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COMMENTARY

The safety of medication in patients who have recently received a Taser shock

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There remains controversy as to whether Tasers can adversely affect cardiac rhythm. It is well established that antipsychotics can adversely affect cardiac rhythm. Therefore the question arises whether it is safe to prescribe and administer an antipsychotic to a person who has recently received a Taser shock. This article addresses this issue and makes recommendations for practice.

Key words: Taser; antipsychotic; medication; cardiac rhythm; safety

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Introduction

Tasers are a brand of conducted-energy device (CED) that are used in the UK and internationally by the police and law enforcement officers enabling them to gain control over aggressive and violent individuals in potentially dangerous scenarios using less than lethal force.

The device sends pulses of electrical current into the recipients' body causing temporary loss of neuromuscular control resulting in involuntary muscle contractions, rendering the recipient temporarily incapacitated; thus giving the police time to gain control of the situation. The neuromuscular incapacitation lasts for as long as the pulses are applied (Kroll 2009, p. 175; SACMILL 2016).

Tasers have been used by the police in the USA and elsewhere since the mid-1970s (Fish & Geddes 2001). They have been widely used in North America since 1999 and now across most states in the USA, and even within psychiatric hospital settings (Erwin & Philibert 2006; Ho et al. 2011a). They were introduced into UK policing in 2003 (SACMILL 2016) and are now used relatively widely; over 10 000 times across England and Wales in 2015 (Home Office 2016).

There is national guidance outlining the appropriate use of Tasers and the care of those receiving a shock (SACMILL 2016; FFLM 2018; DOMILL 2012).

Tasers have been used on thousands of individuals, including those subsequently identified as being in a mental health crisis or with a pre-existing mental illness (Bailey et al. 2016; Hallett et al. 2021) where the use is disproportionately high (Ho et al. 2007; O'Brien et al. 2011), as well as even more commonly on those who were intoxicated (Ho et al. 2007; Strote et al. 2010) and those currently abusing substances including, but not limited to, stimulants and alcohol (Bailey et al. 2016). Commonly one shock is required, but in some cases further shocks were administered. Studies reported that people with a mental illness or current substance misuse (or both) who required

police intervention received more Taser shocks than those without a mental illness; the reasons behind this were interrelated and multifactorial (Bailey et al. 2016; Hallett et al. 2021). White & Ready (2010) concluded that a person's mental health at the time of Taser deployment does not affect the effectiveness of the Taser.

Cardiac safety

Following widespread and international use, a range of complications and clinical sequelae have been reported related to the use of Tasers, and controversies remain regarding certain aspects of safety of Tasers, including in certain populations (Hallett et al. 2021).

Concerns have been raised that the electrical shock can initiate ventricular fibrillation resulting in sudden cardiac arrest either immediately, or sometime later (Zipes 2012, 2014). Post hoc studies of real life data (Ho et al. 2011b) did not identify any fatal cardiac dysrhythmias and therefore concluded that Tasers are safe in this regard (Bozeman et al. 2009), and that the 'incidence of ECD-induced cardiac arrest is extremely low, if not zero' (Kroll et al. 2014). However other studies have concluded that the overall risk of inducing a cardiac fibrillation is not completely negligible (Leitgeb 2014]. The risk of Taser-induced dysrhythmia appears to be higher in men, higher in Asians compared to Europeans and lower in obese people due to the distance between the electrical discharge and the heart (Leitgeb 2014). It also depends on the location of the electrical discharge and proximity to the heart, as well as to the number of shocks given (DOMILL 2012).

Despite these concerns Tasers are generally considered to be safe when used in healthy, sober subjects when deployed in line with the manufacturers and police departments' guidelines (O'Brien & Thom 2014). Such conclusions are based on a large number of studies in humans as well as studies in animals, computer generated simulation models and case studies (Kunz & Adamec 2019).

When Tasers are deployed in real life scenarios these are generally physically and emotionally charged scenarios which in and of themselves have the potential to precipitate adverse cardiovascular events in people suffering from existing cardiovascular disease. Furthermore individuals may be under the influence of substances, prescribed or illicit, or one of the several medications which can potentially increase these risks (FFLM 2018). At the point of use of a Taser, police are likely to be unaware of any medical diseases or risks of the individual.

For acutely severely mentally unwell individuals, the event leading to the involvement of the police and use of a Taser may precede an emergency admission to a psychiatric hospital. Once in this care pathway a range of interventions may be used, including medication, physical restraint and seclusion. The treating care team will be aware that those with severe mental health illnesses often have a range of physical health risk factors including raised blood pressure, obesity, cardiac and respiratory disease, and metabolic syndrome, and are more likely than the general population to misuse alcohol or other substances that may alter cardiac functioning (O'Brien & Thom 2014).

In a hospital care setting if a patient is acutely disturbed, aggressive or violent, short term medication may be used. If the patient refuses to take this orally this may be administered forcibly by intramuscular injection under restraint. This is called rapid tranquillisation (RT). In the UK, benzodiazepines, antipsychotics or the antihistamine promethazine are commonly used as RT (Paton et al. 2019).

Numerous medicines including many antipsychotics have been associated with a lengthening of the QTc interval on the electrocardiogram (Hasnain & Vieweg 2014), with some this led to the ventricular tachycardia torsade de pointes which in turn can lead to sudden cardiac death (Nielsen et al. 2011). Restraint itself is also known to put the body under stress. Furthermore, sudden unexplained death is a known but rare event in the mental health population; the risk factors are unclear but include benzodiazepines, use of multiple antipsychotics and cardiovascular disease and respiratory disease occurring more often in male patients and is thought it may be related to cardiovascular function (Windfuhr et al. 2011].

Therefore the question arises as to whether it is safe to prescribe and administer antipsychotics, RT or other medication to a patient who has recently received a Taser shock.

The UK national guidelines from NICE (2015) describing the management of violence and the use of RT do not address this issue, nor do other more recent RT guidelines (Patel & Sethi et al. 2018), and the national guidelines about the safe after care of a patient who has received a Taser discharge do not address RT (FFLM 2018).

Should a Taser shock induce an arrhythmia in a healthy adult, it is likely that they would return to normal sinus rhythm as soon as the Taser discharge has ceased (FFLM 2018). However there may be further complications in a less healthy individual, an older person, or someone with cardiac disease or risk factors such as certain drugs (prescribed or illicit) (DOMILL 2012)].

Studies of other types of electrical devices such as implantable cardioverter defibrillators, where induction of ventricular fibrillation is a routine part of installation, have established that ventricular fibrillation is either induced, or not, within 1–5 seconds of the electrical shock; and that cardiac pulse disappears within seconds. There is no increased risk of a later ventricular fibrillation as a result of the previous shock, as electrical current is not stored in the human body (Kroll 2009). Thus it proceeds that repeated Taser shocks do not result in a 'cumulative

dose' of electricity (Jauchem 2015), as would occur with repeated doses of medication. Reviewers have concluded that it is doubtful that a Taser shock would directly lead to any delayed cardiac arrest (Jauchem 2015).

In the UK it is recommended that following the receipt of a Taser discharge, every individual must be examined by a medical practitioner, taking a full medical history paying particular attention to any cardiac conditions and substance misuse, followed by an external examination (DOMILL 2012; SACMILL 2016; FFLM 2018).

The evidence does not suggest that routine laboratory testing, electrocardiograms, or prolonged medical observation in a hospital setting are necessary for every individual who has received a Taser shock (Vilke et al. 2011) therefore these are not routinely recommended.

Conclusions and recommendations

Any patient admitted to a psychiatric hospital following events leading to them receiving a Taser shock should be medically assessed in keeping with the UK recommendations (FFLM 2018). If this has not been done prior to admission to the psychiatric hospital then it should be done at that point.

Even if the patient has previously been assessed, if they present with symptoms consistent with a possible cardiac adverse event (e.g. palpitations, chest or arm pain, shortness of breath) or any other significant physical health concerns, a further cardiology assessment including an ECG would be pertinent.

No evidence was found, or any theoretical reason identified, to routinely avoid using any specific medication for a patient who has recently received a Taser discharge. Therefore it is recommended that RT and regular psychotropics be prescribed to such a patient with the usual cautions and considerations tailored to the individual.

In the absence of national guidance on this topic it is hoped that this aspect of care will be addressed by NICE in the review which was planned in 2019 (NICE 2019). In the mean time, in the absence of national guidance, trusts should issue advice to their staff as to how to proceed in caring for disturbed patients who have recently received a Taser shock.

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