider development of radiographers in reporting roles will bring enormous benefits to the patient (Hogg, 1993; Ware et al, 1995; Parkin et al, 1996).

The study results are in accordance with those of a study performed by Robinson and Jackson in which two radiographers undertook reporting of emergency imaging examinations in parallel with the radiologist. An analysis of over 500 cases showed no significant difference in accuracy compared with that of the radiologists (Robinson & Jackson, 1996).

This study concurs with a meta-analysis study performed by Brealey et al. that showed that radiographers compared well with the reference standard, reporting plain films with 92.6% and 97.7% sensitivity and specificity, respectively (Brealey et al, 2005).

Published data and literature suggest radiographers based in the UK, Australia, and South Africa have comparable results for accuracy and effective reporting of radiographs (Cook et al, 2004; Williams, 2006). Regardless of the differences in health systems among countries, radiographers in Sudan could be effectively used in a similar manner as a clinical tool to provide informed opinions where there is a shortage of radiologists, particularly in rural areas (Ferraioli & Meloni, 2010; Kawooya, 2012). The interpretation by radiographers is not an option for the future—it is a requirement to meet the needs of delivering health-care services to our community (Welsh, 2005; CoR, 1997). However, postgraduate

courses involving image interpretation should be encouraged, developed, and supported. To realize this type of role extension for radiographers, a more cooperative approach with the radiographers' professional organizations, health professional councils, universities, and legislation authorities needs to be developed (Cook et al, 2004; Williams, 2006).

5. Conclusion

The results of nuclear medicine radiographer reporting on thyroid scans showed a high level of accuracy compared with the gold standard; this finding may benefit the health-care system, particularly in developing countries where there is a shortage of trained nuclear medicine physicians. However, formal training is required to ensure safe practice.

Further research including intervention and control groups is recommended.

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