Dialysis and Transplant for Diabetes Educators

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National Kidney Disease Education Program
National Institutes of Health
Bethesda, MD
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Disclosure to Participants

- Nothing to disclose

Disclosure of ABIM Service: Andrew Narva, MD

- I am a current member of the Nephrology Board.
- To protect the integrity of certification, ABIM enforces strict confidentiality and ownership of exam content.
- As a current member of the Nephrology Board, I agree to keep exam information confidential.
- As is true for any ABIM candidate who has taken an exam for certification, I have signed the Pledge of Honesty in which I have agreed to keep ABIM exam content confidential.
- No exam questions will be disclosed in my presentation.

ESRD for Diabetes Educators

- Identify the treatment choices for kidney failure.
- Describe the challenges to glucose management associated with dialysis and transplant.
- Identify medications that may increase risk for new onset diabetes after kidney transplant.

Kidney failure is an eGFR < 15

- Kidneys cannot maintain homeostasis.
- Kidney failure is associated with fluid, electrolyte, and hormonal imbalances and metabolic abnormalities.
- End-stage renal disease (ESRD) means patient is on dialysis or has a kidney transplant.
- All ESRD patients have kidney failure
- Not all people with kidney failure have ESRD

Incidence* of diabetes-related end-stage renal disease among adults aged ≥18 years, by race and ethnicity — United States, 1996–2013

*Rate per 100,000 population and age-adjusted based on the 2000 US standard population. AI/AN=American Indians and Alaska Natives. Source: Data from the US Renal Data System and the US Census.
Coping with Kidney Disease and Failure is Challenging

- “I feel fine.”
  - The signs and symptoms may not be obvious until kidney disease is advanced.
- “Why me?”
  - Just like diabetes, acceptance of kidney disease takes time for most people.
  - Kidney disease may progress to kidney failure.
- Kidney “failure” or “end stage renal disease” sound scary.
  - Grief, fear and depression are not uncommon.

Most People are Not Prepared for Kidney Failure

- Discuss treatment choices early with progressive kidney disease.
- “Early” depends on the eGFR and the rate of decline.
- People who are not prepared and need treatment do not have much choice. They may start hemodialysis using a temporary vascular access (catheter).
- In 2011, more than 80% of people started hemodialysis with a temporary vascular access.

Key Issues in Managing CKD

- Ensure the diagnosis is correct
- Implement appropriate therapy:
  - Monitor progression/Goals
  - Screen for CKD complications
- Educate the patient about CKD
- Prepare appropriately for kidney failure

AADE Practice Advisory Recommendations

1. Identify CKD due to diabetes and educate the patient about their kidney test results.
2. Slow progression of DKD: BP, Glucose control, diet
3. Collaborate with PCP to identify and monitor CKD complications.
4. Promote self-management.
  - Talk to patients about CKD
  - Communicate importance of testing
  - Explain progressive nature of CKD
  - Begin to speak about dialysis and transplantation

Kidney disease education is a Medicare benefit

- eGFR < 30
- Medicare B
  - Individual pays 20%, deductible applies
- Qualified providers: physicians, physician assistants, nurse practitioners, and clinical nurse specialists
- Up to six sessions covered

There are Three Choices for Treating Kidney Failure

1. Kidney transplant
  - From a living donor
  - From a deceased donor
2. Dialysis
  - Peritoneal dialysis (PD)
    - Continuous cyclic peritoneal dialysis (CCPD)
    - Continuous ambulatory peritoneal dialysis (CAPD)
  - Hemodialysis (HD)
    - In-center (dialysis unit)
    - Home
3. No transplant and no dialysis
extra space between colon and "physicians" in both

Presentation Account, 11/4/2011
A Kidney Transplant from a Living Donor May Be Better Than Other Treatments

- Transplant-living donor
- Transplant-deceased donor
- Peritoneal dialysis
- Hemodialysis

Number (out of 100) alive at the end of time period by treatment

<table>
<thead>
<tr>
<th></th>
<th>Alive at 1 yr</th>
<th>Alive at 5 yr</th>
<th>Alive at 10 yr</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transplant</td>
<td>95</td>
<td>85</td>
<td>75</td>
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<tr>
<td>Living</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Deceased</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Peritoneal</td>
<td>70</td>
<td>60</td>
<td>50</td>
</tr>
<tr>
<td>Dialysis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hemodialysis</td>
<td>50</td>
<td>40</td>
<td>30</td>
</tr>
</tbody>
</table>

Peritoneal Dialysis May Be a Choice for an Individual Who:

- Has no contraindicating abdominal pathology.
- Wants to do their own treatments at home.
- Is willing to do treatments every day.
- Has room to store supplies at home.

In-center Hemodialysis May Be a Choice for an Individual Who:

- Can travel to a dialysis center 3 times a week for scheduled treatments.
- Prefers trained staff to handle their treatments.
- Does not mind needle sticks.
- Is willing to follow a diet that includes numerous restrictions.

Home Hemodialysis May Be a Choice for an Individual Who:

- Wants to do their treatments at home.
- Has someone who is willing to be trained to help them with treatments at home.
- Is willing to do treatments most days of the week.
- Has room for the machine and to store the supplies.
- Does not mind needle sticks and self-cannulation.

No Treatment and No Dialysis May be the Choice for an Individual Who:

- Feels treatment will not improve their health.
- Feels they have done what they wanted to do in life.
- Has family and friends who are in support of this decision.
I don’t have the publication(s) that this info is derived from. Couldn’t find any references in the JHM booklet.

therese, 2/10/2014
Kidney Transplant: Pros and Cons

**PROS**
- A transplanted kidney is a normal, functioning kidney.
- Fewer diet restrictions are needed.
- A successful transplant may mean a longer life.
- The recipient may have better quality of life.

**CONS**
- The waiting list is long for a deceased donor.
- Rejection is a possibility.
- Anti-rejection medications suppress the immune system.
- Medications and weight gain may make diabetes harder to control.
- New onset diabetes after transplant is a possibility.

Anti-rejection Medications Should be Taken as Directed

<table>
<thead>
<tr>
<th>Medication</th>
<th>Side Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prednisone</td>
<td>Weight gain, Hyperglycemia, Hypertension, Hypoalbuminemia, Nausea, Gram-negative infections.</td>
</tr>
<tr>
<td>Azathiopine</td>
<td>Stomach upset, Muscle pain, Decreased blood counts, GI upset.</td>
</tr>
<tr>
<td>Mycophenolate</td>
<td>Stomach upset, Muscular weakness, Myocardial infarction.</td>
</tr>
</tbody>
</table>

The Risk Factors for New Onset Diabetes after a Kidney Transplant Include:
- Older age
- Ethnicity
  - African Americans and Hispanics > Whites
- Family history of diabetes
- Weight
- Positive Hepatitis C
- Immunosuppressant medication
  - Corticosteroids (prednisone)
  - Tacrolimus > cyclosporine
In Peritoneal Dialysis, the Peritoneum is the Substitute Kidney or "Filter"

What is a PD “Exchange”?
- Dialysis solution with dextrose flows into the abdominal cavity.
- The solution remains for a prescribed time period, also known as the dwell time.
- Substances and fluid pass from the capillaries in the peritoneum into the solution.
- Dextrose enters the blood; and substances and fluid enter the solution.
- The solution is drained at the end of the dwell.


Continuous Cycling Peritoneal Dialysis (CCPD), a Machine Performs 3–5 Exchanges During Sleep

**PD Dextrose Solutions are a Source of Carbohydrate**

- The dextrose concentrations vary:
  - 1.25%, 2.5%, 4.25%
- The size of the bags vary:
  - 2-liter, 2.5-liter, 3-liter
- In CAPD, 60–70% is absorbed. The amount is higher due to longer dwell times.
- In CCPD, 40–50% is absorbed.
- Insulin requirements may increase.

**Intra-peritoneal Insulin May be an Option**

- Insulin may be injected into the bags of PD solution.
- The required dose may double or triple.
- Some insulin adheres to the bag and tubing.
- Lipids may be harder to control.

**Peritoneal Dialysis: Pros and Cons**

**PROS**
- PD preserves residual renal function better.
- They do it on their own.
- They choose the time and place.
- They do not travel to a unit.
- Toxins are removed daily
- The diet is not as restricted as hemodialysis.

**CONS**
- They must plan treatments around their activities.
- They need to adhere to the prescription for adequate treatment.
- They must follow instructions to keep the risk of infection low.
- They need to take supplies when traveling.
- They generally gain weight.
- Diabetes may be harder to control due to the carbohydrate in the dialysate.

**Peritoneal Dialysis and Diet**

- The diet may not be as strict as the diet for hemodialysis.
- The wastes products are removed daily.
- Amino acids lost during the exchanges must be replaced; dietary protein needs are higher.
- Absorbed dextrose calories may add weight.
- People with diabetes are never really “fasting.”

**Nutrition Prescription: Peritoneal Dialysis**

- Protein: 1.2–1.3 g/kg
- Calories: 30–35 kcal/kg
  - Includes calories from dextrose solutions
- Sodium: 2,000–4,000 mg
- Potassium: 3,000–4,000 mg
- Phosphorus: 800–1,000 mg
  - Still need binders
- Fluid restriction—as needed

Reference: Shiro-Harvey, 2002
Hemodialysis (HD) Requires Vascular Access

- A temporary access is the least desirable type.
- A permanent vascular access is required.
  - This access is usually placed in the non-dominant arm.
- Protect blood vessels in both arms!
  - Avoid venipuncture and IV catheter placement above the wrist.

Most People Start Hemodialysis with a Temporary Vascular Access

- No needles are used.
- Blood flow rates are lower.
- They will need additional surgery to place permanent access.

An AV Fistula is the Preferred Access

- An artery is surgically connected to a vein.
- This type of access takes time to mature and cannot be used immediately.
- A fistula is less likely to clot.

Healthy People 2020 Objectives: Improve Vascular Access for Adult HD Patients

- Increase the proportion of patients who use arteriovenous fistulas as the primary mode of vascular access.
- Reduce the proportion of patients who use catheters as the only mode of vascular access.
- Increase the proportion of patients who use arteriovenous fistulas or have a maturing fistula as the primary mode of vascular access at the start of renal replacement therapy.
- Educate the patients early in the course of the disease so they will be ready for treatment.

An AV Graft Will Work for Hemodialysis

- A synthetic tube connects the artery and vein.
- The graft takes less time to mature compared to a fistula.
- A graft is more likely to become infected or clot.

The Dialyzer is the Artificial Kidney in Hemodialysis

- Removal is based on size.
- Some nutrients are removed:
  - Glucose
  - Amino acids
  - Water-soluble vitamins
- Protein-bound substances, including many medications, are not efficiently removed.

**Hemodialysis**

- Conventional home hemodialysis (most common)
  - Three times per week
- Daily home hemodialysis
  - 2–3 hours, 5–6 days per week
- Nocturnal hemodialysis
  - 6–8 hours, 3 or more days per week

*Home Hemodialysis Requires Training and Support*


**In-center Hemodialysis: Pros and Cons**

**PROS**
- Some people prefer the social setting.
- Facilities are found nationwide.
- Staff does the work:
  - Place and remove the needles
  - Monitor treatment
  - Maintain the equipment

**CONS**
- The diet is very strict.
- They have to follow a schedule.
- They must travel to the unit.
- They may take more medications.
- They may feel fatigued.
- Some nutrients are removed during treatment.

**Home Hemodialysis: Pros and Cons**

**PROS**
- Diet is less restrictive with more frequent treatments.
- They decide the time schedule.
- No travel to the unit is needed.
- The newer machines are small.
- Fewer ups and downs occur.

**CONS**
- They must have a partner.
- Partner burn-out is a possibility.
- They need space for treatment: machine, supplies, access to water and drainage, and electricity.
- They insert the needles.
- They need time off from work for initial training.
- Training is not offered everywhere.

**A1c In Dialysis Patients**

- A1c is affected by red cell survival
- In dialysis patients increased red cell turnover gives falsely low results
- Carbamylated hemoglobin is formed in uremic patients and can result in false elevations in the A1c

**No Transplant and No Dialysis**

- This is usually described as supportive care.
- The complications can be treated.
- Medications are still continued.
- The goal is to maintain quality of life.
- Encourage the patient to include family in decision making.
Summary: Treatment Choices

- Discuss the choices early to allow time for the patient to adjust and make a decision.
- Transplant requires daily immunosuppressant medications.
- Dextrose solutions used in peritoneal dialysis contribute to carbohydrate load. Insulin requirements increase.
- Hemodialysis has the most restrictive diet.

Resources

- PREPARED http://ckddecisions.org
- AAKP https://aakp.org
- NKF https://www.kidney.org
- CMS https://www.medicare.gov/people-like-me/esrd/dialysis-information.html
- MEI https://meiresearch.org

Questions & Comments

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All materials available at:
http://nkdep.nih.gov/