Needlestick injuries in European nurses in diabetes

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Abstract

Aim. – With the June 2010 publication of EU Council Directive 2010/32/EU scrutiny is now being focused on the safety and protection of diabetes nurses.

Methods. – We used a questionnaire to study the frequency and risks of Needlestick Injuries (NSI) associated with diabetic injections in European hospitals. 634 nurses participated from 13 western European countries and Russia.

Results. – When patients with diabetes who self-inject at home are hospitalized injections are given always by the staff in 31% of cases, by the patients themselves where possible in 33%, initially by staff; then the patient takes over in 12% and both staff and patient throughout the stay in 21%. 86% of nurses said their hospitals had a written policy on the prevention of NSI but, where it was available, only 56% were familiar with it. 67% of the nurses had not attended any training on the prevention of NSI but giving a diabetic injection at some point in the past. 29.5% of NSI occurred while recapping a used needle. 57% of nurses unscrew pen needles using their own fingers. In 80% of cases the source patient’s identity was known and the sharp item was “contaminated” (known previous percutaneous exposure to patient) in almost half the cases (43%). NSIs were reported to the proper authorities in only 2/3 of cases.

Conclusion. – Our study shows that frequent NSI occur in European nurses treating people with diabetes in hospital settings. These injuries are a source of possible infection despite the small size of diabetes needles. The introduction of safety-engineered medical devices has been shown to reduce the risk of injury. A 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”.

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Résumé

Piqûres accidentelles chez des infirmières hospitalières en Europe lors d’injections aux patients atteints de diabète

But. – Avec la publication en Juin 2010 de la Directive 2010/32/UE l’attention s’est tournée vers la sécurité et la protection des infirmières s’occupant de patients diabétiques.

Méthodes. – Nous avons utilisé un questionnaire pour étudier la fréquence et les risques de piqûres associés à des injections pour le traitement du diabète dans des hôpitaux européens. 634 infirmières de 13 pays d’Europe occidentale et de Russie ont participé à cette étude.

Résultats. – Lorsque les patients atteints de diabète qui s’auto-injectent à domicile sont hospitalisés, les injections sont réalisées par le personnel hospitalier exclusivement dans 31 % des cas, par les patients eux-mêmes dans 33 % des cas, initialement par le personnel puis par le patient dans 12 % des cas et par le personnel et les patients tout au long du séjour dans 21 % des cas. 86 % des infirmières ont déclaré que leur hôpital avait des recommandations écrites sur la prévention des piqûres accidentelles, mais seules 56 % étaient familiarisées avec ces recommandations. 67 % des infirmières n’avaient pas assisté à une formation sur la prévention des piqûres.
1. Introduction

Needlestick injuries (NSI) are one of the most frequent occupational hazards faced by nurses, phlebotomists, doctors and other healthcare workers, as well as those working in downstream functions such as cleaning and waste disposal. Such injuries have the potential for transmitting at least 30 life-threatening blood-borne pathogens, including Hepatitis B (HBV), Hepatitis C (HCV) and human immunodeficiency virus (HIV) [1]. Only 1/10,000 ml of infected plasma is required for HBV transmission [2], and many times this volume is present within the barrel or on the sides of medical sharps, including insulin needles. A surprising number of NSIs occur after use, during the disposal process. HBV is stable in dried blood for at least seven days and HCV for at least 16 hours [3], thus NSI with devices used previously can still be infectious. Not all healthcare workers (HCW) are covered by HBV vaccination; in fact the European range is from 30-90% depending on the country and branch of medicine [4].

The June 2010 publication of EU Council Directive 2010/32/EU, on the prevention of sharps injuries in the hospital and healthcare sector, highlighted the importance of consistently implementing mandatory measures to prevent these potentially fatal injuries. The directive must be implemented in all member states by 11 May 2013 at the latest. In accordance with the directive [5,6] and its transpositions into member state legislation, at-risk injections must be given with a safety-engineered device [7]. This obligation covers all procedures in the hospital as well as those performed in distributed institutional settings (e.g. nursing homes, home health settings, ambulatory clinics) [8].

In the past some authorities have established a risk hierarchy where certain applications of medical needles have been considered to pose less threat than others [9]. This approach usually assumes that one class of devices (e.g. insulin syringes) represent a low risk compared to devices intended for vascular access or blood sampling. However, the most common devices involved in NSI are the syringe and needle [10]. Scrutiny has now been focused on the safety and protection of diabetes nurses and other professionals when they are administering treatment to their patients.

Is the diabetes specialist at risk? And is the risk they face more or less equivalent to that of their colleagues in other healthcare functions? Lee [11], in a survey of acute care nurses in the US, showed that NSI were very frequent amongst nurses working with diabetic patients. Kiss [12] has shown that over 40% of NSI in nursing homes come from insulin pens.

The European Medical Association (EMA), in cooperation with BD, sponsored a questionnaire survey for European nurses who give injections to patients with diabetes in the hospital setting. The purpose of the survey was to assess the frequency and risks NSI associated with diabetic injections in Europe. The questionnaire was voluntary and completely anonymous and surveyed practice in 14 European countries. Here we report on the findings.

2. Methods

The English version of the questionnaire was validated initially by a group of UK diabetes nurse educators and was then translated into the languages of the other European countries. All versions of the questionnaire are available for review at www.wise-workshop.org. A full set of study results and by-country results are also available on this site.

Nurses who injected insulin and/or GLP-1 agents such as exenatide (Byetta™) or liraglutide (Victoza™) at least twice a week for more than 6 months in a hospital setting were invited to participate. Nurses consented to answer all the questions anonymously and were not remunerated for their participation. The study was performed from March to July 2011. Preliminary study findings were presented at the WISE (Workshop on Injection Safety in Endocrinology) meeting in Brussels, 13-16 October 2011.
SPSS software was used to perform the data analysis. Two-tailed tests were used in all analyses. Initially results from each of the 14 countries were analyzed independently and only when the distributions of key demographic parameters were shown to be comparable were all the data pooled into an overall database.

3. Results

Table 1 shows the countries and number of nurses who participated per country in the survey. 634 nurses participated from 13 western European countries and Russia. Most replies (69%) came from nurses on Endocrine/diabetes wards or Internal Medicine wards and most participants were currently injecting patients with diabetes at least twice a day. 623 nurses out of 634 (98%) had experience treating patients who used insulin pens at home and 541 nurses out of 634 (78%) had patients who used syringes at home, hence the majority of nurses were familiar with both devices.

Since most patients in Europe inject at home with an insulin pen while most hospital injections are given with a syringe, we asked: How do patients who use a pen device at home receive injections when in hospital? Table 2 shows the answers. Table 3 gives the results of the same question asked of patients who use a syringe at home.

When asked who gives the injections when a patient with diabetes is hospitalized the overall answers were: Always the staff (31%), the patient where possible (33%), initially staff, then the patient takes over (12%) and both staff and patient throughout the stay (21%). However, there were considerable differences by country (Table 4) with several southern European countries mainly entrusting staff to give the injections while northern European countries allowed the patients to give their own injections.

Overall 86% of nurses said their hospitals had a written policy on the prevention of NSI but, where it was available, only 56% were familiar with it. 67% of the nurses had not attended any training on the prevention of NSI and only 13% had attended one in the last year. Regarding sharps disposal,
Table 5 shows the answers to the question: *What do you do with used needles or syringes immediately after use?* 7.1% of nurses report recapping needles and 5.9% report storing unprotected needles temporarily on a tray, trolley or cart.

Almost a third of nurses surveyed (32%) report suffering a NSI sometime in the past while giving a diabetic injection. The percentages by country are given in Table 6. Of those who received a NSI, 49% occurred with a conventional (non-safety) syringe, 44% with a conventional pen needle, 1.2% with a safety syringe and 0.4% with a safety pen needle. Nurses who had suffered a NSI with pen needles were asked which end of the needle caused the injury. Most of them were injured by the patient end of the needle but nearly 1 out of 10 reported being injured by the cartridge end. Table 7 lists the timing and circumstances for the NSIs. 29.5% of NSI occurred while recapping a used needle.

Removing pen needle is a critical and dangerous step because the user’s fingers must come very close to the exposed tip. Nurses were asked how they performed this step and Table 8 shows the answers. 57% unscrew pen needles using their own fingers.

Nurses who had had NSIs rated them as “superficial to moderate” (based on amount of resultant blood flow) in almost all cases (96%). In 80% cases the source patient’s identity was known and the sharp item was “contaminated” (known previous percutaneous exposure to patient) in almost half the cases (43%).

NSIs were reported to the proper authorities in 2/3 of cases. Table 9 shows the reasons given for not reporting a NSI. Nurses who had suffered a NSI were asked about the actions taken immediately thereafter (Table 10). They were also queried about emotional consequences (Table 11).

### Table 5
**Disposition of used sharp immediately after use**

<table>
<thead>
<tr>
<th>What do you do with used needles or syringes immediately after use?</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Put immediately into a sharps container</td>
<td>83.0</td>
</tr>
<tr>
<td>Store temporarily on a cart, trolley or tray, then dispose in sharps container</td>
<td>5.9</td>
</tr>
<tr>
<td>Recap needle and dispose of in sharps container</td>
<td>7.1</td>
</tr>
<tr>
<td>Clip the needle off and store in the clipping device</td>
<td>0.3</td>
</tr>
<tr>
<td>Throw needle in the rubbish</td>
<td>1.0</td>
</tr>
</tbody>
</table>

### Table 6
**Percentage of Nurses by Country who acknowledge suffering a NSI while giving injections to persons with diabetes**

<table>
<thead>
<tr>
<th>Country</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Russia</td>
<td>25.0%</td>
</tr>
<tr>
<td>Greece</td>
<td>55.0%</td>
</tr>
<tr>
<td>NL</td>
<td>23.0%</td>
</tr>
<tr>
<td>Belgium</td>
<td>19.5%</td>
</tr>
<tr>
<td>France</td>
<td>43.2%</td>
</tr>
<tr>
<td>Spain</td>
<td>39.8%</td>
</tr>
<tr>
<td>Italy</td>
<td>30.5%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>33.3%</td>
</tr>
<tr>
<td>UK</td>
<td>15.4%</td>
</tr>
<tr>
<td>Denmark</td>
<td>29.4%</td>
</tr>
<tr>
<td>Sweden</td>
<td>50.0%</td>
</tr>
<tr>
<td>Germany</td>
<td>42.2%</td>
</tr>
<tr>
<td>Ireland</td>
<td>16.7%</td>
</tr>
<tr>
<td>Finland</td>
<td>40.0%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>32.3%</td>
</tr>
</tbody>
</table>

4. Discussion

Our survey shows that nearly a third of European nurses have suffered a NSI in the past in the context of giving injections to patients with diabetes in the hospital setting. USA data from Lee [13] showed that 78% of nurses had “ever...
experienced a NSI” (all devices included) and that 30% of these came from insulin needles. Hence approximately 24% of USA nurses have suffered a NSI from giving diabetic injections, a figure similar to our own. These injuries put nurses at risk of blood-borne pathogens such as HBV, HCV and HIV.

Policies on safer practices are not in themselves effective in preventing NSI [14]. When they are available nurses are often unfamiliar with them (29%) or untrained in NSI prevention (67%). Unsafe practices such as unscrewing pen needles with the hands and recapping continue to be practiced at high rates. Safety devices have been shown to significantly reduce the incidence of NSI [15-18].

Patients with diabetes may be a source for HCW of pathogenic viruses. According to one study [19], HBV DNA was discovered in 11% of type 2 patients with diabetes, compared to 3% of the control sample. Studies have shown very high effectiveness of HBV vaccination to prevent the development of hepatitis [20]. However a worrying proportion of European nurses (from 30-90% depending on the country) [21] have not had HBV vaccination [22].

The CDC has recently recommended mandatory HBV vaccination for patients with diabetes and has warned that many of them may have been infected in places where they undergo assisted blood glucose monitoring, with more than one person using the monitor [23]. The prevalence of HCV [24] among people with diabetes is also higher in than the general population and that of HIV [25] is approximately equal. For the latter viruses no vaccination currently exists.

NSI with diabetes needles or lancing devices are one of the highest frequency sharps injury in the healthcare setting [11]. Some health care workers believe that because people with diabetes inject with short thin needles they represent little risk of injury. However, pen injection devices aspirate human cells back into the cartridge [26]. These potentially infectious cells can then be deposited back into the needle and then transmitted accidentally through both ends should a NSI occur.

The results of Tables 7 and 8 indicate a high frequency of improper disposal of just-used sharps by nurses in hospitals and similar facilities, in the EU. Education on the seemingly innocuous practices of recapping needles, storing unprotected needles temporarily on a tray, trolley or cart and unscrewing used pen needles with ones hands would go a long way to reducing NSI risk. 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 [27].

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 are available. A number of studies [28,29] have shown that NSI rates fall dramatically after safety devices are adopted. Acquisition costs may initially seem off-putting to healthcare organizations, yet a number of studies [30-32] reveal that the prevention of injury usually leads to a positive return on investment.

A 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” [33].

In conclusion our study shows that frequent NSI occur in European nurse treating people with diabetes in hospital settings. These injuries are a source of possible infection despite the small size of needles used in the management of diabetes. The introduction of safety-engineered medical devices has been shown to reduce the risk of injury. By May 2013, the EU Directive will make it compulsory to use such safety devices in all situations where there is significant risk of sharps injury and infection. In the meantime, many healthcare organizations across the EU are introducing safety devices for use by their staff in advance of that deadline in order to avoid financial, regulatory, reputational and human risk.

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Conflicts of interest disclosure

KS and CL are employees of BD.

Het verminderen van prikaccidenten door inzet van veiligheidssystemen, Dutch Nationaal Hepatitis Centrum, March 2009.


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