

# VA/DoD CLINICAL PRACTICE GUIDELINE MANAGEMENT OF DIABETES MELLITUS

## KEY ELEMENTS

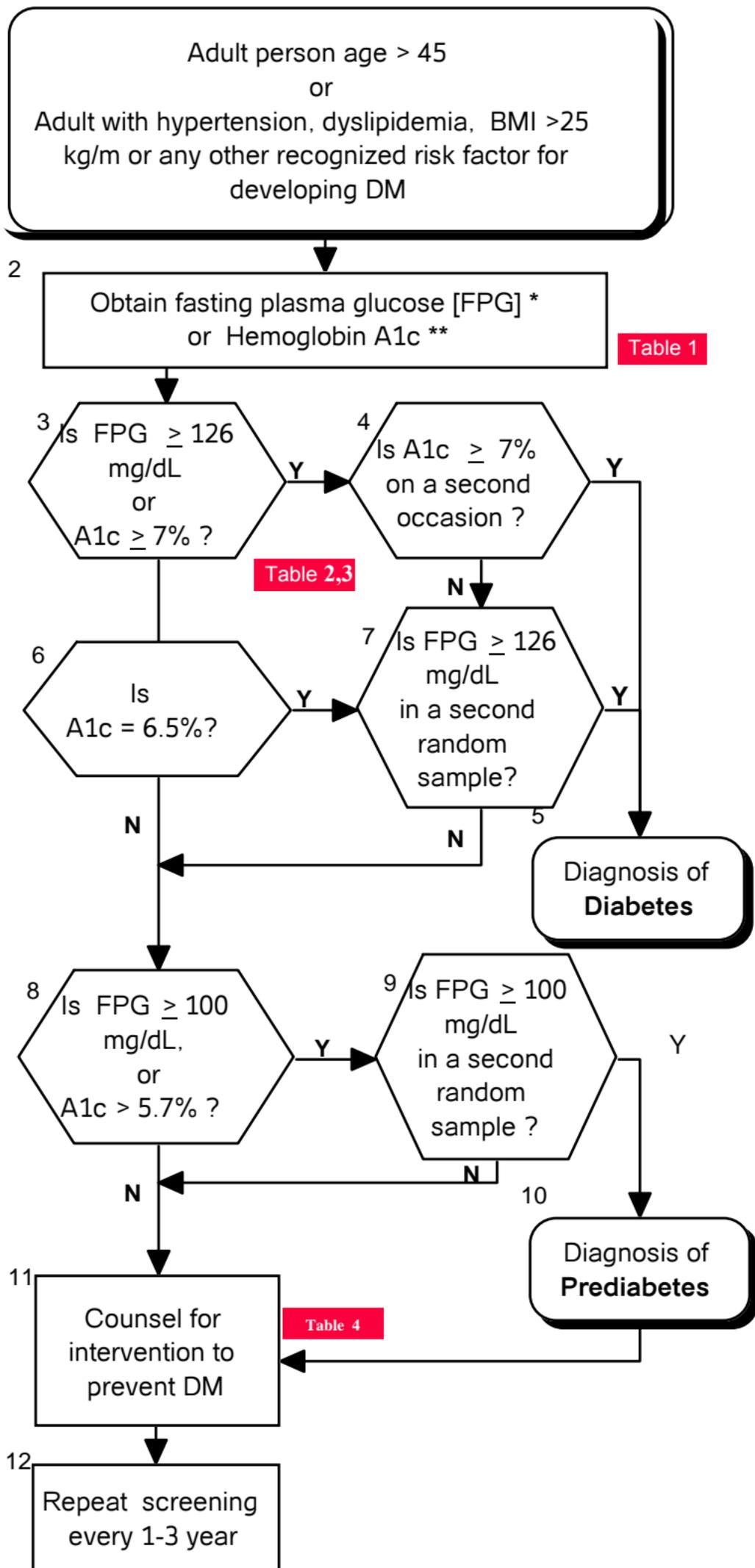
|  |   |
|--|---|
| <b>Primary Prevention</b>                      | <p>Consider <b>screening</b> adults at risk for diabetes or prediabetes</p> <p>Encourage <b>aerobic exercise and diet</b> to achieve weight loss and prevent the progression of prediabetes to diabetes</p>   |
| <b>Secondary Prevention</b>                    | <p>Achieve individualized <b>HbA<sub>1c</sub></b> target through diet, exercise, medication, and patient self-management diabetes education</p> <p>Reduce and control <b>blood pressure</b> to improve quality and length of life, and prevent micro- and macrovascular complications</p> <p>Control <b>cholesterol</b> to reduce risk for cardiovascular disease</p> |
| <b>Tertiary Prevention</b>                     | <p>Screen periodically for <b>kidney disease</b></p> <p>Screen for retinopathy every 12-24 months based on ophthalmic and clinical findings</p> <p>Screen annually for <b>lower extremity</b> complications and risk stratification</p>   |
| <b>Health Preventive Measures</b>              | <p>Consider <b>aspirin</b> therapy to reduce the risk of cardiovascular fatal events</p> <p>Advise about <b>tobacco use cessation</b></p> <p>Provide <b>influenza vaccination</b> in season</p> <p>Provide pneumococcal <b>pneumonia vaccine</b>, if indicated</p>  |
| <b>Patient self-management &amp; Education</b> | <p>Empower patients to make informed decisions about their <b>self-care of diabetes</b></p>   |

Complete guideline is available at:  
<http://www.healthquality.va.gov>  
<https://www.qmo.amedd.army.mil>



# Management of Diabetes Mellitus

## Module S - Screening for DM



Note:

\* Fasting plasma glucose (FPG) is the preferred test.

Random non-fasting plasma glucose is not recommended as first line screening. Non-fasting plasma glucose  $\geq 200$  mg/dl (on at least two occasions) is sufficient to diagnose DM, and <110 mg/dL is sufficient to exclude it. Random non-fasting plasma glucose in the range 111-199 mg/dl should be followed up with FPG test.

\*\* A1c should be measured using a clinical laboratory methodology (but NOT point of care) standardized to the National Glycohemoglobin Standardization Program [NGSP]

## Table 1. Risk Factors for Type 2 Diabetes

- Age  $\geq 40$  years
- Family history (First-degree relative with DM)
- Member of a high-risk population (e.g. African American, Hispanic American, Native American, Asian American, and Pacific Islander)
- Prediabetes (i.e., history of impaired fasting glucose or impaired glucose tolerance tests)\*
- Hypertension (blood pressure  $\geq 140/90$  mmHg)\*
- High-density lipoprotein cholesterol (HDL-C) level  $\leq 40$  mg/dL (0.90 mmol/L) and triglyceride (TG) level  $\geq 250$  mg/dL (2.82 mmol/L)\*
- Presence of vascular disease (coronary, cerebrovascular or peripheral)\*
- Overweight or Obesity (body mass index (BMI)  $\geq 25$  kg/m<sup>2</sup>)\*
- Abdominal obesity\*
- Women with polycystic ovarian syndrome (PCOS)\*
- History of gestational diabetes mellitus (GDM)
- History of delivering babies weighing  $>9$  pounds
- Other clinical conditions associated with insulin resistance (e.g., acanthosis nigricans, non-alcoholic steatohepatitis (NASH))
- Schizophrenia
- Patients treated with certain atypical antipsychotics or antidepressants
- Habitual physical inactivity

\* Associated with insulin resistance

## Table 2. Diagnosis of Diabetes Mellitus

| Status            | Fasting Plasma Glucose (FPG) <sup>(a), (b)</sup><br>or, Hemoglobin A <sub>1c</sub> <sup>(c)</sup>   | Casual Plasma Glucose <sup>(d)</sup>                             |
|-------------------|---|--|
| Diabetes Mellitus | FPG $\geq 126$ mg/dL on two occasions<br>OR<br>HbA <sub>1c</sub> is $\geq 6.5\%$ and<br>FPG $\geq 126$ mg/dL<br>OR<br>HbA <sub>1c</sub> $\geq 7\%$ on two occasions | Casual plasma glucose $\geq 200$ mg/dL plus symptoms of diabetes |
| Pre-diabetes      | FPG $\geq 100$ and $< 126$ mg/dL on two occasions<br>OR<br>HbA <sub>1c</sub> $\geq 5.7\%$ and FPG $\geq 100$ and $< 126$ mg/dL                                      | —  |
| Normal            | FPG $< 100$ mg/dL<br>HbA <sub>1c</sub> $< 5.7\%$  | —  |

(a) Fasting is defined as no caloric intake for at least 8 hours.

(b) FPG is the preferred test for diagnosis, but either of the two listed is acceptable. In the absence of unequivocal hyperglycemia with acute metabolic decompensation, one of these two tests should be done on different days

(c) Using a clinical laboratory (not a Point of Care) methodology standardized to the National Glycohemoglobin Standardization Program (NGSP)

(d) Casual means any time of day without regard to time since the last meal; classic symptoms include polyuria, polydipsia, and unexplained weight loss.

(e) Oral glucose tolerance testing (OGTT) is no longer recommended in routine clinical practice because it is an imprecise test with poor reproducibility. The World Health Organization suggests continued use of the OGTT for patients with blood glucose values in the "uncertain range." Also, the OGTT does seem to better predict macrovascular complications.

## Table 3. Accuracy of using A1c for Diagnosis of DM

The HbA1c assay may be used for the diagnosis of diabetes, with values  $\geq 6.5\%$  being diagnostic. Similar to its use in the management of diabetes, factors that interfere with or adversely affect the HbA1c assay will preclude its use in diagnosis. When a HbA1c assay is not available, or cannot be interpreted in a patient, glucose-based testing should be used for diagnosis.

- Laboratories should use only HbA1c assay methods that are certified by the National Glycohemoglobin Standardization Program (NGSP) as traceable to the DCCT reference. The manufacturers of assays for HbA1c should also show traceability to the IFCC reference method.
- Laboratories that measure HbA1c should participate in a proficiency-testing program, such as the CAP Glycohemoglobin Survey, that uses fresh blood samples with targets set by the NGSP Laboratory Network.
- Laboratories should be aware of potential interferences, including hemoglobinopathies that may affect HbA1c test results depending on the method used. In selecting assay methods, laboratories should consider the potential for interferences in their particular patient population. In addition, disorders that affect erythrocyte turnover may cause spurious results regardless of the method used.
- A1c measurements may be unreliable in the presence of hemolytic anemia, uremia, chronic kidney disease or pregnancy
- A1c is higher for a given level of glycemic control in older individuals and minority patients than in Caucasians, in addition to biological sources of error.
- A1c values from any laboratory have measurement error merely due to sample processing and the actual test measurement

## Table 4. Prevention of Diabetes

- Counselled about the risks of progression to diabetes and the rationale for implementing preventive strategies.
- Individuals with risk factors for diabetes who are not diagnosed with pre-diabetes should also be counseled and educated about how to reduce risks.
- Institute lifestyle modifications to prevent diabetes, including regular aerobic exercise and a calorie-restricted diet to promote and maintain weight loss
- Set an individualized goal to achieve and sustain weight loss of  $\geq 5$  percent of body weight for patients with risk factor for diabetes and a BMI  $\geq 25$
- When lifestyle modifications have been ineffective at preventing a sustained rise in glucose, offer pharmacologic therapy with a metformin or an alpha-glucosidase inhibitor (e.g., acarbose) to delay progression from pre-diabetes to a diagnosis of diabetes.

## Management of Patient With Diabetes

## Review all the following and set priorities

**If :**

**Go to :**



Individualized HbA1c not at target?

**Glycemic Control      Module G**



SBP  $\geq$  140 or DBP  $\geq$  80 mmHg?

**Hypertension      VA/DoD HTN Guideline**



No lipids evaluation within one year?  
Elevated cholesterol or lipids?

**Lipid Control      VA/DoD Lipid Guideline**



No kidney evaluation within one year?  
Microalbuminuria or elevated creatinine?

**Kidney Disease      VA/DoD CKD Guideline**



No eye evaluation within two years? or  
Symptoms or high risk for visual loss? or  
History of retinopathy?

**Eye Care      Module E**



No foot risk assessment within one year ?  
or Risk factors present or active lesion?

**Foot Care      Module F**



Need additional nutritional or  
lifestyle education?

**Self-Management and Education      Module M**

Consider aspirin therapy for patients with diabetes age > 40 OR evidence of cardiovascular disease risk factors

If the patient is a candidate for an influenza vaccine, administer it in season

- Administer pneumonia vaccine, if indicated

- If the patient is using tobacco, refer to the VA/DoD Clinical Practice Guideline for the Management of Tobacco Use Cessation

## **Indications for consultation or referral to specialty :**

- Have type 1 DM; especially patients with history of hospitalizations for metabolic complications and/or patients who are receiving intensive insulin therapy)
- Have new-onset insulin-requiring DM or marked insulin resistance
- Have contraindications or intolerances to medications typically used in managing diabetes
- Have recurrent episodes of incapacitating hypo- and/or hyperglycemia
- Have poor recognition of hypoglycemia and who have a history of severe hypoglycemic reactions (including coma, seizures, or frequent need for emergency resuscitation)
- Have visual and/or renal impairment
- Have psychosocial problems (including alcohol or substance abuse) that complicate management
- Have HbA<sub>1c</sub> > 9.0 percent and are considered for aggressive management on an expedited basis.
- Are not achieving glycemic control despite comprehensive treatment with complex regimen of combination pharmacotherapy including insulin
- Require evaluation or management beyond the level of expertise and resource level of the primary team.

## Table 5. Determination of Target HbA<sub>1c</sub> Level <sup>(1)</sup> <sup>(2)</sup>

1. Determine Glycemic control target range using risk stratification criteria
2. Adjust the target according to patient factors
3. Set the target range after discussion with the patient:

| Major Comorbidity <sup>(d)</sup><br>or<br>Physiologic Age  | Microvascular Complications   |                         |                         |
|--|-------------------------------|-------------------------|-------------------------|
|  | Absent or Mild <sup>(a)</sup> | Moderate <sup>(b)</sup> | Advanced <sup>(c)</sup> |
| Absent<br>>10 years of life expectancy                     | <7%                           | <8%                     | 8-9% *                  |
| Present <sup>(e)</sup><br>5 to 10 years of life expectancy | <8 %                          | <8%                     | 8-9% *                  |
| Marked <sup>(f)</sup><br><5 years of life expectancy       | 8-9% *                        | 8-9% *                  | 8-9% *                  |

(1) Based upon the DCCT referent standard. Clinicians need to evaluate the methodology used at their site.

(2) Reflects a "goal" over time. Intensification of therapy should be undertaken based upon individual clinical circumstances and treatment option.

(a) Mild microvascular disease is defined by early background retinopathy, and/or microalbuminuria, and/or mild neuropathy.

(b) Moderate microvascular disease is defined by pre-proliferative (without severe hemorrhage, intraretinal microvascular anomalies [IRMA], or venous bleeding) retinopathy or persistent, fixed proteinuria (macroalbuminuria) and/or demonstrable peripheral neuropathy (sensory loss).

(c) Advanced microvascular disease is defined by severe non-proliferative (with severe hemorrhage, IRMA, or venous bleeding), or proliferative retinopathy and/or renal insufficiency (serum creatinine level > 2.0 mg/dL), and/or insensate extremities or autonomic neuropathy (e.g., gastroparesis, impaired sweating, or orthostatic hypotension).

(d) Major comorbidity includes, but is not limited to, any or several of the following active conditions: significant cardiovascular disease, severe chronic kidney disease, severe chronic obstructive pulmonary disease, severe chronic liver disease, recent stroke, and life-threatening malignancy.

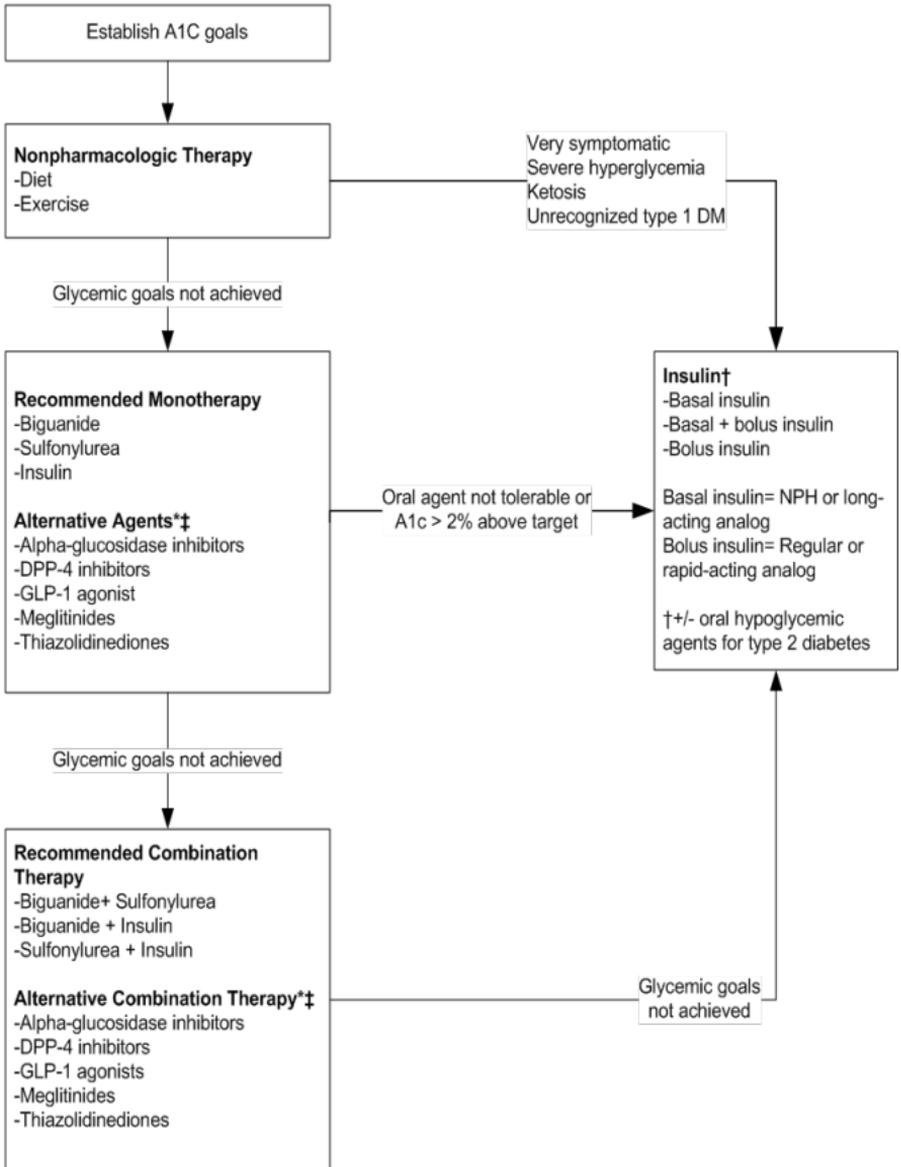
(e) Major co-morbidity is present, but is not end-stage and management achievable.

(f) Major co-morbidity is present and is either end-stage or management is significantly challenging.

\* Further reductions may be appropriate, balancing safety and tolerability of therapy.

## Table 6. Treatment for Type 2 Diabetes

1. Lifestyle modification, diet and exercise
2. Monotherapy with oral agent or insulin
3. Combination (add a second oral agent)
4. Insulin with daytime oral agent
5. Insulin alone
6. Referral



\*Listed alphabetically; not in order of preference

†If applicable, refer to VA [www.pbm.va.gov](http://www.pbm.va.gov) or <http://vawww.pbm.va.gov> or DoD guidance/criteria for further recommendations on use of these agents

## Dyslipidemia Treatment in Patients with Diabetes

|  |  |  |
|--|--|--|
|  | Baseline LDL-C [mg/dL]                   |  |
|  | ≥100                                     | ≥130                                     |
| Diabetes (with or without known CHD)     | Diet & Exercise<br>Consider drug therapy | Diet & Exercise<br>Initiate drug therapy |
| LDL-C ≤130 mg/dL<br>and HDL-C < 40 mg/dL | Consider gemfibrozil                     |  |

## Hypertriglyceridemia in Patients with Diabetes

|   |   |
|---|---|
| Diabetes with triglycerides (TG) 400-1000 mg/dL | Consider gemfibrozil if HDL-C < 40 mg/dL<br>For high TG, use direct LDL-C measurement or non-HDL-C as lipid disorder to guide therapy |
|---|---|

## Foot Care

Every patient with diabetes must have an annual documented foot risk assessment

Every high-risk patient should have a visual inspection of his/her feet

## Eye Care

Persons who have had no retinopathy on all previous examinations should be screened for retinopathy at least every other year

Persons who have ocular risk factors, are on insulin, or have had retinopathy detected on a previous examination should have a

## Kidney Disease

Patients with DM should be screened periodically for the presence of kidney disease using urinalysis and estimation of the glomerular filtration rate (eGFR < 60 ml/min/1.73m<sup>2</sup>)

Patients with diabetes who have a negative urine protein by dipstick should be tested for the presence of microalbuminuria

Microalbuminuria defined as albumin-to-creatinine ratio > 30, confirmed on two out of three urine tests in patients with diabetes mellitus (DM)

It is important to consider other causes of increased albumin excretion, especially in the case of Type 1 diabetes present for < 5 years.

A 24-hour urine collection for protein and creatinine is not needed for

### Definition of Abnormalities in Albumin Excretion

| Condition        | Random Urine for Alb/Cr Ratio (mg/gr creatinine) |
|------------------|--|
| Normal           | <30  |
| Microalbuminuria | 30 - 300   |
| Macroalbuminuria | > 300  |

## Table 8 | Comparison of Insulin Preparation

| INSULIN   |          |                 |          |  |            |
|---|----------|-----------------|----------|--|------------|
| Insulin   | Onset    | Peak            | Duration | Mix Compatible                           | Appearance |
| <b>SHORT-ACTING (prandial)</b>  |          |                 |          |  |            |
| Regular<br>(Novolin R®,<br>Humulin R®)  | 30 - 60  | 2 - 5           | 5-8      | NPH                                      | Clear      |
| Aspart<br>(Novolog®)  | 10 - 20  | 0.5 – 1         | 3 - 5    | NPH                                      | Clear      |
| Lispro<br>(Humalog®)  | 15 – 30  | 0.5 – 1.5       | 3 – 5    | NPH                                      | Clear      |
| Glulisine<br>(Apidra®)  | 15 - 30  | 0.5 – 1.5       | 3 - 4    | NPH<br>(subcutaneous<br>use only)        | Clear      |
| <b>INTERMEDIATE-ACTING (basal)</b>  |          |                 |          |  |            |
| NPH<br>(Novolin N®,<br>Humulin N®)  | 60 – 90  | 4 – 12          | 10 - 24  | Regular,<br>aspart, lispro,<br>glulisine | Cloudy     |
| <b>LONG-ACTING (basal)</b>  |          |                 |          |  |            |
| Glargine<br>(Lantus®)   | 60       | 4 - 6 *         | 20 - 24  | Do Not Mix                               | Clear      |
| Detemir<br>(Levemir®)   | 60 – 120 | 6 - 8 *         | 10 - 24  | Do Not Mix                               | Clear      |
| <b>CONCENTRATED INSULIN</b>   |          |                 |          |  |            |
| Regular U-500<br>(Humulin R U-500®)   | 30 - 45  | 2 – 4           | 6 – 10   | Do Not Mix                               | Clear      |
| <b>PREMIXED PRODUCTS (prandial + basal)</b>   |          |                 |          |  |            |
| NPH/Regular<br>70/30 (Novolin 70/30®)   | 30 – 60  | 2 –12<br>(dual) | 10 – 24  | Do Not Mix                               | Cloudy     |
| Insulin protamine aspart/<br>aspart 70/30<br>(Novolog Mix®)                                       | 10 –20   | 1 – 3<br>(dual) | 10 - 16  | Do Not Mix                               | Cloudy     |
| Insulin protamine lispro/<br>lispro 75/25 or 50/50<br>(Humalog® Mix75/25 or<br>Humalog Mix50/50™) | 15 – 30  | 1 – 6<br>(dual) | 10 – 16  | Do Not Mix                               | Cloudy     |

\* Insulin glargine and insulin detemir are characterized by a relatively flat ("peakless") concentration/time profile