

THE ROLE OF HEALTH MANAGERS IN PROMOTING MEDICAL PHYSICISTS IN AFRICA

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Abstract - Background: The International Atomic Energy Agency (IAEA) has greatly improved the training of Medical Physicists and radiation scientists in African. It is mandatory for each member state to have a regulatory body. In hospitals, with the support of the Health managers, it is the work of the Medical physicist to ensure safety and protection. However, the regulators should over see as a national body. Collaboration among the Medical Physicists, hospital managers and the regulators is critical. This research aimed at analysing the current scenario and collaboration among regulators, Medical Physicists and hospital managers in the safe use of ionizing radiation in medicine in Africa.

Objectives: To assess the current levels of participation and collaboration among regulators, Medical Physicists and hospital managers in the safe use of ionizing radiation in medical Practices in Africa.

Methods: The study was conducted by Federation of African Medical Physics Organisations (FAMPO) during two independent foras. Two questionnaires were designed and used. One to 25 participants from the regulatory bodies during the Regional (AFRA) Training course held between 20th -24th February, 2012 in Gaborone Botswana . The second was to 11 medical Physicists during the Africa Radiation Oncology Group (AFROG) conference held between 20th -24th February, 2012 in Kampala Uganda.

Results: Several gaps exist among the regulators, medical physicists and hospital managers. Training of medical physicists and regulators has been done by the IAEA with little support from the Health managers. Few member states have medical physics and radiation protection associations' responsible for their recognition.

Conclusion: To bridge the gaps, existing qualified Medical Physicists should inform the health managers and policy makers about the role of the Medical Physicists. Through these medical physicists, associations like FAMPO should bridge the gaps using different foras. More training centres for medical Physicists and other radiation scientists should be established.

Keywords: FAMPO, Medical physics, regulators, Africa, Training

I. INTRODUCTION

FAMPO is the "Federation of African Medical Physics Organisations that was established on 7th October 2008 with the aims and purposes of promoting improved quality service to patients and the community in the Africa, promoting the co-operation and communication between Medical Physics Organisations in the region, and where such Organisations do not exist between Individual Medical Physicists, promoting the profession and practice of medical physics and related activities in Africa, promoting the advancement in status and standard of practice of the medical physics profession, promoting and improving the training of Medical Physicists, promoting research and developing in the field of Medical Physics, promoting appropriate use of technology to the benefit of rural populations, organizing and/or sponsor international conferences, regional and other meetings or courses and collaborating or affiliate with other Scientific Organisations. The Federation extends its activities throughout Africa and local Islands in the Region [4]. FAMPO's activities can be got on the website <http://www.federatio-fampo.org>.

During the Third African IRPA Regional Congress (AFRIRPA 2010) that was held from 13th -17th September, 2010 in Nairobi Kenya, several issues were discussed between FAMPO and other parties [7]. These included IOMP, IRPA, WHO, participating medical Physicists and other radiation protection stakeholders. Among the Issues discussed activities In line with FAMPO's objectives were to be carried out according to FAMPO's work plan.

Although there has been growth in the number of radiological and therapeutic facilities in Africa, with an increase in the training of other relevant personnel like radiologists, oncologists and radiographers, these centres still have very few academically and clinically trained medical physicists. This growth has not been matched by growth in manpower in the medical physics speciality[1,2]. What is the current situation?

In all matters of FAMPO's activities, stake holders should be involved. This will be a quicker, easier and transparent procedure to drive the systems especially with our governments to include hospital managers and regulators. IOMP is in position to support most of the activities. However, the initiative is in our FAMPO's hands[1,2]. What is the level of collaboration?

It is very difficult to work with whoever is not known to you. Thus FAMPO should create a data base to improve their functioning. This should involve: Identification of all medical physicists and their addresses in Africa, identification of all centres of radiotherapy, Nuclear Medicine and Diagnostic Radiology in Africa, identification of the type of equipments and sources used in these centres [5,6]. This information can be used as a base line for training by assessing demand and deployment of medical physicists in individual African countries.

Countries to carry out local training of Medical Physicists in Africa should be identified and put in place measures to allow retention of the trained personnel in their respective countries. FAMPO should take an initiative to incorporate the governments through its council representatives [7].

Through IOMP, manufacturers should be contacted to participate in local training of medical physicists. It is FAMPO's responsibility to identify countries where such short and long term training should be done in Africa. To cut on costs of training, countries should share training resources. Where are the trained and qualified MP and other radiation Scientists in Africa and which countries should take up the training? [7]

Young medical physicists have been ignored and left unattended to by qualified senior ones in their countries. Very little or no information is given to them about training opportunities, congress attendance and whatever is happening in the field of medical physicists. Can FAMPO act as a disseminating desk?[9].

The regulatory bodies/ NLO / project coordinators have nominated wrong people to always attend medical physicist's foras. These include relatives and friends. Can FAMPO have a way of dealing with this through the council members from individual countries to support in training and put in place measures for retention?

Could there be collaboration between FAMPO and IRPA to train medical physicists in Africa in radiation protection? Can an alliance be formed to solve the problem of man power especially in handling the work of Radiation Protection Officers (RPO) in hospitals?

Could there be a link between FAMPO and other Medical Physics Organisation from other continents? .This

can be an opportunity to compare notes and also learn from how other association execute their activities to success [7].

Could FAMPO have a link in establishing radiation protection units in hospitals through their Council members. This will improve on communication and ALARA network with other associations in individual countries and among countries.

Haven't MP and radiation scientists in Africa conducted research? FAMPO to encourage research and encourage posting all data collected regarding ionizing radiation on the UNSCEAR website through the correct government channels. This should be a collective effort with other related fields. Dissemination of conferences should be the role of every one.

MP being part of the medical profession, has there been a link with WHO? WHO is in position to support FAMPO in local training of medical physicists to increase on the qualified radiation experts to manage and participate in patient care. With collaborations between FAMPO and WHO, IRPA, IOMP, IAEA and machine vendors, well qualified expertise in MP and other related radiation sciences will be achieved. It is very difficult to equip centres with equipments without having well qualified man power [3,8,9]

II. AIM OF THE STUDY

This research aimed at assessing the current levels of participation and collaboration among regulators, Medical Physicists and hospital managers in the safe use of ionizing radiation in medical Practices in IAEA member states in Africa.

Objectives of the study

1. To identify the training gaps of MPE/QE/ RPO in radiation protection and safety in IAEA African member states.
2. To identify countries with recognised professional bodies governing medical physicists and other radiation protection personnels in IAEA African member states.
3. To establish the current situational analysis of the communication links among Medical Physicists, facility manager and Regulators during management of radiation protection aspects in Medical Practices.
4. To assess the level of involvement of medical physicists, regulators and hospital managers in safety of Medical Practices.
5. To identify the challenges faced by Medical Physicists and regulators when conducting their

work in medical practices in IAEA African member states.

III. METHODS AND MATERIALS

The study was conducted by the Federation of African Medical Physics Organisations (FAMPO) Executive members during two independent foras. Two questionnaires tailored among regulators, Medical Physicists and hospital managers in the safe use of ionizing radiation in medical Practices were designed. One was addressed to 11 medical Physicists that participated during the African Radiation Oncology Group (AFROG) conference held from 20th -24th February, 2012 in Kampala Uganda from eleven countries ie Morocco, Egypt, Kenya, Zimbabwe, Ghana, South Africa, Uganda, Zambia, Cameroon, Tunisia and Mauritius. The second was used to 25 participants from the regulatory bodies of 15 different IAEA African member states that represented their countries during the Regional (AFRA) Training course for trainers in the use of ICT teaching materials in radiation protection held between 20th -24th February, 2012 in Gaborone Botswana and participating countries included; Tanzania, Morocco, Ghana, Niger, Kenya, Botswana, Mali, Nigeria, Egypt, Zambia, South Africa, Sierra Leone, Mauritius, DR. Congo and Uganda.

The questionnaire was used to obtain data on: identifying the training gaps of MPE/QE/ RPO in radiation protection and safety in IAEA African member states, identifying countries with recognised professional bodies governing medical physicists and other radiation protection personnels in IAEA African member states, establishing the current situational analysis of the communication links among Medical Physicists, facility manager and Regulators during management of radiation protection aspects in Medical Practices, assessing the level of involvement of medical physicists and regulators in Medical Practices and identifying the challenges faced by Medical Physicists and regulators when conducting their work in medical practices in IAEA African member states. The data collected was analysed and to be used to improve on the functionality of FAMPO in achieving its objectives.

IV. RESULTS AND DISCUSSION

A. Training gaps of MPE/QE/ RPO in radiation protection and safety in IAEA African member states.

To assess the training gaps of MPE/QE/ RPO in Africa, the qualifications, working experience and centres of training of medical physicists and regulators were analysed.

A.1 Qualification of Medical Physicists and Regulators in IAEA African member states

Figure1 and 2 show the percentage distribution of the current qualifications possessed by medical physicists and regulators working in African hospitals respectively. 9% of the medical physicists have a Bachelor of Science degree in physics, 45% have a Masters degree in Medical Physics and 46% have a PhD in Medical physics.

There is a big divergence among the highly and least qualified Medical physicists in Africa. Identification of the 46% PhD holders and 45 Masters Holder in the area of MP is a key aspect for FAMPO to increase local training of lower but competent carders in MP. This is a cheaper and efficient way once we have well equipped training centres in all areas of Medical practices. It is very difficult to equip centres with equipments without having well qualified man power. This will increase on machine down time, loss of funds by governments, more accidents and incidents. Therefore, training of medical physicists in Africa should be supported by all stake holders.

On the other hand, 40% of the Regulators have a Bachelor of Science degree in physics, engineering or chemistry, 32% have a Masters degree in Physics, engineering or chemistry and 28% have a PhD in similar areas. This shows a uniform distribution of carders at all levels of qualification which is not reflected in the MP Field. However, the diversion of the employed RPO's in different subject matter has presented a problem especially when inspecting Radiotherapy Medical Practices due to lack of training and expertise.

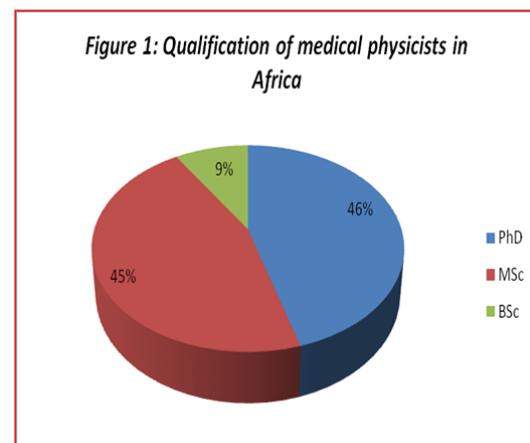


Figure 2: Qualification of RPO's in Regulatory bodies in Africa

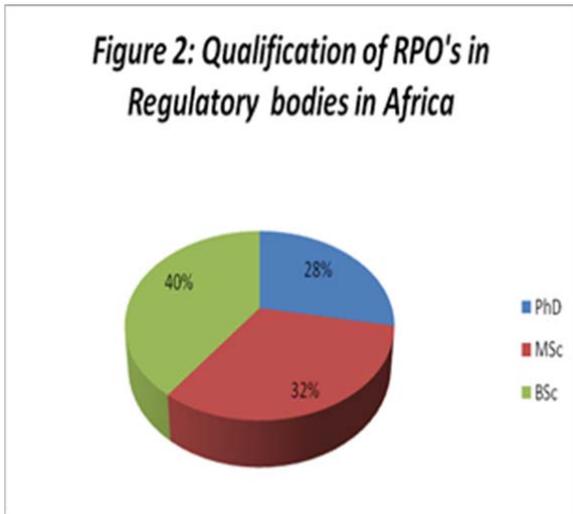


Figure 3: Working experience of MP in Africa

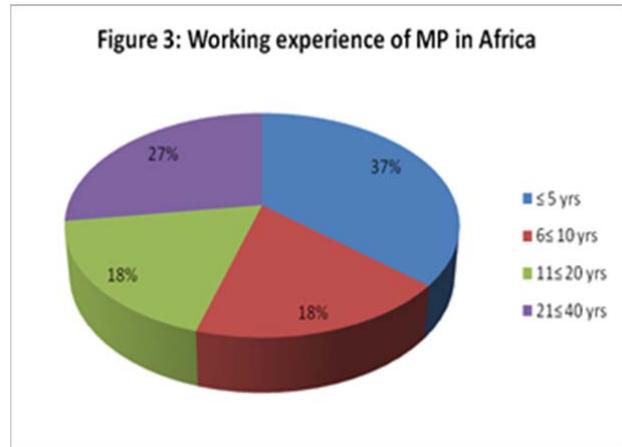
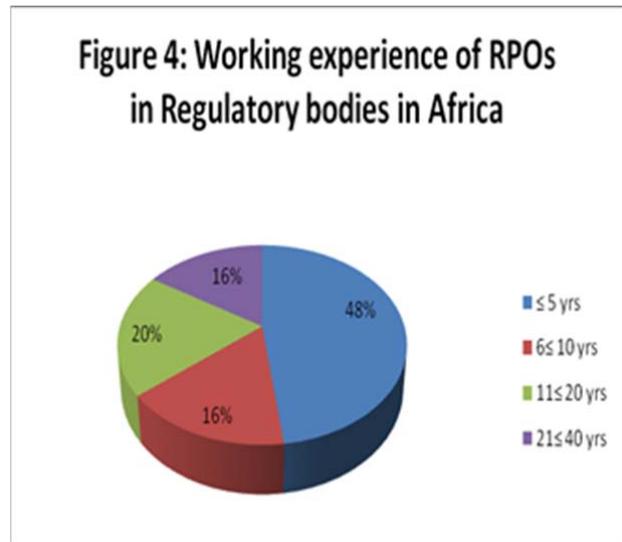


Figure 4: Working experience of RPOs in Regulatory bodies in Africa



A.2 working experience of Medical Physicists and Regulators in IAEA African member states

Figure 3 and 4 shows the percentage distribution of the years of working experience in the field of medical physics and regulatory bodies of the current medical physicists and regulators in Africa respectively. 37% of the medical physicists have worked for less or equal to 5 years, 18% for more than 6 years but less than 10 years, 18% for more than 11 years but less than 20 years and 27% for more than 21 years but less than 40 years.

A big divergence in the working experience of above 21 years corresponding to 27% for the senior MP staffs and below 5 years totalling to only 37% indicate a big gap in the training capability of MP. Continuous training to achieve a uniform distribution of all cadres is a key issue for FAMPO and all stakeholders.

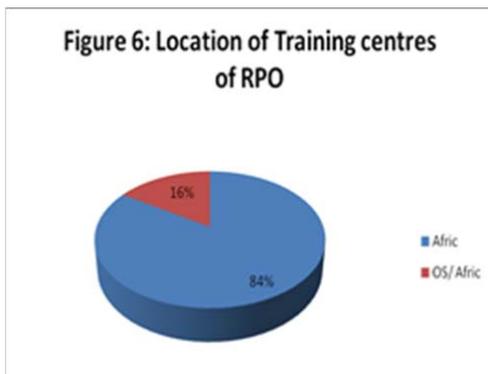
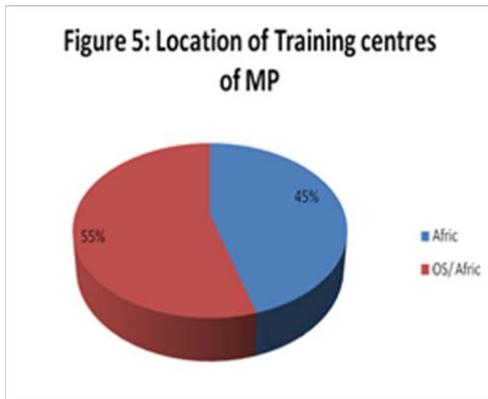
In many centres, although there has been growth in the number of radiological and therapeutic facilities in Africa, with an increase in the training of other relevant personnel like radiologists, oncologists and radiographers, these centres still have very few academically and clinically trained medical physicists. Most of the training has been sponsored by the International Atomic Energy Agency (IAEA). Through different bodies governing MP, member states should take on 100% or cost share in training of MP at higher degrees as it is for other Health professions.

On the other hand 48% of the regulators have worked for less or equal to 5 years, 16% for more than 6 years but less than 10 years, 20% for more than 11 years but less than 20 years and 16% for more than 21 years but less than 40 years. Continuity is possible in RPO field as compared to MP. A good number of young carders is being trained. This is not reflected in the MP Field. FAMPO has established that training of MP is very expensive and very few training centres in Africa exist.

A.3 Centres of training of Medical Physicists and Regulators in IAEA African member states

Figure 5 and 6 indicate the centres where the existing medical physicists and regulators in Africa have trained respectively. 55% of the MP have trained in centres outside Africa and only 45% have trained in African centres. The 45% that have trained in African centres indicate only training centres in South Africa and North Africa. No training centre for Medical Physics exists in East Africa and West Africa. Due to the great demand of Radiation Scientists, it is proved that MP can work as MPE, QE or RPO and have been the backbone of the existing Regulatory bodies in most African Countries. With support of the IOMP, IAEA, WHO, machine vendors, local governments, identification of a training centres for MP in of East and West Africa is key to FAMPO's activities and work plan.

On the other hand, only 16% of the regulators have trained in centres outside Africa and 84% have trained in African centres. Training has been done in their own countries. This indicates that many centres exist in Africa for training RPO's as compared to MP's. However, the incompetence especially in inspecting Radiotherapy centres could be resulting from non comprehensive curricula used for training. Employing personnel with MP background in the regulatory authority can be a quick solution. A review and unifying the training curricula could be a solution. This is an action point for FAMPO, respective Radiation Protection Associations in Africa and other stakeholders.



B. Countries with recognised professional bodies governing medical physicists and other radiation protection personnels in IAEA African member states.

Assessment was done to ascertain IAEA African member states with the Law regulating use of ionising radiation, bodies governing radiation use and recognised professional bodies governing and registering medical physicists and RPOs in African countries

B.1 Existence of Law regulating use of ionising radiation in IAEA African member states

All the 11 participating medical Physicists and 25 regulators indicated that they have approved Laws and bodies governing the use of radiation in their respective countries. However, no concrete answers were given to bodies registering regulators as a profession.

B.2 Recognised professional bodies governing and registering medical physicists and RPOs in African countries

Figure 7 and 8 indicate the percentage existence of bodies governing and registering medical physicists in IAEA African member states as indicated by the responses obtained from the MP and regulators respectively. 36% participating MP indicated to have recognised bodies governing and registering medical physicists and 64% of African countries do not have.

On the other hand, the responses of the regulators indicated that only 45% do have recognised bodies governing and registering medical physicists. 52% of African countries do not have this body. The figures indicated are comparable to those reported by the MP. Recognition of MP in Africa is one of FAMPOs objective. This is backed up by the International Labour Organisation that currently recognises MP as a profession.

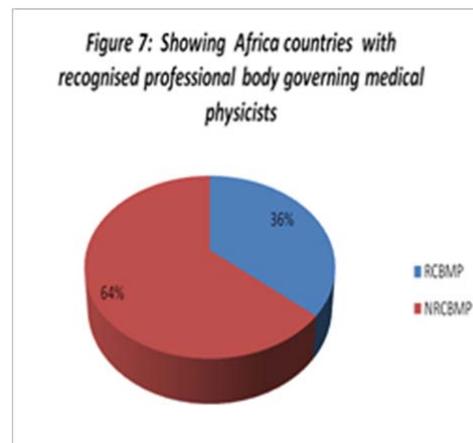


FIGURE 7: (Response from the medical physicists perceptions in the questionnaire used for AFROG- Uganda)
 RCBMP: % age African Countries with recognized bodies governing and registering medical physicists
 NRCBMP: % age African Countries with NO recognized bodies governing and registering medical physicists

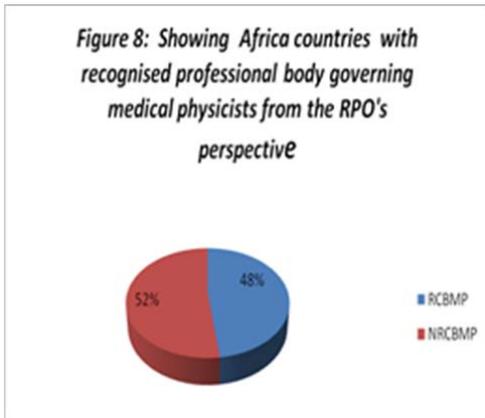


FIGURE 8: (Response from the RPO's perceptions in the questionnaire used in Botswana)

RCBMP: % age African Countries with recognized bodies governing and registering medical physicists

NRCBMP: %age African Countries with NO recognized bodies governing and registering medical physicists

Non recognition by some states has presented a challenge of ineffective communication among individual physicists and related fields. This has also led to non-representation on hospital and government boards which has led to minimal financial support to the field of MP. Through FAMPO, mass collaboration and recognition of MP in Africa should be done and sensitization of their roles done through networking with the existing MP or related bodies.

C. Communication links among Medical Physicists, facility manager and Regulators during management of radiation protection aspects in Medical Practices.

Figure 9 and 10 indicate the existence of collaboration between medical physicists and Regulators in management of safety in Medical Practices as collected from the MP and regulators respectively

From the perspective of MP, 55% of African Countries have collaboration between MP and RPO when managing safety issues in Medical practices. Among the areas of collaboration include; consultancy, conference participation and individual dosimetry. However, the 45% that work in isolation pose a challenge on how safety issues are managed. Whereas both parties can work as Qualified experts (QE) especially in settings with low personnel in both fields. FAMPO should work with the different Radiation Protection Associations in Africa to achieve positive results with minimal accidents and incidents.

On the other hand, 80% of RPOs of African Countries have collaboration with the existing MP when managing safety issues in Medical practices. However, some countries with no MP at the medical facility or regulatory body face a challenge when inspecting Radiotherapy centres. Some countries use the same RPO as QE and MPE. There is also a mix of duties and roles among MP and RPO.

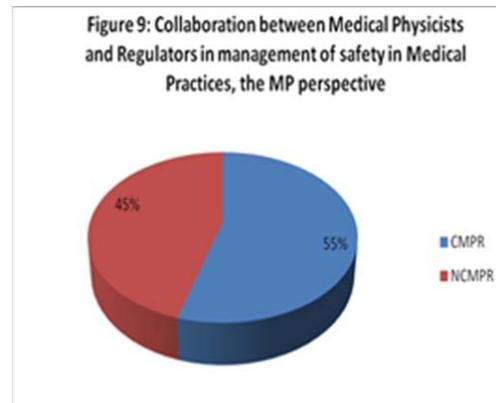


Figure 9 : Existence of collaboration between medical physicists and Regulators in management of safety in Medical Practices as collected from the MP during AFROG

CMPR: % age African Countries that have collaboration between MP and RPO when managing safety issues in Medical practices

NCMPR: % age African Countries that have NO collaboration between MP and RPO when managing safety issues in Medical practices



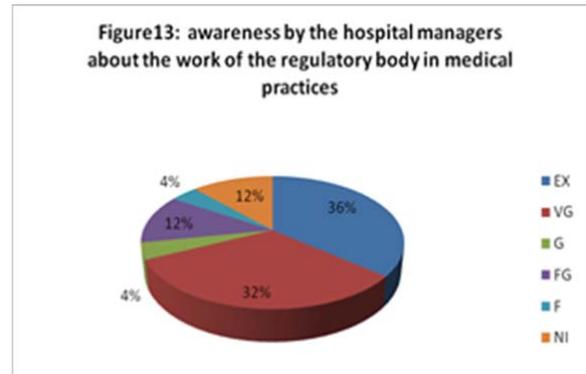
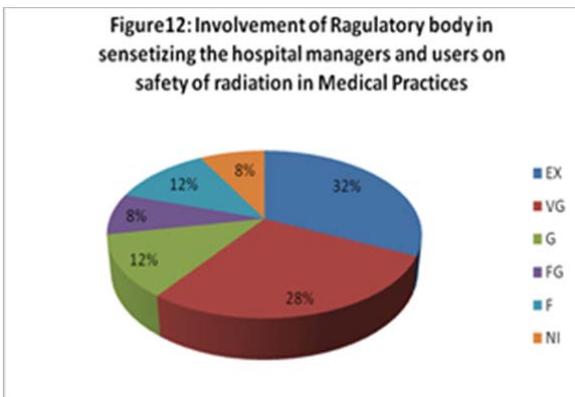
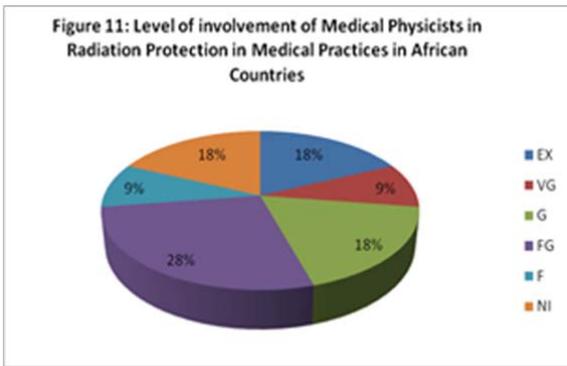
Figure 10: Existence of collaboration between medical physicists and Regulators in management of safety in Medical Practices as collected from the regulators (RPO's in Botswana)

CRMP: % age African Countries that have collaboration between MP and RPO when managing safety issues in Medical practices

NCRMP: % age African Countries that have NO collaboration between MP and RPO when managing safety issues in Medical practices

D. Level of involvement of Medical Physicists, regulators and hospital managers in Radiation Protection in Medical Practices in IAEA African member countries

Scores of the level of involvement of medical physicists, regulators and hospital managers in radiation protection of medical practices were made according to the scoring criteria; Excellent (EX) 90%-100%, very good (VG) 80%-90%, good (G) 70%-80%, fairly good (FG) 60%-70%, fair (F) 50%-60% and not involved at all (NI) below 50%. Figure 11, 12 and 13 show the levels of involvement of; MP in radiation protection in medical practices, Regulatory body in sensitizing the hospital managers and users on safety of radiation in Medical Practices and awareness by the hospital managers about the work of the regulatory body in medical practices



Results as indicated in figure 11, indicated a non uniform level of involvement of MP in handling radiation protection in medical Practices. 18% for excellent involvement, 9% for very good, 18% for good, 28% for fairly good, 9% for fair and 18% are not involved at all. The 55% that indicate below 70% involvement causes a challenge and FAMPO should investigate for the causes of this less involvement of MP in manning radiation protection in medical practices.

Results as indicated in figure 12, for the Involvement of Regulatory body in sensitizing the hospital managers and users on safety of radiation in Medical Practices. 32% for excellent involvement, 28% for very good, 12% for good, 8% for fairly good, 12% for fair and 8% are not involved at all. For the Law to be strong, effectiveness of the regulatory bodies should be felt by all radiation users in every country. Un effectiveness causes loopholes in the implementation of the Law.

Results as indicated in figure 13, indicated, 36% for excellent awareness by the hospital managers of the work of the regulatory bodies in medical practices, 32% for very good, 4% for good, 12% for fairly good, 4% for fair and 12% are not aware at all. Since the hospital managers play a big role in policy, training and funding. Through sensitizing workshops organized by the regulatory bodies to create awareness and have a vote for support in terms of operational funds, training and employment of MP and RPOs.

E. Challenges faced by Medical Physicists and regulators when conducting their work in medical practices in IAEA African member states

Several challenges were noted from the respondents and these included.

- Untimely release of funds from the government for the regulatory bodies to carry out their work.

- Inadequate number of Medical Physicists in the country. Most regulators/ RPOs play the roles of the Medical Physicists.
- Lack of commitment to radiation safety by some hospital managers in some hospital or clinics
- Confusion on the roles and responsibilities of the Regulators and Medical Physicists.
- Some hospital administrators do not appreciate the need for radiation safety in their settings
- Unjustified increase of licence fees brings lack of cooperation with users
- Inadequate collaboration and communication among regulators, existing MP and hospital managers
- Some countries with no MP employed in the regulatory body, find it very difficult to inspect Radiotherapy centre.
- Some countries do not have any MP existing so no collaboration can be done.
- Unauthorised radiology centres
- Some countries share same body for radiation protection and MP.
- Most regulatory bodies and MP have not established the radiation sources used in medical practices. A data base is missing. So inspection and licensing of all sources is very hard
- MP play the role of RPO in some countries. This presents a big overload.
- Due to limited personnel, time is not enough to carry out safety assessment in some hospitals
- Lack of developed procedure and training of MP and RPOs.
- Lack of inadequate commitment to safety culture at policy level, managerial level and individual level.
- Some countries have newly recruited MP and regulators. So no link at all.
- Some counties have unqualified experts who try to work as MP and regulators. This presents a brain drain.
- Unwillingness to work in remote/rural centres leaves safety issues in medical practices unattended too.
- Lack of tools to use and expertise to use them

V. CONCLUSION

The gaps identified in the study should be an indicator for FAMPO to carry out close collaboration through the FAMPO Council representatives, radiation protection

associations, WHO, IRPA, IOMP, machine vendors and policy makers when executing its functions.

Currently, about 48 individual medical physicists in Africa have expressed interest in FAMPO and registered. In addition GAMP, NAMP, SAAMPS, SAMP and MPST of Ghana, Nigeria, South Africa and Tanzania have also expressed interest. The Federation extends its activities throughout Africa and local Islands in the region and the activities of the federation are not aimed at profit.

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