

Consequences of using inappropriate insulin syringe needle lengths

Lesley Barrow

Insulin syringes are used in hospital wards and community settings. Injection using insulin syringes with 12.7 mm needle length result in rapid absorption into muscle tissue, which can lead to severe hypoglycaemia. In Lothian, Scotland, DSNs and the clinical supplies department have removed such syringes from hospital wards. Recent ward surveys, however, indicate that these syringes have been put back into use; stock lists have since been amended and wrong stock removed. Preventing the supply of insulin syringes with 12.7 mm needles to the health service from the National Distribution Centre (Scotland) is not possible, therefore there is a continuing risk that such syringes may again enter the system. Ward stocks must be surveyed frequently and flyers regarding insulin syringes distributed and displayed in ward and care home stock rooms, and in district nurse offices.

Over recent years, insulin pens and pumps have increasingly been used by people with diabetes to administer their insulin. The NHS Lothian Diabetes Register (2010) found that over 5000 people in NHS Lothian use such devices to treat their diabetes. In hospital, up to 25% of patients have known diabetes (Sampson et al, 2007) and over half of these people are treated with sulphonylureas or insulin (Stanisstreet et al, 2010).

If people are incapacitated and unable to self-administer their insulin, nurses must deliver the prescribed insulin treatment. However, secondary and primary care protocols often do not allow nurse administration of insulin with insulin pens. This may be for health and safety reasons, for example the risk of needlestick injury when changing needles on pen devices, or that some nurses have not had adequate training in the use of pens and therefore risk incorrect use. Ward nurses therefore have to

use insulin syringes and vials to administer treatment when the patient is unable to self-treat for any reason.

In Lothian, there are over 450 people in the community who are given insulin via syringe and vial (NHS Lothian, 2010), which is administered by district nurses and care home nurses.

Hypoglycaemia and insulin syringe needle length – the evidence

The length of the needle on insulin syringes is of great importance. Several studies have shown that when injecting insulin, appropriate needle length is necessary for the medication to be absorbed into the subcutaneous adipose tissue (Frid et al, 1990; Strauss, 2002; Annersten and Willman, 2005). Injection into muscle tissue is not beneficial as the insulin is absorbed too rapidly (Thow et al, 1990), which can result in hypoglycaemia, and has a shorter duration of

Article points

1. Severe hypoglycaemia can occur if insulin is injected into muscle.
2. In Lothian, insulin syringes with 12.7 mm needle length have been removed from hospital wards. Also, DSNs have reinforced the use of insulin syringes with 8 mm needle length in education sessions in care homes.
3. Ward surveys have since found insulin syringes with 12.7 mm needle length back in stock.
4. Constant vigilance and awareness by nurses using insulin syringes of appropriate needle lengths is vital.

Key words

- Education
- Hypoglycaemia
- Syringe needle length

Lesley Barrow is a Diabetes Specialist Nurse, Western General Hospital, Edinburgh.

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1. Twenty-five per cent of people with diabetes have experienced hypoglycaemia while in hospital.
2. When running education sessions in care homes, DSNs reiterated the need for using insulin syringes with 8 mm needles. When speaking with community nurses, DSNs encouraged the use of syringes with 8 mm needles for primary care patients.
3. A spot-check of 15 wards at the Western General Hospital by the DSNs showed that three wards had only insulin syringes with 12.7 mm needles; five wards had 0.5 mL syringes with 8 mm needles, but also 1 mL syringes with 12.7 mm needles; seven wards had the correct insulin syringes with 8 mm needles (47%).
4. The clinical supplies department instructed all Lothian wards to use only insulin syringes with 8 mm needles.

action than when injected subcutaneously (Vaag et al, 1990; King, 2003).

Magnetic resonance imaging has enabled a better understanding of the anatomy of insulin injection sites (Strauss, 2002), and it has been shown that injecting insulin with a shorter needle has no negative influence on glycaemic control (Kreugel et al, 2007). Diabetes UK (2010), diabeticketinopathy.org (2010) and some manufacturers of insulin and insulin syringes recommend the use of 5, 6 or 8 mm needles for insulin administration in most adults.

Earlier this year, Dr Gerry Rayman (NHS Diabetes Clinical Lead for Inpatient Diabetes Care) presented the results from the Inpatient Diabetes Audit, which showed that 25% of people with diabetes have experienced hypoglycaemia while in hospital (Rayman, 2010a; 2010b). As Dr Rayman states: "This has serious consequences as inpatient hypoglycaemia not only increases length of stay but is associated with an increased mortality" (Stanisstreet et al, 2010). In addition, hypoglycaemia is the most feared complication of insulin therapy (Stanisstreet et al, 2010).

First hypoglycaemic incident

In 2006, an incident occurred at the Western General Hospital (WGH), Edinburgh, when an older man with type 1 diabetes (duration >55 years) was given an insulin injection by ward nurses. The man was emaciated with a BMI of 16.1 kg/m². He had successfully managed his diabetes for many years but was too ill in hospital to self-inject. He became severely hypoglycaemic shortly after being injected and lapsed into an unconscious state, requiring medical intervention with intravenous glucose. The insulin injection had been given with a syringe using the longer needle length of 12.7 mm. The insulin was injected into the muscle rather than into subcutaneous tissue and consequently was absorbed too rapidly.

Following this incident, DSNs in at WGH and the Royal Infirmary of Edinburgh, and clinical supplies colleagues, endeavoured to have all insulin syringes with 12.7 mm needles removed from the hospital wards. This was carried out by changing stock lists,

removing syringes with 12.7 mm needles and educating staff about the appropriate use of insulin syringes with 8 mm needles. When running education sessions in care homes, DSNs reiterated the need for using insulin syringes with 8 mm needles. When speaking with community nurses, DSNs encouraged the use of syringes with 8 mm needles for primary care patients.

Second hypoglycaemic incident

In July 2008, medical staff at WGH reported that a patient was again being injected with insulin syringes with 12.7 mm needles. The patient was experiencing attacks of unexplained hypoglycaemia, which resolved when injected with syringes with 8 mm needles. When this ward and several others were visited, it was found that the wrong syringes were back in stock. The head of clinical supplies for Lothian was notified, and on reviewing ward computerised stock lists she found that many wards in Lothian were again having insulin syringes supplied with 12.7 mm needles.

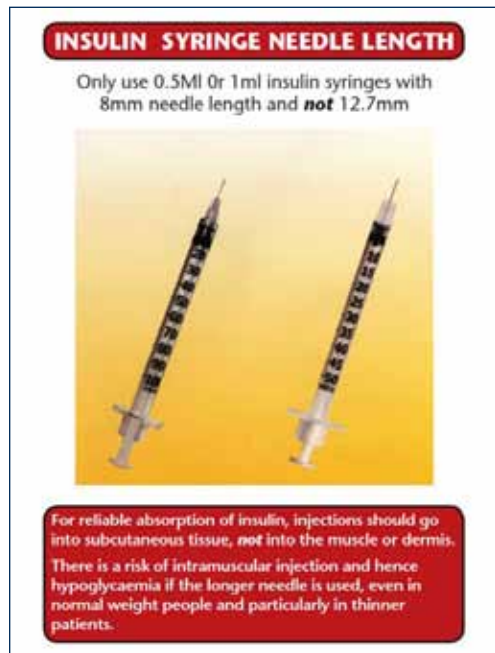
A spot-check of 15 wards at WGH by the DSNs showed that three wards had only insulin syringes with 12.7 mm needles; five wards had 0.5 mL syringes with 8 mm needles, but also 1 mL syringes with 12.7 mm needles; seven wards had the correct insulin syringes with 8 mm needles (47%). Other checks on wards at the Royal Infirmary of Edinburgh showed a similar pattern of re-emergence of the wrong syringes.

What changes have been made?

The clinical supplies department instructed all Lothian wards to use only insulin syringes with 8 mm needles. All Lothian computerised standard stock order documents were amended. Enquiries were made as to whether the Scottish National Distribution Centre could stop stocking insulin syringes with 12.7 mm needles. It was found that this was not possible as insulin syringes with the longer needle are supplied and used for other areas outside of diabetes, such as nuclear medicine.

In September 2009, a further spot-check for insulin syringes on 15 wards at WGH showed

Figure 1. Flyer indicating correct insulin syringe needle length.



that three wards continued to have old stock of insulin syringes with 12.7 mm needles (which they were asked to remove forthwith) but they also carried 0.5 and 1 mL syringes with 8 mm needles. Eleven other wards had the correct insulin syringes – either 0.5 or 1 mL, or both (73%). One ward had no insulin syringes in stock. This demonstrated a 26% improvement in the use of insulin syringes with the correct needle length in hospital wards.

A laminated flyer (Figure 1) has been produced for display in all secondary care ward stock rooms in Lothian. The same flyer has been distributed to all community nurses in primary care and to all care homes in Lothian.

The clinical supplies department has removed the provision number for syringes with 12.7 mm needles from ward order books and has disabled ordering on the eFINS electronic ordering system with a cross-reference to syringes with 8 mm needles. Distributing flyers on the subject to all wards, care homes and district nurses will raise awareness of the risk of using syringes with an inappropriate needle length. Inpatient DSNs will continue to spot-check ward stock rooms. A national survey of how other trusts prevent this problem has not yet been possible.

Conclusion

Although there has been an improvement in the correct use of insulin syringes at WGH, there is a risk that insulin syringes with 12.7 mm needles may again seep into the system in the future. Frequent spot-checks will be required long-term. At the time of writing this article, a consultant has again found syringes with 12.7 mm needles stored in the acute receiving unit at WGH. ■

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- Annersten M, Willman A (2005) Performing subcutaneous injections: a literature review. *Worldviews Evid Based Nurs* 2: 122–30
- Diabetes UK (2010) *Care Recommendations*. Diabetes UK, London
- diabeticretinopathy.org.uk (2010) *Injection techniques, site and absorption*. Available at: <http://tinyurl.com/3yl3a7t> (accessed 04.08.10)
- Frid A, Ostman J, Linde B (1990) Hypoglycaemia risk during exercise after intramuscular injection of insulin in thigh in IDDM. *Diabetes Care* 13: 473–7
- King L (2003) Subcutaneous insulin injection technique. *Nurs Stand* 17: 45–52
- Kreugel G, Beijer HJM, Kerstens MN et al (2007) Influence of needle size for subcutaneous insulin administration on metabolic control and patient acceptance. *European Diabetes Nursing* 4: 51–5
- NHS Lothian (2010) *NHS Lothian Diabetes Register*. NHS Lothian, Edinburgh (accessed by password 26.04.10)
- Rayman G (2010a) Audit of inpatient care: Key findings. Presented at: *Diabetes UK Annual Professional Conference*, Liverpool, 3–5 March
- Rayman G (2010b) *Diabetes inpatient audit*. National Diabetes Inpatient Specialist Nurse UK Group meeting, London, 29 April
- Sampson M J, Brennan C, Dhatariya K et al (2007) A national survey of in-patient diabetes services in the United Kingdom. *Diabet Med* 24: 643–9
- Stanisstreet D, Walden E, Jones C, Graveling A (2010) *The Hospital Management of Hypoglycaemia in Adults with Diabetes Mellitus*. NHS Diabetes, London
- Strauss K (2002) *Insulin Injections in the Arms or Thighs: Do these Sites Need Specific Recommendations?* Beckton Dickinson, USA
- Thow JC, Johnson AB, Fulcher G, Home PD (1990) Different absorption of isophane (NPH) insulin from subcutaneous and intramuscular sites suggest a need to reassess recommended insulin injection technique. *Diabet Med* 7: 600–2
- Vaag A, Handberg A, Lauritzen M et al (1990) Variation in absorption of NPH insulin due to intramuscular injection. *Diabetes Care* 13: 74–6

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