

# Improving insulin safety: An ongoing campaign



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Since it was first administered to a young boy with type 1 diabetes in Toronto, Canada in 1927, insulin has saved tens of thousands of lives. However, improper insulin use has cost lives too and remains one of the top three high-alert medications worldwide.

Described in the early 1920s as a “thick brown muck” (Bliss, 2007), insulin has come a long way over the past 90 years, with more purified compounds, simpler delivery devices and shorter, finer needles. Now, over 30 different insulins are available to prescribe in the UK, which offers greater choice but can create confusion, particularly for those less experienced in managing people on insulin. Traditionally, insulin was initiated and supervised by specialist teams in hospitals but over the past decade or so, many more “generalists” with an interest in diabetes are offering enhanced diabetes services including insulin initiation and ongoing management. There are benefits to offering such a service: it is usually closer to home, waiting times may be shorter and the person will often be seen by a clinician with whom they have a trusted and established relationship.

## Insulin safety training

In May 2016, the PCDS invited healthcare professionals (HCPs) working in both primary and secondary care to complete a short survey on managing insulin in general practice, the results of which were published in an earlier issue of the Journal (PCDS, 2016). It was not entirely surprising that the majority of respondents, as members of the PCDS, had at least some responsibility for the ongoing management of insulin and just over half of respondents were responsible for insulin initiation. I would argue that ongoing management of insulin is the more challenging of the two, requiring careful assessment to determine reasons for suboptimal control, and to perform dose adjustment and treatment intensification. To perform this role

competently, the HCP must be properly trained but they also need to be dealing with people on insulin on a regular basis and see sufficient numbers both to develop and maintain expertise and confidence. Only 60% of those completing the survey confirmed that they had undertaken training or attended an update in insulin management and, in over 20% of this group, it was more than 4 years ago.

Between 2003 and 2009, the National Patient Safety Agency (NPSA) received 16 600 medication incident reports involving insulin. The top three error types were wrong dose, strength or frequency (26%), omitted and delayed doses (20%) and wrong insulin product (14%; Cousins et al, 2011). Subsequently, in June 2010, the NPSA issued a Rapid Response Report on safer administration of insulin (NPSA, 2010), the key recommendations of which appear in *Box 1* on the next page.

Insufficient training of HCPs was identified as one reason for the reported insulin errors, and the Rapid Response Report called for all organisations in the NHS and private sector to ensure that training programmes were put in place for every HCP expected to prescribe, prepare and administer insulin. The report also highlighted the responsibility of the individual HCP to recognise the limits of their personal knowledge, skills and competence in the administration of insulin therapy and stated that, where there is uncertainty, they should seek additional help and support (NPSA, 2010).

Despite some initial improvements following publication of the Rapid Response Report in 2010, errors are still occurring, as shown in the latest National Inpatient Diabetes Audit (Health and Social Care Information Centre, 2016). Over a 3-year period from January 2013 to December 2015, there were 33 605 reported errors; 22 995 of these occurred in hospitals and 8226 in the community (Health and Social Care Information Centre, 2016). These errors

*“These errors sometimes have tragic consequences for not only patients and their families but also for the healthcare professional involved, as serious patient safety incidents involving insulin tend to generate considerable media attention.”*

**Box 1. For IMMEDIATE ACTION by all organisations in the NHS and independent sector.**

1. All regular and single insulin (bolus) doses are measured and administered using an insulin syringe or commercial insulin pen device. Intravenous syringes must never be used for insulin administration.
2. The term “units” is used in all contexts. Abbreviations, such as “U” or “IU”, are never used.
3. All clinical areas and community staff treating patients with insulin have adequate supplies of insulin syringes and subcutaneous needles, which staff can obtain at all times.
4. An insulin syringe must always be used to measure and prepare insulin for an intravenous infusion. Insulin infusions are administered in 50-mL intravenous syringes or larger infusion bags. Consideration should be given to the supply and use of ready-to-administer infusion products (e.g. prefilled syringes of fast-acting insulin 50 units in 50 mL sodium chloride 0.9%).
5. A training programme should be put in place for all healthcare staff (including medical staff) expected to prescribe, prepare and administer insulin.
6. Policies and procedures for the preparation and administration of insulin and insulin infusions in clinical areas are reviewed to ensure compliance with the above.

sometimes have tragic consequences for patients, their families and the HCP involved, and serious patient safety incidents involving insulin tend to generate considerable media attention.

“Never Events” are defined as serious incidents that are wholly preventable as national guidance or safety recommendations exist and should be implemented by all HCPs. In effect, there would be no defence if such an error occurred. It should be noted that the overdose of insulin due to abbreviations (i.e. where “u” or “iu” is used to denote units) or where an incorrect device is used (i.e. an intravenous syringe) is currently listed as a Never Event (NHS England, 2015).

In 2010, NHS Diabetes (now part of NHS Improving Quality), in partnership with the NPSA, launched a national e-learning module on insulin safety and many completed this training. However, 6 years on the module is no longer free of charge and many organisations have chosen to stop subscribing. The fact that so few HCPs responding to the PCDS survey had undertaken recent training in insulin safety or management is of concern, particularly given the pace at which things are changing in insulin management.

### **Developments in insulins**

Recently, several higher-strength insulins have become available, such as Tresiba® (insulin degludec) 200 units/mL, Humalog® (insulin lispro) 200 units/mL and Toujeo® (insulin glargine) 300 units/mL. The first biosimilar insulin product (Abasaglar® [insulin glargine] 100 units/mL) has been

launched, and there is also a fixed combination product that combines insulin with a glucagon-like peptide-1 receptor agonist (Xultophy® [100 units/mL insulin degludec and 3.6 mg/mL liraglutide]). Differences in the concentration, formulation and dosing of these new products mean there is even greater potential for medication error. Around 40% of the respondents in the survey felt “very familiar” with the full range of insulins currently available, around half were “somewhat familiar” and a small number (4%) were “not at all familiar”. The respondents represent a population of HCPs with an interest in diabetes and I would assume that, for the majority of GPs, practice nurses and district nurses who have some involvement with insulin, their familiarity with these newer agents is likely to be far less.

### **Drawing-up of insulin using insulin syringes**

Anecdotal evidence that some HCPs were “drawing out” insulin from prefilled insulin pens and cartridges using insulin syringes prompted the PCDS to publish a statement last year to highlight the dangers of this practice (PCDS, 2015). Prefilled pens and cartridges are not designed to have the insulin extracted and the practice is not endorsed by any of the manufacturers. The practice can damage the device, lead to dosing errors and potentially result in patient harm. There is also the danger that a less experienced practitioner may mistakenly use an intravenous syringe to extract and then

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administer the insulin, resulting in them giving 10 times the intended dose. Worryingly, 32% of respondents in the survey said they were aware of insulin being drawn out of pens or cartridges for administration by HCPs.

The recently launched higher-strength insulin preparations are only available as prefilled pens. If higher-strength insulin is drawn from these pen devices into an insulin syringe, which measures the dose in terms of 100 units/mL, then the dose will be double that intended for 200 units/mL strength insulins and treble that for 300 units/mL strength insulins.

NHS Wales (2016) has recently issued a Patient Safety Alert (PSA004) highlighting the risks associated with extracting insulin from pen devices and state emphatically that it is not permitted. It is to be hoped that NHS England will issue a similar warning before serious harm occurs.

### Correct injection technique

Correct injection technique is essential for insulin to achieve optimal effect. Poor technique, including the use of inappropriate needle length, failure to rotate injection sites correctly and the reuse of needles, can all undermine the effectiveness of insulin therapy, lead to glycaemic variation, cause hypoglycaemia and potentially adversely affect outcomes. Evidence suggests that lipohypertrophy, a common problem associated with poor injection technique, is present in over half of all people using insulin (Blanco et al, 2013; Grassi et al, 2014). Insulin users need to be taught correct injection technique at the outset, but it also needs to be discussed and re-assessed at subsequent reviews. Encouragingly, 77% of respondents in the survey said they discussed injection technique with patients routinely at every insulin review, with similar numbers inspecting injection sites at least annually. The Forum for Injection Technique is due to launch an updated 4<sup>th</sup> edition of the UK Injection Technique Best Practice Recommendations, which can be accessed in the next few months at [www.fit4diabetes.com](http://www.fit4diabetes.com).

Insulin is a life-saving but potent drug and there is huge potential for error. Increasing numbers of people are using insulin (Holden

et al, 2014), and I believe that almost every HCP will, at some point, handle, prescribe or administer insulin. We have a responsibility to ensure we understand the potential risks and avoid preventable error.

In 2015 the PCDS, in association with TREND-UK, launched a free e-learning module, “The Six Steps to Insulin Safety”. I encourage every HCP, including those with limited involvement in insulin management, to complete the training. It takes around an hour and, providing the user achieves the 75% pass mark in a short assessment, they will receive a downloadable certificate for continuing professional development. There is a facility for clinical commissioning groups and trusts to track the progress of all HCPs working in their organisation to ensure that all staff have undertaken up-to-date training in insulin safety. To access the module visit [www.cpd.diabetesonthenet.com](http://www.cpd.diabetesonthenet.com). ■

Blanco M, Hernández MT, Strauss KW, Amaya M (2013) Prevalence and risk factors of lipohypertrophy in insulin-injecting patients with diabetes. *Diabetes Metab* **39**: 445–53

Bliss M (2007) *The Discovery of Insulin* (2<sup>nd</sup> edition). University of Chicago Press, USA

Cousins D, Rosario C, Scarpello J (2011) Insulin, hospitals and harm: a review of patient safety incidents reported to the National Patient Safety Agency. *Clin Med* **11**: 28–30

Grassi G, Scuntero P, Trepiccioni R et al (2014) Optimizing insulin injection technique and its effect on blood glucose control. *J Clin Translat Endocrinol* **1**: 145–50

Health and Social Care Information Centre (2016) *National Diabetes Inpatient Audit 2015*. HSCIC, Leeds. Available at: <http://bit.ly/1RzzQBh> (accessed 19.05.16)

Holden SE, Gale EA, Jenkins-Jones S, Currie CJ (2014) How many people inject insulin? UK estimates from 1991 to 2010. *Diabetes Obes Metab* **16**: 553–9

National Patient Safety Agency (2010) *Safer administration of insulin*. NHS, London. Available at: <http://bit.ly/2bmZKu7> (accessed 08.09.16)

NHS England (2015) *Never Events List 2015/16*. NHS England, London. Available at: <https://www.england.nhs.uk/wp-content/uploads/2015/03/never-evnts-list-15-16.pdf> (accessed 08.09.16)

NHS Wales (2016) *Patient Safety Alert (PSA004/July 2016). Ensuring the safe administration of insulin*. Patient Safety Wales, Pencoed. Available at: <http://bit.ly/2bVnIaz> (accessed 02.09.16)

Primary Care Diabetes Society (2015) Statement on the drawing-up of insulin using insulin syringes from insulin pen cartridges and prefilled pens. *Diabetes & Primary Care* **17**: 49–51

Primary Care Diabetes Society (2016) Clinical snapshot: Results from the PCDS survey series. *Diabetes & Primary Care* **18**: 118