Beyond Health Literacy: Cognitive demands of diabetes self-management

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CDEs and the challenge of patient self-management

- DSME/T outcomes are vital in the emerging healthcare landscape
- DSM is a complex job
- Literacy is a general cognitive ability
- Disabilities and aging can affect literacy
- DSM must be cognitively accessible
  - Identify the most critical tasks
  - Identify cognitive barriers in tasks
  - Deliver instruction based on cognitive difficulty (Bloom's taxonomy)
  - Select Bloom-referenced educational materials

Effective patient education and self-management are part of the healthcare landscape.
All patients with chronic illness make decisions and engage in behaviors that affect their health (self-management). Disease control and outcomes depend to a significant degree on the effectiveness of self-management. Effective self-management support means more than telling patients what to do… Using a collaborative approach, providers and patients work together to define problems, set priorities, establish goals, create treatment plans and solve problems along the way.

No hospital got top scores for readmissions or communication.
Objective: Keep blood glucose within safe limits

- Learn about diabetes in general (At “entry”)
  - Physiological process
  - Interdependence of diet, exercise, meds
  - Symptoms & corrective action
  - Consequences of poor control

- Apply knowledge to own case (Daily, Hourly)
  - Implement appropriate regimen
  - Continuously monitor physical signs
  - Diagnose problems in timely manner
  - Adjust food, exercise, meds in timely and appropriate manner

- Coordinate with relevant parties (Frequently)
  - Negotiate changes in activities with family, friends, job
  - Enlist/capitalize on social support
  - Communicate status and needs to practitioners

- Update knowledge & adjust regimen (Occasionally)
  - When other chronic conditions or disabilities develop
  - When new treatments are ordered
  - When life circumstances change
  - Conditions of work—24/7, no days off, no retirement

Good glucose control requires good judgment

- It is NOT mechanically following a recipe
- It is keeping a complex metabolic system under control in often unpredictable circumstances (like accident prevention process)
- Coordinate a regimen having multiple interacting elements
- Adjust parts as needed to maintain good control of system buffered by many other factors
- Anticipate lag time between (in)action and system response
- Monitor advance “hidden” indicators (blood glucose) to prevent system veering badly out of control
- Decide appropriate type and timing of corrective action if system veering off track
- Prioritize conflicting demands on time and behavior
The challenge in DM self-management

Diabetes self-management is inherently complex
- Relentless, evolving cognitive demands
- Frequent cognitive overload
- High-risk errors = noncompliance

Must recognize cognitive burdens of DSM

AND how to reduce those burdens

Cognitive demands of DSM are like all complex jobs

- Elementary teacher
- Nurse
- Nuclear power plant operator

Heavy cognitive burdens

- Learn and recall relevant information
- Reason and make judgments
- Deal with unexpected situations
- Identify problem situations quickly
- React swiftly when unexpected problems occur
- Apply common sense to solve problems
- Learn new procedures quickly
- Be alert & quick to understand things

*Job analysis by Arvey (1986)

Disasters waiting to happen

Diabetes Disaster Averted series:
http://www.diabetesincontrol.com/articles/practicum
Label literacy

- A diabetic educator taught a patient insulin-to-carbohydrate (I:C) ratios so he could match insulin doses to the amounts of carbohydrates he consumed. (The I:C ratio specifies how many grams of carbohydrates are covered by each unit of insulin.) Patients need to read food labels and understand portion size to dose their mealtime insulin correctly.
- When reviewing the patient’s food and insulin dose log, the educator questioned the carbohydrate content for a food item that seemed high.
- As the patient answered, the educator realized that the patient had been looking at the total weight in grams of the food item/serving size instead of the total carbohydrates grams in the item/serving size.
- This resulted in calculating a higher insulin dose than needed. Fortunately, the patient did not experience significant hypoglycemia.
- Some patients have also mistaken the percent of daily allowance of carbohydrates in each serving as the weight of carbohydrates in grams.

Improving the Literacy Level (Readability)
of educational materials
does not guarantee
comprehension & compliance
because it does not reduce
cognitive demands.

Readability doesn’t make a complex task easy

Ingredients of readability:
ASW: Average syllables per word
ASL: Average words per sentence

\[(0.39 \times ASL) + (11.8 \times ASW) - 15.59\]

Decades of literacy research

National literacy surveys
- Use written info to perform a task (“reading to do”)
- Tasks simulate everyday activities with familiar materials
- Very large representative samples

Sample tasks
What makes some items more difficult?

"Information processing complexity"

<table>
<thead>
<tr>
<th>NALS level &amp; scores</th>
<th>% US adults reading at this level</th>
<th>Simulated everyday tasks</th>
<th>NALS level &amp; scores</th>
<th>% US adults reading at this level</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 (275-325)</td>
<td>3%</td>
<td>Use calculator to determine cost of carpet for a room</td>
<td>4 (225-275)</td>
<td>15%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Use eligibility pamphlet to calculate SSI benefits</td>
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<td>Calculate miles per gallon from mileage record chart</td>
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<td></td>
<td>Write brief letter explaining error on credit card bill</td>
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</tr>
<tr>
<td>4 (225-275)</td>
<td>15%</td>
<td>Use eligibility pamphlet to calculate SSI benefits</td>
<td>3 (275-325)</td>
<td>31%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Explain difference between 2 types of employee benefits</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculate miles per gallon from mileage record chart</td>
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<tr>
<td></td>
<td></td>
<td>Write brief letter explaining error on credit card bill</td>
<td></td>
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</tr>
<tr>
<td>3 (275-325)</td>
<td>31%</td>
<td>Determine difference in price between 2 show tickets</td>
<td>2 (225-275)</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Calculate miles per gallon from mileage record chart</td>
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<tr>
<td></td>
<td></td>
<td>Write brief letter explaining error on credit card bill</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 (225-275)</td>
<td>10%</td>
<td>Locate intersection on street map</td>
<td>1 (225)</td>
<td>23%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total bank deposit entry</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 (225)</td>
<td>23%</td>
<td>Locate expiration date on driver's license</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Not reading per se, but "problem solving"

- number of features to match
- level of inference ("connecting the dots")
- abstractness of info
- distracting information

Task #1—Underline sentence saying how often to give the medicine

Pediatric Dosage Chart

<One piece of info>

- Simple match
  - But lots of irrelevant info

Screening for literacy level

Short, simple, and non-threatening

Single Item Literacy Screen (SILS)

"How often do you need to have someone help you when you read instructions, pamphlets, or other written material from your doctor or pharmacy?"
Persons age 65+ are at much greater risk of low literacy

Persons with disabilities are also at much greater risk of low literacy
UD survey: Diabetes patients with disabilities

Low “literacy” (tack of success in using materials in English) can result from:
- input problems (hearing, sight, language)
- weak processing (lower cognitive ability)
- output limitations (motor, speech impediments, etc.)

We are focusing on (b) but recognize (a) and (c) are important too.

How to increase the cognitive accessibility of DSM…

1. Target the most critical tasks
2. Identify cognitive demands
3. Deliver instruction based on cognitive taxonomy (Bloom’s)
Information is better because it’s in chart form.

But, it contains a confusing technical symbol. Can you spot it? “Amount per serving.”

Attention-diverting labeling

Pros:
• Fewer items
• Single vertical list
• Major headings stand out

Cons:
• Lots of irrelevant info
• Seemingly inconsistent info

How to increase the cognitive accessibility of DSM…

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2. Identify cognitive demands
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Bloom’s Taxonomy of Learning Objectives

Bloom’s levels = continuum of cognitive complexity

- **Bloom’s Taxonomy of Educational Objectives**: A taxonomy developed by Benjamin Bloom and colleagues in the 1950s, it categorizes educational objectives into six levels: Knowledge, Comprehension, Application, Analysis, Synthesis, and Evaluation.

- **Bloom’s Taxonomy for Health Sciences**: A modified version of the original taxonomy, tailored specifically for health sciences education.

**Bloom’s Levels**

1. **Remember**: Recite, reproduce, recall, recognize, identify
2. **Understand**: Interpret, explain, explain, demonstrate, illustrate
3. **Apply**: Use in a new setting, perform, execute, implement, control
4. **Analyze**: Compare, contrast, contrast, distinguish, recognize
5. **Synthesize**: Construct, develop, devise, formulate, design
6. **Evaluate**: Judge, choose, decide, critique, distinguish

**Bloom’s Taxonomy of Educational Objectives, Cognitive Domain**

- **Simplest tasks**: Remember, recall, identify, recognize
- **Most complex tasks**: Evaluate, judge, choose, decide, critique

**Core Tasks in Diabetes Self-Care**

1. **Eat healthful diet**
2. **Take and track**
3. **Monitor blood sugars**
4. **Spot & solve problem**
5. **Adjust daily plan**
6. **Take action**

**Nutrition Facts**

- **Nutrients** (per serving):
  - Calories: 180
  - Fat: 7g
  - Cholesterol: 30mg
  - Sodium: 300mg
  - Carbohydrates: 25g
  - Fiber: 4g

- **Simplest tasks**: Remember, recall, identify, recognize

**Core Tasks in Diabetes Self-Care**

1. Identify, recognize, recall
2. Identify, recognize, recall, demonstrate
3. Identify, recognize, recall, demonstrate, implement
4. Recall, demonstrate, evaluate
5. Recall, demonstrate, evaluate
6. Recall, demonstrate, evaluate

**To be or not to be**

- To be or not to be, that is the question.
- To be or not to be, that is the question.
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**Bloom’s Levels in Diabetes Self-Care**

- **Simplest tasks**: Remember, recall, identify
- **Most complex tasks**: Evaluate, judge, choose, decide, critique
How to increase the cognitive accessibility of DSM…

1. Target the most critical tasks
2. Identify cognitive demands
3. Deliver instruction based on cognitive taxonomy (Bloom’s) – materials

“Rx for Physical Activity”
for a Rural Community Health Center

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Presented at the 2009 Diabetes Translation Conference
Long Beach, CA, April 22, 2009

Graduated Rx

http://www.udel.edu/educ/gottfredson/Rx

Teaching the teacher: Script for CDE when prescribing “Rx for Walking”

Provides the CDE with:
- Educationally sound curriculum
  - Key ideas
  - Content, sequence, and pace of instruction, etc.
- Implicit training
  - Be concrete, personalize, use meaningful metaphors, etc.
Curriculum design: Don’t assume they know what’s obvious to you

Can’t assume:
- What a pedometer is
- How to wear it
- The exact regimen of the Rx
  - i.e., extra steps

That the educator will know specific learning steps for:
- Aim of script (e.g., extra steps)
- How to adjust regimen

Smart people are busy making life more complex
• Recognize that “To be or not to be” is not easy to do.
• Know educational requirements in evolving healthcare.
• Assess and know implications of patient’s literacy level.
• Recognize cognitive complexity of patient’s DSM tasks (cf. Bloom’s)
• Minimize the cognitive complexity of educational materials & programs.

CDEs can simplify the maze....