Diabetes – Fast Facts

- **Prevalence**: 30.3 million Americans (23.1 million were diagnosed, and 7.2 million were undiagnosed.), or 9.4% of the population, had diabetes.
  - Approx. 1.25 million American children and adults have type 1 diabetes.
- **Prevalence in Seniors**: 25.2%, or 12.0 million seniors (diagnosed and undiagnosed) age 65 and older
- **New Cases**: 1.5 million Americans are diagnosed with diabetes every year.
- **Prediabetes**: In 2015, 84.1 million Americans age 18 and older had prediabetes
- **Deaths**: Diabetes remains the 7th leading cause of death in the United States in 2015, with 79,535 death certificates listing it as the underlying cause of death, and a total of 252,806 death certificates listing diabetes as an underlying or contributing cause of death.


Wisconsin

What’s true nationwide is also true in Wisconsin.
Diabetes and prediabetes cost an estimated $5.9 billion in Wisconsin each year.

**Fast Facts**
- Diagnosed - 541,523 (11.2%) of the adult population
- Undiagnosed - 142,000 have diabetes but don’t know it
- Prediabetes - 1,550,000 people (36.1% of the adult population)
- Newly diagnosed - 21,000/year


The Liver & Pancreas

http://www.fxo.logistudio/science-photo-library/getty-images
HCV and Diabetes: A non-chance association


Liver Disease and Diabetes Mellitus

• Liver disease occurring as a consequence of diabetes mellitus

• Diabetes mellitus and abnormalities of glucose homeostasis occurring as a complication of liver disease

• Liver disease occurring coincidently with diabetes mellitus and abnormalities of glucose homeostasis


Glycemic Control


Genetic & Environmental Factors Associated w/ Non-alcoholic Fatty Liver Disease (NAFLD)

Progression of non-alcoholic fatty liver disease (NAFLD)


Liver cirrhosis of various etiologies manifests as different clinical glucose metabolism disorders with the progression of the disease. HCV hepatitis C virus, DM diabetes mellitus, NAFLD nonalcoholic fatty liver disease


The Vicious Circle

Blood Borne Pathogens

- HIV
- Hepatitis - symptoms are similar no matter which type of hepatitis you have.
  - Hepatitis A
  - Hepatitis B
  - Hepatitis C
  - Hepatitis D
  - Hepatitis E

Types of Viral Hepatitis

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of virus</td>
<td>Feces</td>
<td>Blood/blood-derived body fluids</td>
<td>Blood/blood-derived body fluids</td>
<td>Blood/blood-derived body fluids</td>
<td>Feces</td>
</tr>
<tr>
<td>Route of transmission</td>
<td>Fecal-oral</td>
<td>Percutaneous permucosal</td>
<td>Percutaneous permucosal</td>
<td>Percutaneous permucosal</td>
<td>Fecal-oral</td>
</tr>
<tr>
<td>Chronic infection</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Prevention</td>
<td>Pre/post-exposure immunization</td>
<td>Pre/post-exposure immunization</td>
<td>Blood donor screening; risk behavior modification</td>
<td>Pre/post-exposure immunization; risk behavior modification</td>
<td>Ensure safe drinking water</td>
</tr>
</tbody>
</table>

Source: Center for Disease Control and Prevention (CDC)

Hepatitis Vaccine

- Hepatitis A - People with chronic liver disease, including HCV should be protected from Hep A
- Hepatitis B
  - Adults under 60 years of age with diabetes
  - People with chronic liver disease
  - Dialysis and pre-dialysis patients
  - People infected with HIV
  - Residents and staff of facilities for developmentally disabled people
  - Sexually active people who are not in long-term, mutually monogamous relationships
Who should be tested for Hep C?

- Abnormal liver function
- Sexual partners have been diagnosed with hepatitis C
- Infants born to HCV-infected mothers
- HIV
- Injecting drug users
- Ever been incarcerated
- Recipients of clotting factors made before 1987
- Long-term hemodialysis
- Baby boomers (born during 1945–1965)


Global Burden of Disease Associated with Unsafe Injections

Estimated Annual Incidence, 2000

- > 20 million Hepatitis B virus infections
- 30% of new infections
- >2 million Hepatitis C virus infections
- 40% of new infections
- >250,000 HIV infections
- 5% of new infections

Ezzati M et al. Lancet. 360(9343): 1347-60, 2002

Injection safety is a complex public health issue

Requires a multidimensional approach (4Es):

- Epidemiologic surveillance,
  - reporting, monitoring, and investigation of outbreaks potentially related to unsafe injections;
- Educational initiatives
  - to promote understanding and use of safe injection and basic infection control practices
- Enforcement
  - and oversight by federal and state authorities; and
- Engineering of devices,
  - equipment, and processes to reduce or eliminate disease transmission risks.

https://www.cdc.gov/mmwr/pdf/ww/mm6221a3.pdf

CDC Grand Rounds: Preventing Unsafe Injection Practices in the U.S. Health-Care System

Background

Injectable medications are commonly used in healthcare settings for the prevention, diagnosis, and treatment of various illnesses. Examples include chemotherapy, immunizations, antibiotic medications, and medications used for analgesia and anesthesia. Medical injections often are administered in conjunction with surgical procedures, endoscopy, imaging studies, pain control, and cosmetic or complementary and alternative medicine procedures. Safe manufacturing and pharmacy practice are essential because every injection must begin with sterile medication. The appropriate medication must then be safely prepared (usually drawn up in a syringe), then administered in a manner that maintains weekly and minimizes risk for infection. Safe administration depends on adherence to the practices outlined in CDC’s evidence-based Standard Precaution guidelines (1). Healthcare providers should never:

1. Administer medications from the same syringe to more than one patient;
2. Enter a needle with a used syringe or needle;
3. Administer medications from single-use vials to multiple patients.

These unsafe practices are still encountered, mostly among large public healthcare systems. Even now, more than one-fifth of patients receive multiple injections in the course of an encounter, and in those settings, HCV infections are transmitted to patients as a consequence of unsafe syringe reuse (after the HCV-infected healthcare provider had self injected) or from concentration of medication that was scored with a used syringe. Outbreaks involving infected healthcare providers who administered injectable drugs likely have affected large numbers of patients (2). “Indirect” syringe reuse (i.e., contaminated medication vials used with a used syringe) often is identified during outbreak investigations. Identification of medications primarily involves

https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6221a3.htm?s_cid=mm6221a3_e
Hepatitis B

- Hepatitis B virus is 50 – 100 times more infectious than HIV.
- The hepatitis B virus can survive outside the body at least a week.
- Infection
  - Acute hepatitis B refers to the first 6 months
  - Chronic hepatitis B refers to the illness that occurs when the hepatitis B virus remains in a person’s body.

Diabetics at Risk for HBV

- In the United States (US), patients with diabetes mellitus (DM) have twice the risk for developing acute hepatitis B virus (HBV) infections as healthy adults.¹
- The seroprevalence of antibodies to HBV core antigen (anti-HBc) is 60% higher among patients with DM than those without DM.²

Diabetics at Risk for Hep C

- Everyone with diabetes should get an HCV test.
- Everyone with HCV, needs to be assessed for diabetes on a regular basis.
- Patients with Type 2 Diabetes (T2D) were at an increased risk of acquiring HCV infection compared to non-T2D subjects (pooled OR = 3.50)


CDC. Viral Hepatitis Statistics and Surveillance
Forecasted Annual Deaths Associated with Chronic Hepatitis C Infection


Outbreak: Erosion of Trust in Health Care

- Disease transmission
- Patient/family anxiety
- Malpractice
- Legal charges
- Criminal charges
- Bad publicity

Aug 30, 2011

Dean Clinic says patients may have been exposed to hepatitis, HIV

http://host.madison.com/wsj/news/local/health_med_fit/dean-clinic-says-patients-may-have-been-exposed-to-hepatitis/article_5806e8b6-d261-11e0-8dcb-001cc4c002e0.html

Sep 21, 2011

Most of patients possibly exposed to HIV, hepatitis have been tested

http://host.madison.com/wsj/news/local/health_med_fit/most-of-patients-possibly-exposed-to-hiv-hepatitis-have-been/article_68fc68a8-e4a9-11e0-95b9-001cc4c002e0.html
Dean Clinic reports contacting 80 percent of those potentially exposed to bloodborne diseases

http://host.madison.com/wsj/news/local/health_med_fit/dean-clinic-reports-contacting-percent-of-those-potentially-exposed/article_1f1a24de-d5a7-11e0-8c51-001cc4c03286.html

Expired testing kits found at site where patients possibly exposed to hepatitis, HIV

http://host.madison.com/wsj/news/local/health_med_fit/expired-testing-kits-found-at-site-where-patients-possibly-exposed/article_0ab6e6a6-eada-11e0-933d-001cc4c03286.html

HIV, hepatitis testing continues for Dean Clinic patients

Board reprimands nurse who potentially exposed patients to hepatitis, HIV

DAVID WAHLBERG | Wisconsin State Journal | dwahlberg@madison.com | May 3, 2012

The Wisconsin Board of Nursing on Thursday reprimanded Stacey Anderson, a former diabetes nurse educator at Dean Health System who potentially exposed more than 2,000 patients to hepatitis or HIV over five years.


Contaminated devices

• Blood glucose monitoring
• Insulin pens/Syringe reuse
• Toe nail clippers
• Sharps disposal


More than 60 test positive for hepatitis, but state finds no link to Dean Clinic incident

DAVID WAHLBERG | Wisconsin State Journal | dwahlberg@madison.com | Aug 23, 2012


Outbreaks (n=23) of HBV infection associated with blood glucose monitoring practices in US healthcare settings 1990-2009

52% of outbreaks in past 5 years

Blood Glucose Monitoring

Point of Care (Dec 2005). Vol 4, No 4, pp158-63
## Components of Tool Kit
- Introduction
- Sample Policy
- Resources
- Perceived Barriers to Single Use Glucose Meters
- Samples
  - Procedural Steps for Blood Glucose Monitoring
  - Device Evaluation Tool
  - Competency of Glucose Meter Monitoring


## Single Patient Use Blood Glucose Meters
- Select a glucose monitoring device
- Follow instructions for use
- Review competency annually
- Conduct quality control measures
- Issue glucose monitoring device to each patient
- Label each device with resident’s name
- Store securely in resident’s room
- Arrange for resident owned device at discharge
- Disinfect issued device before issuing to another resident


## Blood glucose monitoring devices
- Assign to each patient if possible.
- Clean and disinfect between patients.
- Restrict use of finger stick devices to individual patient.
- Maintain supplies and equipment w/in patient rooms
- Use single-use lancets that permanently retract after puncture.
- Never reuse finger stick devices and lancets.
- Thoroughly clean B4 disinfection.
- Disinfect the exterior surfaces following the manufacturer’s directions.

## Luminol
- Latent blood reagent
- Tested all blood glucose monitoring devices.
- Back sides of devices were typically contaminated with blood from gloved hand.
- Document cleaning of devices after patient use.
FDA: Injectable insulin pens not for use by more than one patient

March 10, 2009 | 1:34 pm

What part of the phrase “risk of spreading blood-borne disease” did the staff of two Army hospitals not understand when they began, starting in 2007, using a new-generation “multidose insulin injection pen system” to administer insulin to diabetics? Sure, they got the idea that they should use a new needle each time they used the pens, as they moved

One Insulin Pen, Only One Person

Insulin Administration

Insulin pens are pen-shaped injector devices that contain a reservoir for insulin or an insulin cartridge. These devices are designed to permit self-injection and require that a new needle be used for each injection. In some healthcare settings, healthcare providers use insulin pens to administer insulin to patients. It is critical to remember that insulin pens are meant for only one person.

Although invisible to the eye, back flow of blood into the insulin pen can happen during an injection. This creates a risk of bloodborne and bacterial pathogen transmission to patients if the pen is used for more than one person, even when the needle is changed.


One Insulin Pen, Only One Person

• Studies have demonstrated that retrograde travel of blood and tissue back into the insulin pen cartridge can occur, which can lead to disease transmission even when the needle is changed between patients.


Insulin Pens: Recommendations For Safe Use

- Insulin pens and other injection equipment are meant to be used on one person only.
- Insulin pens should never be used for more than one person, even when the needle is changed or when there is leftover medicine.
- Insulin pens and other injection equipment should be clearly labeled with the person’s name or other identifying information to ensure that the correct pen is used only on the correct person.
- Health care facilities should review their policies and educate their staff regarding safe use of insulin pens and similar devices.
- If reuse is identified, patients should be promptly notified and offered appropriate follow-up including blood borne pathogen testing.
- These recommendations apply to any setting where insulin pens and other injection equipment are used. This includes hospitals, assisted living facilities, nursing homes, clinics, health fairs, shelters, detention facilities, homes, schools, and camps.

Why does this keep happening?

- Dosing accuracy
- Convenience
- Ease of use
- Pre-labeled with product name and barcode
- Patient specific barcode option
- Ready for administration
- Takes less time
- Reduces waste
- Less risk for needle stick injury

**Medication Errors**

A Clinical Reminder About The Safe Use of Insulin Vials

Matthew Grissinger, MPH, PASCP

**Risks With Insulin Vials**

- Simply replacing insulin pens with insulin vials may result in unintended vulnerabilities that can result in errors.
- Staff members who have been using insulin pens for any length of time, transitioning back to insulin vials may uncover knowledge deficits that could lead to errors and patient harm.

**Dosing Errors**

- Look alike vials
- Unlabeled syringes
- Beyond use expiration dating
- Cross contamination

**Safe Use of Insulin Vials**

- Staff education
- Pharmacy oversight
- Insulin dosing
- Insulin syringes
- Small vial size

- Stock the smallest vials
- Stock appropriate syringes (segregate TB syringes)
- Separate and verify drugs to prevent mix-ups
- Don’t rule out problems

**Insulin Concentration History**

**U500 Is Highly Concentrated**

- U500 R contains 500 units of insulin in each mL (5x more concentrated than U100).
- U500 R allows a patient to inject one fifth the insulin volume compared with injecting the same dose of a U100 insulin.
Patient Education

• Some patients have tried to inject insulin without removing the needle cover, thus failing to administer the insulin.


They are only approved for use on individual patients, even when the needle is changed or when there is leftover medicine. No exceptions.

http://www.co.la-crosse.wi.us/solidwaste/hhm.asp#whatis8

Dispose of used sharps disposal containers according to your community guidelines.

• Drop box or supervised collection sites
• Household hazardous waste collection sites
• Mail-back programs
• Residential special waste pick-up services

Household generated “Sharps” including needles, syringes, and lancets are accepted at the La Crosse County HHM Facility free of charge from La Crosse County Residents who treat themselves for medical conditions such as diabetes.

Sharps must be brought to HHM in approved containers. The only acceptable containers are:
  Ø a registered, red “Sharps” container
  Ø a thick plastic laundry detergent bottle with a screw type cap.

Detergent containers should be labeled with the word “SHARPS” using black, permanent marker.

Be sure lids are closed tightly or locked.

Note: if the sharps are in a container other than those listed above (i.e. milk jug, soda bottle, coffee container, bag, box etc.) they cannot be accepted.

https://www.flickr.com/photos/ldaphotos/6321875537/in/album-72157627949569161/
One-Handed Needle Recapping Method

• Step 1: Place the cap on a flat surface like the table or counter with something firm to "push" the needle cap against.
• Step 2: Holding the syringe with the needle attached in one hand, slip the needle into the cap without using the other hand.
• Step 3: Push the capped needle against a firm object to "seat" the cap onto the needle firmly using only one hand.

Personal Sharps Containers

• Discharge education
  • Travel
  • Outings
Infection Prevention and Control in the Podiatric Medical Setting
Challenges to Providing Consistently Safe Care

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Clara Tsao, RN, BSN2
Mary Beth White-Comstock, RN, CCE2
Barbara Montana, MD, MPH2

Unsafe practices are an underestimated contributor to the disease burden of bloodborne viruses. Outbreaks associated with failures in basic infection prevention have been identified in institutional settings with increased frequency in the United States during the past 15 years, representing an alarming trend and indicating that the challenges of bloodborne viruses have not been diminished. Directly related to the number of medical associations, public health investigations by state and local health departments, and the Centers for Disease Control and Prevention, have identified cases and outbreaks of acute infections that are associated with podiatric medical patients at risk for viral, bacterial, and fungal infections. All healthcare providers, including podiatric physicians, must make infection prevention a priority in any setting in which care is delivered. (J Am Podiatr Med Assoc 105(3): 264-272, 2015)

Hepatitis C virus transmission in a skilled nursing facility, North Dakota, 2013

A large outbreak of hepatitis C virus occurred among residents of a long-term skilled nursing facility. Molecular analysis of hepatitis C virus from residents linked the cases by transmission. Breaches in infection control during phlebotomy, podiatry, and other nail care procedures led to the outbreak. This investigation highlights the importance of good infection control practices in skilled nursing facilities to prevent hepatitis C outbreaks.

Background: From March-August 2013, a large outbreak of hepatitis C virus (HCV) infections was diagnosed among residents of a long-term skilled nursing facility in North Dakota. No new infections were reported after this period.

Methods: The public health investigation assessed risk factors, exposures, and outbreak characteristics. Blood specimens were collected from residents who were, or were not, infected with HCV.

Results: Of 236 residents, 13 (5.5%) were confirmed to be infected and 201 (85.0%) were not infected with HCV. Of the 13 infected residents, 7 (53.8%) were confirmed to be infected with HCV.

Conclusion: Further investigation is needed to identify the source of infection and to determine whether enhanced infection control procedures may have contributed to the outbreak.
Clean & Disinfect after Use

- Whenever possible, blood glucose meters should **not** be shared. If they must be shared, the device should be cleaned and disinfected after every use, per manufacturer’s instructions.

- If the manufacturer does not specify how the device should be cleaned and disinfected then it should not be shared.

- Use an EPA registered disinfectant effective against HIV and Hep B

- Follow instructions for use for registered disinfectant
  - Know the kill time.
  - Personal Protective Equipment (PPE)
Diabetics in the Workplace

Immunizations

- Hepatitis B
- Influenza
- Pneumococcal
- Tdap
- Shingles
- And possibly Hepatitis A


Rationale for the Recommendation

- Use of blood glucose meter for more than one resident without cleaning and disinfection between uses
- Failure to consistently wear gloves and perform hand hygiene between fingerstick procedures
- Use of the same fingerstick devices for more than one resident
- Cross-contamination of clean supplies with contaminated blood glucose monitoring equipment used by home health agencies
- Use of the same injection equipment such as a syringe or insulin pen for more than one person
- Failure to maintain separation of clean and contaminated podiatry equipment
- Improper sterilization of contaminated podiatry equipment
- Failure to perform environmental cleaning and disinfection between podiatry patients

Effectiveness of the Hep B Vaccine

- A 3-dose course of recombinant hepatitis B vaccine induced protective levels of antibodies in 75.4% of diabetic participants and 82.0% control participants matched for age and BMI, with no statistically significant difference in seroprotection rate.

- Increasing age and BMI were associated with decreased likelihood of achieving seroprotection after hepatitis B vaccination in the regression model, with age appearing to be the most clinically relevant factor. Seroprotection rates declined with age in all study participants regardless of DM status, with only 58.2% of participants with DM and 70.2% controls aged ≥60 y achieving seroprotection.


Exposure Investigation

1. Verify the diagnosis of health care associated infection with a blood borne pathogen.
2. Phone a friend (the local health department).


Questions?
Identify the one thing you will do to decrease your risk or your patient’s risk to acquiring a life threatening infection related to unsafe injection practices.