Diabetes: Developmental Approach

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Goals

1. Review biology, treatment & adjusting the plan
2. Discuss age related physiology
   - Infant
   - Pre school
   - Childhood
   - Tweens & Teen
   - Young adult
3. Co-morbidities: stress, anxiety, depression, behavioral
4. Building resiliency

Auto-immune

- Self made antibodies destroy the beta cells:
  - Unable to make insulin
  - Genetic predisposition (HLA type)
  - Environmental triggers: viral, food, toxins, stress

Other screening labs:

- Thyroid antibodies: free T4, TSH, (17-30%)
- Celiac (TTG IgA, IgG) (1-16%)
- Look at growth, weight loss, diabetes, abdominal pain, mal absorption
  - Autoantibody exams: determining A1C, erratic blood sugars, fatigue (9-13%)
- Random cholesterol
- Autoimmune types: IC 512 & Gad 65 AB, Highly sensitive insulin AB, ZNT8AB-Barbara Davis

Genetics
- Beta cells
- Immune modulation/inflammation
- Insulin resistance
- Environment

Groop et al. 2014
**Type 1 Incidence**

- 5-10% of total population with diabetes
- 85% pediatric diabetes is type 1
- 30% are overweight at diagnosis
- 1 in 300-400 kids
- Common auto-immune condition in children
- T1D 30,000 per year nationally 24/100,000
- Increased incidence of 2-3% per year
- Can occur at any age
- Average age of onset is 4-11 years
- Age of onset is younger
- Equal incidence: gender, socioeconomic status

**Unique to pediatrics with T1DM**

- Family's interpretation of developmental tasks
- Abilities of each individual
- Insulin resistance with puberty
- Child ability to understand, verbalize, process & learn new info
- Responsibility for age
- Tasks - timely, frequently, every day
- Who in charge
- Transition parent to child
- Electronic tools are helpful, Blue loop

**Pediatric concerns - foster normal G & D**

- Symptoms:
  - Polyuria, polydipsia, polyphagia
  - Weight loss, leg cramps, dehydration
- Insulin sensitivity
  - Physical growth
  - Sexual maturity
- Developmental stage
  - Ability to provide self care
- Supervision in schools
  - Care outside the home
- Risks to cognitive development
  - Family dynamics
- Limited research
  - Need to rely on expert opinion
  - Multidisciplinary team
  - Timely education
- Adult supervision vs self-care
  - Physical ability
  - Emotional development
  - Psychological needs
Insulin: Since 1921
Leonard Thomson- the 1st

Flexible Plan: Multiple daily injections (MDI)
- In all age groups = associated with reaching glucose targets (easier to obtain control)
- Less fluctuation in BG linked to better academic performance
- Children in optimal control? adults in optimal control?
- Complication reduction?
- **"If miss 1 meal bolus every other day: * AIC by 1%**

4 injections per day
- Pre-pubertal TDD: no ketones = 0.3 u/kg; ketones = 0.5 u/kg
- Pubertal TDD: no ketones = 0.5 u/kg; ketones = 0.8 u/kg

Pre-pubertal 70% with meals = bolus PLUS 30% basal
Pubertal 60% with meals = bolus PLUS 40% basal

Case #1: Weight 50 kg
- Beginning puberty dose: 0.5 u/kg
- 50 kg X 0.5 u/kg = 25
- 25 x 40% = 10 units basal
- 25-10 = 15 basal
- 3 meals = 5 u/meal
- Target 150; Correction (50; 35)
- Carbohydrate: 70-80 grams (bolus 1:15)

Insulin types
- Basal: 24 hour coverage
  - Lantus: may burn, lower pH (belly or butt)
  - Basigar: generic?
  - Levemir: may not last 24 hr
  - Tresiba: newer, different action
    - Report feel more even
    - Good for irregular dosing times, missed injections
- Quick acting:
  - start 5-10 min, peak 60-90 min, lasts 120-150 min up to 6 hrs
  - Humalog
  - Novolog
  - Apidra
- Soon: FIASP quicker absorption
  - starts in 2.5 min.
  - Adult
Emergencies

- **Low blood sugar – medical emergency**
  - (treated with quick acting carbohydrate)
  - Less than 60 mg/dl with symptoms
  - Less than 70
  - What ever mood they are in...

- **Diabetic Keto-acidosis: not enough insulin**
  - (treated with insulin and hydration)
  - The body uses alternate fuel (fatty acids, proteins)
  - The waste product of this is ketones (poisons)
  - Ketones make the body more acid

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### Hypoglycemia

**Brain needs glucose**
- High or low glucose = changes in mentation
- Physiologic: body systems ready to assist but... counter regulatory response abnormal in person with type 1
- Hypo unaware: 9x more frequent lows
- Safety:
  - What ever the mood...
  - Treat with quick acting carbs
  - Rule of 15’s—it’s individual

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### Glucagon for lows & during illness

- **Glucagon for lows: emergency**
- **Dose**
  - <5 yo use half
  - 5 & over use full amount
  - Mix in vial, can use insulin syringe to administer
- **Position on side- N/V**

**Glucagon for lows with Blood:**
- **Dose sub Q**
  - Over 1 year, negative ketones
    - Unable to maintain 85 at 15:
      - 2 years: 2 units (20 mcg)
      - Over 2 units
  - 3 years & up: 1 unit of age (max of 15 units (150 mcg))
  - Mix per label
  - Draw dose with insulin syringe
  - On reconstituted: good 24 hrs in fridge
  - May repeat dose every 30-60 min
  - Discard mix after 24 hours
  - Refill glucagon Rx immediately
**Diabetic Keto-Acidosis**

- DKA = 25-30% of new present in DKA
  - Too little insulin to transport glucose
  - Glucose (BS) accumulates (>250 mg/dl)
  - Body uses alternate fuel
- DKA can evolve quickly
  - (young, poor access, lower income & parent education)
  - Most common cause of death in childhood
  - (100% mortality without insulin)
- ketosis, dehydration, electrolyte imbalance, acidosis
- It occurs more often with type 1 diabetes
- Anything that increases BS & decreases insulin action can contribute to DKA
  - You can have ketones with a normal sugar

**Casey Johnson’s Cause of Death:**

**Diabetes Neglect 2010**

- Johnson, 30, ... coroner said in a brief statement.
  - She died of diabetic ketoacidosis, a life-threatening condition caused by lack of insulin and high blood sugar.
- Johnson, 30, may have been dead as long as two days before found.
- Missing insulin and ...
  - Casey Johnson died of “natural” causes and a disregard for her own well-being, the LA County coroner said today. The 30-year-old diabetic hadn’t been taking her insulin or other medications, hadn’t been exercising, and hadn’t been following the strict diet doctors prescribed for her. The official cause of death was “Diabetic Ketoacidosis,” the technical name for a diabetic coma TMZ reports.

The couple face up to 25 years in prison and up to $100,000 in fines if convicted.

**DKA Symptoms**
Situations contributing to inadequate insulin

- New onset
- Infection
- Lack of planning, testing/knowledge
- Insulin resistance
- Suboptimal treatment plans (growth, forget appointment)
- Inadequate sick day management
- Poor absorption
- Lipo hypertrophy
- Lipo atrophy
- Poor insight into impact of missing insulin
- Co morbidities:
  - Exacerbation of hyperthyroidism: increases metabolism, numbers go up, need more aggressive mgmt
  - Hypoglycemia—hypothyroid state
- Cumulative: studies prior to admission
  - large volume of high calorie fluids prior to DKA (type 1)

Psychological reasons

- Insulin omitted for weight control (in 11-25 year olds, up to 36% report insulin misuse)
- Psychological problems complicated by eating disorder
- Depression, fatigue
- Insulin avoided (fear of low)
- Needle injecting in public
- Needle issues

Inadequate insulin, cont...

- Cumulative effect:
  - missed dose
  - re-match insulin/CHO
  - site rotation
  - post meal sliding
  - the body thinks they are testing
  - then add stress....

Insulin issues:
- out dated
- improperly stored
- (cooked in automobile)
- inaccurately measured
- incorrectly injected
- no air shot
- pump, leakage

DKA prevention reminder card

Diabetic Ketoacidosis Too Little Insulin
- Test for ketones, for accuracy, use the color key on the bottle
- If positive, even if sugar is in target range:
  - Follow the 3 hour rule
  - Test 3 hours from the first in 3 hours
- After giving correction dose at each check:
  - If sugar is less 200 wait once
- Follow the 30/30/30 rule of thumb chart:
- Three testing day and night:
  - Test until sugar is under 250 and there are no ketones
  - Call provider
  - Your blood sugar is out of control
- Place what you want to eat
- Service food and sugar
- If sugar is over 250 and ketones are still moderate to large after three hours of connecting with insulin every hour

Emergency (diabetes): 414-250-2300
Emergency (after 4:00 p.m.): 414-250-3900
For pump Same as above, if first dose does not improve sugar give insulin by shot. Check your pump and tubing for problems.
Developmental Layers

- Infant
  - Under 8: parents do all
  - Child gradually cooperates
  - Pink Panther Book by Peter Chase

- Pre school
- Childhood
- Tweens & Teen
- Young adult

Infant
13 month
- Tachypnea, low energy, a little weight loss
- ED: pH 7.19, bicarb 4, BS 576 mg/dl
- A1c 7.8%
- Celiac, thyroid negative

HI 95%, Wt 37%
- Basal: am 1 unit pm ½ unit,
- Bkt:
  - <200 = 0.5 unit,
  - ≥200 = 1 unit,
- Lunch/supper: <150 = 0
  - 150-350 = 0.5
  - >350 = 1

- Changed to MDI – food + correction
- Introduced to ¼ unit dosing

Problem: does not eat solids, relying on breast milk for nutrition

- Breast feeding = 15 gms, (est.)

After 1 week: new plan

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*Dose + 0.25 units if + ketones

4/17/2019 21
Age related goals: the infant 0-12 mo.

- **Glycemic goals for infant**
  - HbA1c 7.5-9%
  - Insulin use 0.2-0.5 u/kg/d

- **Child Dia-abilities**
  - May gradually alert adult to low BS
  - May offer finger for BS
  - Sometimes pulls on parent leg
  - Or stares ahead
  - Adult role
    - Define child’s world, provide structure, boundaries
    - Do all cares
    - Diabetes care evolve as rituals of love
    - Parents win battles
    - For him, worked with dietitian, and primary care regarding introduction of more solid foods

- **Developmental tasks**
  - Development: Trusting relationship
  - With primary caregivers
  - (Great prevent and tx lows)
  - Avoid extreme glucose fluctuations
  - Care with stress
  - Share burden of care to avoid burn out

Toddler 13-36 mo.

- **CA: 2.38 yr**
- **Do at 20mo**
  - Growth good: Wt & Ht @ 50th %
  - Age: 8.1 % (7.5-9%)
  - Insulin use 3 unit (0.25 u/kg/d)
  - Target 100-200 sensitivity 225
  - Basal 58%, am 1 + pm 0.75 unit
  - Ratios: 1:30, 1:26, 1:30

- **Frustrations:**
  - # variability
  - Unpredictable child behaviors
  - dose pre meal is tricky
  - random lows, (gets crabby),
  - testing 8-10 x/day

- **Pump interest**

Age 2-4 yr:

- Increase child involvement.
- Allow more control of self, environment.
- Explore how things fit into daily life

Toddler development

- **Dia-abilities**
  - Parents do all
    - Acceptance of DB care as part of life
    - Offer pre insulin post meal/ irregular food intake
    - Establish a schedule
    - Manage picky eater
    - Limit snacking, cope with lack of cooperation
  - For him: All classes finished
  - Pump screening done—ready
  - Has good family and extended family support
  - Also looked into glucose sensor

- **Tasks for age**
  - Developing: sense of mastery & autonomy
  - gross motor skills
  - Developing speech
  - Learning to trust
  - Responding to love (did not understand hug not kiss)

- Rapid growth and development
- Learn through imitation
- Parent acceptance of diabetes care as part of life = imitated by child
Sensor technology = improved Db QOL

Dex com
- Approved for age 2 years - pending insurance
- PA for younger
- Interstitial glucose, slightly delayed from BS
- Accurate, needs calibration 2 times per day (G5)
- Transmits to phone, watch
- Alarms, arrows
- Info to pumps: T slim & Omni pod in future
- New: Dex G6, update software, no calibration, interface with insulin pumps
- Freestyle Libre:
  - CGM with wired enzyme tech, sensor
  - Enzyme allows calibration once at factory
  - Wired enzyme tech, keeps sensor from straying from the calibration - no need to calibrate with finger test
  - Sensor will update BG every 15 min
  - Need to scan for data to be saved (at least every 8 hr)
  - CGM trend graphs can be viewed in scanner
  - Does not alert to high or low sugars
  - Scan app for phone

Pump therapy

In alphabetical order:
- Medtronic
  - 670G artificial pancreas over 7 years
  - stable overnight, stay on loop
- Omnipod
  - No tubing
  - Future will talk to Dex com
  - Shocks - failure with insulin irretrievable
  - New model will have more refined dosing
- Tandem T slim X2
  - Software upgrade, large 480 units
  - Dex com transmits to screen
  - New model interface with Dex com G6

Micro manage; improve Db QOL
- Only use rapid insulin
- Basal = background insulin
- Bolus = dose for food, correction
- Same doses as MDI
- Basal: may need to decrease (lantus, levimir) by a little -10%
- Dawn effect: numbers higher at wake up, bkfst
- Increase basal from 0400-0900
- Lows with activity - suspend, detach, temporary basal
- Basal rates for week, day, school, extreme sport, sedentary
Pre School

- 3-7 year ADA 4-6 yr
- Developing a sense of mastery & autonomy
- Minimize prevent lows
- Cope with unpredictable appetite & activity
- Trusting other caregivers with cares
- Reassure them diabetes is no one's fault
- Education on self-care for school, etc.
- Like stickers – immediate, symbolic rewards
- Trace body, sticker on site- avoid over use

- Egocentric
- Classify objects by 1 feature
- Magical thinking
- Simple choices
- Good/bad based on punish/reward
- Likes to help
- Wants to do it by self
- Distress to authority
- Cooperative play
- Does some tasks with supervision
- Parent separation, school- rules outside home
- Play date

Pre school case

- Lucy age 4 dx for 1 year
- Honey moon is fading
- Day care is busy
- Lows every day after wakes from nap time at day care
- Will decrease the meal ratio
- Encouraged adjusting for activity

- Is picky about eating, does not eat what served at day care
- Review need to eat
- Discuss alternate carbs if not like what served
- Adjust for activity
- Allow choice between 2 healthy choices
- Sticker to chart for cooperation

Early School-age

- 5½ year old
- At 7.2% (8.1%)
- Minimal lows
- TDD = 17 units or 0.7 u/k/d
  1700 = 100, 400 = 24
- Lantus 6.5%
- Meals 1:14, 1:16, 1:18
- BS- 180/180

- 5-7 yr. eager to please and follow directions
- Participates in thinking out loud for parent
- May be able to test sugar with prompting
- Setting health goal
  - Focused on activity
  - Asked what may interfere with daily activity:
    - sick, storms, tomatoes???

5/17/2019 30
School age: early 7-10-12 years

- Glycemic goals: 70-140
- Bed time: 100-180
- A1c goal: <8.1%
- Diabetic:
  - Testing:
  - Age 10-12 gives injection with supervision
  - Make own food choices, learning carb counting
  - Recognize and treat lows
  - Beginning to understand patterns
  - Start to self inject
  - Progress to self correcting
  - Health screening, BMI, pubertal changes (ADA), video time, activity
  - Help with food choices in restaurants

Developmental tasks:
- Concrete thinker, more logical and understanding
- More curious, social & responsible
- Behave properly, growth spurts, rest
-individual for care
- Intention, being fair & nice is important
- Increased independence with supervision
- Increased social involvement/care
- Sensitivity to teasing, self esteem, social acceptance
- Organized sports, prevent back, clubs, hobbies
- Away from parents for longer periods of time
- Overnights
- Learned to check injection sites at home
- When asked to show insulin pump site...

8 yo Male - Case #6

8 yo Male

Saved by school

A1c jumped to >14
Repeal DKA
Not ED
Family disorder?
DKA episode
Summer break: 2nd year
Followed DKA care
Worked with primary care
Supervision? mom working
Sibling was to supervise
Really on his own
School is a blessing
New onset diabetes

- CA: 12.1
- Weight/height matched, normal BMI
- Polyuria, polydipsia for 1-2 days, some weight loss
- No emesis, nausea, or nocturia
- BS 545 mg/dl at MD office, no urine ketones
- A1c 8.4 % (4.5-5.5),
- Given Lantus, (0.2 u/k/d) report for education the next day
- Also ++ Thyroid AB, (auto immune hypothyroidism)
- Cholesterol 385 mg/dl
- **Mother with type 1 diabetes since age 9**

School age: middle school

- CA: 12 yr, Dx @ age 4 yr
- BMI 12%, Wt 10%, Ht 5%
- Pre-menarchal
- A1c 8.2% (historically 7.8%)
- CSR: age 8.5 yrs
- TDD 33 u/d = 0.99u/kg/d
- Basal 8.9 (27%)
- 1:11, 1:15, 1:16, sensitivity 80
- Target 70-120
- Rules: 1700 = 52, 400 = 13
- Goals: A1c < 8.1 %
- 70-130 pre meal;
- 90-150 @ HS

Diabetes break

- Parent takes over:
  - Check every 4, make sure time, date set on meter, sun 1 minute
  - Check math and insulin dose with every dose
  - Hard work for the parent/family
- Try to set up with Blue Loop
- Dose calculator
- Numbers are there
- Facilitate decision making

- Diabetes break
  - A12 yo female
    - A1c was 6.5%, now 9.5%
    - On 0.74 u/kg/d
    - Same doses, more supervision
  - 3 month FU
    - A1c 8.8% 0.75 u/kg/d
    - BMI 78th centile
  - Father commented the extra supervision was hard
13 year old –
- CA: 13.13 yr male: dx age 9 yr.
- Ht: 45 th, Wt: 18 th
- BMI: 10 th
- TDD 46 or 1.21 uk/gld
- A1c 10.6 %, (was 7.8% when parent in charge)
- Basal 41%
- Meals 1:7, sensitivity 35,
- 1700 = 37, 400 = 8.7
- issues: site overuse, not dosing for
- high numbers at supper
- Did not stop video game for dose or “I would die”

This patient:
- History of # falsification, site overuse, dose match
- Parental supervision increased, mom at work after school
- Used phone: set alarm for after school snack, reviewed sites
- When asked for urine at clinic visit stated “That’s how it all began”

Early adolescent:
- Manage body changes
- Dev strong sense of self-identity
- Increase insulin with puberty
- Weight & body image concerns
- BS control more difficult
- Renegotiate parent/teen roles
- Learn coping skills- increase self manage
- Prevent & intervene in db related family conflict

DKA example

John age 14
- Routine clinic visit 8 months
- post dx
- Prolonged honeymoon
- This visit:
- 8.5 kg weight loss
- A1c was 6.7 now > 14
- Current BS-405,
- Urine ketones: Large
- Sent to lab- lytes ok

Follow red column on card
- Tested, dosed q 2 hours
- After 4 hours, improved

Noted in visit
- Log book # all normal
- Returned to full supervision

Older adolescent 15-19 case #10
- 17.37 yo Male
- Wt @ visit - 3 kg
- Lips dry, BS 446,
- Ketones large
- Forgets lantus 2 d/7
- Forgets Humalog rarely but
- Rarely tests—1-2/d
- 1.09 u/kg/d
- Meals 1:6 BS-125/25
- A1c = 14%
- Goals: A1c <7.0 %
- Social issues
- Anger issues
- In alternative school
- Called at 3.5, sugar 408
- Gave corrections followed DKA card
- Lab ok to go home, I got his cell #
- Sugar down to 300, 212, 199
- Reviewed overnight cares
- Libre?

The next visit: shows his new tattoo,
- made by self with a kit
- Discussion re: infection control, infection risk
Later adolescent 16-19

- Est. sense of identity post HS
- Decisions about social, work, education
- Ongoing discussion re transition to adult
- Transition to independence
- Coping skills for self-management
- Assess for db conflict
- Monitor for risky behavior
- Sexual relations
- Experimenting
- Think on multiple levels: what the- yet lives in here & now.
- Judgment based on universal principles, internalized values
- Periodic adult oversees
- Multiple transitions

Life is busy- increased flexibility
- Self care- treat to goal
- School, work, social = testing issues
- Electronics, test pre drive
- Puberty concerns
- Cause effect for high/low sugars
- Higher intensity with activity- increase duration
- Week end warrior

17 yo Female- diagnosis → current

16.5 yo female growth charts
Diabetes Family concerns

- Feel sadness/loss
- Frustration/isolation
- Db fatigue
- Control/safety
- Family conflict
- Negotiate life transitions
- Support from HC provider
  - "Be on same page" - Find positive: I like... I wish

Assess diabetes distress
- Db distress scale
- DDS parents 1-2012

BG over target: use poker face
- Ask what now, not why
- Use I like; I wish
- If discord, establish agreement with parent/teen
- Set goals

Psychosocial

Parental impact
- Warmth and caring:
  - for each 1 less DKA by .88
- Parental negativity:
  - for each 1 more DKA by 1.5
- No correlation for responsibility of management tasks
- Decreased family support → Increased psych issues, decreased self esteem & social skills

Family factors
- Adherence & family function → Health outcomes
- Warm caring parents buffer the stress
- Diabetes support → adherence to treatment
- Need high support at diagnosis, less over time
- Minimize negativity
- Fear of low is a barrier
  - Nocturnal lows 2-4 hours before seizure (in sensor)
  - 2 yr post dx teen/youth
  - withT1DM have 2x depression & adjustment issues of peers
  - improved by family vs of placebo
Behavioral

- Aggression, antisocial conduct adversely associate with poorer control
  - Anxiety, depression
- Low socioeconomic, supply availability = less control
- Less control, higher psych issues than general population
- Db out of control—increased risks of psych morbidity

However:
Anxious children—more diligent self care

Psycho factors that increase A1c risk

- Stressed diabetes care-family well-being
- Unresolved feelings over parental divorce,
- anger RE step parent, abuse,
- parent conflict over care
- Anxiety
  - increased for boy
  - Increased for girls
- If upset RE db care—associated with depressive symptoms
  - early tx

Family
- Nurturing family environment: Caring, warm, supportive, understanding, with healthy limit setting
- Culture: low SE status—longer hospital stay, increased DKA, poorer control
- Divorce or one parent family, & increased family work hours decreased family stability
- Parent perfectionism encourage to let go, be positive, + connections, also supportive, knowing professionals

Thought control risks

- Decreased mental efficiency occur with sugar fluctuations
  - BG > 400 mg/dl (22.2 mmo/L) = severe low
- Behavior impacted by blood sugar for the moment plus long term effects of poor control
  - Transient changes during acute low/high
  - Impairment of cognitive performance and mood
  - Disengagement and negativity
- Externalizing behaviors (aggression, over activity, conduct problems) may provide background in which hyperglycemia exists
  - Aggravating behavior w/ diabetes = strong predictive of externalizing behavior, or teen
  - Externalizing behaviors predictive of poor metabolic control
  - also mental health problems in middle-aged adults
Academic & memory risks

No difference in cognitive function in type 1 VS those without type 1

Risks to academic achievement
Reading scores and GPA lower with poor control
Tight control with frequent lows also a risk
Neither early onset of diabetes nor frequent missed school was associated with lower achievement scores

Risks for memory failure with increased frequency/severity of severe high and/or low episodes
Disrupt memory function typical of hypoxia caused by injury
High acetonisa linked to ischemia

Memory recall for event & decreased rate of accurate memory
Link to Alzheimer’s (AD): Alzheimer is systemic failure: glucose is the energy for mitochondrial powerhouse, insulin allows glucose to enter, signals pathway

Pediatric care in general

Family centered care
School:
- medical mgmt plan, IEP, 504
- Supervision: 1 nurse/750
- Safety at school?
- Look at numbers night before
- Sugar sweetened cereal
- Summer break

Diabetes distress in parents
- Db burn out
- Ask about Db distress experience
- What are your needs as a parent?
- Support

Initial adjustment
- Short term goals - multi small steps to build habits
- JDRF parents
- Need to learn & master specific tx behaviors
- Celebrate success
- Feel alone

Parent/family

Parenting style: most report authoritarian/democratc
Can’t assume parenting style not relevant
Work to keep parent participation, eap, mom, encourage authoritative parenting

Dev. Parent expertise 4 steps:
1. Set expectation
2. Trial the plan
3. Pattern recognition
4. Proactive mgmt
Enable development of parent expertise

Parent as mentor: when mentioned had less concerns, more confidence, more perceived DB impact
Mentor added adjustment, careful selection needed
Seek help with G & D, sleep, eating habits, community
Mentor help with adjust to dx

(Sullivan-Bolyai 2010, 2011)
Parent/ family, cont.

- Coping skills training to mom:
  - DB self-efficacy
  - More confident mom,

- Child behavior not influence mom DB behavior,
- Consistent DB regimens= better control
  (Marvicsin, 2008)

- Parent stress ranges 10-74%,
  worse at dx,
  increased when child reported stress & depressive symptoms; (Whittemore, et al 2012)

- African-American: increased importance on social support & family intervention
  (Marvicsin, 2008)

- Screen for psychological stress, family centered intervention: work on team work, communication, behavioral family therapy

Parallel vigilance

- Parent expertise

- Evaluate:
  - How parent talks, enacts confidence;
  - Parents combine normal watchfulness & child care PLUS intense parallel watch for DB problems

Other risks

- Greatest barrier to effective control is behavioral:
  - early referral helps

- Increased risk
  - older age at dx,
  - single parent,
  - lower SE status,
  - high family conflict,
  - poor problem solving & coping

- Goals:
  - provide positive network, supportive peers that promote self care,
  - problem solving (coping skills) training
  (Wysocki, 2006)

- Depression higher in DB:
  - Depression Prevention programs, CBT, learn to monitor & evaluate thoughts, ID mood level, recognize thoughts that trigger (not db article)

- Role transition through normal development can help
  (Merry, et al 2011)

- T1d, slight lower cognition, learning and memory in verbal & visual:

- More affected with early onset T1d:

- Seizure associated with overall cognition, inconsistent cognitive effects: possibly reflec opposing effects of poorer vs better control
  (Gaudier, et al, 2008)
Education

- ADA: monitoring in school classroom is allowed
- Team approach, developmentally appropriate, & ongoing education
  - Silberstein, et al 2005

Developmental Education:
- Foundation for lifelong care,
- Foster independence, positive attitude as child matures:
  - (Charron-Prochownic & Schwartz 1984)

Resiliency

- Ability to cope with stress & adversity, bounce back
- It is a process, not a trait
- Results of individual's ability to interact environment
- Process that promotes well being are protective factors during life situations
- Exhibit optimism, direction, house in the face of adversity, patience, empathy, faith, achievement
- Activiation, self efficacy, resilience

- Protective: cognitive function, positive relation, competence in age-salient developmental tasks
- High expectations: meaning, goal, personal agency, interpersonal & problem solving skills
- Resilience may be trainable & teachable
- Bernardo Resilience may be moveable & teachable in influencing health, well-being, QOL

- Activation, self efficacy, resilience

Resiliency in Db

- How we develop coping measures impacts resiliency

Primary coping skills
- Problem solving
- Emotional expression
- Associated with
  - Increase QOL
  - Higher competence
  - And better Db control

Secondary coping skills
- Acceptance
- Distraction
- Related to
  - Higher social competence
  - Better QOL
  - Better A1c
- Use of disengagement (withdrawal) decreases in poorer A1c, lower competence
- Teen more likely to use secondary, followed by primary
- Greater primary = resilience
- Educator:
  - Help determine most effective coping for the teen
  - Education on coping strategies

(Leppin et al 2014)
Diabetes resilience model 2012

- Develop preventative interventions
- Protective programs (non Db) equip with skills protective of depression:
  - build skills of executive function,
  - problem-solving,
  - communication,
  - benefit finding strategies,
  - optimism,
  - positive coping with Db burdens

- Protective programs (non Db) equip with skills protective of depression:
  - build skills of executive function,
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  - communication,
  - benefit finding strategies,
  - optimism,
  - positive coping with Db burdens

Hillard, Harris, Weissberg-Benchell 2012

By overcoming risks, we achieve new behaviors & resiliency

Outcome on Right: Health resilience is goal

See diagram:

Thriving with diabetes

Character, strengths:
- Backbone to human condition,
- Strength, congruent activity is route to the psychological good
- Optimal resilient qualities:
  - happy,
  - subjective well-being,
  - optimism,
  - faith,
  - self-determined,
  - resilience,
  - creativity

Optimal resilient qualities:
- happy,
- subjective well-being,
- optimism,
- faith,
- self-determined,
- resilience,
- creativity

Help to develop:
- strengths,
- skills to cope,
- recover from hardship,
- be prepared for challenges,
- develop ability to negotiate challenges = more resilient, capable & happy

From healthychildren.org

Building resilience

Mentoring:
- take time to build & connect,
- ID strengths, supports,
- promote autonomy,
- build on strengths

My goal setting to build resilience & grit (drive & direction):

Goal setting in EPIC:
- What I manage well
- My strengths:
- My support:
- My goal:
- My drive: (motivation)
- My direction: (baby steps)
How to do this

- Stress management
- Coping skills program:
  - Enhance social support
  - Problem solving, add Db specific info & skills
  - Support self-management

Consider level of self mastery & teen perception how Db impact their life

- Emotional resilience during year 1
  - After initial strain to family:
  - mom > dad with initial upheaval:
  - this resolved in 6 months.
  - in mom's by 1 year

Careful attention to depression, anxiety & resilience should be in the design of multi-disciplinary approach to Db:
- A1c as control not correlated to knowledge
- Koivus, et al 2012

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Review of downloads

- A1C method: Medtronic
- Assess: progress,
  - Meal bolus
- Identify & confirm
- Weekly review
- Make changes
- Load at settings

Control besides puberty issues

- Celiac: A1c not as expected, absorption, number variability
- Thyroid: hyper: increased hunger, metabolism, insulin needs may go up,
  - hypothyroid: watch hypoglycemia & bradycardia
- Obesity: increased resistance, needs more insulin to get the job done
- Alcohol: risk hypoglycemia, behavior, not recognize lows, or excessive quantity leads to high sugars

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Diabetes transition

- Self care not easy
- Lapses are anticipated
- Life gets in the way
- Set achievable goals
- All work/learn at different pace
- How to work with insurance, fill rx, make appt, have sick plan, who to contact for help
- Look at current skills
- What do they need to learn/do
- Practice skills at home now
- Work as a team
- Communicate, collaborate, problem solve
- Call your parents—they worry
- Talk about normal things first
- Anticipate challenges

summary

- Era of transformation in diabetes care
- Future looks bright for technology and ease of management of insulin requiring diabetes
- Preventing Type 2 diabetes and clinical conditions leading up to it will be our future
- Start young
  - In utero - educate mothers and mothers to be
  - Nutrition
  - Exercise

Questions?

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references

- Chase, P. Understanding Diabetes A handbook for people who are living with diabetes 12th edition
- Cryer, P. 2009. Hypoglycemia in Diabetes ADA

Table 3: Screening for diabetes and prediabetes in asymptomatic youth 10 years

<table>
<thead>
<tr>
<th>Criteria for Screening</th>
</tr>
</thead>
<tbody>
<tr>
<td>HbA1c ≥5.7% threshold for age and sex, or</td>
</tr>
<tr>
<td>BMI ≥95th percentile for age and sex, or</td>
</tr>
<tr>
<td>Weight ≥100% of ideal for height.</td>
</tr>
</tbody>
</table>

Family history of type 2 diabetes in first- or second-degree relative
*Racial/ethnicity (Native American, African-American, Latino, Asian American, and Pacific Islander)*

- Maternal history of diabetes or gestational diabetes in the child's generation
- Signs of insulin resistance or conditions associated with insulin resistance
  - Macroscopic polydactyly
  - Hyperpigmentation
  - Hypothyroidism
  - Polygenic obesity syndrome
  - Small for gestational age birth weight

Note: Screening should be initiated at 10 years or at age of onset of diabetes if puberty occurs at a younger age. Frequency of screening every 5 years. Adapted from Hall 175.
Comparing Definitions for T1D, ‘LADA’, T2D

<table>
<thead>
<tr>
<th>IMMUNITY</th>
<th>AGE</th>
<th>GENES</th>
<th>BMI</th>
<th>INSULIN THERAPY</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1D in children:</td>
<td>Strong</td>
<td>child</td>
<td>low</td>
<td>Immediate</td>
</tr>
<tr>
<td>T1D in adults:</td>
<td>++</td>
<td>adult</td>
<td>normal</td>
<td>Immediate</td>
</tr>
<tr>
<td>LADA:</td>
<td>++</td>
<td>adult</td>
<td>high</td>
<td>Infrequent</td>
</tr>
<tr>
<td>T2D:</td>
<td>low</td>
<td>adult</td>
<td>normal</td>
<td>Variable</td>
</tr>
</tbody>
</table>

*Comparing Definitions for T1D, ‘LADA’, T2D*

<table>
<thead>
<tr>
<th>MODY subtype</th>
<th>GEN</th>
<th>Monogenic-phenotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>MODY 1</td>
<td>HNF4A</td>
<td>Progressive and severe β-cell dysfunction.</td>
</tr>
<tr>
<td>MODY 2</td>
<td>Glucokinase (GCK)</td>
<td>Mild to severe and stable hyperglycemia, glucose regulation varies, but is a higher level.</td>
</tr>
<tr>
<td>MODY 3</td>
<td>HNF1A (GPI)</td>
<td>Progressive and severe β-cell dysfunction. Pseudo-pseudohypoparathyroidism.</td>
</tr>
<tr>
<td>MODY 4</td>
<td>IPF-1 (IPF1)</td>
<td>Progressive and severe β-cell dysfunction. Progressive pseudohypoparathyroidism.</td>
</tr>
<tr>
<td>MODY 5</td>
<td>HNF4B (TFF1)</td>
<td>Progressive and severe β-cell dysfunction; renal and growth abnormalities.</td>
</tr>
<tr>
<td>MODY 6</td>
<td>Staunton D1</td>
<td>Progressive and severe β-cell dysfunction and retinopathy.</td>
</tr>
<tr>
<td>MODY 7</td>
<td>CEL (Calbindin-D28k Epig)</td>
<td>Variable diabetes; Exercise genetic influence.</td>
</tr>
</tbody>
</table>

*Comparing Definitions for T1D, ‘LADA’, T2D*