Faculty of Forensic & Legal Medicine

TASER®: Clinical effects and management of those subjected to TASER® discharge

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Introduction

TASER® background, clinical effects and management

Background

TASER® conducted energy devices are battery-operated, pistol-like devices and are one of several so-called less-lethal options available to the police that assist them in managing violent and aggressive people and those with other forms of acute behavioural disturbance. Other police options include CS and PAVA irritant sprays, handheld batons and physical restraint.

The TASER® X26™ was introduced into UK policing in 2005 while the TASER® X2™ was introduced in September 2017.

These devices, which exert their effects by delivering brief pulses of electricity into the body, can be used in two main ways: probe mode and drive-stun mode.

Probe mode refers to when darts are fired at the subject from a cartridge fixed to the front of the TASER®. These darts, which travel at 40-50 metres per second, are designed to embed in clothing or skin while remaining electrically connected to the TASER® by fine insulated wires.

Drive-stun mode refers to when the electrodes at the front of the TASER® are directly applied to clothing or to the skin.

From an injury perspective, one of the main differences between the TASER® X26™ and the TASER® X2™ is in the design of the probes (Figure 1). The masses of the TASER® X26™ and X2™ probes are 2.85 g and 2.56 g, respectively.

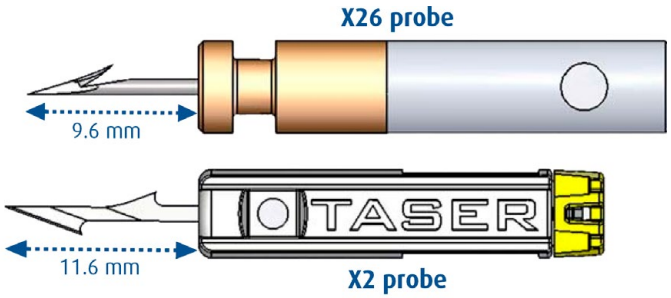

Figure 1 Comparison of the TASER® X26™ and X2™ probes

In UK policing, the overwhelming majority of TASER® discharges involve use of the device in probe mode rather than drive-stun mode.

Clinical effects

The effect that the electrical pulses produce depends on the mode of use.

While application of drive-stun produces a localised, intense, sensation of pain, probe mode application produces a generalised, intense, pain sensation and disrupts voluntary movement.

The range of clinical effects of the TASER® X26™ and TASER® X2™ has been reviewed by two independent medical advisory committees (see DOMILL, 2012 and SACMILL, 2016).

Clinical effects that have been associated with the application of TASER® discharge include:

- Localised superficial burns and erythema due to the passage of electrical current through the skin.
- Dart penetration injury which may involve deeper-lying organs and tissue. Pleural, brain, ocular, nasolacrimal duct, testicular, urethral and digital tendon injuries are among those that have been identified either at initial clinical assessment or subsequently.
- Musculoskeletal injury from the intense muscle contraction. Spinal compression fractures have been reported; ethmoid bone fracture.
- Bony injuries from TASER®-induced falls (including non-fatal and fatal head injury).
- Triggering of epileptic seizures.
- Cardiac effects (see below).

Although earlier human studies indicated that TASER® discharge in probe mode does not adversely affect breathing, one study suggests that inspiratory activity may be severely compromised (VanMeenen et al., 2013).

The circumstances in which the police use TASER® devices (and other 'less-lethal' methods of restraint) are likely to be physically and emotionally charged. This in itself has the potential to precipitate adverse cardiac or cerebrovascular events in individuals suffering from clinically diagnosed or subclinical cardiovascular disease. Alcohol, illicit drugs and mental health conditions (including drugs prescribed to treat those conditions) all have the potential to increase the risk to individuals, even in the absence of TASER® use.

A continuing source of controversy concerns whether the electrical discharge from TASER® devices, when applied to the anterior chest through a dart that has embedded in the skin or clothing overlying the heart, can directly affect heart rhythm (Zipes, 2012). A single human volunteer study using a new type of conducted energy device demonstrated that it is possible to induce rapid ventricular capture in this way (Ho et al, 2011). On the basis of this study, the government's independent advisory committee on the medical implications of less- lethal weapons took the view that it would be prudent to assume that the same effect could arise with the Taser® X26 (see DOMILL, 2012).

Should rapid ventricular capture occur in a young, healthy individual, it is likely to revert to sinus rhythm as soon as the TASER® discharge ceases. The consequences of ventricular capture may be more sinister in people with diseased hearts or who have taken illicit or prescription drugs having intrinsic effects on cardiac electrophysiology or coronary perfusion (DOMILL, 2012).

Further controversy surrounds the effects of TASER® discharge on the unborn child. A risk could conceivably arise from a direct effect of the TASER® discharge current or could be secondary to other effects, such as discharge- induced falls (DOMILL, 2012).

Information on the medical effects of TASER® devices is provided by the manufacturer (Axon Enterprise, 2017).

Management

Advice to Custody Officers and other Officers

An individual who has been subjected to TASER® discharge should be assessed at the earliest opportunity by a healthcare professional (e.g. a doctor, nurse or paramedic).

Prior to this, appropriate first aid or resuscitation procedures should be administered whilst awaiting healthcare assessment. Healthcare advice may need to be sought urgently by phone.

If there are any signs of adverse or unusual medical reactions, then medical assistance should be provided immediately. A Forensic Physician must be called to review and to document any effects of the TASER® discharge. If an individual is in hospital, a Forensic Physician should assess that person at the hospital.

Police officers should be mindful that the darts might be used to self-harm or as a weapon against them. Therefore, consideration should be given, if darts are left in the body, to handcuffing the subject. Taking the above considerations into account, the Custody Officer should conduct an appropriate risk assessment prior to placing the subject in a cell.

If darts are located in the person's clothing and have not penetrated the skin, police personnel may remove them. Officers and others must be aware that when darts are removed from a subject's body, the darts become a biohazard and the officer will need to take appropriate precautions both during and after removal. The probes should be retained and exhibited.

Custody Officers and other officers need to be aware of the circumstances of TASER® use to inform any healthcare professional. In particular, injuries sustained when subjects fall to the ground, especially injuries to the head, may not be apparent immediately. Close monitoring of a subject throughout the period of detention, both before and after a healthcare assessment, is of the utmost importance and the subject should be provided with the same level of supervision given to prisoners intoxicated with alcohol or drugs.

The Custody Officer will ensure that, as soon as is practicable, the subject is provided with the information leaflet: *Advice to People Subjected to TASER® Discharge*. (This leaflet is appended to the present practice recommendation.)

Advice to Healthcare Professionals

All persons subjected to TASER® discharge must ultimately be examined and assessed by a registered medical practitioner – a doctor – (eg Forensic Physician or Emergency Department doctor) who is familiar with the nature of TASER®-associated risks and complications.

If the doctor is unfamiliar with these unique risks and complications, he or she must be provided with a copy of these recommendations to inform them.

In most cases, initial first aid or dart removal (if not already done) may be undertaken by any appropriate healthcare professional (e.g. nurse or paramedic) or, where the darts have not penetrated the skin, by police officers. Darts that have penetrated the skin may be removed by stabilising the skin surrounding the TASER® dart and, while firmly grasping the probe, removing it with rapid traction. Ensure that the extracted dart is intact (see Figure 1).

An antiseptic wipe should be used to clean the skin around the dart exit wound.

Where darts have penetrated or are adjacent to sensitive and/or high risk areas, such as the eyes, ears, nose, mouth, face, neck, genitalia, spine, hands, feet or joints, doctors should use their clinical judgment and if necessary, seek specialist advice on dart removal.

A full history must be taken, documenting any specific health conditions (e.g. cardiac arrhythmias, pacemaker, drug or alcohol use, epilepsy, diabetes), the nature of the TASER® deployment and any other form of restraint used (from officers involved in the deployment) and identifying any specific symptoms reported by the subject during or following the use of the TASER®.

A complete external examination (including documentation and assessment of sites of dart penetration) to document visible injury and a full cardiovascular, respiratory, musculoskeletal and neurological examination should be undertaken to identify or exclude any TASER®- associated complications. Appropriate referral to specialists may be required.

The potential effects of TASER® discharge on the fetus are unknown, and pregnant women should be referred for specialist obstetric review.

All those who have been subjected to TASER® discharge must be advised to attend their GP or Emergency Department if they have any subsequent concerns.

Electrocardiography, X-ray, ultrasound, CT or MRI scans may be indicated depending on the medical assessment. If head injury has been sustained, the UK Faculty of Forensic and Legal Medicine has produced advice on the evaluation and management of head injury in persons held in police detention. (See: *Head injury warning*)

It is unlikely that the TASER® would have been used in isolation from other forms of restraint. Concurrent injuries or effects arising from police use of other forms of force should also be considered during assessment of the patient. (See: *Irritant sprays: clinical effects and management*)

It is view of the Faculty of Forensic & Legal Medicine that everyone who has been exposed to a TASER® discharge should receive exactly the same high quality and standard of healthcare as set out in this Guidance whether they are a member of the public, a police officer or a detainee.

References

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Produced by Dr Jason Payne-James and Dr Bob Sheridan
on behalf of the Faculty of Forensic & Legal Medicine

Advice to People Subjected to TASER® Discharge

You have been subjected to the effects of a TASER® Conducted Energy Device (CED). The TASER® CED passed short pulses of electricity into your body. The electricity made your muscles contract (go stiff). You may well have lost balance and fallen to the ground. The device was used by a specially trained police officer.

During or after use of the TASER® you are likely to have experienced one or more of the following:

- Extreme pain and muscle spasms when the electricity was delivered
- Being dazed for several minutes afterwards
- Loss of memory of the event
- Unsteadiness and a spinning sensation
- Temporary tingling
- Weakness in the limbs
- Local aches and pains
- Tissue redness and swelling at the skin area where the TASER® electricity was applied

These are normal effects of the TASER® and should resolve by themselves.

While in custody you will have been medically examined and, if necessary, treated for any injuries, including those from use of the TASER® CED.

If any of the above symptoms are still present a day later, or if you develop any other health problem that was not there before the TASER® was used, you must attend your GP or local Emergency Department.

You may have two small marks (similar to bee stings) in your skin. These are small puncture wounds from the short needles (barbs) through which the electric current passed into your skin. These barbs will have been removed before or while you were in custody. There may be small burns similar to sunburn around these marks. These should return to normal in a few days. If they do not, and there is pain and swelling, you may have a local infection – you must see a doctor. If the probes only stuck in your clothing you may still have two small areas of skin underneath that look sunburned.

There are no known effects of the TASER® electricity on the well-being of the unborn child. However, if you are pregnant and have been subjected to TASER® discharge you should be reviewed by your doctor or midwife.

This advice has been adapted from *TASER®: Clinical Effects and Management of Those Subjected to Taser® Discharge*, published by the Faculty of Forensic and Legal Medicine. The advice in this leaflet is designed to complement, and not replace, locally authorised SOPs or guidelines for the medical management of members of the public who have been subjected to TASER® discharge and other forms of force. Where the advice given in this leaflet differs from local procedures, the local procedures should take precedence. Distributed by the National Police Chiefs' Council.