



52. Judicious use of medical imaging

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Background

Medical imaging has been a major contributor to the advancement of modern medicine. Wilhelm Roentgen, a German physicist, created the first medical X-ray image in 1895 – an image of his wife’s hand with a ring on her finger. Seventy-six years later, in 1971, a British company created the EMI Scanner, the first of the 3D imaging devices now commonly known as CT scanners.

An estimated 65-70 million CT scans are performed in the U.S. each year. These scans enable earlier discovery and diagnosis of diseases than previously possible, track the influence of treatment inside the body and reduce the number of surgical interventions required. In these ways, the scans improve the quality of healthcare, lengthen the lifespan and improve the quality of life for many patients.

Along with their substantial medical benefit, imaging tests raise many difficult questions pertaining to medical treatment and healthcare economics.

Ionizing radiation damages the genetic material of the radiated cells, sometimes irreversibly, and may cause malignancies. According to generally agreed-upon assessments, 1%-2% of cancer cases diagnosed each year in the U.S. are caused by ionizing imaging tests. CT scans performed in the U.S. in 2007 (the last year with relevant information) were projected to result in 29,000 cases of cancer.

About 20,000 CT scans are performed in the U.S. every day, with radiation 100-500 times stronger than a regular chest X-ray. A third of patients scanned in 2007 were 35-54 years old and 66% of this group were women. These are the age and sex groups that are at higher risk of cancer resulting from radiation. Due to the cumulative risk to the general population from ionizing radiation, we must reassess and carefully balance the benefits and risks of this radiation. The financial aspect of overusing imaging methods should also not be taken lightly. The accepted estimate is that 20%-50% of these scans do not yield information that improves diagnosis or treatment and do not affect the life expectancy of the patient – and are therefore unnecessary. Despite this fact, the number of imaging tests is rising at a rate of 10% per year, outpacing the growth in the use of prescription drugs (6%-8%). Since the yearly cost of these tests in the U.S. is \$100 billion, it comes as no surprise that government authorities and medical associations have joined in an effort to rein in the increase in overuse of imaging devices.

Overuse

There are numerous and complex reasons for the overuse of imaging. Briefly, we might mention physicians’ academic education that encourages being “thorough and



comprehensive” when creating a wide differential diagnosis, confirming or disproving every diagnosis on the list – while discounting the practical and prudent side of community healthcare, which is more frugal in nature. This is a culture that offers rewards for the number of tests, and not for their nature; it is a financial culture that encourages over-paying for procedures, as opposed to consultations and conservative evaluation. Defensive healthcare urges the treating physician to perform excessive examinations, and the radiologist to request further clarifying imaging tests.

The patients, who lack knowledge of the risks entailed in imaging, see imaging tests as a sign of better treatment and insist on their right to undergo these tests, without having to pay for them. Finally, private clinics directly influence consumers through direct marketing and large newspaper ads that play upon the patients’ fears. For example, these clinics encourage widespread ionizing survey tests “for the early discovery of atherosclerosis in the heart, which could cause heart attack and death.”

We must encourage a renewed evaluation and a professional discussion among physicians and the public regarding the limitations of performing ionizing imaging tests in healthcare, in order to find the appropriate balance between their benefits and risks. The instructions of the Medical Directorate (40/2008) in the Ministry of Health, along with the joint position paper of the Israel Heart Society and the Israel Radiological Association regarding “Guidelines for Computed Tomography of the Heart” (April 2010), are the first steps towards the necessary change.

Position paper:

- Imaging tests, since they are non-invasive, accessible and carry no immediate risk, are used frequently and contribute towards improving medical diagnosis and treatment.
- The use of imaging tests, especially those that include ionizing radiation, should be justified in terms of the immediate gain versus the long-term risk.
- The risk of cancer due to ionizing radiation from a single test is low, but numerous tests on the same patient create a cumulative risk for him, along with health implications for the general public.
- Patients should be referred to imaging tests, and the tests should be carried out, only if there is a detailed clinical prescription requiring it, and if there is no other appropriate test that does not include ionizing radiation.
- Extra caution is necessary when using ionizing radiation on children, young adults, women and, in particular, pregnant women.
- Patients should be notified about the risk entailed in imaging tests, as an integral part of the informed consent for the test.
- Physicians and the public should be educated about appropriate use of imaging tests, with a special emphasis on fair and responsible utilization of limited technological and human resources.