

# Nurse safety practice in diabetes camps

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**Position statements and guidelines for the care of children with diabetes in a camp setting and reviews of nursing staff roles can be found in medical literature. In this article, the authors report some possible pitfalls in nurse safety practice that are not stressed in guidelines, and offer some practical suggestions based on their own experience in diabetes camps. They focus on the risk of blood-borne pathogen contamination through glucose meters and through reusable penlet finger-stick devices. They also emphasise the risk of blood regurgitation into insulin cartridges.**

Several international organisations have position statements or guidelines on the care of children with diabetes in a camp setting (American Diabetes Association [ADA], 2012; Pihoker et al, 2018). The main goal of these camps is to provide an enjoyable recreational experience for each child and to allow them to interact with other children with diabetes in a safe environment (Pihoker et al, 2018), whilst minimising hypoglycaemia and preventing hyperglycaemia and diabetic ketoacidosis (DKA) among campers (ADA, 2012).

Recently, a systematic review has been published in this Journal, in which several roles for diabetes nurses in diabetes camps were highlighted: checking and assessing blood glucose data; educating children on self-management of diabetes; treating hyper- and hypoglycaemic episodes; and performing night rounds to provide better supervision of glycaemic variation and to prevent acute complications (La Banca et al, 2020).

The aim of the current article is to raise awareness of hygienic practices among nursing staff through some practical indications which the authors feel are not stressed enough in guidelines. Reporting and promoting observations of the healthcare

team's experience at camps for children with diabetes could be an important starting point to implement standard evidence-based safety practices in these settings.

## Pitfalls in camp safety practice

We report three potential pitfalls in nurse safety practice that need to be highlighted in guidelines of the care of children with diabetes in a camp setting.

### 1: Contamination through glucose meters and finger-stick devices

In diabetes camps, nurses help children to become active agents of their own diabetes management, and one important goal is for them to be able to check their blood glucose levels on their own. A blood glucose meter should be assigned to each child, rather than shared, due to the risk of contamination from blood on the surface of the meter (Centers for Disease Control, 2011). The children's camp is a setting, like hospitals, schools, assisted living facilities and so on, where "assisted monitoring of blood glucose" could be performed by a healthcare professional (Klonoff and Perz, 2010).

It can happen that a blood glucose meter has to be shared, for example if a child forgets their

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## Article points

1. Children in diabetes camps should have their own blood glucose meters and finger-stick devices, to prevent blood-borne pathogen contamination.
2. Nurses should supervise and assist with insulin administration, and insulin should be stored safely elsewhere when not in use.
3. Blood can be regurgitated back into insulin pens; therefore, pens should only ever be used by one person.

## Key words

- Children and young people
- Diabetes camps
- Insulin safety
- Type 1 diabetes

## Authors

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own, during night rounds or in case of checks for severe hypoglycaemia. In view of this, we want to underline that the device must be cleaned and disinfected after every use, according to the manufacturer's instructions, to prevent potential cross-contamination of infectious agents.

Nursing staff have to teach children that reusable penlet finger-stick devices are intended for personal use. Even if the lancet is changed for each patient, finger-stick devices are in close contact with blood during every use. Therefore, the potential blood contamination of the inner or outer surfaces of the device makes the sharing and reuse of these devices unsafe. If during the camp the personal finger-stick device of a child is not available, nursing staff should adopt single-use disposable finger-stick devices featuring lancets that permanently retract after activation (Klonoff and Perz, 2010).

At our camps, all participants have to bring their own blood glucose meter and finger-stick device. They carry the tools in a backpack or in large pouch pockets so that they can check their blood glucose on their own. During the night rounds, it is common for nurses to finger-prick test children as they are mostly asleep, and this puts nurses at risk of needle-stick injuries. Therefore, single-use, disposable finger-stick devices are recommended.

**2: Supervision and safe storage of insulin**

Another educational goal is to help and teach children how to perform their own insulin injections, as well as to supervise and assist those who are competent in this technique. Based on our experience, an important safety indication for nurses is to keep the labelled patients' pens in a room close by, or in a bag during some activities, to avoid extra insulin administrations to cover extra food between meals, especially in the case of teenagers. For the same reason, it is very important that nurses also supervise the adolescents during meal-time injections, to double-check the number of units actually injected.

**3: Sharing of insulin pens**

Although it is clear that needles are strictly for individual use and should be changed after each injection, we want to stress that insulin pens are also for single-person use and should never be shared between two individuals. In *Figure 1* we show an insulin cartridge used by one of our patients, a

10-year-old child with recent type 1 diabetes onset, who noticed a reddened cartridge after the injection of one unit of a rapid-acting insulin analogue in the upper arm. This photo demonstrates a potential source of blood contamination, and we use it in our clinic as an educational tool for patients and nursing staff about the importance of not sharing insulin pens.

**Discussion**

While the first two safety pitfalls are easy to understand, the third deserves further consideration. Le Floch et al (1998) reported that biological material, including squamous and epithelial cells, was found in the needle and cartridge of 62% of 120 adults living with type 1 diabetes. Biological material was found more frequently in those who were treated with insulin for a longer time (>15 years), those who were relatively new to insulin therapy (<2 years), and those who injected in the thighs or buttocks. The presence of cells was not significantly associated with use of the pinched skinfold technique, the nature of the pen, the insulin cartridge, the needle, the size of the needle, the presence of air bubbles or the remaining volume of insulin solution in the cartridge. Since external or prior contamination was not observed,



*Figure 1. Blood regurgitation into an insulin cartridge.*

these results indicate that biological material can be aspirated from the skin or subcutaneous tissue, through the needle and into the cartridge. The authors suggest, after injection, rapid removal of the needle from the pen, to prevent cells from entering the cartridge. The capture of cells into the cartridge could be related to many factors, including increased pressure in the needle after puncture and before injection, reduced internal pressure in the cartridge after (versus during) the injection, and temperature changes causing cells to be drawn through the needle by the contracting insulin solution (Ginsberg et al, 1994).

Using an immunochromatographic test with antihuman haemoglobin antibody, Sonoki et al (2001) demonstrated blood contamination in 4.1% of cartridges used by people with diabetes. The quantity of contaminated blood per cartridge was calculated to be over 0.3  $\mu\text{L}$ . Such regurgitation occurred independently of hydrostatic pressure and appeared to be dependent on the devices used and possibly on the frequency of button pressing.

Together, these studies confirm that back-flow of blood and other biological material into the insulin cartridge or reservoir can occur after injection, and could result in the transmission of contagious diseases such as hepatitis B if pens are shared. Reports of insulin pen sharing have come from a variety of US healthcare settings. Since 2011, there have been at least six separate incidents in which patients were contacted and given advice to test for blood-borne pathogens because individual insulin

pen devices were reused for multiple patients (Schaefer et al, 2013). These incidents occurred in spite of clear package instructions stating that pens are not to be shared and a series of alerts issued by the US Food and Drug Administration, the Centers for Disease Control and Prevention, and other groups such as the Institute for Safe Medication Practices (ADA, 2012).

In summary, we report on three possible pitfalls in nurse safety practice at diabetes camps, and consequent hygienic procedures that we have implemented and wish to share as practical indications for nursing staff. ■

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