

Professional Approach to Radiation Protection

transcribed plenary speech of

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I. INTRODUCTION

The following are integrated in this presentation to show how inculcating professionalism in radiography profession (one of allied health professions) leads to a healthier nation.

- Professionalism
- Biological effects of radiation
- Radiation protection
- Evidence based practice

II. PROFESSIONALISM

The main characteristics of a profession are: having a distinct and specialized knowledge acquired through proper training, a code of professional conduct, governed and represented by a professional organization, autonomy or independence, and, altruism or working towards the benefit of the clients.

Allied health professions in Sri Lanka have most of these characteristics but the having independence to practice and taking decisions is debatable and need to be improved.

Professional organizations are not the regulatory body and are not empowered to issue license to practice is also an issue to be addressed.

There is widespread agreement that Evidence Based Practice (EBP) is a necessary component of health care and that EBP is part of their professional conduct and is a required competency for all health professionals.

EBP can also be applied to medical radiation technology (Radiography & Radiotherapy). Most applications of radiographic procedures based on previous evidence resulted from research work. It is important that the choice of diagnostic procedure and treatment reflect the best available evidence in any clinical situation.

III. BIOLOGICAL EFFECTS OF RADIATION

Radiography involves the use of ionizing radiation and can produce harmful biological effects in spite of the diagnostic and therapeutic advantages. The biological effects are categorized as 'Somatic effects' and 'Genetic effects' generally and as "Deterministic effects" and "Stochastic effects" more specifically.

When a beam of Radiation strikes the body, part of its energy penetrates and transmits through, part of it scatters in all the directions and the rest of the energy is absorbed by the body. The absorbed energy makes the harmful biological effects.

The absorbed radiation energy, called the 'Absorbed dose', is measured and quantified by a unit called the Gray. Same amount of different types of radiation e.g. X-rays, Gamma rays, Beta rays, Alfa rays, and high energy Neutrons, causes different effects. Therefore to standardize the measurement, "Dose equivalent" is introduced. It is obtained by multiplying the absorbed dose by a factor called "Radiation weighting factor", (W_R). Dose equivalent is measured in "Sieverts".

The effect varies with the type of body tissue because the variation of the radiation sensitivity of different tissues. To take this into account "Effective dose" is introduced. It is obtained by multiplying the Equivalent dose by a factor called "Tissue weighting factor", W_T . Effective dose also is measured in Sieverts and is universally adopted to quantify the radiation doses. Gonads have the highest tissue of 20% of the whole body dose.

The deterministic effects are involved with acute high doses, and are not likely to be received in normal radiographic procedures, but some are possible with therapeutic procedures.

The stochastic effects of radiation which involves low doses; according to the Multiplicative model introduced by the ICRP in 1990, describes that a given dose produces a risk which is a constant multiple of the pre-existing spontaneous risk of cancer. Therefore even a small radiation dose has a risk of producing a cancer late in the life.

IV. RADIATION PROTECTION

The patient who undergo diagnostic or therapeutic procedures involving ionizing radiation receives the highest radiation doses. The dose varies with the type of procedures. Although the individual procedures does not exceeds the recommended dose limits it need to be kept

as low as possible to minimize the risk of producing cancer late in the life.

The protection of the patient from unnecessary radiation is a professional obligation of all healthcare professional involved.

Justification, Optimization and Limitation are the three cardinal principles in radiation protection

Justification of a procedure is the first of the three cardinal principles of radiation protection.

Evidence-based medical imaging can be used to justify the decision to perform an imaging examination and to optimize the technique used. Radiographers who use the EBP framework are able to apply research findings and ensure optimal clinical outcomes.

V. EVIDENCE BASED PRACTICE

To answer a clinical question, e.g. whether to use CT Colonogram or Double contrast barium enema to investigate for colonic pathology, EBP can be used.

Principles of EBP involves five steps: formulate a question, search for the answer, appraise the literature, apply the results, and evaluate the outcome.

PICO format (P : patient or problem, I: investigation concerned, C: comparison investigation, O: outcome expected) is used to formulate a well-built clinical question.

After formulating the question search the data bases for answers. There are various sources of data and systematic reviews considered to be most reliable. After finding the answers, analyze them to find the most reliable and valid answer. Then can apply the result. Finally evaluate the outcome for future implications.

EBP is a process by which the most strongly supported evidence is applied to clinical practice. Following the steps of EBP will allow the Radiographer to ask relevant clinical questions, search for evidence, appraise the evidence, apply the evidence to practice, and evaluate the outcome.

However, the key to ensuring best practices will remain the ability of individual practitioners to effectively integrate new evidence with their existing knowledge and expertise, while respecting the patient's values and preferences.

VI. CONCLUSION

EBP helps select the best practice in radiography in taking decisions maximizing the benefits while minimizing the risk.

Adoption of EBP is important if radiography (or any other profession) is to be recognized, and advance professionally.