

Investigation 3.6

3.6A: Chronic Disease

3.6B: Diabetes

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3.6A: Chronic Disease

Introduction: Referrals are an important tool within your practice of medicine.

No one knows everything, so a good physician will recognize the limits of his or her abilities, both in knowledge and experience. Other physicians will refer patients to you because they believe you can handle the patient's condition more efficiently. By the same token, you will have patients whom you realize require **expertise** beyond your knowledge and experience; and you will refer those patients to a colleague whom you respect. The next case represents an example of referrals working in both directions for the same patient.

Many of the citizens of our country have a huge problem with **obesity**, so we hear a lot about various **diets** to attack this problem. You probably know that our foods contain three primary components: **protein, fat, and carbohydrates**. **Diabetes** is a disease related to the inability to get broken down carbohydrates, called **glucose**, into the tissues throughout our body. We will talk more about that later.

Diabetes is important in this case because uncontrolled diabetes can inhibit healing following surgery. In this lesson you have a patient named Gilbert who has bad knees. You sent Gilbert to see a surgeon to treat his knees, but the surgeon wants Gilbert to come back to see you. Let's see what happens.

1. **Chief Complaint:** You are having a very busy day in your **primary care** office, seeing all sorts of patients, non-stop, when your receptionist pulls you away to take a phone call from an **orthopedic surgeon** in your community. When you take Dr. Drazer's call, she jumps right over any small talk and goes right to the issue.

"I've got your patient Gilbert Isaacs with me here in the office and as you thought he needs a new left knee sooner rather than later." You referred Gilbert to Dr. Drazer only a few days ago because his knee pain had stopped responding to your **conservative treatment regimen**. People generally stay healthier when they are active in some way every day and Gilbert's knee pain had gotten so bad he had become a fixture on a couch.

"Well I am delighted that you can help him," you respond. Dr. Drazer, who must also have her office full of patients, shot right back, "But Gilbert has a **hemoglobin A1c** of 7.8 drawn yesterday, and I need him lower than 6 for a week before I dare put a **steel knee** into his leg. Can you get him there for me and keep me informed so I can work him into the **surgery schedule** as quickly as possible?" Without even waiting for my response she added, "I'll have him call your office and come in to see you. Thanks for sending him to me." The phone

went “click” in my ear. I guess I had a new chief complaint, not from the patient but from the patient’s surgeon.

2. **Review of Medical Records:** Gilbert Isaacs is a 72 year old male, retired business man. He has been in your care for the past twelve years. When you were introduced to Gilbert he was very overweight, weighing in at 270 pounds. Gilbert mentioned at his annual physical exam eleven years ago that for the past year he experienced getting up eight to ten times during the night to urinate and that he had recently lost a significant amount of weight in a short period of time without dieting. Gilbert thought this was a normal result of drinking a lot of water due to extreme thirst. This history had prompted you to perform a series of blood tests that had confirmed the diagnosis. Gilbert demonstrated elevated levels of blood glucose starting about 10 years ago, and a **glucose tolerance test** confirmed the diagnosis back then of **Type II Diabetes**. Since that time Gilbert maintained a **low carbohydrate diet** (a diet popularly known as the Adkin’s Diet) and two years ago he started taking a pill that decreases the production of glucose by the liver. Gilbert has never taken insulin shots.

Since that time he has returned twice each year for evaluation of his diabetic status and adjustment of his oral medication. However, over the past six months you have seen him in the office more frequently concerning swelling and pain in his left knee. You have prescribed oral anti-inflammatory medicines and referred him for physical therapy over the past several months without benefit to the patient. Last week you referred him to Dr. Drazer for an **orthopedic consultation**. He is now referred back for control of his **diabetes** so that he can undergo surgical replacement of his severely arthritic left knee with a **prosthetic** knee.

Dr. Drazer has asked that Gilbert’s hemoglobin A1c stay below 6 for a week. This request comes from an observation that levels above 6 predict a significantly higher incidence of infections following joint replacement surgery. An infection in an artificial joint proves very difficult to resolve, unless the surgeon actually removes the artificial joint so that antibiotic medications reach the infection. No one wants to go through that process. When patients have an elevated glucose over an extended period of time the glucose attaches to the proteins in the patient’s blood stream and that causes the ability of white blood cells to fight infections to diminish. So it is not enough to simply get the blood glucose level down to normal on the day of surgery, Dr. Drazer needs the serum glucose level down to normal levels for a week or more to make sure the white cells have returned to their normal infection fighting capabilities.

3. Examination:

Height, 5' 11, **Weight**: 188 pounds

Blood Pressure is 132/89. **Pulse** = 22 b/min **Temperature** (Oral) = 98.6 F.

Head and Neck:

Eyes: vision corrected with glasses, **trifocals**

Ears: normal examination

Mouth: **partial denture**, otherwise normal

Neck: normal anatomy, no **carotid bruits**

Heart: normal sounds, no sign of **cardiac** enlargement, normal **sinus rhythm**

Lungs: breathe sounds normal all quadrants

Abdomen: **bowel sounds** active, no masses or tenderness, no **liver distention**, no **renal** discomfort on **percussion**

Extremities: enlarged left knee with reduced range of motion and significant discomfort on both extension and flexion.

Reflexes and **pulses** normal.

4. **Differential Diagnosis**: For this particular patient there is no differential diagnosis. You are fully aware of Gilbert's diagnoses:

- a. Type II Diabetes, not well controlled
- b. Arthritis left knee with a recommendation of knee replacement

5. Medical Tests

Below is a summary of some available tests to consider and a short description of how they might help your medical investigation:

Which test(s) would be most appropriate at this time? (check any that apply)

- CBC (complete blood count)**
- Random Plasma Glucose**
- Magnetic Resonance Image (MRI)** of pancreas and liver
- Hemoglobin A1C** blood test
- Ultrasound** of pancreas and liver
- X-Ray** of Abdomen

6. Immediate Treatment Options:

Which treatment would be most appropriate while waiting for test results:

Complete Blood Count (CBC)	Analyzes the amount of red blood cells, white blood cells, and platelets in blood sample
Random Plasma Glucose	Provides blood glucose level at any point in time from small blood specimen
Magnetic Resonance Imaging (MRI)	Provides a layer by layer view of the pancreas and liver
Hemoglobin A1C Blood Test	Provides an index of average blood glucose over past 2-3 month timeframe by measuring glucose bound to protein hemoglobin in the blood sample
Ultrasound of Pancreas & Liver	Uses sound to visualize the structures of the pancreas and liver
X-Ray of Abdomen	Shows the spine and any areas of calcification of the pancreas or liver

- Emergency Surgery** to remove the pancreas and/or liver.
- Radiation therapy** to stimulate the pancreas to produce more insulin.
- Prescription** for stronger insulin stimulating medicine
- Prescription** for insulin and needles
- No change of prescriptions** until all tests come back with results.

7. Test results:

Since Gilbert is already known to have type II diabetes the appropriate test would be the Hemoglobin A1C. This test tells you Gilbert's average blood glucose over the past two to three months. This is very helpful in letting you know how well Gilbert has been controlling his disease.

The following chart represents the key to reading Hemoglobin A1C test results:

Diabetes Diagnosis	Hemoglobin A1C level in blood
Normal (non-diabetic)	Less than (<) 5.7%
Pre-diabetic	Between 5.7% and 6.4%
Diabetes	6.5% or greater

Gilbert's Hemoglobin A1C test comes back with a result of 7.8%. What is the current state of his diabetic disease? (circle one answer from each line)

Normal

Pre-Diabetic

Diabetic

Well controlled diabetes

Out of control diabetes

Is Gilbert a good candidate to be referred back to Dr. Drazer for knee surgery in the next week? (Circle your answer) Yes No

Why or Why not? _____

Additional food for thought:

Type II (the Roman numeral we read as two) **Diabetes** has become all too common in our population. Normally, special islands of cells in the **pancreas** (a long, slender organ just under the stomach) monitor the level of sugar in our bloodstream. If we eat sugar and the sugar level goes too high, the cells in the pancreas **excrete** insulin into the bloodstream to ask all the cells in the body to take more sugar molecules inside and use that sugar for energy to drive the cells' activities. On the other hand, if we do not eat any sugar, those same cells in the pancreas release another **hormone** to encourage the **liver** to convert some of its stored carbohydrates back into glucose. In Type II Diabetes the patient makes insulin, but the cells throughout our body have become ineffective in **absorbing** more **glucose** when called upon to do so. Patients with Type II Diabetes (sometimes called **insulin resistant** diabetes) generally have a **progressive** chronic disease course treated first by reducing sugar in their diet, next with pills that make insulin more effective, and finally they may need to get insulin by **injection** or **inhalation** (currently an experimental method of administration). You

cannot absorb **insulin** through your stomach or intestines because the normal digestive process our bodies use treats insulin (a protein) as food and tears it apart (digestion) for use in building new proteins inside our cells.

Type I Diabetes shares the same problem of elevated blood glucose, but in this case the problem lies completely in the pancreas with the cells that make the insulin. Those cells have been destroyed in Type I Diabetes by the body's natural defenses to a viral infection. We see Type I Diabetes occurring generally in children and young adults who appear to have a **genetic abnormality** that allows the virus to produce this effect. We say those patients are "**insulin dependent**" because they must receive daily doses of insulin by injections or inhalation in order to live.

Types III, IV, and V Diabetes exist but you can put off learning about them until you get to medical school.