Efficiency and Efficacy in Radiology

By Edward L. Maurer, DC, DACBR

Since the inception of radiography, the radiological health care community has wrestled with the do’s and don’ts of radiographic examination. Numerous standards, guidelines, criteria and protocols have been articulated by many, sometimes diverse individuals and organizations in radiology. Most of these have significant merit in outlining radiography used intelligently. Yet a confusion still exists in some minds as to the logic and reasonableness of these directives. Often at basis for this confusion is a lack of perception regarding efficient use of radiography as opposed to its efficacious use. This is a distinction worthy of exploration.

In 1977 a meeting was organized by the World Health Organization (WHO) in collaboration with the International Agency for Atomic Energy (IAAE) and the Belgian Government. The primary intent of this meeting was to investigate "the efficacy and efficiency of the diagnostic application of radiation and radionuclides." A report of findings was later amplified and detailed in a paper written by the WHO Chief Medical Officer, W. Seelentag. Efficiency is defined as the ability of a system (facility, staff, and equipment) to deliver appropriate health service as regards the quality and quantity of the work. Efficacy is defined as a measure of the ability of a diagnostic procedure to influence the health outcome of a patient (or a whole population).

It shows common sense for the public to recognize the advisability of employing x-ray in the detection of fracture, choleliths, scoliosis, etc. These conditions all lend themselves to a high degree of accuracy for their demonstration on x-ray, and more importantly, enhance the treatment measures selected by the treating physician.

Seelentag states: "What is less evident, however, are the criteria for evaluating the efficacy and efficiency of x-ray diagnosis. For example, a radiological examination that excludes the need for surgical intervention may be diagnostically efficacious without actually leading to improvement in health. Similarly, an examination which is efficacious from a diagnostic point of view may be rendered therapeutically ineffective by lack of access to surgical services. And an x-ray undertaken without appropriate clinical indication will usually contribute no more than vaguely to the diagnosis. Conversely, a potentially efficacious x-ray examination may be nullified by technical inefficiency on the part of the radiographer or
the reader. In order to have the potential for improving a patient’s health, a radiological examination must be clinically indicated, competently performed and interpreted, and able to influence management and treatment of the patient."

Efficient use of radiography (which is, at the same time, efficacious for the treatment and resultant health benefits of a patient) represents a professional duty and obligation. To permit inefficient use of technical factors and personnel would result in not only unacceptable radiographs, with little if any value in treatment selection, but would represent a health risk for the patient regarding unnecessary exposure to ionizing radiation.

Efficacious use of radiography is measured in several ways. First, the radiographs should provide demonstrable evidence of findings which are meaningful to diagnosis or prognosis. Secondly, the radiographs should demonstrate findings which will influence the treatment or management of the patient. Lastly, the radiographs will hopefully provide such therapeutic selection information to assist the patient in improvement of clinical complaints. It is acknowledged that this last category does not always occur, but does explain the purpose of this third category as distinct from category two.

It is axiomatic that the chiropractic physician must first achieve optimum efficiency in radiographic production. This necessitates state of the art equipment, e.g., rare earth screens, collimation, filtration, quality assurance in the darkroom, etc., and personnel who are trained and competent in radiologic technology. Radiographs must all be of diagnostic quality to meet the challenge of efficiency. Thereafter, each radiographic study should meet the test of efficacy noted above or be subject to challenge regarding their production. As stated earlier, any radiograph which does not meet the challenge of efficacy, regardless of reason, must be considered unnecessary or lacking in appropriate clinical indication for its production.

In today’s health marketplace, much is made of the risk-benefit or cost-effectiveness evaluation of health care services. This is particularly true where the procedure carries an inherent risk for potential harm, e.g., ionizing radiation employed in radiography. Enhancement of the risk-benefit analysis is accomplished when using the efficiency-efficacy measure described above. The cost factors of potential radiation risk as well as economic factors are inherent in the use of ionizing radiation and therefore inescapable regarding cost-effectiveness evaluation.
In summary, the efficiency/efficacy model described above provides an additional poignant reminder to all practitioners that all radiographs must be of the highest possible diagnostic quality. In addition, their production is not only based on absolute demonstration of clinical need, but should meet the test of efficaciousness following their production. Radiography is, without question, one of the most useful tools available to the chiropractic physician in patient care. Indiscriminate use or use not based on clinical efficacy and need is unjustified.

Notes:


3. Ibid.

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