



Code of Practice for the Safe Use of Shortwave (Radiofrequency) Diathermy Units (1985)



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NATIONAL HEALTH AND MEDICAL RESEARCH COUNCIL

Code of Practice for the Safe Use of Shortwave (Radiofrequency) Diathermy Units (1985)

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Appendix XXVII

CODE OF PRACTICE FOR THE SAFE USE OF SHORTWAVE (RADIOFREQUENCY) DIATHERMY UNITS (1985)

Introduction

The therapeutic use of heat produced in deep tissue by electromagnetic radiation absorbed in the body is called diathermy. The heat increases the flow of blood in the tissues through dilation of the blood vessels. This in turn increases capillary pressure, cellular membrane permeability, and metabolic rate, causing a more rapid transfer of nutrients from the blood across cell membranes. These actions may reduce pain and promote quicker healing.

A shortwave diathermy unit is a device designed to generate radiofrequency radiation and transfer it, via cables and electrodes, to the area to be treated. The units can be operated in either a continuous wave or pulsed mode but both produce heat in deep tissue. Two basic types of electrodes (applicators) are in use, the capacitor-type and the inductor type. In the first case tissue heating is basically due to the radiofrequency electric field, while for the inductive electrodes (coils), heating occurs by a combination of electric field effects and currents induced in the tissue by the magnetic field. The heating profile of the two mechanisms is somewhat different.

These devices are capable of generating a sufficiently high level of radiation that there may be cause for concern for the safety of the gonads and, in the case of pregnant patients, the foetus. Improper use of the machine may result in burns and/or scalds and deep tissue or organ damage. Care must also be taken to avoid subjecting the operator and/or the public to radiation levels exceeding those prescribed in the Australian standard AS 2772 ('Maximum exposure levels - Radio-frequency radiation - 300 kHz to 300 GHz'). It must be noted that the level of radiation present in the vicinity of a diathermy unit may be increased by the presence of nearby metallic objects or other units or by reflection from the wall.

Care must be taken to ensure that the shortwave radiation does not cause interference with other equipment.

This code sets down appropriate rules and procedures to avoid excessive and/or unnecessary exposure to shortwave radiation but should be read in conjunction with any State/Territory regulations covering their use.

Definitions

'Shortwave diathermy unit' means a device using electromagnetic energy in the shortwave frequency range (3-30 MHz) for therapeutic purposes. The unit includes electrodes, the shortwave generator, and all associated electronics, controls and enclosures. In Australia the only approved frequency for shortwave diathermy is 27.12 MHz.

'Treatment' means the use of a shortwave diathermy unit on a human being to treat a symptom, disease or disability.

'Applicator' means any device designed to conduct, transmit or transfer electromagnetic energy from a shortwave diathermy unit to a patient undergoing treatment.

'Control' means any control used during operation of a shortwave diathermy unit which affects the radiation emitted by the applicator.

'Health professional' means a registered person who has satisfactorily completed an appropriate course of training approved by the relevant registration board and the State/Territory health authority.

'User' means the person having administrative responsibility for use of a particular shortwave diathermy unit. This person shall be the owner or hirer of the unit or his agent or, if the unit is owned or hired by an institution or organisation, the agent of that body.

'Operator' means the health professional given the responsibility, by the user, to treat the patient using a shortwave diathermy unit.

'Shall' indicates that the particular requirement is considered necessary to ensure protection from radiation.

'Should' indicates a procedure or precaution which is to be applied, whenever practicable, in the interests of minimising radiation hazards.

Hazards of High Level Exposure to Shortwave Radiation

Burns

These may result as a consequence of excessive exposures or may be due to non uniform heating of different tissue layer or to reduced heat dissipation mechanisms (as in the case of the subcutaneous fat layer). In some cases deep tissue and organ damage may ensue because heating is induced at a depth where thermal sensation is reduced.

Teratogenic effects

Abnormalities in offspring have been reported in several animal species after exposure to intense shortwave radiation. Intense fields resulting in significant temperature increase of the foetus could result in teratogenic effects in humans.

Effects on the gonads

Exposure to shortwave radiation may increase the temperature of the testes to the point where temporary sterility is induced. Very high specific absorption rates may cause permanent damage. The ovaries may also be at risk.

Examination and Interview

Shortwave treatment shall not be administered unless prescribed by a health professional (as previously defined). At the examination and interview, when treatment is being prescribed, the health professional shall determine the suitability of the patient for treatment. This should not be prescribed if:

- the patient does not understand the potential risks,
- the patient is not able to cooperate with the operator in maintaining the proper position and in reporting the presence of a heating sensation which is the only indication of an adequate or excessive dose,
- the patient does not have normal sensation in the treatment area,
- the patient has metallic implants within the treatment area,
- the patient is pregnant,
- the patient wears a pacemaker,

- the patient has undergone ionising radiation therapy to the treatment area in the three months prior to the diathermy being administered, as skin sensation and blood circulation may be diminished,
- there is evidence or known history of vascular insufficiency in the treatment area,
- the patient has any evidence of cancer, unless the shortwave treatment is carried out as part of a hyperthermia treatment regime. (The metastasis of a cancerous growth may be accelerated by a moderate increase in temperature, such as can be caused by a shortwave treatment not specifically intended to treat a malignancy.)
- there are open wounds, haemorrhage, ischaemic tissue, tuberculous joints, or acute infections within the treatment area.

In the cases where the clinician, after due risk/benefit consideration, deems it necessary to prescribe shortwave diathermy treatment outside the guidelines given above, adequate advice shall be given to the patient, the user and the operator of the shortwave diathermy unit.

User Responsibilities

The user shall ensure, by administrative controls or otherwise, that: the shortwave diathermy unit complies with all relevant Australian Standards and is maintained in accordance with the relevant State requirements,

- the unit is operated only by health professionals,
- the unit operator is not exposed to a radiation level exceeding the standard for occupational exposure specified by the appropriate authority,
- the general public (including waiting patients, receptionist etc.) is not exposed to a radiation level exceeding that recommended by the appropriate authority,
- a range of applicators suitable for treating different areas of the body is available, a visible and/or audible signal is installed, to indicate that the unit is operating,
- the unit is not the cause of electric interference with other equipment (This may require the use of a screened cubicle and a mains filter.),
- non metallic chairs and/or beds are available to patients undergoing shortwave diathermy treatments.

Treatment

Before administering the treatment the operator shall: ensure that the thermal sensitivity of the patient is not impaired by analgesics, ensure that the patient has removed all metallic objects (rings, watches, metal rimmed glasses, etc.) from the treatment area,

- remove towelling or clothing from the treatment area, ensure that the skin is dry,
- ensure that if the patient is wearing a hearing aid, it is removed, ask the patient to report immediately any symptoms experienced during the treatment except 'a mild, comfortable warmth',
- ensure that the cables are correctly connected to both the machine and the applicator, not rest the applicator or cables over metal surfaces,
- align the applicator accurately to ensure an appropriate pattern of heating,

- ensure that the testes are not directly irradiated and that care is taken to minimise indirect irradiation,
- ensure that the cables leading to the applicator are not placed in the vicinity of the patient's non targetted tissue,
- ensure that the chair or other patient support is not metallic and that other large metallic objects are kept at least three metres from the electrodes and cables.

After activating the unit the operator shall:

- remain at least 1 m from the electrodes and 0.5 m from the cables during treatment,
- ensure that the patient maintains the correct position and remains cooperative,
- not leave the patient during the treatment, unless the patient has been supplied with an emergency cut-off switch and the patient is reliable,
- not allow the patient to touch the unit,
- ensure that no other person is in the vicinity of the unit or of the applicator during the treatment, in accordance with the administrative controls established by the user.