Comment: Diabetes Mellitus is a chronic and degenerative disease of great importance in Mexico.

DIABETES MELLITUS

Presented by
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University of Northern Iowa
Cedar Falls, IA

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Diabetes Mellitus: A World Threat

The prevalence of diabetes will increase 35% from 135.3 to 299.7 million.

Predictions:

• A birthrate decrease will lead to the aging of the world population.

• During the next 50 years, the number of people of 60 years of age or older will triple, increasing from the current 606 million to almost 2,000 million by 2050.


Comment: Diabetes has been recognized as a health threat worldwide. Its prevalence is estimated to increase 35% between 1995-2025 due to a decrease of birthrates and the aging of the world population.
10.76% of the adult population

➢ 5.5 Million diabetics

➢ 6 million people with abnormal fasting blood glucose (110-126 mg/dL)

THE PREVALENCE OF DIABETES MELLITUS IN MEXICO (ACCORDING TO THE ENSA 2000)

*ENSA: Encuesta Nacional de Salud, The National Health Census

Comments: The prevalence of diabetes in the Mexican population is estimated to be close to 5.5 million diabetics between the ages 20-69 or 10.7%
The impact of Diabetes in Mexico

Patients with:

- Visual disorders, 45% 2,700 000
- Renal failure, 30% 1,800 000
- Hypertensive, 65% 3,900 000
- Diabetic Necrobiosis, 15% 900 000

The direct cost (Hospitalization, medication, medical care, etc.) as well as the patient and family’s out of pocket expenses (transportation fees, time, etc.) are between 100 and 330 million dollars per year.

It is estimated that the cost only for medical care per diabetic patient is around 52,000 dollars.

Estimations according to the OPS/OMS
Programa de Acción de Diabetes, Mexico 2001
(Diabetes Action Program)

Comment: Diabetes is an important cause of amputations of lower body members resulting from a non-traumatic origin, as well as blindness and kidney failure.

Retinopathy,
It is estimated that 50% of diabetic patients will suffer from this disease after 10 years of being diagnosed and 80% after 20 years of being diagnosed.

35% of patients with diabetes type 1 will suffer from kidney failure after 15-20 years of being diagnosed and 15% of patients with diabetes type 2 after 5-10 years of being diagnosed.
Regional Comparison of the Prevalence of Diabetes According to the ENEC 1993 and ENSA 2000

Map 1: ENEC 1993
greater than or equal to 140 mg/dl
National: 8.2%

Map 2: ENSA 2000
greater than or equal to 126 mg/dl
National: 10.9%

Source: ENEC 1993 / ENSA 2000/ CNVE/ SSA

*ENEC: Encuesta Nacional de Enfermedades Crónicas or National Survey of Chronic Diseases
*ENSA: Encuesta Nacional de Salud or National Health Census

Comment: According to the National Health Census (ENSA) of 2000, diabetes is frequently seen in some northern states like Coahuila with a prevalence of 10% and Nuevo Leon 9.7%. The lower prevalence was found in San Luis Potosí 5.4%, Chiapas 5.2%, and Oaxaca 4.8%, where the majority of the cases were Women by 53%.

In this slide we can see the prevalence of diabetes and how it has increased among the Mexican population according the numbers of the National Survey of Chronic Diseases of 1993 and ENSA of 2000.
Comment: One of the risk factors associated with diabetes is Obesity.
*Clip Art taken from : www.ceacuu.org
The Prevalence of Obesity and Excess Weight in Mexico

Comment: Again, according to ENSA, 2 out of 3 Mexican Nationals are overweight or suffer from obesity with an estimated prevalence of 24.4% in the year 2000.

![Prevalencia de obesidad y sobrepeso en México](image)

Abdominal Obesity

Waist dimensions in Mexico

Men

Women

Waist dimensions in centimeters

OMS or WHO Criteria of 2000

Source: ENSA 2000 ONVE SSA
Preliminary results
A Sedentary Lifestyle

It is considered that an individual has a sedentary lifestyle when he or she performs less than 180 minutes of physical activity, of moderate intensity, in one week.

Comments: Another aspect associated with the development of chronic and degenerative diseases, like diabetes and hypertension, is a sedentary lifestyle.
ESTILOS DE VIDA EN LA SOCIEDAD ACTUAL

Lifestyles in our current society

Ingresos
Income

Seguridad y diversidad de alimentos
Security and food diversity

Aceites vegetales asequibles
Available Vegetable Oils

Exposición a los medios
Exposure to the Media

Comer fuera de casa
Eating outside of home

Trabajos con experiencia física
Jobs with physical Activities

Aumento de la recreación sedentaria
An increase in sedentary activity

Oportunidades para realizar actividad física
Opportunities to perform physical activities

Cambios alimenticios
Diet Changes

Obesidad
Obesity

Actividad física
Physical Activity

Desarrollo económico
Economic Development

Urbanización
Urbanization

Causas posibles de la transición y la aparición de la obesidad en los países en vías de desarrollo. Adaptado de Martorell y Stein, 2000

Possible causes of the transition and the appearance of obesity in developing countries. Adapted from Martorell and Stein, 2000
The probable cause of obesity in developing countries has been attributed to the current lifestyle, where urbanization, better economic development and an increase in income have resulted in diet changes and less physical activity.
Criterios diagnósticos en la diabetes mellitus
Diagnostic Criteria in diabetes mellitus

1. Síntomas clásicos de la diabetes más una glucosa plasmática casual ≥ 200 mg/dl
   The classic symptoms of diabetes plus a casual plasmatic glucose ≥ 200 mg/dl

2. Un nivel de glucosa plasmática en ayunas ≥ 126 mg/dl
   A fasting glucose ≥ 126 mg/dl

3. El valor de glucosa plasmática de 2 hrs. postprandial en una prueba de sobrecarga oral ≥ 200 mg/dl
   The glucose level ≥ 200 mg/dl, two hours after performing the Glucose Tolerance Test

Comments: The ADA (American Diabetes Association) criteria to diagnose diabetes is followed in our daily practice.
The Prevalence of Diabetes at the Regional Hospital in La Barca

Total de consultas Enero a Diciembre 2005
Total number of consultations from January to December of 2005

(3,095)

Total de pacientes con diagnóstico de diabetes mellitus
Total number of patients diagnosed with diabetes mellitus

1081  = 34.9%

Pacientes con diagnóstico de DM 1ª. Vez
Patients diagnosed with diabetes for the first time

158  = 14.6%

Pacientes diabéticos con HTA asociada
Diabetic patients also suffering from hypertension

353= 32.6%

(1ª vez) 74  = 6.8%

Comments: The prevalence of diabetes at the Regional Hospital in La Barca during 2005 was of 34.9%. The total number of patients that received care during external consultation was of 1081. 14.6% were diagnosed with diabetes for the first time and 32.6% were diabetic patients that also suffered from hypertension.
**Comment:** The prevalence in our hospital varies according to the age. It is higher in people between the ages of 45-65 by 42.3% and the lowest is found in people younger than 45 by 13%. The presence of these pathologies are more frequent in women than in men.

<table>
<thead>
<tr>
<th>Edad (Age)</th>
<th>Sexo (Gender)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Masculino (Male)</td>
<td></td>
</tr>
<tr>
<td>&lt; 45 años</td>
<td>41 3.7</td>
<td>141</td>
</tr>
<tr>
<td>45 – 64 años</td>
<td>136 12.5</td>
<td>458</td>
</tr>
<tr>
<td>45 – 64 years old</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt; 65 años</td>
<td>164 15.1</td>
<td>482</td>
</tr>
</tbody>
</table>
Complicaciones más frecuentes
Common Complications

- Nefropatía (Nephropathy) (24)
- Pie diabético (Diabetic foot) (21)
- Neuropatía (Neuropathy) (32)
- Retinopatía (Retinopathy) (11)
- Descontrol Metabólico: Hiperglucemia ** (26)
  (Metabolic disorders: Hyperglycemia)
  ** requirieron hospitalización
  (**that required hospitalization)

Comments: The complications often found in our population are: Neuropathy, nephropathy, and diabetic foot among others.
### Manejo y control de los pacientes
#### Care and treatment of diabetic patients

<table>
<thead>
<tr>
<th>Historia clínica / Clinical History</th>
<th>Visita inicial / Fist visit</th>
<th>3 meses / Three months</th>
<th>6 meses / Six months</th>
<th>1 año / A year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Historia familiar / Family History</td>
<td>X</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Factores de riesgo relacionados a ECV / Risk factors related to a Cardiovascular event</td>
<td>X</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Factores económicos y psicosociales / Economical and psychological factors</td>
<td>X</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Uso de tabaco y alcohol / The use of tobacco and alcohol</td>
<td>X</td>
<td>_</td>
<td>_</td>
<td>_</td>
</tr>
<tr>
<td>Peso y estatura / Weight and height</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Circunferencia de la cintura / Waist dimensions</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Presión arterial / Blood pressure</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Examen oftalmológico / Ophthalmological exam</td>
<td>X</td>
<td>--</td>
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<tr>
<td>Examen de los pies / Feet exam</td>
<td>X</td>
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<td></td>
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</tbody>
</table>
Comments (slide 16):

- **The Care and treatment of diabetic patients,**

  During the initial consultation, for every patient that is seen, we open a clinical file which includes family history and the risk factors associated with each case of diabetes.

  We inquire about their usage of tobacco and alcohol, their diet, economical situation, as well as psychological aspects of the patient.

  We do a complete physical evaluation focusing mainly on their weight, height, blood pressure, feet condition and an eye exam.
### Control y seguimiento de pacientes con diabetes mellitus

**Treatment and Follow-Up of patients with diabetes mellitus**

<table>
<thead>
<tr>
<th>Pruebas de laboratorio</th>
<th>Visita inicial</th>
<th>3 meses</th>
<th>6 meses</th>
<th>1 año</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LAB test</strong></td>
<td><strong>First visit</strong></td>
<td><strong>Three months</strong></td>
<td><strong>Six months</strong></td>
<td><strong>A year</strong></td>
</tr>
<tr>
<td>Glucosa plasmática en ayunas</td>
<td>X</td>
<td>X</td>
<td>X**</td>
<td>_</td>
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<tr>
<td><em>Fasting Glucose Test</em></td>
<td></td>
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</tr>
<tr>
<td>HbAc1 &lt; 7%, (&lt; 6.5%)</td>
<td>X</td>
<td>X*</td>
<td>X**</td>
<td>_</td>
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<tr>
<td><em>A1c Hemoglobin</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pérfil de lípidos</td>
<td>X</td>
<td>X</td>
<td>X***</td>
<td>_</td>
</tr>
<tr>
<td><em>Lipid Profile</em></td>
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<td></td>
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<tr>
<td>Creatinina sérica</td>
<td>X</td>
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<td>_</td>
<td>X</td>
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<tr>
<td><em>Serum Creatinine Test</em></td>
<td></td>
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<tr>
<td>Examen general de orina</td>
<td>X</td>
<td>_</td>
<td>X</td>
<td>_</td>
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<tr>
<td><em>Urine test</em></td>
<td></td>
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<tr>
<td>ECG</td>
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<td>_</td>
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<tr>
<td><em>EKG</em></td>
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<tr>
<td>Depuración de creatinina y excreción de prot tot</td>
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<td>X</td>
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<tr>
<td><em>Creatinine depuration and PROT-TOT extraction</em></td>
<td></td>
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<tr>
<td>Micro albuminuria</td>
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<td>_</td>
<td>_</td>
<td>X</td>
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<tr>
<td>Glucosa postprandial</td>
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<td>X</td>
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<tr>
<td><em>Postprandial glucose</em></td>
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</table>

*personas que no están logrando los objetivos de manejo / Patients that are not accomplishing the treatment goals*

**Personas con buen control glicémico / Patients with a good glycemic control**

***mal control de lípidos / Poor lipid control***
### Plan de tratamiento

<table>
<thead>
<tr>
<th></th>
<th>Visita inicial</th>
<th>3 meses</th>
<th>6 meses</th>
<th>1 año</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Evaluación nutricional</strong></td>
<td>X</td>
<td>_</td>
<td>X</td>
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<tr>
<td><em>Nutritional Evaluation</em></td>
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<tr>
<td><strong>Medicamentos</strong></td>
<td>X</td>
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<tr>
<td><em>Medications</em></td>
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<tr>
<td><strong>Auto evaluación</strong></td>
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<tr>
<td><em>Self-management</em></td>
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<tr>
<td><strong>Adiestramiento para el auto cuidado</strong></td>
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<tr>
<td><em>Self-management training</em></td>
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<tr>
<td><strong>Plan de Ejercicio</strong></td>
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<tr>
<td><em>An exercise plan</em></td>
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</tbody>
</table>

**Referencia a otras especialidades** / **Referral to see other specialists**:  

- **Nutrición**: Pacientes con diagnóstico reciente, que no están controlados y pacientes con complicaciones  
  *Nutrition*: Patients that have been recently diagnosed, that are not controlled, and patients with complications

- **Nefrología**: pacientes con incremento en el nivel de azúcares > 2.5 Cr  
  *Nephrology*: Patients with an elevated Serum Urea Nitrogen level > 2.5 Cr

- **Oftalmólogo**: pacientes con diagnóstico reciente  
  *Ophthalmologist*: Patients recently diagnosed
Comment (slides 18, 19)

- Considering that we are a 2nd level hospital within our healthcare system, and that we don’t have all the services and specialists that some patients require, we screen our patients and refer them to a dietician, ophthalmologist, podiatrist, nephrologists, etc.
Comments: Patients that are diagnosed during their initial consultation, receive diabetes education individually. Diabetes Education is consider an important pillar of care and treatment.
Comments: Out of the total number of patients diagnosed with diabetes, 53% were treated with an Antidiabetic agent, 15% also required treatment with insulin, and 12% did not follow any treatment or didn’t follow it regularly.
Fallas en el objetivo para alcanzar un control óptimo en las cifras de glucosa
Elements that did not allow the patient to meet the ideal glucose levels

- Desconocimiento de las condiciones del tratamiento / Not knowing the restrictions of the treatment
- Negación de la enfermedad / denial
- Falta de implicación del paciente en el plan de atención / Lack of involvement of the patient in the treatment
- Costo de los medicamentos / the cost of the medicine
- Dosis subóptima / Not the ideal dosage
- Falta de relación médico-paciente / Lack of patient-provider relationship
Programa de educación a los pacientes diabéticos en el Hospital Regional La Barca

Education Program for Diabetic Patients at the regional Hospital in La Barca

- Conceptos en diabetes (tipos)  
- Dieta y ejercicio físico  
- Fármacos orales  
- Insulina y técnicas de aplicación  
- Objetivos del tratamiento (hiperglucemia, hipoglucemia)  
- Autocontrol Complicaciones de la diabetes  
- Cuidado de los pies  
- Aspectos sociales y laborales  
- Dinámicas de grupo

Comments: At the Hospital Regional La Barca, we have a Diabetes Education Program that involves both the patients and their relatives. The first Diabetic Education Group was created in the year 2000. The purpose of this group was to improve the quality of life of these patients, to avoid late complications and stimulate their involvement in the treatment. We follow an annual program that covers different topics.
1.- Individual durante las consultas  
**Individual Education in consultations**

2.- En grupo a través del programa del Club de diabéticos (formado en Agosto 2000)  
**Education as a group through the Diabetic Group Program (Which started in August of 2000)**

3.- Durante los tiempos de espera en las salas de consulta **While they wait in the waiting room**

3.- Mediante folletos, periódicos murales  
**Through pamphlets, poster boards**

4.- Día de la salud  
**Day of Health**

Comments: Self-control is considered an indispensable treatment in order to achieve the stability of our patients. We also try to improve the quality of care that is provided to every diabetic patient:
- providing on each consultation, education about their illness
- Through the Diabetic group
- **While they wait in our waiting rooms, using TV and videos**
- Giving them pamphlets and having poster boards.
“DIA DE LA SALUD”
16 DE JULIO
2005

“Day of Health”
July 16, 2005

Comments: Another important goal is identifying the population at risk. Since 2004, we have dedicated one day per year to be the “Day of Health.” On this day we screen for non-transmittable chronic diseases.
Día de la Salud

The Day of Health

Módulos de atención Care Booths

- Detección en Diabetes Mellitus e HTA
  Diabetes and Hypertension Screening Tests
- Detección oportuna de Cáncer
  Cervico-uterino
  Early detection of Cervical Cancer
- Comusida (AIDS)
- Atención del Adulto y Anciano
  Adult and Senior Care
- Salud Mental
  Mental Health
- Salud Dental
  Dental Health
- Puesto de Vacunación
- Immunization Booth
- Oftalmología
  Ophthalmology
- Mamografías
  Mammograms
- Densitometrías
  Densitometry
- Cáncer de próstata
  Prostate Cancer
- Sobrepeso
  Weight Problems
- Atención al Niño Sano
  Well child

Comments: These are the Care booths that are available to the entire community. The day of Health takes place at the Town Plaza.
Comments: This event is done in collaboration and full support of the Public Health Department, county authorities, and community groups.
Diet Plan

Goals:
- Delay or avoid the development of diabetes mellitus
- Maintain or reach ideal weight
  - Body mass index 18.9 to 24.9
  - Waist dimensions: less than 85 for women and less than 95 for men
- Glucose Levels:
  - Fasting Glucose Test less than 100 mg/dL or less than 110 mg/dL blood sample
  - 2 hour Postprandial glucose less than 140 mg/dL
- Maintain or achieve TBG levels less than 110 and 200 mg of cholesterol
- Promote healthy eating habits

Comments: The care for Diabetic patients includes a change in their lifestyle, where the diet plan represents an important pillar of care so they can meet their goals.
Comments: The benefits of an exercise plan in diabetic patients can be seen in the decrease of glucose levels, blood insulin, and A1c Hemoglobin as well as the low-density of lipoproteins or low-density of cholesterol.

- It improves the sensitivity to insulin
- Lipid profile
- Blood pressure

Benefits of Physical Exercise

Body Fat Index

- Reduces Body Weight
- Reduces the risk of a heart disease
Ejercicio y la Diabetes Mellitus

Comments: The benefits of an exercise plan in diabetic patients can be seen in the decrease of glucose levels, blood insulin, and A1c Hemoglobin; as well as low-density lipoproteins or low-density cholesterol.

• It improves the sensitivity to insulin
  • Lipid profile
  • Blood pressure

Glucose (sugar) in your blood
Blood insulin
A1c Hemoglobin
Low-density lipoproteins

It Improves:

Sensitivity to insulin
Lipid profile (cholesterol, triglycerides)
Fibrinolytic Activity (anticoagulant)
High-density lipoproteins
Blood pressure (slight to moderate)
AGENTES ORALES Antidiabetic Agents

SULFONILUREAS (1ª. Generación) Sulfonylurea (1st generation)
Clorpropamida Clorpropramid
Acetohexamida Acetohexamide
Tolbutamida tolbutamine
(2da generación) (2nd generation)
Glibizida Glibizide
Gliburida Gliburide
Glibenclamida Glibenclamide
(3ª generación) (3rd generation)
Glimepirida Glimepiride
BIGUANIDAS  Biguanides

Metformina  Metformin
Fenformina  Fenformin
INHIBIDORES DE LA ALFA-GLUCOSIDASA  Alpha inhibitors - Glucosidase
Acarbosa  Acarbose
TIAZOLIDENDIONAS  Thiazolidinediones or glitazones
Pioglitazona  Pioglitazone hydrochloride (Actos)
Rosiglitazona  Rosiglitazone maleate- (Avandia)
INHIBIDORES DE LA DDP-4  DDP-4 Inhibitors
Insulinas comercializadas en México

Types of insulin sold in Mexico

**Insulina Regular (Humulin-R®, Novolin-R ®)**

Regular Insulin

**Lispro (Humalog)**

**Intermedia NPH (Humolín N ®)**

**Insulina premezclada – mixta 70/30**

Mixed insulin