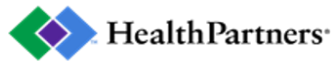**HealthPartners**

Meeting the Challenges of Diabetes: Consequences of Disease Progression

The MCO Diabetes Performance Improvement Collaborative
May 11, 2022

Tammy Chambers
Janet Ungs, CNP

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MN Health Plans Collaborative

BlueCross BlueShield Minnesota

HealthPartners

Hennepin Health

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South Country HEALTH ALLIANCE

ucare

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Introductions

Janet Ungs, Nurse Practitioner, Endocrinology
- Graduated from University of Iowa, BSN and of Missouri for MSN as a clinical nurse specialist with an emphasis in Diabetes.
- Twenty years after that degree, went back to Graceland University online and completed a Family Nurse Practitioner program with an emphasis in diabetes care and management.
- I have held a certification in diabetes education for over 20 years and have worked with diabetes patients for about 25 years total, the last 12 years as a NP.
- I have been practicing at Park Nicollet since October 2016 and was in Cedar Rapids Iowa before that.
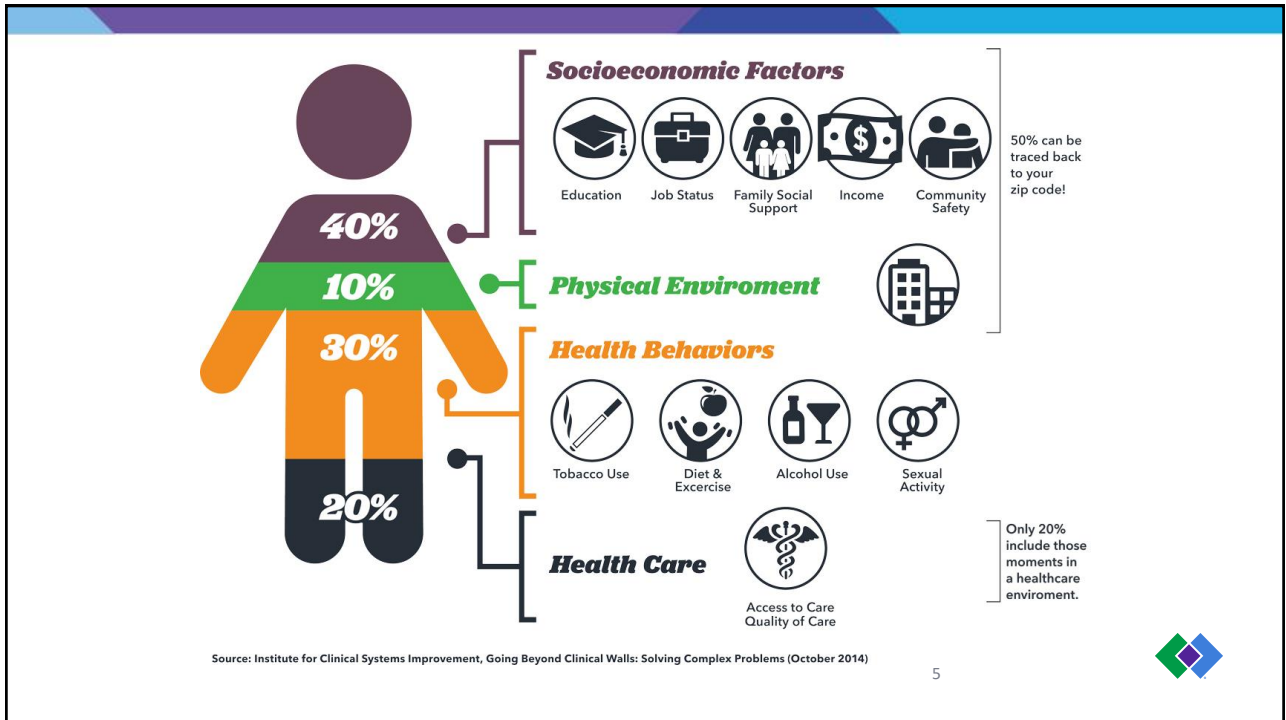
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Objectives

- Discuss incidence and cost of diabetes
- Discuss microvascular complications-eye, kidney, feet
- 2022 ADA treatment guidelines
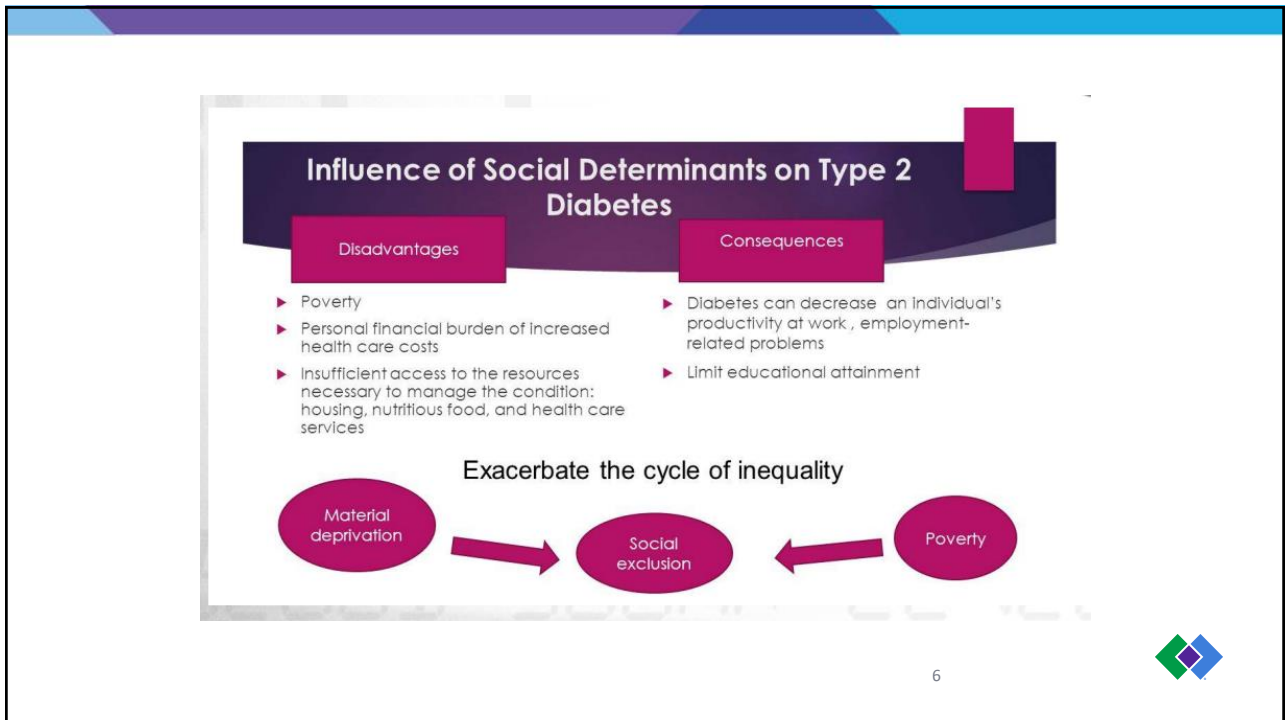- How to engage patient as partner

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Socioeconomic Factors

Education · Job Status · Family Social Support · Income · Community Safety

50% can be traced back to your zip code!

40%

10% — Physical Enviroment

30% — Health Behaviors

Tobacco Use · Diet & Excercise · Alcohol Use · Sexual Activity

20% — Health Care

Access to Care Quality of Care

Only 20% include those moments in a healthcare enviroment.

Source: Institute for Clinical Systems Improvement, Going Beyond Clinical Walls: Solving Complex Problems (October 2014)

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Influence of Social Determinants on Type 2 Diabetes

Disadvantages
- Poverty
- Personal financial burden of increased health care costs
- Insufficient access to the resources necessary to manage the condition: housing, nutritious food, and health care services

Consequences
- Diabetes can decrease an individual's productivity at work, employment-related problems
- Limit educational attainment

Exacerbate the cycle of inequality

Material deprivation → Social exclusion ← Poverty

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Diabetic Retinopathy Incidence In Low Income/ Education /Medicaid -Like population

	n	Retinopathy (n)	Prevalence of retinopathy (%)	Model 1 OR	Model 1 95% CI	Model 2 OR	Model 2 95% CI	Model 3 OR	Model 3 95% CI
Education level									
College	235	45	19.2	1.00		1.00		1.00	
High school	316	76	24.1	1.28	(0.84–1.95)	1.31	(0.86–2.04)	1.29	(0.49–1.22)
Junior high school	102	31	30.4	1.85	(1.07–3.17)	1.91	(1.09–3.34)	1.38	(0.75–2.49)
Income level									
High	207	41	19.8	1.00		1.00		1.00	
Middle	201	48	23.9	1.36	(0.84–2.19)	1.44	(0.88–2.36)	1.15	(0.68–1.94)
Low	175	47	26.9	1.66	(1.02–2.72)	1.56	(0.94–2.6)	1.12	(0.65–1.94)
Public healthcare insurance									
Others	608	132	21.7	1.00		1.00		1.00	
Public assistance	64	24	37.5	2.27	(1.29–3.92)	2.19	(1.20–3.95)	1.72	(0.91–3.21)
Employment status									
Regular employment	313	58	18.5	1.00		1.00		1.00	
Irregular employment	158	42	26.6	1.80	(1.13–2.85)	1.72	(1.03–2.86)	1.40	(0.82–2.39)
No employment	179	52	29.1	2.00	(1.30–3.09)	2.23	(1.36–3.68)	1.71	(1.01–2.90)

OR, odds ratio; 95% CI, 95% confidence interval; SES, socioeconomic status; BMI, body mass index
Model 1: Adjusted for age
Model 2: Model 1 + gender, marital status, BMI, physical activity, smoking, and drinking
Model 3: Model 2 + duration of diabetes and HbA1c

Socioeconomic status and type 2 diabetes complications among young adult patients in Japan
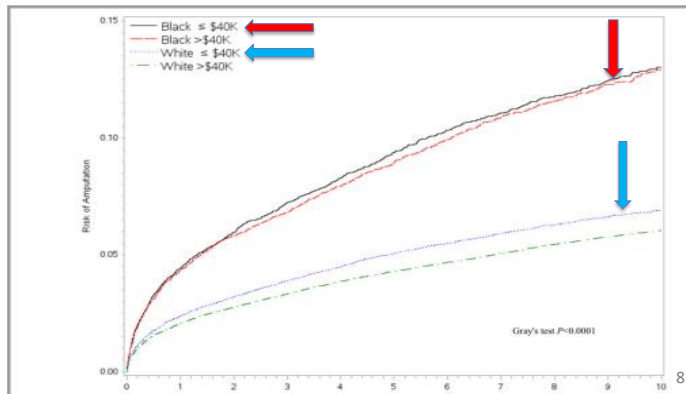**Mitsuhiko Funakoshi Yasushi Azami... Jiro Miura**

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Race and Socioeconomic Status Independently Affect Risk of Major Amputation in Peripheral Artery Disease

Shipra Arya [1] [2], Zachary Binney [3], Anjali Khakharia [4], Luke P Brewster [4] [5], Phil Goodney [6], Rachel Patzer [7] [3], Jason Hockenberry [8], Peter W F Wilson [9] [10]

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©2019 International Diabetes Center
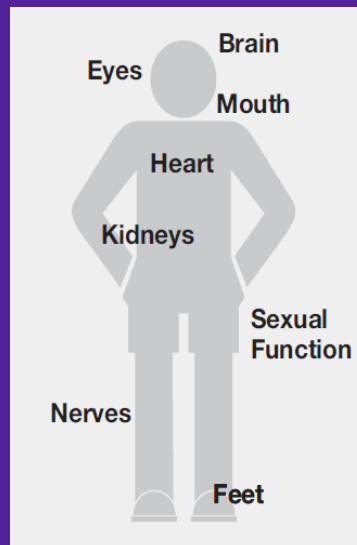
Incidence and cost

- ADA 2019 stats
- 1 in 10 people have diabetes
- ~37.3 million Americans
- 1.9 million type 1

- Cost-26% increase from 2012 to 2017
  - Most recent data $327 billion/year
  - 1 in 4 health care dollars
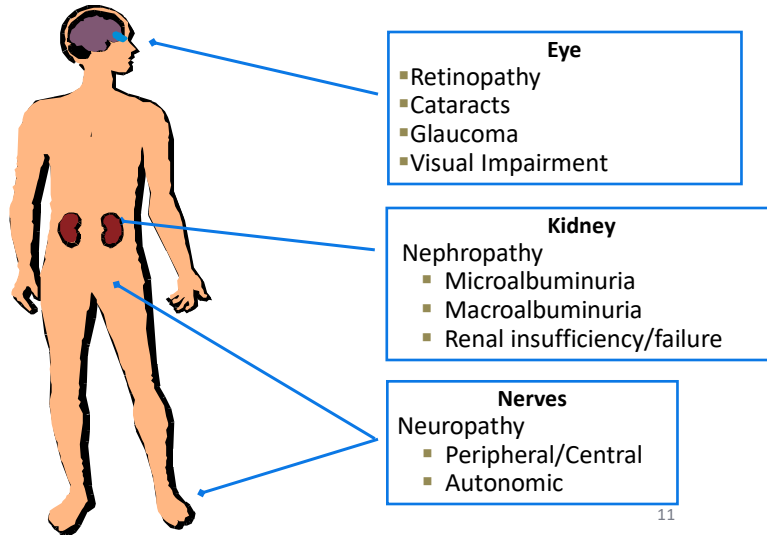 - Over age 65 highest costs-hello baby boomers

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Microvascular Complications Associated with Diabetes

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Microvascular Complications of Diabetes: From Head to Toe

Eye
- Retinopathy
- Cataracts
- Glaucoma
- Visual Impairment

Kidney
Nephropathy
- Microalbuminuria
- Macroalbuminuria
- Renal insufficiency/failure

Nerves
Neuropathy
- Peripheral/Central
- Autonomic

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Microvascular-how does it happen

- Major contributors: BG, BP, LDL
  - Harden and stiffen vessels causing bleeding
  - Irritation of nerves
  - Smallest vessels in eye and kidney

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Eye-Retinopathy

- Severity depends on length and degree of diabetes control
- Likely to have kidney issues as well

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Scope of Retinopathy in Diabetes(DR)

- After 20 years of diabetes- Evidence of retinopathy in almost all patients with type 1 DM, 60-85% with type 2 DM
- Leading cause of new cases of blindness among adults aged 20-74 years
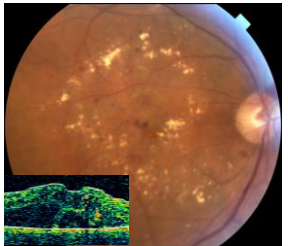- Detecting and treating diabetic eye disease with laser can reduce the development of severe vision loss by 50-60%
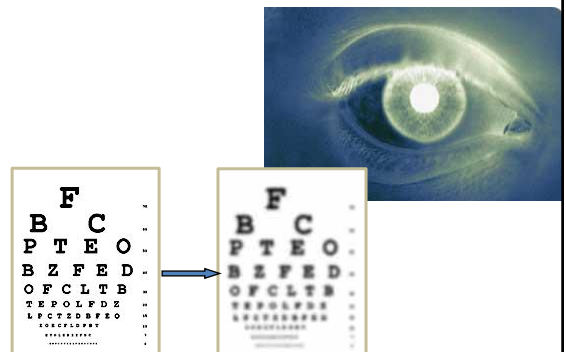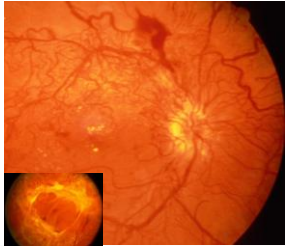

National Diabetes Fact Sheet, US 2011

Bressler *etal*. NEJM 2011: 365; 1520-1526

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Classification of Retinopathy in diabetes

Microvascular damage	Swelling in central retina	End stage
• Chronic, occurring over years	• *Accounts for most vision loss*	• Neovascularization of retina
• Typically no significant vision loss, but progresses to DME and/or PDR	• Clinically significant ME (CSME) involves or threatens the fovea	• High risk of severe visual loss
• Similar damage occurs in other end-organ vascular beds	• Co-exists with any level of DR	

More common ⟶ 15 Less common
Less severe   More severe

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What does diabetic retinopathy look like?

Normal Vision

Diabetic Retinopathy

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ADA recommendations

Diabetes Type	Recommended Time For First Examination	Recommended Follow-up
Type 1	At time of diagnosis	**Every 5 years**
Type 2	At time of diagnosis	**Yearly**

American Academy of Ophthalmology Retina Panel. Preferred Practice Pattern® Guidelines.

- 40-50% do not receive recommended eye care (NCQA, 2009)
- Joslin study of patient self-awareness of DR (ARVO, 2011; n=3100)
    - 93% of patients with DR and 63% with vision-threatening DR were unaware they had *any* DR
    - 83% with vision-threatening DR had no scheduled follow-up eye exam
        ARVO = The Association for Research in Vision and Ophthalmology ; NCQA = National Committee for Quality Assurance.

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Retinopathy:
What We Know & What We Are Learning

We Know – The following are critical:
- Regular eye check ups
- Glucose control
- Blood pressure control
- Smoking cessation
- Women planning or pregnant should have prompt eye exam with follow-up

We Are Learning:
- ACE/ARB's may slow progression of retinopathy
- Fenofibrate may slow progression of retinopathy (30-40%) - FIELD and ACCORD-EYE
- VEGF inhibitors with prompt or deferred laser gold-standard Rx for diabetic macular edema (DME)

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Kidney-Nephropathy

- How does it happen?
- BP, BG and LDL contributes to vessel disease-filtration unit

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Glomerular Filtration Rate (GFR)

- Glomerular Filtration Rate (GFR) is most useful to determine level of kidney impairment
    - GFR does not help determine cause of kidney disease
    - GFR is rough measure of the number of filtering nephrons
    - Cannot be measured directly
    - Not recommended for
        - Extremes of age (children and elderly)
        - Malnutrition
        - Severe obesity
        - Altered muscle mass (amputee)

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Kidney Failure in U.S.

Cystic kidney
2.3%

Urologic diseases
1.4%

Glomerulonephritis
6.6%

Other
17.6%

Diabetes
43.7%

High blood pressure
28.4%
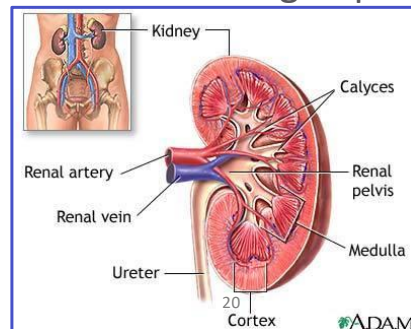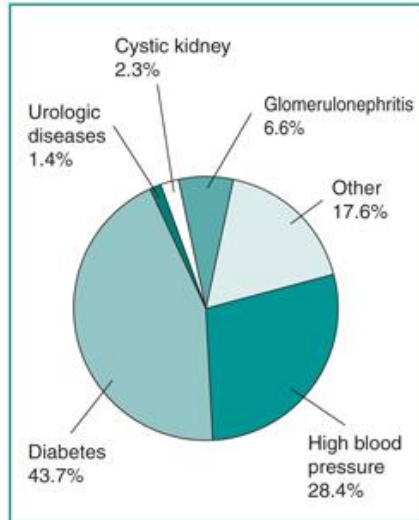
Source: United States Renal Data System. *USRDS 2012 Annual Data Report*

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Stages of Chronic Kidney Disease (CKD)

Stage	eGFR (ml/min/1.73 m²)	Description	Action
1	>90	Normal or higher GFR w. evidence of kidney dx	Dx and Rx of co-morbidities
2	60-89	Mild decrease in GFR	Monitor progress and Rx co-morbidities
3	30-59	Moderate decrease in GFR	Monitor progress and Rx co-morbidities and consider referral
3a	45-59		
3b	30-44		
4	15-29	Severe decrease in GFR	Pre ESKD, prepare pt. for dialysis
5	<15	Kidney failure	Dialysis or replacement

CKD

CKD defined as Stage 3 or higher for 3 months or more

Am J Kid Dis 2002 39:S1-266   Bakris, GL *Mayo Clin Proc* 2011 86:444-456

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Nephropathy Screening Recommendations

Nephropathy
- Urinary albumin and eGFR screen at least 1x/year (Albumin/creatinine (A/C) ratio preferred)

Type 1 Diabetes
- After 5 years duration (age >10 or puberty, whichever is earlier); annually thereafter

Type 2 Diabetes or any diabetes with hypertension
- At diagnosis; annually thereafter

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Albuminuria: Definitions

Term	ACR (albumin:creatinine ratio) (aka UMAR)	
Nephrotic Range Proteinuria	> 3,500 mg/g	
Macroalbuminuria ("Very High Albuminuria")	> 300 mg	Increased ESRD risk
Microalbuminuria ("High Albuminuria")	30-300 mg/g	Increased CV Risk
"Normal"	0-30 mg/g	

- Confirm with two or more samples over 3-6 months

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Treatment of Nephropathy in diabetes

- Glucose control
  - A1C <7% delays onset of albuminuria- individualize target for pt safety
- Smoking cessation
- ASA/Lipids
  - All patients with persistent albuminuria should be Rx with ASA and statins
  - Consider ASA and statins in all patients with eGFR <60 ml/min
  - Fenofibrate may further reduce albuminuria (ACCORD-LIPID) but can increase serum creatinine
- Low protein diet (0.8 g/kg/day)
- ACEi/ARB <u>not</u> indicated for primary prevention in those with normal blood pressure, A:C ratio <30, and normal GFR

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Treatment of Nephropathy in diabetes

Blood pressure control:
  - <140/90 mmHg
  - Can consider lower target e.g. <130/80 mmHg if significant proteinuria
- Start ACE Inhibitor(ACE-I) or Angiotensin II Receptor Blocker (ARB)
  - Baseline creatinine and K+, repeat in 1-2 weeks
  - Titrate dose to maximum approved hypertension dose if can be achieved safely
  - Monitor A/C ratio to assess response to therapy and progression of disease
  - Similar BP control and kidney protection actions
- May need multiple BP medications to reach goal
  - UKPDS 30% pts with 3 or more drugs

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Feet-Neuropathy

- How does it happen
- BG affects protective coating on nerves-telephone wire
- Delay of signal
- Loss of protection-can't feel pain
- Pt. has loss of flexibility and eyesight acuity to self evaluate

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Signs and Symptoms of Diabetic Peripheral Neuropathy

Symptoms

- Numbness or loss of sensation (asleep or "bunched up sock under toes" sensation)
- Prickling/Tingling
- Pain (aching, burning, lancinating)
- Unusual sensitivity or tenderness when feet are touched (allodynia)

Signs

- Diminished vibratory perception
- Decreased knee and ankle reflexes
- Reduced protective sensation such as pressure, hot and cold, pain
- Diminished ability to sense position of toes and feet

Time

Time

Peripheral and Symmetric Stocking Glove Distribution

Symptoms and signs progress from distal to proximal over time

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The Foot Examination
Standards of Care at Diagnosis and Annually

Visual Exam: careful inspection
- Skin, shoes, shape of foot

Vascular integrity
- Pulses
- Capillary refill
- Ankle-Brachial Pressure Index (if indicated)

Neurological examination and function
- Light touch (5.07/ 10g monofilament)
- Vibratory sensation (128-Hz tuning fork)
- Reflexes

Source: Staged Diabetes Management, 5th edition, Quick Guide, pages 7-26.

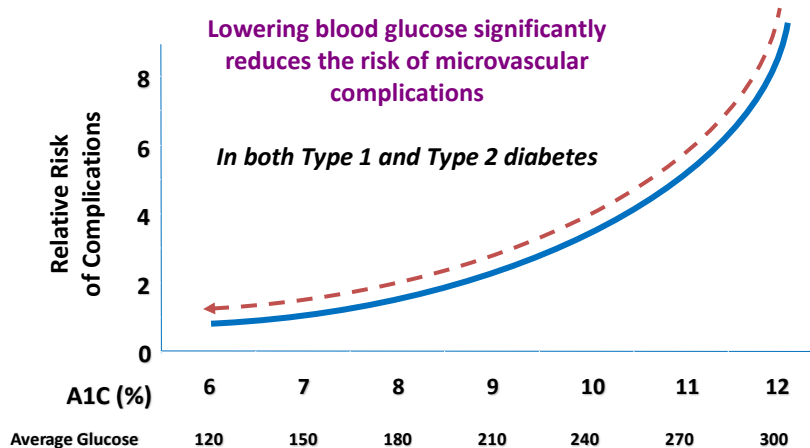29

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ADA 2022 guidelines

- Screen at age 35-A1c, BG levels
- Diabetes diagnosis based on A1c and fasting or random BG
- A1c goals based on DCCT 6.5%
  - Elderly goals for A1c
  - Daily BG levels part of evaluation of control
  - Smaller BG range is goal, 70% between 70-180 24 hour levels

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Complications Risk in Diabetes

Lowering blood glucose significantly reduces the risk of microvascular complications

In both Type 1 and Type 2 diabetes

Relative Risk of Complications (y-axis: 0, 2, 4, 6, 8)

A1C (%)	6	7	8	9	10	11	12
Average Glucose	120	150	180	210	240	270	300

Adapted from: Skyler JS. *Endocrinol Metab Clin North Am.* 1996 Jun;25(2):243-54.
DCCT Study Group. *N Engl J Med* 329:977, 1993
UKPDS 35. Stratton IM. *BMJ* 321:405-412, 2000.

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Intensive Diabetes Therapy: Reduced Incidence of Complications

	DCCT	Kumamoto	UKPDS
HbA1c	9 → 7.2%	9 → 7%	8 → 7%
Retinopathy	63%	69%	17% to 21%
Nephropathy	54%	70%	24% to 33%
Neuropathy	60%	Improved	-
Cardiovascular Dx	41%	-	16%

Diabetes Control and Complications Trial (DCCT) Research Group. N Engl J Med 1993; 329, 977-996
Ohkubo Y et al. Diabetes Res Clinc Pract. 1995;28:103-117
UK Prospective Diagets Study (UKPDS) group. Lancet 1993;352:837-853
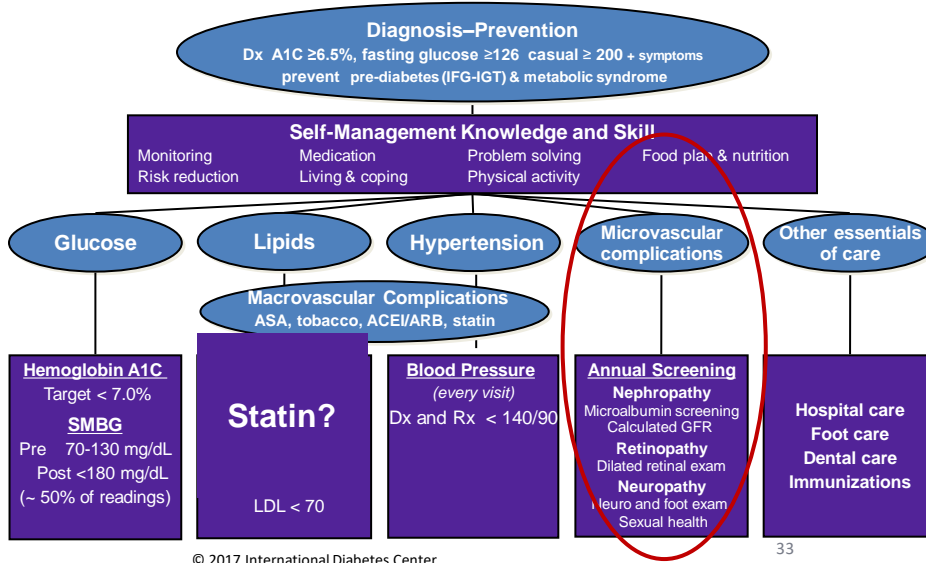Slide modified from D. Kendall, IDC

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Priorities of Care for Adults with Diabetes

Diagnosis–Prevention
Dx A1C ≥6.5%, fasting glucose ≥126 casual ≥ 200 + symptoms
prevent pre-diabetes (IFG-IGT) & metabolic syndrome

Self-Management Knowledge and Skill

Monitoring	Medication	Problem solving	Food plan & nutrition
Risk reduction	Living & coping	Physical activity	

Glucose — Lipids — Hypertension — Microvascular complications — Other essentials of care

Macrovascular Complications
ASA, tobacco, ACEI/ARB, statin

Hemoglobin A1C
Target < 7.0%
SMBG
Pre 70-130 mg/dL
Post <180 mg/dL
(~ 50% of readings)

Statin?

LDL < 70

Blood Pressure
(every visit)
Dx and Rx < 140/90

Annual Screening
Nephropathy
Microalbumin screening
Calculated GFR
Retinopathy
Dilated retinal exam
Neuropathy
Neuro and foot exam
Sexual health

Hospital care
Foot care
Dental care
Immunizations

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ENGAGE your patient to partner with you

- Goal to keep them out of hospital or ED
- Establish rapport/trust
- Frequent contact with you
- Listen, non judgmental, no scolding
- Moderate your expectations-goal to move them forward
- Thank them for making the effort to come see you
- Recognize their efforts

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Cases-#1 difficult to motivate

- Case #1-30 something male, type 1
- Heavy smoker, ADD, oppositional, defiant, autistic
- First visit: argumentative, poor control, had many previous providers.
- Poor historian

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Case 1 cont

- My approach
  - Listened-see where he was
  - Establish rapport
  - Get him to come back
  - Avoid hospital-refusal to go
  - Communication with his case worker

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Case 1 result

- Ongoing problems but he comes and I can talk to him, reason with him
- Measurable changes?
- His confidence is improved, more calm

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Case #2 Foot issues and challenges

- Male 40's type 1 with "foot sore" for a year
- My first visit with him
  - Low income
  - Afraid to lose his job
- Multiple ulcers, non painful
- Refused urgent or emergent care
- Podiatry after a week with follow up wound care and treatment

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Case # 3 food insecurity

- Pregnant type 1
- Mental health issues
- Drinking 4 or more regular Mt Dew daily
- Not hungry for other food
- Went for "low hanging fruit"
- Goal to decrease amount of pop

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SUMMARY

- Encourage regular provider visits-3-6 months
- Encourage annual eye and foot exam with labs
- Goal to keep them out of the hospital/ED
- Establish rapport/trust
- Frequent visits
- LISTEN
- Making any progress is good
- Realize your limits

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Questions?

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Thank You!

Evaluation Link

Certificate of Participation –
upon completion of Evaluation

Recording - Recording can be found at the Performance Improvement Project - Diabetes Page on the Stratis Health Website

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