

# Using Comparative Effectiveness Research

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**National  
Business  
Group on  
Health**

## Premixed Insulin for Type 2 Diabetes

*This guide provides actions suggested by the National Business Group on Health for employers who want to use comparative effectiveness research (CER) in their health plan and program design. It is based on comparative effectiveness research funded by the federal Agency for Healthcare Research and Quality (AHRQ) on two preparations of premixed insulin for type 2 diabetes. For more information about premixed insulin for type 2 diabetes, such as additional findings and data, see the “Resources” section at the back of this guide.*

### Impact on Employers

Diabetes mellitus (diabetes) is taking a toll on the U.S. population. Diabetes affects 25.8 million people in the United States—8.3% of the population.<sup>1</sup> UnitedHealthcare estimates that 8% of plan members have diabetes, while another 20% are prediabetics.<sup>2</sup>

Diabetes is an expensive chronic condition. Consider the following:

- UnitedHealthcare estimates that employers pay on average 13 times more per year in health costs for an employee with diabetes than for a healthy employee.<sup>3</sup>
  - \$22,512 per employee with diabetes
  - \$1,721 per employee without diabetes
- Yearly Treatment Costs:<sup>4</sup>
  - Prediabetic patients: \$5,000
  - Previously undiagnosed diabetics expected cost: \$12,000
  - Diabetics without complications: \$10,000
  - Diabetics with complications: \$30,000
- Yearly Absenteeism and Presenteeism Costs<sup>5</sup>
  - Absent: 15 million work days
  - Reduced performance (presenteeism): 120 million work days
  - Unemployment disability: 107 million work days lost

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### About Premixed Insulin

Premixed human insulin (premixed NPH/regular insulin) is structurally identical to insulin produced by the human pancreas. It is available in short-acting (regular insulin) and intermediate-acting (NPH) insulin. Newer premixed insulin (premixed analogues), combines rapid-acting insulin with intermediate-acting insulin.

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# Using Comparative Effectiveness Research

## Agency for Healthcare Research & Quality Comparative Effectiveness Research Findings

The AHRQ Effective Health Care Program funded a systematic review of the research literature on premixed insulin for type 2 diabetes, resulting in consumer and clinician guides. The following findings are based on the AHRQ September 2008 Evidence Report entitled, *Comparative Effectiveness, Safety, and Indications of Insulin Analogues in Premixed Formulations for Adults with Type 2 Diabetes*.

Oral medications to lower blood sugar (glucose) levels are a primary component of treatment. Although oral drugs are effective, insulin is frequently required to achieve a desired level of blood sugar control. Twenty-eight percent of people with type 2 diabetes use insulin alone or in combination with an oral diabetes drug. A blood test called A1c is done at a physician's office or lab a few times a year. The A1c shows the average blood sugar level over the past two to three months.

Premixed insulin preparations are intended to simplify dosing. Premixed insulin combines rapid- and intermediate-acting insulin to provide more flexibility in treatment regimens. For people using more than one type of insulin, these preparations may allow them to reduce the number of daily insulin injections.

### Main research findings:

#### Oral Medications and Newer Premixed Insulin

Newer premixed insulin can lower blood sugar more than oral medications. However, newer premixed insulin is also more likely to cause very low blood sugar and more weight gain than oral diabetes medications.

#### Long-Acting Insulin and Newer Premixed Insulin

Newer premixed insulin can lower A1c and blood sugar after meals more than long-acting insulin. Newer premixed insulin is more likely to cause very

### What is Type 2 Diabetes?

Diabetes is a metabolic disorder. Type 2 diabetes (non-insulin-dependent diabetes mellitus [NIDDM], or adult onset diabetes) is the most common form of diabetes, accounting for 90% to 95% of all diagnosed cases of diabetes.<sup>6</sup> Risk factors for type 2 diabetes include age (older people tend to be more vulnerable); obesity; family history of diabetes or gestational diabetes; impaired glucose metabolism; and physical inactivity. Certain races and ethnicities also have a higher risk of being diagnosed with type 2 diabetes. Most people with type 2 diabetes have the following problems:

- The pancreas does not produce enough insulin to meet an individual's metabolic needs.
- Cells do not use the available insulin effectively.

low blood sugar and weight gain than long-acting insulin. On the other hand, long-acting insulin is better at lowering blood sugar before eating.

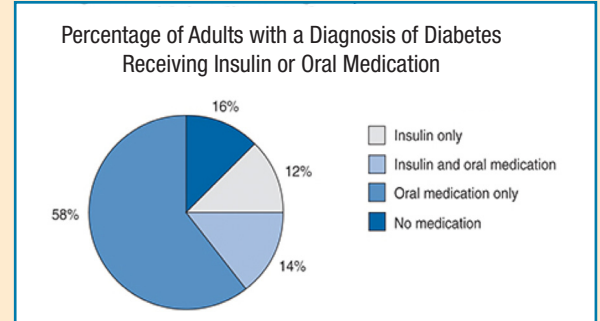
#### Premixed Human Insulin (NPH/regular insulin) and Newer Premixed Insulin

Premixed human and newer premixed insulin preparations have about the same effect. Newer premixed insulin, however, is better at lowering blood sugar after meals.

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## Diabetes Treatments

People with type 2 diabetes can control their blood glucose by eating a healthy diet, participating in an exercise program, losing excess weight and taking oral medication. Medications for people with diabetes often will change over the course of the disease. For example, some people with type 2 diabetes taking oral medications may also need insulin injections to control their blood glucose. In addition, patient education and self-care practices are important aspects of diabetes management.



Source: Centers for Disease Control and Prevention. 2007–2009 National Health Interview Survey.

## Insulin Preparations

### Premixed Human Insulin (Premixed NPH/Regular Insulin)

Structurally identical to insulin produced by the human pancreas, it is available as a short-acting (regular insulin) and intermediate-acting (NPH) insulin preparation. Premixed human insulin provides continuous insulin supplementation and short-term meal coverage.

### Newer Premixed Insulin (Premixed Analogues)

This preparation combines rapid-acting insulin with intermediate-acting insulin. Newer premixed insulin provides continuous insulin supplementation and short-term meal coverage.

## Comparing Oral Medications and Newer Premixed Insulin: Benefits & Side Effects

BENEFITS	Oral Medications for Diabetes	Newer Premixed Insulin
Better at lowering A1c		X
Better at lowering fasting blood sugar (before eating)		X
Better at lowering blood sugar after meals		X
SIDE EFFECTS	Oral Medications for Diabetes	Newer Premixed Insulin
Less hypoglycemia (very low blood sugar)	X	
Less weight gain	X	

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### Comparing Long-Acting Insulin and Newer Premixed Insulin

BENEFITS	Long-Acting Insulin	Newer Premixed Insulin
Better at lowering A1c		X
Better at lowering fasting blood sugar (before eating)	X	
Better at lowering blood sugar after meals		X
SIDE EFFECTS	Long-Acting Insulin	Newer Premixed Insulin
Less hypoglycemia (very low blood sugar)	X	
Less weight gain	X	

### Comparing Premixed Human Insulin (NPH/Regular Insulin) and Newer Premixed Insulin

BENEFITS	Premixed Human Insulin (NPH/Regular Insulin)	Newer Premixed Insulin
Better at lowering A1c	--Similar Results --	
Better at lowering fasting blood sugar (before eating)	--Similar Results --	
Better at lowering blood sugar after meals		X
SIDE EFFECTS	Premixed Human Insulin (NPH/Regular Insulin)	Newer Premixed Insulin
Less hypoglycemia (very low blood sugar)	--Similar Results --	
Less weight gain	--Similar Results --	

#### Still Unknown

Since most studies of premixed insulin last one year or less and focus on short-term outcomes, there is insufficient evidence to determine the following:

- Whether the effectiveness of premixed insulin or the occurrence of adverse events as a result of this treatment varies by age, gender, race or ethnicity;
- If premixed insulin results vary for people with poor blood sugar control or coexisting medical conditions;
- Long-term safety of premixed insulin and its impact on quality of life and treatment satisfaction; and
- Effects of premixed insulin on long-term outcomes, such as mortality, cardiovascular disease, kidney disease, neuropathy, retinopathy and long-term weight change, compared with other type 2 diabetes medications.

# Using Comparative Effectiveness Research

## National Business Group on Health Strategies for Employers



Employers can help their employees learn about the various treatments for type 2 diabetes and work with their care providers to consider treatment benefits, risks and side effects.

### *Employee Education and Supports*

#### *Help employees learn about healthy lifestyles to prevent diabetes.*

- Strongly encourage employees to maintain an active lifestyle. For example, healthy lifestyle incentives, such as gym subsidies and team-based fitness or weight-loss competitions, have proven to be effective in motivating employees to exercise regularly.
- Encourage employees to maintain a healthy weight by including and even subsidizing healthy options in the cafeteria.
- Educate employees about how challenging, painful and risky it is to have diabetes. Given how much an individual can do to prevent diabetes, educating employees could be lifesaving and certainly quality-of-life-enhancing.

#### *Help employees learn about treatment options for type 2 diabetes.*

- Supply employees with the AHRQ consumer and clinician guides on type 2 diabetes. Disseminate AHRQ guides at on-site clinics and online. Encourage employees to take the guides with them to doctor appointments.

#### *Some questions a patient may want to ask his/her doctor include:*

- How often do I need to take insulin?
  - Are some kinds of insulin easier to measure and inject?
  - Can I use a prefilled insulin pen?
  - How much will this type of insulin cost?
- Provide care guidelines developed by the American Diabetes Association, and encourage employees to ask their physicians and caregivers to follow the guidelines.
  - Provide employees with decision aids and educational materials on type 2 diabetes through events such as health fairs and/or electronically through the company's intranet or portal.

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### Patient Decision Aids

*Although many of these products are used by National Business Group on Health members, this is not intended as an endorsement of these products, nor is it a complete list of all such services.*

#### Diabetes Interactive Diary (DID)

The Diabetes Interactive Diary (DID) provides immediate insulin dosing recommendations based on current blood glucose level, carbohydrate intake and carbohydrate–insulin ratio. All information is transmitted to and from the central server by mobile telephone text message transmission.<sup>8</sup>

#### AIDA

AIDA is a web-based educational simulator program of glucose–insulin interactions, insulin dosages and dietary adjustments in diabetes mellitus.<sup>9</sup>

#### DiasNet

Diabetes Advisory System (DiasNet) is a website that allows patients to compare their own insulin dosing regimens and meal data to predict blood glucose levels and to learn how to adjust insulin doses or meal sizes.<sup>10</sup>

#### Consumer's Medical Resource

<http://www.consumersmedical.com>

Employers contract with CMR to provide employees with a comprehensive overview of their condition, treatment options with available effectiveness and outcomes data, and lifestyle information. The service also helps patients choose the best hospitals and providers.

#### Health Dialog

<http://www.healthdialog.com>

Employers contract with Health Dialog to give employees access to the Shared Decision-Making® programs, including personal health coaching.

### Plan Design

Consider a value-based design for your pharmacy plan to encourage adherence with diabetes treatments. New plan designs are more targeted than in the past, using condition severity (e.g., members at high risk for adverse health events) and member engagement (e.g., individuals who use a health coach or participate in a disease management program) to determine whether patients are eligible for reduced cost sharing. Also, whenever possible, encourage employees to choose generic medications.

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## EMPLOYER CASE EXAMPLES:

**Dell** provides diabetic medications and supplies at reduced or eliminated copays for enrolling in a Well at **Dell** diabetes program.

**GE** and **UnitedHealthcare's Diabetes Health Plan** was introduced in 2009 for diabetics and prediabetics. The plan eliminates cost sharing for diabetes-related supplies and medications, lowers copays for related physician visits and subsidizes nutrition and weight management benefits. It also increases dollars available from the health reimbursement account (HRA) when participants get routine diabetes exams and preventive screenings and use a health coach.

An analysis of **UnitedHealthcare's Diabetes Health Plan** found that the three top motivators for enrolling in the diabetes plan were reduced copays for doctor visits, reduced pharmacy copays and free supplies. Among patients likely to enroll, an annual cost savings of \$500 was the threshold at which they became the most motivated.

### Network Management

Monitor the status of diabetes treatment and complications among employees by using diagnosis codes (ICD-10 Codes) obtained from your health plan or data warehouse.

These may include:

- Repeat hospital admissions
- Specialty referrals, including dialysis
- Emergency department claims
- Insulin use

### 2011 ICD-10 Diagnosis Codes

E10	Diabetes mellitus
.0	With coma
.1	With ketoacidosis
.2	With renal complications
.3	With ophthalmic complications
.4	With neurological complications
.5	With peripheral circulatory complications
.6	With other specified complications
.7	With multiple complications
.8	With unspecified complications
.9	Without complications

## Conclusion

Employers can educate employees about the importance of healthy lifestyles to prevent prediabetes and diabetes. They can also work with health plans to ensure that recommended care guidelines are followed by health providers. Furthermore, they can implement a value-based design for their pharmacy plan to reduce employee costs and encourage adherence to diabetes treatments.

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## Resources

### For Employers

Clinician Guide: *Premixed Insulin Analogues*  
Agency for Healthcare Research and Quality,  
March 2009

### For Employees

Clinician Guide: *Premixed Insulin for Type 2 Diabetes, A Guide for Adults*  
Agency for Healthcare Research and Quality,  
March 2009

### Questions are the Answer

Agency for Healthcare Research and Quality  
This is an easy-to-use consumer website that helps patients take an active role in their health care by asking questions so that they understand their condition and options.

<http://www.ahrq.gov/questionsaretheanswer/>

### For Free Print Copies of the Consumer and Clinician Guides

AHRQ Publications Clearinghouse – 800.358.9295

Consumer Guide: *Premixed Insulin for Type 2 Diabetes, A Guide for Adults*, AHRQ Pub. No. 08(09)-EHC017-A

Clinician's Guide: *Premixed Insulin Analogues*, AHRQ Pub. No. 08(09)-EHC017-3

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The Business Group is the only non-profit organization devoted exclusively to representing large employers' perspectives on national health issues and providing solutions to its members' most important health care and health benefits challenges. The Business Group fosters the development of a safe health care delivery system and treatments based on scientific evidence. Members share strategies for controlling costs, improving patient safety and quality of care, increasing productivity and supporting healthy lifestyles.

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