

**Preventing Infection and Injury During Blood
Glucose Monitoring and Insulin Administration
American Association of Diabetes Educators (AADE) Position Statement**

Introduction

Diabetes educators provide diabetes self-management education (DSME) and diabetes self-management support (DSMS) for persons with diabetes and when appropriate to individuals assisting in their care. Effective DSME can include education about blood glucose monitoring and treatment with insulin and other injectable medications.¹ Demonstrating these can involve contact with patient blood, resulting in potential exposure to bloodborne pathogens such as hepatitis B (HBV), hepatitis C (HCV), and the human immunodeficiency virus (HIV). To minimize risk transmission, standard infection control measures should be observed when demonstrating or assisting with such tasks as blood glucose monitoring, injection of insulin and other injectable medications, and when handling medical devices such as lancet devices (including lancets and lancet platforms), needles, syringes, pens, syringes, blood glucose meters, and insulin pumps.²

It is the position of AADE that diabetes educators need to be aware of, and use safe practices for monitoring blood glucose and administering insulin and non-insulin injectable medications. This is for the protection of the diabetes educator and the persons in their care. In addition, diabetes educators should be a source of up-to-date information for those they encounter including other healthcare professionals, community health workers, family members and others assisting in the care of persons with diabetes. Safe practices need to be consistently used in all settings where DSME and DSMS take place, including traditional health care environments such as medical practitioners' offices or hospitals; other public care settings such health fairs, summer camps, schools, nursing homes, and assisted living facilities; and in the private homes of persons with diabetes.

Background

There is risk of infection transmission to diabetes educators and others handling the variety of "sharps" including lancets, needles and pens and also medical devices such as lancet platforms, blood-glucose monitors and insulin pumps which are commonly used by persons with diabetes. An estimated 10% of healthcare workers experience needlestick exposure yearly,³ of which 20% are related to the use of insulin pens.⁴

Another mechanism for the spread of infection is when blood contaminated devices are used on multiple patients without appropriate disinfection between patients. Unsafe practices of this nature have the potential to put large numbers of patients at risk and cause significant morbidity and mortality. The pathogens most likely to be transmitted through contact with blood are HBV, HCV, and HIV. HBV is the most resilient of the three pathogens and can survive for up to a week on contaminated surfaces.⁵ It accounts for the majority of infectious outbreaks related to blood glucose monitoring and insulin administration. HVC can also be transmitted via contact with contaminated surfaces, but is most frequently spread by direct contact with the blood of an infected person, such as through needlestick injuries.⁶ HIV does not survive very long outside the body and is primarily spread to healthcare workers via sharps-related exposure, and even the risk of such transmission is very low.⁷ Infection

following needlestick exposure to contaminated blood occurs in an estimated 19% to 37% of exposures to HBV, 1.9% of exposures to HVC, and 0.32% of exposures to HIV.⁸

Outbreaks of infectious disease linked to improper handling of material associated with diabetes care in health care settings continues to occur⁹⁻¹¹ despite communication efforts about practices to reduce transmission.¹²⁻¹⁴ For example, between 2004 and 2011, there were more than 15 instances of hepatitis B (HBV) infection outbreaks associated with unsafe practices during provider-assisted blood glucose monitoring.¹⁵ This figure probably underestimates the scope of the problem, since cases of acute infection may not always be recognized or reported. These outbreaks represent instances of avoidable harm.

Precautions to Reduce Infection Risk

It is best practice for diabetes educators to apply the Center for Disease Control and Prevention (CDC) recommended Standard Precautions to all patient encounters in order to prevent the spread of infectious disease.¹¹ Standard Precautions are based on the principle that all blood, body fluids, secretions, excretions (except sweat), non-intact skin, and mucous membranes can contain transmissible infectious agents. These precautions apply to all patients, regardless of suspected or confirmed infection status, and in any setting. This means that standard precautions should be observed during all patient encounters and when handling relevant samples and medical devices. Following these guidelines will minimize direct contact with blood, reducing occupational exposure and thus decrease the chance of infection.⁸

Hand Hygiene

Contaminated hands of healthcare personnel are an important contributor to indirect contact transmission of pathogens.¹⁶ This type of transmission occurs when providers touch a surface or object that has been contaminated and then does not decontaminate her hands prior to touching another patient and/or their medical device.

Use of Gloves

Gloves serve to protect both patients and healthcare providers from exposure to pathogens carried on hands. They may possibly reduce the volume of blood on the external surface of a sharp, thereby reducing exposure from needlesticks.⁸

Reducing risks associated with sharps and sharp paraphernalia

Hand held and spring loaded lances, syringe needles and insulin pens are among the commonly encountered medical devices considered as a medical 'sharp'. Needles and syringes are for one-time use only and should never be reused. Using and disposing of these properly, by avoiding recapping, purposely bending, breaking or removing needles from syringes, and using care when resheathing pens are among the ways to reduce the chances of infection. Insulin pens may be especially problematic as evidence suggests that many healthcare workers are unfamiliar with procedures for the safe use of insulin pens,⁴ and therefore are at increased risk of needlestick injury from these devices.

Active Prophylaxis

HBV Vaccination recommendation for diabetes educators and persons with diabetes

The Occupational Safety and Health Administration (OSHA) mandates that employers offer HBV vaccination to health care workers which has contributed to the decreased incidence of occupational HBV infection.¹⁷ Although not a Standard Precaution per se, vaccination against HBV is recommended as an adjunctive measure to improve the effectiveness of infection control measures.

Diabetes educators should be aware that the CDC recommends HBV vaccination for all unvaccinated adults with diabetes mellitus between the ages of 19 to 59.¹⁸ It is estimated that a one-time HBV vaccination of adults with diabetes could prevent more than 4,000 hepatitis B infections.¹⁸ The evidence supporting HBV vaccination for older adults is less robust, so the CDC advises that the vaccine can be administered at the discretion of the treating clinician for those persons with diabetes, 60 years of age or older.

Although comprehensive discussion of post-exposure prophylaxis is beyond the scope of this document, diabetes educators should be aware that immediate treatment with vaccines or antiretroviral drugs can reduce the risk of infection from exposure to a pathogen.⁸

Safe Handling of Medical Devices

Diabetes educators can reduce the risk of bloodborne infection transmission by following guidelines for safe handling of these devices and educating patients and others involved in caring for patients about these practices.^{2,19} (The box below includes links to resources on the prevention of bloodborne infections during diabetes-related care from U.S. public health agencies.)

Online Resources for Safe Blood Glucose Monitoring and Insulin Administration

- CDC Statement on Infection prevention during blood glucose monitoring and insulin administration; <http://www.cdc.gov/injectionsafety/blood-glucose-monitoring.html>
- CDC Clinical reminder: Insulin pens must never be used for more than one person; <http://www.cdc.gov/injectionsafety/clinical-reminders/insulin-pens.html>
- CDC. Frequently asked questions (FAQs) regarding assisted blood glucose monitoring and insulin administration; http://www.cdc.gov/injectionsafety/providers/blood-glucose-monitoring_faqs.html
- FDA. Information for Healthcare Professionals: Risk of Transmission of Blood-borne Pathogens from Shared Use of Insulin Pens; <http://www.fda.gov/Drugs/DrugSafety/PostmarketDrugSafetyInformationforPatientsandProviders/DrugSafetyInformationforHealthcareProfessionals/ucm133352.htm>
- CDC Expert Commentary. Make Every Injection Safe! <http://www.medscape.com/viewarticle/735593>
- CDC. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings; <http://www.cdc.gov/ncidod/dhqp/pdf/isolation2007.pdf>
- National Center for Infectious Diseases. Guideline for Hand Hygiene in Health-Care Settings; <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5116a1.htm>

Lancet Devices

There are two categories of lancet testing devices: those designed for multiple reuse on a single person and those that are designed for disposal after a single use. Infection outbreaks have occurred when reusable devices have been improperly used on multiple patients.²⁰ Even after cleaning and disinfection, these devices can remain contaminated with bloodborne viruses, posing an infection risk.²¹ Some single-use models circumvent this issue by autodisabling after use, preventing their reuse on multiple patients.

Blood Glucose Meters

As blood glucose meters do not appear to come into direct contact with the patient, they can be incorrectly assumed uncontaminated and suitable for reuse.¹⁹ However, multiple outbreaks demonstrate them to be a conduit for indirect transmission.

The increased use of electronic information systems introduces another opportunity for infection transmission via glucose meters brought to appointments to download glucose readings directly into an electronic medical record or other system. This presents a chance to contaminate the work environment and potential for infection spread. (MK Schaefer, personal communication, April 2012)

To minimize exposure and transmission of pathogens related to blood glucose meters, when possible meters should be assigned to an individual person and clearly labeled and stored to prevent inadvertent use by others. Blood glucose meters should be cleaned and disinfected following manufacturer's instructions. And in situations where necessity dictates use of a meter for multiple people, it needs to be cleaned and disinfected after every use. However, current disinfection and sterilization guidelines must be strictly followed.²

Insulin Pens

Insulin pens are devices that inject insulin in predetermined doses. They are designed to be reused on the same patient after changing the needle. They are, however, **not** safe for reuse with multiple patients, even if a fresh needle and cartridge is inserted.

Insulin Vials

Where facilities use multi-dose vials of insulin, it is optimal that individual vials be dedicated for use by a single person. If this is not possible, vials need to be stored and insulin accessed away from the patient care environment to avoid cross contamination.

Insulin Pumps

Infusion device sets with safety features to prevent accidental needlesticks following cannula insertion may be particularly suitable for children who may have to perform an infusion set change at school and for patients who are unable to insert their own infusion sets and require third-party assistance.

Educating Other Professionals, Persons with Diabetes and those assisting with their care

In addition to implementing guidelines for preventing injury and infection in their own practice, diabetes educators are responsible for communicating appropriate information to all individuals involved in blood glucose monitoring and insulin administration. Persons with diabetes, healthcare workers and as well as all individuals assisting in the care of those with

diabetes need to be aware of possible sources of contamination and practices to minimize infection risk. Educators should be knowledgeable about precautions to reduce risk of injury and indirect transmission of pathogens, including guidelines for safe handling and disposal of sharps and medical devices. Persons with diabetes and those assisting in their care should be advised **not** to share lancing devices for obtaining blood samples, glucose monitoring equipment or injection equipment (needles, syringes, insulin and non-insulin pens).

Proper disposal of used sharps (e.g. needles and lancets) is also important. Uncontained sharps disposed in residential settings expose waste industry workers and the general public to injury and infection. Sharps are often inappropriately disposed of in plastic bags with other household waste. Individuals provided specific information about how to dispose of sharps report an increased propensity to do so.²² Information provided should include details about local or state ordinances governing the disposal of syringes and lancets in their area. Safe disposal alternatives include supervised collection sites (e.g. at primary care provider offices or pharmacies), mailback programs, syringe exchanges, or at-home needle destruction devices.²³ If these options are not available, or if sharps must be stored at home prior to using one of these options, sharps should be placed in strong plastic container with a screw top (e.g. bleach bottle or other thick walled plastic jug) to prevent spills. If being disposed of with residential waste, sharps containers should be placed in the regular trash—not the recycling.

Role of Diabetes Educators

Diabetes educators serve a critical role in the provision of DSME and DSMS to persons with diabetes and those assisting in their care. As an essential member of the diabetes care team, diabetes educators should:

- Be informed about and competent in the use of standard precautions for all patients, relevant material and medical devices.^{11,16}
- Seek to communicate with and serve as a reliable resource for healthcare professionals, community health workers and others who may be less familiar with the various delivery systems and monitoring devices used by persons with diabetes. This is especially important in settings (e.g. hospitals, camps, nursing homes, etc.) where assistance with blood glucose monitoring and insulin administration may be required.
- During the course of DSME and DSMS, provide persons with diabetes with the information needed to safely use medical devices for self-management including those needed for monitoring blood glucose levels and injecting medication. This content should be at an appropriate literacy level and include practical information about disinfection and safe dispose of sharps and other potentially contaminated materials.

Recommendations

To prevent injury and the spread of bloodborne infections, diabetes educators should be aware of, and educate persons with diabetes and other involved in their care about safe practices for monitoring blood glucose and administering insulin and other injectable medications. Key safe practices include:

- Understanding possible sources of contamination and how pathogens can be transmitted from infected individuals to health care workers and then others.
- Applying Standard Precautions—including appropriate hand hygiene, use of gloves, and safe handling/disposal of sharps—in all patient encounters.
- Using appropriate techniques when handling sharps and medical devices to prevent needlestick injuries and cross-contamination.
- **Never** reusing lancet devices, insulin pens, and needles/syringes for more than one patient.
- Whenever possible, assigning blood glucose meters to an individual patient. Where this is not possible, cleaning and disinfect the meter after every use, per manufacturer’s instructions.
- Vaccination against hepatitis B and encouraging persons with diabetes to have all appropriate vaccinations.
- Periodic assessment of adherence to injury and infection prevention recommendations by persons with diabetes, healthcare workers and individuals assisting in the care of those with diabetes.

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Criteria for Rating Evidence and Grading Recommendations*

Levels of Study Design or Information Type: Evidence

Citation Grading Key:

1—Large randomized controlled trial (RCT); Multicenter trial; Large meta-analyses with quality rating

2 -- Randomized controlled trial that has some design or methodological flaws; Prospective cohort study; Meta-analyses of cohort study; Case-control study; Quasi-Experimental study (rigorous pre-post with a control group); Systematic review that is well designed

3 -- Methodologically flawed randomized controlled trial; Nonrandomized controlled trial; Observational study; Case series or case report; Review (note Cochrane reviews are systematic reviews that could qualify as Level 2 evidence)

4 -- Expert consensus; Expert opinion based on experience; Theory-driven conclusions; Unproven claims; Experience-based information; Opinion Piece

* This is not an exhaustive list. Reviewers will need to use their own judgment at times. Levels of evidence are in parentheses after each reference.

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