I-Krobs: Robot That Dispenses Oral Sodium Iodine i-131 Radiotherapy Capsules for Patients With Thyroid Diseases

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In the field of medicine, healthcare workers are regularly exposed to radiation over extended periods of time, which lead to various health problems. Although numerous regulations and guidelines have been implemented worldwide to mitigate these risks, the radiation protection system in Vietnam remains rudimentary, especially regarding the distribution of I-131 capsules, one of the earliest nuclear drugs to be used. During working hours, healthcare workers have to be in close contact with the capsules and patients for a long time, while they are only protected by a radiation shielding glass, which is potentially hazardous because according to ALARA – the guiding principle of radiation safety – the healthcare workers haven't been kept safe. Therefore, we designed and built a robotic system to improve the I-131 distribution process and safeguard the health of medical personnel and patients. This system features five separate chambers, each containing I-131 capsules with varying radioactivity levels. Each chamber is enveloped in lead to ensure radiation shielding. The robot is able to identify, count, and distribute the capsules to patients, while the accompanying software assists physicians in monitoring the medication process. This system has undergone multiple tests and achieved 100% accuracy in its distribution. Upon arrival, patients receive RFID cards and their medication in a separate room with the robot, which medical staff can monitor safely via cameras. The robot automates the dissemination of I-131, making it easier, safer, and more accurate. Overall, implementing this system has significantly benefitted medical personnel by minimizing radiation exposure and potential risks.

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