AbstractID: 13101 Title: Design and study of in-house ultrasound based automatic patient movement monitoring device for teletherapy treatment

Purpose: The purpose of the present study is to fabricate indigenously ultrasonic based automatic patient's movement monitoring device (UPMMD) that immediately halts teletherapy treatment if a patient moves claiming accurate field treatment. This device is an electronic compact device, which is small in size, low-power, high-precision, non-intrusive, low cost, light in weight and reusable.

Method and Materials: The UPMMD is an electronic device, which consists of circuit board, magnetic attachment device, LED indicator, speaker, ultrasonic emitter and receiver, which are placed on either side of the treatment table. UPMMD functions based upon the reflection of sound waves. The ultrasonic emitter is emitting the ultrasound waves and the receiver receives the signal from the patient, when a patient moves, the receiver activates the circuit, an audible warning sound will be produced in the treatment console room and thus alerting the technologist to stop the treatment. Simultaneously, the electrical circuit to the teletherapy machine will be interrupted and radiation will be halted.

Results: Studies were conducted on phantom and 210 patients with different types of cancers. It shows that among the 210 patients, 89 cancer patients have moved from their positions during the treatment by more than 0.3cm whereas the rest of them received the radiation without movements. During the treatment, the interruption of radiation has occurred due to the patient's movement from 0.5 to 1.5cm laterally from the actual planed field area.

Conclusion: This study revealed that the device can prevent the patient's normal tissues from unnecessary radiation exposure and also it is helpful to deliver the radiation to the correct tumor location. The raising sound alerts the radiation technologists. It also enables the technologists to do their work more efficiently. So, this device can potentially be used to monitor and control the patient's movement during External Beam Radiation Treatment.