Supplemental Appendix 14

NEEDLESTICK INJURIES/BLOOD-BORNE INFECTION RISK

Risk of Diabetes Sharps

Needlestick Injury (NSI) is one of the highest frequency accidents in the healthcare setting. Diabetes needles are often implicated, and these are used on almost every ward in a hospital. Used needles have been shown to retain traces of blood, sometimes contaminated blood. According to one study, Hepatitis B (HBV) DNA was discovered in 11% of T2DM with diabetes, compared to 3% of the control population. The CDC has recommended mandatory HBV vaccination for patients with diabetes and has warned that many may have been infected by reusing glucose monitors used by other patients. The prevalence of HCV among people with diabetes is also higher in than the general population and that of HIV is approximately equal. One study 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.

Risk to Diabetes Nurses

In a survey performed among 634 diabetes nurses in 13 western European countries and Russia in 2012 nearly a third reporting suffered a NSI in the context of giving injections to patients with diabetes in the hospital setting. This is similar to US data. Lee showed that 78% of US nurses had ‘ever experienced a NSI’ (all devices included) and that 30% of these came from insulin needles. Hence approximately 24% of US nurses have suffered a NSI from giving diabetic injections, a figure similar to Europe. These injuries put nurses at risk of blood-borne pathogens such as HBV, HCV and HIV. A worrying proportion of European nurses treating people with diabetes have not had HBV vaccination. Recapping a used needle accounted for 29.5% of the NSIs. Removing a pen needle is a potentially dangerous step because the user’s fingers come very close to the exposed tip. Nurses are usually trained to use a clamp or sharps...
box to remove the pen needle, but in the European survey 57% of the nurses said they unscrewed used pen needles in the hospital setting using their own fingers.\textsuperscript{5} Policies on safer practices exist and are posted on line and made available to nurses via posters, videos and other training tools. However by themselves these means are not effective in preventing NSI. When they are available nurses are often unfamiliar with them (29%) or untrained in NSI prevention (67%).\textsuperscript{5} Unsafe practices such as unscrewing pen needles with the hands and recapping continue to be practiced at high rates. Risks can extend as well as to ‘downstream’ workers (cleaning personnel, rubbish removers, incinerators, as well as to the general public) if they receive an accidental NSI or muco-cutaneous blood exposure.\textsuperscript{253} Nurses who experience a NSI may have to change their work routines and duties for varying periods following injury, often involving a prolonged and stressful period of not knowing whether they have contracted a life-threatening infection.\textsuperscript{254}

\textbf{Double Risk of Pen Needles}

Pen needles have two sharp ends, one which injects the patient and the other which penetrates the insulin cartridge. NSI occur with both ends, and both can be sources of potential infection. Most injured nurses in Europe receive their NSI from the patient end of the needle but nearly 1 out of 10 reported being injured by the cartridge end.\textsuperscript{5} When unscrewing a used pen needle (done by more than half of European nurses) users’ fingers are usually closest to the cartridge end of the needle than the patient end. Pen injection devices aspirate human cells back into the cartridge during use\textsuperscript{82} even after a single usage. Potentially infectious cells can then be deposited back into the needle and then transmitted accidentally through both ends should a NSI occur.\textsuperscript{255}

\textbf{International Legislation}

In 2000 President Clinton signed into law the ‘Needle Stick Safety and Prevention Act’\textsuperscript{256} requiring all healthcare facilities in the USA to provide needle protective devices to their staffs. Healthcare employers in the USA are moreover required under law to maintain sharps injury logs and involve non-managerial HCW in the evaluation and implementation of needle protective devices.\textsuperscript{257} A 2010 EU Directive (2010/32 /EU\textsuperscript{258, 259}) states that all at-risk injections must be given with a safety-engineered device.\textsuperscript{260} This obligation covers all diabetes injections
in the hospital as well as those given in distributed institutional settings (e.g. nursing homes, ambulatory clinics, schools, prisons, nurseries, 3rd party injectors in home health settings, etc.). India has similar guidelines to the US and the EU. The World Health Organization Guideline Development Group has also published recommendations on safety devices. India has pioneered a Green Diabetology movement, which seeks to ensure safe, person-friendly, and environment-friendly disposal of all insulin-related supplies, including sharps. Green diabetology is an integral part of optimal insulin technique. Active involvement of all stakeholders is needed to make this movement a success.

**Safety Devices**

Currently a number of safety-engineered medical devices exist, including active devices (where the user manually activates a needle shield) or passive devices (which shield or retract the needle automatically after it has been deployed). Many diabetes nurses are unaware that these devices exist. Safety devices have been shown to reduce the incidence of NSI dramatically and accounted for <2% of NSI in one survey. They have also proven to be cost-effective. However when pens are introduced into a hospital setting, nurses’ workload increases considerably during the switch-over period and their need for additional time and training must be taken into account.

This material has not been edited, and the authors take responsibility for the accuracy of all data.