This poster aims to give an overview of electrosurgery in the perioperative setting. This will be achieved by identifying and defining some of the common forms of electrosurgery used in perioperative practice and will identify some of the hazards that can be associated with these products.

The following recommendations were reviewed and developed by the NATN Practitioners’ Panel.

NATN gratefully acknowledges the support of Felicia Cox and Paul Wicker in contributing to this poster.
2. Fulguration and COAG: When the COAG waveform is used at a high
dose it is often used if the patient has a pacemaker in situ

◗ When a patient has a pacemaker in situ do not use the COAG waveform

Bipolar Diathermy

In bipolar diathermy the active and return electrodes are combined within
the diathermy lead to form a circuit so that current flows between the two points
which are both separated with insulating material. Bipolar diathermy is preferred
to be safer as the current path is much shorter than that utilised in monopolar
as the distance between the point of application and diathermy is generally utilised
in the following situations:

◗ When coagulation is required only

◗ When coagulation is required in peripheral areas of the body such as
hands or feet or other areas where channelling may occur

◗ In procedures requiring minimal coagulation

◗ When a patient has a pacemaker in situ

Ultrasonic

In addition to electrosurgery and diathermy, ultrasound equipment can also
be used to cut or coagulate tissue using high frequency sound waves, for example,
the UltraCision instrument or Harmonic Scalpel from Ethicon Endo-surgery.
Liguoruse from Tyco Healthcare or the Radiofrequenc Vapouriser from
Mitek. These instruments take the formation of ultrasound which is
mechanical energy, and this transformation usually occurs in the hand piece
focusing the wave through a transducer. Collisions of ultrasound used within a conductive medium such as saline. Ultrasound equipment is designed for both open and laparoscopic procedures.

Electrosurgery Explained

Electrosurgery requires an electrosurgical generator which produces the
radio frequency current, cable and active electrode or a return plate or
inert electrode for the use of monopolar diathermy. Bipolar diathermy uses
the same items with the exception of the return or indifferent electrode
as it is not required. The electrosurgical generator or unit can produce three distinct
treatment effects, known as fulguration, desiccation and cutting. The
electrosurgical generator creates different waveforms which are determined by
the waveform selection as monopolar, COAG, CUT or BLEND. The
designs and desired effects are linked as follows:

1. COAG: COAG works to create a small burn of radiofrequency, which when used on low power create the effect known as Desiccation. Desiccation is defined as a relatively slow drying out of tissue by current that does not produce spashes which in turn leads to cutting

2. Fulguration or COAG: When the COAG waveform is used at a high
power setting it will create the effect known as fulguration. The high
power generates sparks which create entramenton heating of tissue
causing cells to dry out quickly rather than explode into steam.

3. Cutting: The CUT waveform is a continuous waveform at a lower voltage
but higher current than COAG. This creates a high density of current in
a specific tissue area within a short period of time. This results in cell
breakdown due to the localized but intense heat.

4. Blend: This is a combination of CUT and COAG and is used where
haemostasis is required as tissue is cut.

Hazards of Electrosurgery

There are a number of hazards that can be identified in relation to the use
of electrosurgery in the perioperative environment, and it is important to be
aware of these in order to minimise the risk of adverse events.

Accidental Burns

The source of an accidental burn is often linked to the return electrode. Some
burns are found directly below the return electrode and are
associated with a failure of the electrode. This problem has largely been
an issue with the development of Contact Quality Monitor (CQM) and
Return Electrode Monitor (REM) plates. These systems are designed to
monitor the patient to pad interface. Many return electrodes are now single
use and consist of a dual pad that is adhesive. Within the electrosurgical
unit, there is a monitoring unit which in the event of the patient’s electrode
pad being ineffective, will sound an alarm and cut the current, thus
preventing the pad being positioned incorrectly or not fully in contact with the patient
as well as the possibility of a defective pad.

In situations where a specific effect is not achieved on normal settings, all
equipment should be checked prior to increasing the power to minimise
the risk of accidental burns to either the patient or the surgeon.

Cautions should also be taken to ensure that the live electrode is stored in
an insulated container away from the operative field, when not in use.
All equipment should be plugged in and working after use and there should be
a system in place whereby the accurate number of usages of reusable
equipment such as cables and forceps is recorded.

Other Hazards Associated with Electrosurgery Include:

◗ Interaction with skin preparations and other alcohol based or
aerosol products used within the perioperative environment.

◗ Potential of chemical in skin preparations may be flammable or
ignitable due to the possibility of ignition. This type of skin prep
should be allowed to dry or be dried with a surgical awl, prior to
the start of any surgical procedure (MDA2002).

◗ Interference with other medical devices such as pacemakers, ECG
machines and video equipment used in the operating theatre.

◗ Accidental electrocution of the patient or staff with low frequency
main electricity