IMAGING MODALITIES: DO INTERN RADIOGRAPHERS PREFER ONE MODALITY OVER ANOTHER?

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Abstract

Background: Specialisation has been viewed as a necessity for increase in performance by professionals. Performance is known to be governed by preference thus a need to assess the preference of imaging modalities among Radiographers.

Objectives: To assess preference and factors that influenced such preferences of imaging modalities among intern Radiographers.

Methods: A self-structured questionnaire in line with the objective of the study was used as an instrument for data collection. Questionnaires were distributed among interns in a tertiary health institution and among those who attended CT run 1 in Abuja. Data was analysed using SPSS version 21. A p-value of 0.05 was adopted as a criterion for level of significance.

Results: The response rate to this survey was 92.4%. The preference of imaging modalities according to respondents is in this order: magnetic resonance imaging, computerised tomography and ultrasonography. The reason for this preference is mostly because of low technical know-how, low exertion of physical energy to acquire diagnostic images and less time associated with working with the imaging modalities. Preference has a strong positive correlation with accessibility (0.632; p=0.03) and functionality (0.713; p=0.01) of available imaging modalities.

Conclusion: Intern Radiographers prefer one modality over another. Less technical know-how associated with the modalities influenced this preference. Efforts should be made to make available functional imaging equipments and to enable Radiographers to have an unlimited access to available ones.

Keywords: Interns, Radiographers, Imaging modalities, Preference.

Introduction

Surroundings and upbringing in terms of geopolitical location, cultural background, religious beliefs and education can affect a person's preference. The above factors have been found to affect preference because repeated exposure to certain idea or concept correlates with positive preference [1]. Preference refers to an individual's attitude towards something which is typically reflected in an explicit decision making process [1]

Radiography profession started with the discovery of x-rays by Wilhelm Roentgen. Since then, there is increasing demand for accurate and quick diagnosis in line with current global evidence based medical practice [2]. In the past two decades, advances in technology and computing have expanded the frontiers of radiography as a profession. Now recognized as one of the fastest growing medical profession, radiography practice encompasses different imaging modalities. These include conventional radiography (diagnostic radiography), magnetic resonance imaging

(MRI), computed tomography (CT), sonography, radionuclide image (nuclear medicine) positron emission tomography (PET) and single photon emission computed tomography (SPECT), radiotherapy [3].

Evolutions of sub-specialties in a profession are often followed by training (education) programmes designed to enhance the capacity of would be specialists to successfully fit into specific subspecialties. In such countries as United Kingdom, subspecialties in the radiography profession include paediatric, forensic, mammography, CT, MRI, therapy, PET, SPECT, Industrial, academic and diagnostic radiography. With newer technological advances, Sonographers, for instance, now sub-specialise in obstetrics/ gynaecology, cardiovascular, abdominal, small body parts (superficial scanning) and skeletal imaging [3].

By specialising in preferred field, radiographers will develop more skills to be more effective in patient care. This could help to end the dearth of radiographers in clinical practice who possess higher qualification other than B.Sc, DCR or DIR [4] as they will see the need to acquire more relevant skills needed in clinical practice in their areas of preference. Specialisation in preferred field by Radiographers is therefore encouraged globally as sound reasons have been advanced for the extension of Radiographers' roles to complement those of radiologists [5].

A study by [3] to survey sub-specialty preferences of Radiography students at University of Lagos, Nigeria, found that awareness of sub-specialties in the Radiography profession was high among 4th and 5th year radiography students of university of Lagos, Nigeria. Sonography was the most preferred sub-specialty. Remuneration and availability were main attractors to sub-specialties. Fear of the effects of ionizing radiation and also concerns over physical exertions associated with some modalities were main detractors to some sub-specialties.

A study was conducted by [6] to assess barriers and incentives for choosing to specialise in mammography among Australian undergraduate radiography students. Students were asked to rank their priority of which they would want to specialise. From 248 students invited to participate, 101 students replied to the survey. Students indicated that they had been taught all modalities, however not all students had experienced them on clinical placement. Male students reported being discriminated against working in Mammography as it is a work for only females. Students have more clinical access to ultrasound, computerised tomography (CT) and magnetic resonance imaging (MRI). This appeared to be a major factor why student wish to specialise in these modalities. Role extension and higher wages were given as possible incentives that would make specialising in Mammography more appealing.

In their study, [7] compared the difference in career preferences between first and final Year medical students. They noted that the students of Dow medical college do have some preferences for their future fields of practice which they admitted to be influenced by some factors either personnel or social. The assessment of career preference of final year medical students of Ziauddin medical university by [8] among 232 medical students reported that students choose internal medicine, surgery and paediatrics as their first three career choices. Personal interest was ranked as most influencing factor that contributed to choice of specialty. [9] Studied factors associated with the specialty choice of Korean medical students. It was a cross-sectional survey of 9499 medical students. They reported that the order of preferred medical specialties was internal medicine, psychiatry, and paediatrics. For surgical

specialties, the order was orthopaedic surgery, general surgery, and ophthalmology. Medical specialties were most preferred by women and students in the third (men) and second (women) year of the medical program, whereas surgical specialties were most preferred by men and students in the first year of the program. Students in the third year mostly prefer non-clinical medicine. They concluded that medical college students had a stronger preference for non-clinical medicine than graduate medical school students.

A study by [10] to determine medical specialty choice and related factors responsible for these choices among 1223 Brazilian medical students and recent Doctors found that orthopedic surgery and psychiatrics has the highest positive responses. Financial reasons and personal interest were noted to be the highest factor influencing their choice of specialty.

Studying preference and reasons for such preferences among intern Radiographers may be a step toward addressing the dearth of clinical Radiographers with higher training in Nigeria [4] since, acquisition of more clinical relevant skills geared towards specialization will be encouraged. Radiographers want to gain professional autonomy which might call for specialization. Since preference governs specialization and hence performance [11], it is pertinent to examine whether Radiographers prefer one modality over another to necessitate specialization and hence higher performance. The findings may help the Radiographers Registration Board of Nigeria (RRBN) to make available continuous professional development (CPD) programs on all imaging modalities to enable interns Radiographers choose which one(s) they prefer.

Materials and Methods

This was a prospective cross-sectional survey carried out between July and August 2018. Consent was obtained before Interns were recruited into the study. Intern Radiographers in a tertiary health institution in south-eastern Nigeria and those that attended 2018 CT course Run 1 in Abuja who, were deemed to have adequate knowledge and clinical exposures to different imaging modalities in the profession, were enlisted for the study. Self-structured questionnaire designed in line with specific objectives of the study was used to collect data. Data was analysed using SPSS version 21 to determine the frequencies, percentages and mean of responses. A Pearson's correlation analysis was also carried to determine the relationship between preference, functionality and accessibility of imaging modalities. A p-value of 0.05 was adopted as a criterion for a level of significance.

Results

The number of questionnaires distributed was 92 but 85 were returned. This made it a response rate of 92.4%.

Table 1 shows functional modalities interns have been exposed to from their clinical posting till date. From the table the most functional were conventional x-ray 85(100%), followed by computed tomography 64(75.30%), while the least functional modalities are nuclear medicine 6(9.1%) and radiotherapy 14(16.5%). Orthopantomography is not available.

Table 2 above shows that the most accessible modality according to respondents was conventional x-ray 85 (100%), followed by computed tomography 64(75.30%) while Orthopantomography was not accessible.

Table 3 shows that the most preferred modality is MRI with mean and standard deviation of 3.69±1.542 and the least preferred is Orthopantomography with a mean and standard deviation of 1.65±1.268.

preference of modality were because of low technical know how of the modality and less time consumption in working with them. Being a modern age imaging modality is the lease reason that influenced preference.

significant positive correlation between the accessibility, functionality and preference of imaging modality. Also, there is a strong significant positive relationship between functionality and preference for an imaging modality.

Table 1: Modalities worked with during training

Modalities	Functional	Non-functional
Conventional x-ray	85 (100%)	Nil
Computerised tomography (CT)	67 (75.3%)	18 (21.2%)
Fluoroscopy	45 (52.9%)	40 (47.1%)
Magnetic resonance imaging (MRI)	35 (41.2%)	50 (58.8%)
Ultrasound	50 (58.8%)	35 (41.2%)
Theatre Radiography	16 (18.8%)	69 (81.2%)
Mammography	24 (28.2%)	61 (71.8%)
Radiotherapy	14 (16.5%)	71 (83.5%)
Nuclear medicine	6 (9.1%)	79 (92.9%)
Orthopantomography	Nil	85 (100%)

Table 2: Modalities accessed during internship training

Modalities	Accessible	Non-accessible
Conventional x-ray	85 (100%)	0 (0%)
Computerised tomography	64 (75.3%)	21 (24.7%)
Fluoroscopy	46 (54.1%)	39 (45.9%)
Magnetic resonance imaging	22 (25.9%)	63 (74.1%)
Ultrasound	55 (55%)	30 (30%)
Theatre Radiography	26 (30.6%)	59 (69.4%)
Mammography	23 (27.1%)	62 (72.9%)
Radiotherapy	8 (9.4%)	77 (90.6%)
Nuclear medicine	1 (1.2%)	84 (98.8%)
Orthopantomography	Nil	85 (100%)

Table 3: Most preferred modality by interns

Modality	Mean	Standard deviation
Conventional x-ray	2.64	1.542
Computed tomography	3.5	1.435
Fluoroscopy	2.71	1.479
Magnetic resonance imaging	3.69	1.589
Ultrasound	3.34	1.608
Theatre radiography	2.15	1.376
Mammography	2.66	1.680
Radiotherapy	2.34	1.547
Nuclear medicine	2.22	1.569
Orthopantomography	1.65	1.120

Table 4: Reasons for choosing the preferred modality

Reasons	Mean	Standard deviation
High remuneration	2.76	1.470
Non-usage of ionizing radiation	2.38	1.496
Low technical know how	3.46	1.350
Low time consumption	3.06	1.375
Low physical exertion	2.98	1.354
Modern age imaging modality	1.88	1.322
Imaging modality exposed to	2.56	1.451
Availability	2.86	1.449
High diagnostic precision	2.22	1.400
Opportunity to work with unfamiliar imaging modality	2.26	1.216
Accessibility	2.42	1.276
Functionality	2.29	1.289
High profit	2.09	1.359

Table 5: Correlation among accessibility, functionality and preference of imaging modalities

Variables	Functionality		Accessibility	
	R	p-value	r	p-value
Preference	0.713	0.009	0.632	0.028

r= coefficient of correlation. p= level of significance

Discussion

The Radiography profession has evolved so much in the past two decades as a result of technological advancements. This has culminated in the availability of many imaging modalities and has created room for sub-specialisation in the profession hence, necessitates the assessment of imaging modality preference among newly qualified Radiographers since preference governs specialisation and hence performance [11].

The findings of this study show that Intern Radiographers have preference for different imaging modalities in this order: Magnetic resonance imaging (MRI), Computerised tomography (CT), Ultrasonography, Fluoroscopy, Mammography, Conventional Radiography, Radiotherapy, Nuclear medicine, Theatre Radiography and Orthopantomography. On the trend of the most preferred modality in this study, ultrasonography was the least of them. This could be because Radiographers are restricted in the country of study to access the modality in government establishments were most of the respondents are doing there one year internship programme.

This preference shown by Radiographers is in conformity with the work of [10] were medical students and newly qualified Doctors prefers one specialty over another. Also, [7] noted that the students of Dow medical college do have some preferences for their future fields of practice in their minds which they admitted to be influenced by some factors either personnel or social.

In this study, MRI has the highest mean preference followed by CT and ultrasonography. The main reasons these were preferred is because they have low technical know-how, low exertion of physical energy to acquire diagnostic images, less time consumption required to operate

these imaging modalities and their availability. This is contrary to the work done by [3] where sonography was the most preferred, followed by MRI and CT. In the work of [3], remuneration and availability were main attractors to these sub-specialties. Fear of the effects of ionizing radiation and also concerns over physical exertions associated with some modalities were main detractors to some sub-specialties. On the factors that influenced preference, the present work and that of [3] agrees that availability of these imaging modalities mostly influenced preference.

The present study shows that the most accessible modality was conventional x-ray, followed by computed tomography. Contrary to this, [6] reported that students have more access to ultrasonography, computerised tomography and magnetic resonance imaging modalities and, this appears to be a major factor why students prefer these modalities. This discrepancy in both results could be as a result of different policies that govern imaging in the countries of study, accessibility and functionality of these equipments. However, inferential statistic in the present study shows that there is a strong significant positive correlation between the accessibility, functionality and preference of imaging modality. This shows that the more Radiographers access functional imaging modalities, the more they will prefer to work with them. This is therefore in tandem with the work of [6] where clinical access to ultrasound, computerised tomography (CT) and magnetic resonance imaging (MRI) appeared to be major factor students' wishes to specialise in these modalities.

Contrary to the report of this study, the report of the study by [8] among final year medical students of Ziauddin medical university shows that personal interest was ranked as the most influencing factor that contributed to choice of specialty. In the study by [12] personality trait is a typical intrinsic factor in the specialty choice. A study by [10] concluded that financial reasons and personal interest were the highest factor influencing their choice of specialty. This disagreement in the reports of these study could be as a result that this study was done among Radiography interns while the results of [8][10][12] was done among medical students of different countries

Conflict of interest: There is no conflict of interest associated with this work.

Conclusion

Radiographers mostly prefer MRI, CT and Ultrasonography. This preference is influenced mainly by less technical know-how, low time consumption, less exertion of energy associated with working with these modalities and availability of these imaging modalities.

Recommendations

Efforts should be made by Federal Republic of Nigeria through its health establishments to ensure adequate availability and functionality of different imaging modalities. Radiographers Registration Board of Nigeria should help to institute policies that will ensure unlimited accessibility to all imaging modalities by Radiographers to enable each person work in their preferred field.

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