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ABDOMINAL COMPUTED TOMOGRAPHY RADIATION DOSE FOR SIX HOSPITALS AT NORTHERN REGION IN MALAYSIA

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Computed tomography (CT) is an advanced imaging modalities. Its powerful ability to assist more precise diagnosis cause it to be used widely in several countries. The risk of radiation to human health has always become a concern among researchers including Malaysia. This is due to the fact that the number of CT scanner and CT procedure in Malaysia is increasing more than 15% from 2009 to 2010. Therefore, it is expected that the number will increase year by year. The aim of this research is to study the variation of radiation dose (dose descriptors) to the patients at the hospitals involved in this research. However, this research is only focus in certain hospitals in northern region of Malaysia. The dose descriptors include weighted CT Dose Index (CTDIw), volume CT dose index (CTDIvol), dose-length product (DLP) and effective dose (E). The data had been collected by using questionnaire distributed to the hospitals. The data was analysed by using CT Expo v 1.4 in order to calculate the dose descriptors. The result showed that there are variation of dose descriptors in all hospitals and the overall result is higher than previous studies. It is hoped that every hospital can implement the guideline recommended by established bodies in order to reduce the radiation dose to the patient.

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CHAPTER ONE
INTRODUCTION

1.1 RATIONALE OF THE STUDY

Computed tomography (CT) is an advance imaging technique that enables the radiologist to give more accurate diagnosis of disease. Studies regarding CT have been started not long after the development of SSCT by a great name of Godfrey Hounsfield [1, 2]. The studies are still being continued by today's researchers [3-5] and perhaps in future. From these studies, it can be concluded that even though CT is an amazing and very useful instrument for diagnostic studies, it contributes high exposure not only to the patients but also to the personnel as well.

In Malaysia, Clinical Research Centre has reported [6] that the CT scanner number has increased from 126 in 2009 up to 145 in 2010. As consequences, the number of CT cases also increased from 406,217 to 484,831 for the same period of time. From the data provided, it is expected that the total number of CT scanner and CT procedures has also increased. This situation will directly increase the total dose contribution to the Malaysia population.

A report by United Nations Scientific Committee on the effects of Atomic Radiation (UNSCEAR) 2000 [7] reported that Malaysia is classified into health-care level II country based on the number of population per physician. In UNSCEAR 2008 reported [8] that CT is on the top list of overall medical exposure dose contributor even though CT only accounts for a few percent in diagnostic medical examinations.

Nowadays, Multi-slice computed tomography (MSCT) becomes more favourable compared to single slice computed tomography. Its ability to produce more slice of image in a single rotation has reduced the duration of examination and enable image reconstruction. However, the ability of MSCT to perform more slices of images and longer examination ranges may increase radiation dose [9].

Surveys [8, 10, 11] from various countries reported that the mean effective dose from abdominal CT was the highest compared to other body regions. The data reflect the importance of continuous assessment regarding abdominal CT radiation dose in order to keep the dose as reasonably low as and at the same time maintaining the image quality.