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EFFECTIVENESS OF COMMUNICATION BETWEEN STUDENT RADIOGRAPHERS AND PATIENTS BEFORE, DURING AND AFTER RADIOGRAPHIC PROCEDURES

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ABSTRACT

Introduction. Effective communication during radiographic procedures has significant benefits such as enhancing patient understanding and adherence to treatment plans. At the University of Namibia (UNAM), radiography students receive didactic lectures and are exposed to the principles of effective communication during clinical placements. Students are expected to apply verbal and nonverbal communication methods to enhance a patient's experience in radiology departments. The use of ineffective communication methods may hinder patient outcomes and adherence to procedural instruction.

Purpose. To assess the effectiveness of communication between student radiographers and patients before, during, and after radiographic procedures.

Methods. A quantitative, cross-sectional and descriptive research design was utilised. A convenience sampling strategy was used to select first, second, third and fourth-year radiography students. Data were collected in three phases. Self-developed questionnaires and checklists were used to collect data.

Results. A total of 50 students (n=50) and 50 patients (n=50) participated in the study. Patients reported good communication skills: 1st years (84.2%), 2nd years (70%), 3rd years (85.7%), and 4th years (75%). There was no statistically significant association between communication skills and year of study (p=0.883), gender (p=0.495) and spoken language (p=0.357). Effective communication was noted during most interactions with patients. However, weaknesses were found in the communications methods used by the student participants before and after the radiographic procedures.

Recommendations. The study recommends that didactic lectures on effective communication should be complemented by using role play and simulation so as to further reinforce students' communication abilities. Proper clinical supervision and mentoring are also recommended to improve clinical training and monitoring with regard to effective communication.

Keywords: effective communication, student radiographers, simulation, mentoring

LAY ABSTRACT

Student radiographers' ability to effectively communicate with patients before, during and after radiographic procedures were evaluated.

INTRODUCTION

Radiographic procedures are complex and their outcome is dependent on the co-operation of a patient. Radiography is a scientific discipline in which radiographs are obtained of the anatomy and physiology of patients in order to manage their health conditions.[1] During radiographic procedures, it is a radiographer's responsibility to accurately position a patient, apply radiation protection measures, select suitable exposure factors, and give each patient appropriate instructions regarding the examination they are undergoing.[1] To fulfil this core function radiographers, including students, must possess, among others, interpersonal skills.[2] In radiography one essential interpersonal skill is effective communication. Communication can be described as a dialogue or a two-way process where information is exchanged from one person to another, verbally and/or nonverbally.[2-3] To communicate effectively, the main message between a sender (radiographer) and receiver (patient) must not be distorted by noise or interference as this may hamper the communication process and result in an incorrect interpretation of a message being conveyed.[3] It is therefore vital that a sender and receiver of a message understand each other.[4] Therefore, radiographers need to eliminate communication barriers because poor communication may lead to undiagnostic radiographs in terms of a lack of understanding by patients of what is expected of them. For

patients to understand, follow and adhere to instructions during these examinations, radiographers must communicate effectively with them. Adherence to procedural instructions minimises repeats as well as unnecessary radiation exposure to patients and radiographers. In more specialised procedures (e.g., fluoroscopy and excretion urography), the communication process usually starts days before the date of the respective radiographic examination. It is thus important that radiographers adequately explain the procedure and preparation to a patient. When communicating with patients radiographers must remain sensitive to their physical and emotional needs so as to contribute to the successful completion of radiographic procedures.[5] It has been reported that linguistic differences between patients and healthcare professionals may pose challenges such as ineffective and inequitable patient care. This can result in patient treatment and management errors as well as psychological stress among patients.[6] Literature further highlights that there are patient and healthcare professional-related factors that may hinder or facilitate effective communication. These factors include medical jargon, nonverbal cues (e.g., body languages, facial expressions), and patient disabilities.[7] A study found that although healthcare practitioners are trained to establish rapport and communicate effectively, they fail to use these skills when interacting with patients in a clinical setting.[7] Radiographers tend to use parental styles of communication when dealing with patients and these styles are commonly associated with practitioner-centred approaches which often result in non-compliance and communication failure.[8] Communication failures contribute up to 30% of all malpractice claims.[9] Students need to avoid medical jargon as it usually is not easily understood by patients.[10] In addition, educators and training institutions must teach students how to adapt their verbal and nonverbal communication techniques so as to accommodate different patient types.[11] Another major factor that could create a communication barrier is patient literacy. William, Moeller and Willis[12] highlighted that communication for patients with low literacy can be improved by encouraging patients to ask questions.

For radiographers to effectively communicate with patients and avoid medical errors they need to employ patient-centred communication strategies that show respect for a patient's autonomy and dignity.[13-14] Patients that understand instructions adhere to treatment plans and have better health outcomes.[14]

At the University of Namibia (UNAM), radiography students are exposed to the principles and methods of effective communication during clinical practice and these are taught in a first year module, methods of patient care and preparation. Students are expected to integrate theoretical concepts when they are doing clinical practice during workplace learning.

Radiography students at UNAM undergo clinical placement to gain hands-on experience in different imaging modalities including general radiography, fluoroscopy, mammography, mobile radiography, operating theatre radiography, and computed tomography, among others. The researchers observed evidence of poor communication between student radiographers and patients during routine radiography procedures. There is a paucity of research on the effectiveness of communication in the Namibian context and patient satisfaction with communication practices of student radiographers. It was against this background that the researchers decided to assess the effectiveness of communication between student radiographers and patients before, during, and after radiographic examinations.

METHODOLOGY

Ethical clearance was obtained from the research ethics committee of the School of Nursing at UNAM as well as the executive director of the Ministry of Health and Social Services. Permission to conduct the study was also granted by the chief radiographer in-charge at the selected radiology research site. A quantitative, descriptive and cross-sectional study was conducted. Participants (both student radiographers and patients) were recruited and included in the study. The desired representative sample size of the student population at UNAM in the radiography programme was calculated using Slovin's formula, where $n=N\div1+Ne^2$.[15] The target population for this study was all student radiographers registered at UNAM (N=71). Using a margin of error (e) = 0.05, the desired sample size was calculated as 60 students (n=60). A convenience sampling method was used to select student participants across the four-year groups as well as patient participants. Each student was paired with one patient thus the potential sample size of 60 was equal for both groups of participants. This was deemed appropriate as only one student observation was allowed to avoid familiarity bias.

Before participation, a briefing session was held with student radiographers in the morning before the day's work commenced. They were informed about the purpose, scope, benefits and risks associated with participation in the study. They were also informed that they would be observed during their interaction with the patients, and their conduct rated using a checklist. After the information session, students were invited to participate voluntarily and were informed that they could withdraw from the study without any repercussions. Fifty (n=50) students agreed to participate; they were asked to sign the informed consent form. Each patient was approached, as soon as they had completed the registration process in the x-ray department, and given an information sheet containing the purpose, scope, benefits and risks associated with participation in the study. All patients were informed that participation in the study was voluntary, and they had the right to refuse participation or withdraw from the study at any time without any consequences. Furthermore, they were informed that a student radiographer would be conducting their procedure under indirect supervision of a radiographer. For those patients who were not willing to participate in the study,

their x-ray procedure was attended to by a radiographer. Patients who agreed to participate in the study (n=50) then signed the informed consent form. The explicit details of the observation checklist were not shared with the students or the patients to minimise acquaintance bias. Patients who consented (n=50) were randomly paired to student radiographers who had also consented to participate (n=50) in the study. The anonymity of the participants was ensured by coding the questionnaire and checklist. No personal details of the participants were recorded. The collected data was also stored in a locked office and was only accessible to the researchers.[16]

Data were collected using a self-developed, self-administered questionnaire and observational checklist. The questionnaire and checklist were developed by means of a literature review,[17-18] as well as the opinions of lecturers teaching clinical modules. The questionnaire consisted of questions that were similar to those in the checklist. Two checklists consisting of three sections were used before (phase 1) and during the procedure (phase 2). Section A pertained to the demographic information of the student participants. Section B consisted of eight actions that were observed and evaluated by the researchers by indicating either yes or no for each action. Section C consisted of ten actions that were observed and rated using a five-point Likert scale with intervals of never, rarely, neutral, almost every time, every time (always); the researchers ticked the applicable point for each action. The questionnaire was used after the procedure (phase 3) and consisted of three sections of closed and open-ended questions. Section A pertained to the demographic information of the patient participants. Section B had twelve yes/no questions for them to answer in terms of the care provided during their respective radiography procedure. Section C had three open-ended questions where they were asked to rate their overall opinion of the communication skills used by student radiographers, as well as to state whether or not the communication skills of the relevant student needed to be improved. The rigour of the research instruments was tested by conducting a pilot study on ten students (n=10) using the same research protocol. The research instruments were then refined based on the feedback received from the pilot study participants. The results of the pilot study were excluded from the final data analysis.[19]

Data collection took place during August and September 2019 from 08:00 to 17:00 Mondays to Fridays when radiography students were in the clinical setting for workplace learning. Data were collected by one trained researcher (observer) to ensure consistency of observations. To minimise the effect of power relations between the researchers and the students, a final year student was tasked to conduct the observations. The data collection process was divided into three phases. Phase 1 (before the procedure) was observation of the communication process between each participant and their patient. Phase 2 involved observation of communication skills and methods used during the radiographic procedures utilising the checklist. Upon completion of the radiographic examination by the respective student-participant, a questionnaire was administered to the respective patient for completion (phase 3).

Statistical Package for the Social Sciences (SPSS) version 26 was used to analyse the data. Descriptive statistics were used to display data using frequency distribution tables and percentages. Initially, the chi-squared test was used to determine whether there was any association between the year (level) of study, gender, spoken language and communication skills of students. However, following the peer review process of the article it was pointed out that this may not have been the most appropriate statistical test to use due to the small sample size. Hence, the data were re-analysed using the Fisher's exact test to determine the above stated associations to enhance accuracy of our results. We therefore only report the Fisher's exact test results and not the initial chi-squared results. Results were considered statistically significant if $p < 0.05$.

RESULTS

Fifty students (n=50) consented to partake in the study. Demographic data of the student participants were captured: females (86%) and males (14%); median and standard deviation age were 20 years ± 2.3 years (n=50). Participants' year of study: 1st years (n=18), 2nd year (n=21); 3rd year (n=7) and 4th year (n=4). The mean and standard deviation age of the patient-participants was 34 years ± 15.8 years. The home languages of the participants (students and patients) are presented in Table 1. English is the official language in Namibia, but it was the home language of only 6% (n=3) of the student participants and 10% (n=5) of the patient participants.

Table 1. Home language spoken by student-participants and patient-participants

Home language	Student-participants n(%)	Patient-participants n(%)
English	3 (6)	5 (10)
Oshiwambo	27 (54)	22 (44)
Afrikaans	11 (22)	4 (8)
Otjiherero	2 (4)	8 (16)
Rukwangali	2 (4)	6 (12)
Shona	3 (6)	0 (0)
Shilozi	1 (2)	0 (0)
Subiya	1 (2)	0 (0)
Damara/Nama	0 (0)	4 (8)
Portuguese	0 (0)	1 (2)
Total	**50 (100)**	**50 (100)**

Students' communication skills observed before the radiographic procedure

Table 2 displays the communication skills observed before commencing radiographic procedures. Areas in which the participants performed sub-optimally were: addressing the patient with respect (38%), explaining the procedure clearly (46%), and encouraging patients to ask questions (24%).

Table 2. Observed communication skills before the radiography procedure

CRITERIA	YES n(%)	NO n(%)
Student addressed the patient with respect	19 (38)	31 (62)
Student greet the patient warmly and introduced themselves	33 (66)	17 (34)
The procedure was clearly explained	23 (46)	27 (54)
Avoided using any medical jargon	44 (88)	6 (12)
Treated the patient with dignity and respect	47 (94)	3 (6)
Student encouraged the patient to ask questions	12 (24)	38 (76)
Appropriate information was given to the patient e.g. putting on gowns	37 (74)	13 (26)
Waiting before and after the procedure was explained to the patient	40 (80)	10 (20)

Students' communication skills observed during the radiographic procedure

Table 3 presents the communication skills of the student participants during radiographic procedures. Less than half of the participants (44%) routinely explained to their patients the need and reason for the procedure and 16% did not provide this information to their patients. The majority of participants (90%) always communicated with patients in a language that they easily understood. Nonverbal communication was often used (56%). The majority of student participants (74%) also used alternative means to communicate with their patients to overcome language barriers. The vast majority (94%) always maintained an interpersonal distance appropriate to see, hear and talk to their patients whilst positioning and exposing during the procedures. The majority of participants also portrayed other communication skills measured as well (Table 3).

Patients' perspectives regarding students' communications skills after completion of the radiographic procedure

Table 4 displays the patient participants' perspectives regarding the communication skills of the students upon completion of their respective procedure. The majority (98%) perceived the student participants to be friendly and approachable, and 92% felt comfortable with them. A few (10%) indicated that they did not have a clear indication of what was expected of them. The majority of patient participants (80%) were of the opinion that they were presented with clear instructions during the procedure. Despite the use of a translator, 18% of them felt uncomfortable with the language used during the communication process. Sixty

Table 3. Observed communication skills during radiographic procedures

CRITERIA	EVERY TIME n (%)	ALMOST EVERY TIME n (%)	NEUTRAL n (%)	ALMOST NEVER n (%)	NEVER n (%)
Informing the patient what you are going to do to them	22 (44)	13 (26)	0 (0)	7 (14)	8 (16)
Had appropriate pitch	39 (78)	6 (12)	0 (0)	10 (10)	0 (0)
Spoke in a language that the patient could understand	45 (90)	2 (4)	1 (2)	2 (4)	0 (0)
Made use of nonverbal communication	28 (56)	16 (32)	0 (0)	3 (6)	6 (6)
The student was willing to listen to and assist the patient	33 (66)	13 (26)	2 (4)	1 (2)	1 (2)
The student paid attention to and acknowledged verbal cues	36 (72)	11 (22)	0 (0)	3 (6)	3 (6)
The student used other methods to make up for any communication barriers	37 (74)	6 (12)	6 (12)	0 (0)	1 (2)
The student maintained an appropriate distance	47 (94)	3 (6)	0 (0)	0 (0)	0 (0)
The student remained appropriately formal	37 (74)	10 (20)	0 (0)	1 (2)	2 (4)
Student had an appropriate speaking rate	41 (82)	9 (18)	0 (0)	0 (0)	0 (0)

Table 4. Patients' responses

STATEMENT	YES n(%)	NO n(%)
Did you find the student radiographer friendly and approachable?	49 (98)	1 (2)
Did you feel comfortable with the student radiographer?	47 (94)	3 (6)
Did you understand what you were expected to do before, during and after the procedure?	45 (90)	5 (10)
Was the procedure clearly explained to you?	40 (80)	10 (20)
Were you spoken to in the language that you felt most comfortable with?	41 (82)	9 (18)
Do you feel like you were given enough information that would have helped you to be more cooperative during the procedure?	46 (92)	4 (8)
Did the student radiographer pay attention to your personal needs and preferences	43 (86)	7 (14)
Did the student radiographer explain to you how long you should wait before the procedure?	26 (52)	24 (48)
Did the student radiographer explain to you how long the report will take?	30 (60)	20 (40)
Did the student radiographer keep you calm throughout the procedure?	42 (84)	8 (16)
Were the instructions given before and during the procedure clear?	45 (90)	5 (10)
Do you feel like you were treated fairly and with respect despite any barriers present between you and the student radiographer?	47 (94)	3 (6)
Did you feel free to ask questions?	45 (90)	5 (10)

percent felt that post-procedural instructions and waiting times were adequately explained. The majority (90%) also felt at ease to ask the student participants questions.

According to them the majority of students' overall communication skills were good (78%). The results per year group were: 1st years (84.2%); 2nd years (70%); 3rd years (85.7%); and 4th years (75%). Eighty-two percent of them indicated that the student participants' communication skills could be improved.

Associations between students' year of study, gender, spoken language and their communication skills

There was no statistically significant association between the communication skills of students and their year of study (p=0.883), gender (p=0.495) and spoken language (p=0.357).

DISCUSSION

Effective communication occurs when a meaningful message is passed on to a listener. Though healthcare professionals are trained to establish effective communication with their patients, they do not always implement the theory in practice to establish positive interactions with patients during medical procedures.[7] The student participants in this study were mostly females (86%). In terms of the literature, the gender of healthcare workers does impact on how they communicate with patients: females tend to be more empathetic and collaborative communicators compared to males.[20-21] Though the students went through the same communication training in the radiography programme at UNAM, the inherent nature of the different genders may affect how they demonstrate the same principles in practice. In this study, however, there was no significant difference observed in communication between different genders (p=0.495). Standardisation of communication training, including the use of standardised tools and simulation, has been recommended as ways to improve students' communication skills.[22]

Communication can be verbal or nonverbal. The former includes communication by word of mouth and the latter is through behaviour that creates or represents meaning.[23] In radiography, face-to-face communication with patients predominantly utilises both verbal and nonverbal techniques. Communication must also be effective so that patients can understand and follow instructions. This implies that effective communication affects good patient care and the quality of radiography services and procedures. Language barriers is one factor that can severely impede verbal communication between healthcare workers and patients.[17] The participants in this study spoke a variety of languages as per the Namibian demographics (Table 1). English is the official language but only a few Namibians speak it at home. This presents challenges in practice as interpreters have to be called in to relay instructions to patients which may compromise the effectiveness of communication. The use of interpreters may lead to loss of important communication vectors such as body language and facial expressions that may aid in establishing trust and rapport between healthcare professionals and their patients.[24] In addition, a sense of relationship can be ensured by the expressive use of face, voice, gestures and appropriate eye contact which can aid in the success of the procedure.[18] Some patient participants indicated that they were uncomfortable with the language used, even with the use of an interpreter (Table 4).

The students' level of study, which could have both negative and positive effects on communications,[21] did not affect the level of communication in the current study (p=0.883).

This is in contrast to findings in the literature where the experience of a healthcare worker was reported to influence communication skills positively especially in lieu of effective verbal communication.[25]

Communication that aims at establishing rapport, trust and respect is crucial in the healthcare professions.[26] It can influence both the success of treatment intervention and patient cooperation in terms of instructions. During radiographic procedures, communication occurs between a radiographer and a patient before the commencement of the actual procedure. The findings (Table 2) show that the majority of the student participants did not address their patient with respect (62%), did not explain the procedure clearly (54%), and did not encourage patients to ask questions (76%). This undermines the value of pre-procedure communication and compromises patient trust and may reflect a lack of patient respect. Student radiographers must develop an ability to utilise the relatively short patient encounter before the commencement of a procedure to establish patient trust and rapport.[27]

Effective communication during radiography procedures is possible when a supportive environment is established that minimises tension and shyness whilst encouraging patients to speak openly.[28] This is crucial as the success of a radiographic procedure depends on a patient's understanding and full cooperation with instructions.[8] Students must pause during the communication of instructions to allow patients to assimilate the information and ask questions when they do not fully understand the instructions.[29] Pre-procedure communication, therefore, becomes influential in the conduct of further communication and may ultimately influences the outcome of a procedure.

Effective communication is the hallmark of patient-centred care in radiography. It is based on a radiographer's understanding of patients' concerns, ideas, needs and expectations in the context of their physiological, psychosocial and cultural context to reach a shared understanding.[30] Radiographer-patient communication during a procedure should aim to explain a procedure to gain patient cooperation, allay patient fears and reduce anxiety associated with a procedure. It is meant to benefit a patient more than a radiographer, enabling patient-centred communication as opposed to practitioner-centred communication.[31] The majority of student participants demonstrated communication that was synonymous with patient-centred care (Table 3). This included a verbal explanation of a procedure in a language understandable by a patient (90%) while using an appropriate pitch (78%) and tone. In addition, the student participants demonstrated the desired anatomical position to their patients to enhance their understanding. This empowers a patient to effectively decide whether or not to proceed with an examination. Whilst the medical professions were generally paternalistic in the past,[32-33] effective communication during a procedure enables patients to fully exercise their autonomy and decide on their healthcare. However, as the main method of data collection in this study was overt observations, the Hawthorne effect cannot be entirely ruled out.[34]

The level of both patient satisfaction and compliance is related to the effectiveness of communication between a patient and practitioner. In radiography ineffective communication leads to poor compliance with instructions that can result in repeated procedures and unnecessary radiation dose to a patient.[35] It may increase patient anxiety and reduce their satisfaction with the care and service provided. This may extend to the period after the procedure when patients are waiting for their results. In this study, 40% of the patients were not informed of the waiting times for their results at the end of the procedure. This is a reflection of poor communication by student radiographers. If waiting times are not communicated properly, patients tend to be less calm and complain frequently.[36] Although most the patients rated the communication skills of the student radiographers as good, they also indicated there was a need for improvement in their skills.

CONCLUSION

Most of the student participants demonstrated effective communication during interaction with their patients. However, communication before the procedure appeared to be rushed and did not entirely satisfy all the required elements of effective communication. It is important that students understand the need for effective communication before a procedure and how it may affect patient cooperation and the success of a radiographic procedure. There appeared to be more focus on communication that occurs in the examination room during the radiographic procedure. Students demonstrated effective communication during the radiographic procedure which helped patient participants to clearly understand what was expected of them. This is important as it may help in reducing the number of repeated examination and unnecessary radiation dose. There also appeared to be minimal attention focussed on post-procedure communication as significant elements were poorly communicated to the respective patient after their procedure. The assessment by patient participants also indicated that though communication was good for most parts of the procedure, there is room for improvement by the student participants.

LIMITATIONS

The random pairing of students and patients could have changed the behaviour of students as they would have become aware that they were under observation. However, this Hawthorne effect was minimised by withholding the observation checklist from the students. Only one observer was used during data collection to limit inter-observer bias. Nonverbal means of communication was observed but not quantified in this study. This could be important as nonverbal communication maybe influenced by culture. Informed consent could have been obtained in a more secure and private office but none was available during the time that the

study was conducted at the research site. The researchers ensured that each patient participant was seated far away from other patients during the recruitment and data gathering process.

RECOMMENDATIONS

There is a need for improvement in communication education and training of radiography students. Techniques such as role-play and simulation can be used to teach and observe communication in a controlled setting which allows for repetition and reinforcement. Special focus must be placed on communication that occurs before and after radiographic procedures to ensure that all elements of effective communication are practiced appropriately. Close supervision and mentoring in clinical practice is also recommended to improve clinical training regarding effective communication. It will also enable areas of shortcomings to be identified early and corrective action to be taken in time.

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AUTHORS' CONTRIBUTIONS

JN conceptualised the study, did the literature review, collected and analysed data. ED supervised the study, assisted with the literature review, assisted with data analysis and prepared the manuscript. AK assisted with the literature review, data analysis and preparation of the manuscript. AK and ED finalised the manuscript and guarantee the integrity of the study.

CONFLICT OF INTEREST

None to declare

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