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### NEEDLESTICK INJURY PREVENTION IN THE DIABETES SETTING

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In the world of diabetes care, most current discussion centres on effective self-administration, accurate insulin dosage, and the avoidance of short-term lipohypertrophy and longer-term health complications resulting from dosage inaccuracies. However, with the advent of a new EU Directive on sharps injury prevention (Council Directive 2010/32/EU), and the impending mandatory implementation deadline of May 2013 in all EU countries, scrutiny has now been focused on the safety and protection of specialist diabetes nurses when they are administering treatment to their patients.

Is the diabetes specialist at risk? And is the risk they face more or less than their colleagues in other healthcare functions? To answer this question requires an objective appraisal of the situation. In our experience, a number of false assumptions about the risk of needlestick injury (NSI) and infection in diabetes treatment have regularly cropped up in conversation with healthcare organisations. This short article reviews the most commonly held misconceptions and offers third party references to refute those misconceptions.

#### **Myth Number One – people with diabetes have a lower prevalence of dangerous viruses than the general population.**

This is not true. People with diabetes are at least equivalent to the general population in this regard, if not higher. According to one study (Demir, M, Serin, E, Göktürk, S, et al., 2008), Hepatitis B (HBV) DNA was discovered in 11% of Diabetes type 2 patients, compared to 3% of the control sample, a statistically significant difference. Diabetes specialists working with this group would therefore be at greater risk – in this respect - from NSI and infection than those administering to the general population.

It is not sufficient risk control to rely on the fact that a high proportion of healthcare workers treating people with diabetes will have had the HBV vaccination. The vaccination coverage is far from 100% (De Schryver A, Claesen, B, Meheus, A et al., 2010) and even vaccinated individuals may not be completely protected, because titers of protective antibodies decline over time. Moreover, there are other dangerous viruses, such as HIV and Hepatitis C (HCV), for which there is no vaccination. Looking at infection risk across the board, there are more than 30 viral diseases that a NSI can transmit, of which the most dangerous are HCV and HIV, where their prevalence among people with diabetes is higher than (HCV) (Simó, R, Hernández, C, Genescà J et al., 1996), or equal to (HIV) (Mondy, K, Overton, ET, Grubb, J et al., Mar. 2007) the general population.

#### **Myth Number Two – there are not as many NSIs when treating people with diabetes needles, smaller needles do not carry a significant risk of infection, prophylaxis clears any possible infections, and anyway, diabetes needles and injection devices do not get contaminated.**

In fact, the situation is exactly the opposite. NSI with diabetes needles or lancing devices are actually one of the highest frequency sharps injury in the healthcare setting (Kiss, Phillippe, de Meester, et al., Dec 2008). There is no branch of medicine with little or no risk of NSI. Moreover, most people with diabetes are being treated in Internal Medicine, where the highest risks of NSI occur. Some have remarked that people with diabetes inject with tiny needles that, by virtue of their size, represent little risk of injury. Again, this misses the main point. Pen injection devices aspirate human cells back into the cartridge. These potentially infectious cells can then be deposited back into the needle and then transmitted accidentally should a NSI occur. Equally, diabetes needles themselves have been shown to retain traces of blood.

The small size of diabetes needles does not significantly reduce risk either. It takes minute quantities of blood to transmit HBV or HCV, and it is therefore worth dwelling on some simple mathematics, evaluating the number of people who could be infected by the blood in one hollow-bore needle. The average volume of blood inoculated in an associated injury via a 22-gauge needle is approximately 1.0 – 2.0 µL (Mondy, K, Overton, ET, Grubb, J et al., Mar. 2007), which may contain an infectious dose of a blood-borne virus. The viral load in a millilitre of infected blood can be anywhere up to a billion (10<sup>9</sup>) virus particles for HBV (Public Health Agency of Canada) . If we assume a typical load of ten million (10<sup>7</sup>) per millilitre of infected blood, then this would give a load of 10,000 virus particles per µL. This is enough to infect many people with HBV. The load for HCV is lower, but is still enough to infect multiple victims. If we move from risk to actual conversions, the story is significantly worrying, with studies showing HCV conversions running at between one and two in every hundred NSI percutaneous exposures (UK Occupational bloodborne Virus report, Nov. 2008).

What about the impact of prophylaxis on people unlucky enough to sustain an NSI and a subsequent infection? Certainly, the latest prophylactic medications can prevent conversion. However, there is a 'golden hour', in which urgent action must take place for these to be effective. Moreover, even if one receives prophylaxis, there are a number of adverse and unpleasant side effects to therapy – not just physical, but also occupational and psychological. Affected persons have to change their work routines and duties for periods following injury, often involving a prolonged and extremely stressful period of not knowing whether they have contracted a life-threatening infection (Nursing Times, 2006). Changes in sexual habits also have to be enforced, putting a strain on family life and relationships.

**Myth Number Three - people with diabetes recap and safely dispose of their needles; there are no diabetes safety needles; and the new EU Directive on sharps injury prevention specifically excludes diabetes treatment.**

It is also a fallacy that people with diabetes scrupulously follow safe disposal procedures, recapping their needles and putting them into a specialised sharps receptacle. In fact, one study (Journal of Diabetes, 2010) has shown that only 33% of used sharps go into containers made specifically for the disposal of sharps. 12% go into an empty bottle or milk carton, 46% go straight into the rubbish after recapping, and 3.5% go in the bin without even being recapped.

Quite apart from the safe disposal of sharps, there are now a number of safety-engineered medical devices on the market, comprising active devices, where the user has to manually activate a needle shield, or passive devices, which shield or retract the needle automatically after it has been deployed. Many people are unaware that these devices even exist. This is tragic, in that numerous studies (Adams, D, Elliott TS., 2006; Jagger J. et al., 2008) have shown that NSIs drop dramatically where safety devices are adopted. Acquisition costs may initially seem off-putting to healthcare organisations, yet a brief look at studies (Armada, Gil L, Fernandez, Cano MI et al., 2006; Glennard, Anna H., Persson, Ulf, 2009; NHS Scotland) on the subject reveals that the prevention of injury usually leads to a clear return on investment, especially in mitigating legal, regulatory, financial and reputational risk.

Finally, the new European Directive that has now come into force specifically stipulates that wherever there is risk of sharps injury, the user and all healthcare workers must be protected by adequate safety precautions, including the use of 'medical devices incorporating safety-engineered protection mechanisms' (Council Directive 2010/32/EU).

In conclusion, the treatment of people with diabetes may not be logically excluded from best safety practices. People with diabetes have the same, if not higher, prevalence of dangerous viruses. More needlestick injuries than the norm occur in treating people with diabetes, those injuries are a high risk source of possible infection despite the small size of diabetes needles, and the introduction of readily available safety-engineered medical devices have been clearly shown to reduce the risk of injury and infection. By May 2013, the EU Directive will make it compulsory to use safety devices in all situations, where there is significant risk of sharps injury and infection. In the meantime, many healthcare organisations across the EU are introducing safety devices well in advance of that deadline in order to avoid financial, legal, regulatory, reputational and above all, human damage.

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