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Improving health literacy in patients with diabetes

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LIMITED HEALTH LITERACY and lack of basic math skills (numeracy) are more pervasive problems than many nurses suspect. Combine these limitations with a largely self-managed chronic disease such as diabetes and the possible complications—such as severe hypoglycemia—can be catastrophic. In diabetes, use of high-risk drugs such as sulfonylureas and insulin require additional patient understanding to prevent admissions for hypoglycemia and overuse of hospital resources.[1]

Patients with a limited ability to read and write shouldn't be considered unintelligent. Many patients with low literacy skills can learn complex self-management protocols, provided they receive clear instructions. This article provides a literature review about health literacy related to diabetes self-management and gives nurses evidence-based tools they can use to help patients overcome health literacy or numeracy issues.

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Understanding health literacy and numeracy

The CDC defines *health literacy* as the degree to which someone has the capacity to obtain, communicate, process, and understand basic health information and services to make appropriate health decisions.[2] These skills are a prerequisite to make sense of health information and services or to provide health information and services to others.

Health numeracy describes the skills and ability to understand and use numbers required to successfully execute many health-related tasks, including:

- calculating medication dosing intervals and correction scales for insulin.
- interpreting medication instructions and food labels.
- determining insulin-to-carbohydrate ratios.[3]
- deciphering charts (such as for growth and body mass index).
- weighing the risks and benefits needed to make informed decisions related to healthcare, such as appropriate A1C target ranges based on comorbidities and age.

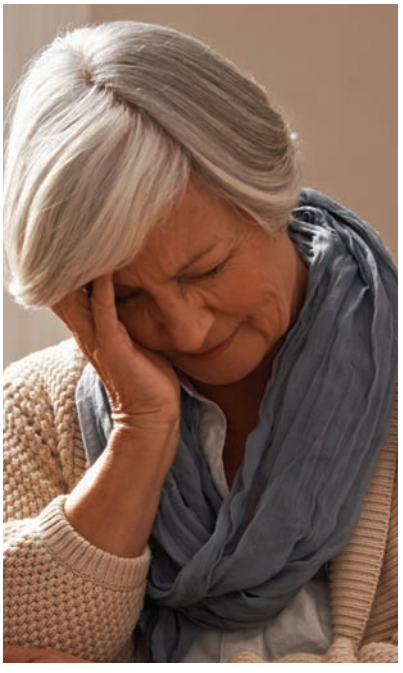
Understanding the impact

Health literacy is one of the strongest predictors of health status—stronger than income, employment status, education level, and racial or ethnic group.[4] Assessing and managing low health literacy is important for nurses who hope to help patients with diabetes stay safe, informed, and well controlled.

The scope of the problem is described by the National Center for Education Statistics.[5] Overall, it estimates that only 12% of adults have proficient levels of health literacy, defined as the skills needed to perform more complex and challenging literacy activities. The CDC identifies 18.8 million people in the United States as having diabetes. If 88% of them have health literacy deficiencies, then 16 million Americans will have problems managing their diabetes, especially if they take insulin.

Looking at the literature

Al Sayah et al. conducted a systematic review of 24 studies about the relationship of health literacy or numeracy and at least one health outcome in people with diabetes.[6] The results indicate that low health literacy is consistently associated with poorer diabetes knowledge.



About 88% of adults may have health literacy deficiencies leading to problems managing complex health problems such as diabetes.

Other retrospective or smaller studies have shown some concerning trends, however. Kaiser Permanente's Diabetes Study of Northern California (DISTANCE) examined the impact of health literacy on a cross section of patients with diabetes (N = 14,357).[7] They asked patients to self-report their level of health literacy and any significant episodes of severe hypoglycemia, such as losing consciousness or needing assistance to manage the reaction. Overall, they noted that problems learning, needing help reading, and lack of confidence with forms were independently associated with significant hypoglycemia. Of the 14,357 patients, 11% or 1,579 individuals had experienced signs and symptoms of severe hypoglycemia. Within this group experiencing severe hypoglycemia, 59% were taking insulin, 23% were taking mixed oral medications, 13% were taking secretagogues, and 5% were taking metformin alone. They also reported that 8% or 129 of 1,579 had to go to the ED or were admitted to the hospital because of their signs and symptoms. For these reasons, hypoglycemia seems to be implicated as a potentially serious and costly consequence of limited health literacy in this population.

The impact of health literacy on our nation's veterans is also substantial. A study of 502 veterans in Miami, Fla., evaluated the impact of inadequate health literacy.[8] They found that 29% of their population had low health literacy, 26% had marginal literacy, and 45% had adequate literacy. For those veterans with inadequate health literacy, they perceived their health as poor or fair (63%) compared with those with adequate health literacy (37%). This perceived lack of health and limited health literacy poses barriers to clinical outcomes that nurses need to understand when interacting with veterans, especially those with a complicated, largely self-managed chronic disease such as diabetes.

Problems with health numeracy can have a large impact on diet management and nutrition as well as on A1C control. A study by Bowen et al. found that patients with diabetes (N = 150) with numeracy problems consumed more calories from carbohydrates than from protein or fats.[9] They also noted that those with low numeracy skills were more likely to estimate portion size incorrectly, misinterpret food labels, and receive worse diabetes self-care.

The Bournemouth Diabetes and Endocrine Centre in the United Kingdom found that people (N = 112) with higher health numeracy skills (53%) achieved lower A1C levels than their counterparts.[10]

Additional health literacy resources

Source	Website
Centers for Disease Control and Prevention: Simply Put: A Guide for Creating Easy-to-Understand Materials, 3rd ed.	www.cdc.gov/healthliteracy/pdf/Simply_Put.pdf
Agency for Healthcare Research and Quality: AHRQ Health Literacy Universal Precautions Toolkit	www.ahrq.gov/professionals/quality-patient-safety/quality-resources/tools/literacy-toolkit/index.html
Always Use Teach-back! Teach-back! Training Toolkit	www.teachbacktraining.org/

Osborn and colleagues examined the relationship of self-efficacy to health literacy and numeracy and diabetes control.[11] Their cross-sectional primary care study of 383 participants found that health literacy and numeracy are each associated with greater diabetes self-efficacy, and greater diabetes self-efficacy is associated with lower A1C levels.

Some studies found that patients with low health literacy have more hospital readmissions and use the ED more often. Rubin et al. noted poor health literacy (lack of knowledge about diabetes and discharge instructions) was one of five major reasons for early readmission of patients with diabetes in their qualitative study.[12] They indicated that most patients lacked awareness that the A1C reflects the average range of blood sugar over 3 months, and most didn't know their most recent A1C value.

Berkman and colleagues reviewed six studies and found that all but one study showed a statistically significant association of increased hospitalization and use of inpatient services with lower health literacy levels.[13] Moreover, their review of studies showed an association of greater ED use with low health literacy.

Health literacy also impacts appointment no-show rates. Holtzman and colleagues conducted a study at a university dental clinic in Los Angeles (N = 200) and found that the strongest predictor for failing to show for appointments was seeking health information through fewer rather than more sources.[14] The second most common reason, however, was lack of health literacy.

Patients with lower health literacy are more likely to make errors when taking their medications. Mixon et al. reported that among patients taking cardiac medications, female participants with higher health literacy and higher subjective numeracy had lower odds of misunderstanding their medications' indications, doses, or frequency.[15] Furthermore, Berkman et al. examined participants' ability to interpret prescription medication and nutrition labels and found a positive correlation with health literacy level.[13]

Health literacy assessments can also impact patient satisfaction. Komenaka et al. conducted a study (N = 2,026) that found routine health literacy assessment is feasible in a surgical practice and doesn't cause any perceived decrease in patient satisfaction.[16] In fact, satisfaction was greater during the years when health literacy assessments were performed.

In summary, lack of health literacy may lead to multiple strains on the healthcare system as well as for patients, including medication errors, missed appointments, adverse medical outcomes, and lower patient satisfaction. For patients with diabetes, a chronic disease requiring daily self-management, it's imperative to assess for limited literacy and numeracy skills and adjust interventions appropriately.

Performing an assessment

Understandably, many patients aren't willing to admit they have literacy problems. Assessing this clinical barrier can be complex. First and foremost, remember that years in school or education level may not accurately reflect literacy skills. Wallace notes that while "variables such as years of education are associated with health literacy, they are not perfectly correlated and do not provide enough information to guide care."[17] Some patients with limited health literacy have completed high school or college, are well spoken, may look over written materials and say they understand, hold white collar or even healthcare jobs, and function well when not under stress.

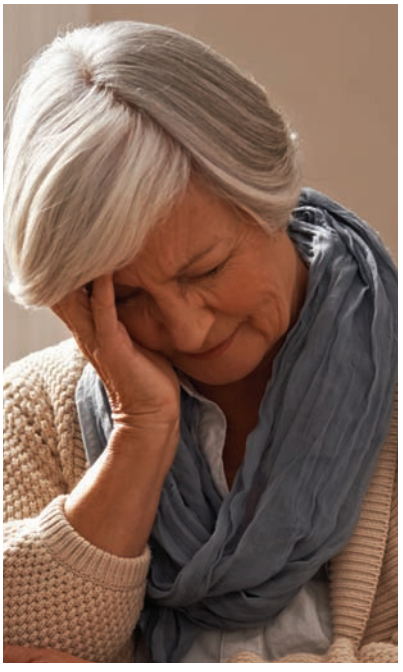
The National Assessment of Adult Literacy discussed additional reasons for limited literacy skills.[5] These can include learning disabilities, cognitive decline in older adults, and the "use it or lose it" theory of neuroplasticity that suggests that reading abilities are typically three to five reading levels below the last year of school completed.

Cornett provides some of these red flags to keep in mind when meeting a patient for the first time. These warning signs could indicate problems with health literacy or numeracy.[18]

- Patients often make excuses when asked to read or fill out forms; for example, "I don't have my glasses," "I'm too tired to read," or "I'll read this when I get home."

• Poor readers often lift text closer to their eyes or point to the text with a finger while reading. Their eyes may wander over the page without finding a central focus.
• Patients may provide an incomplete medical history or check all items as "no" to avoid follow-up questions. Poor readers often miss appointments and make medication errors.
• Patients with low health literacy become skilled at listening, and they often take instructions literally to avoid making mistakes. For example, they may be instructed in clinic to take nutritional insulin three times a day, but then they skip a meal and still take the insulin. In this case, they may not be able to read the prescription label that says to take this insulin with meals. To identify their medications, they look at the pills for color, size, and shape because they can't read the labels. Patients may appear nervous, confused, frustrated, or even indifferent. They may withdraw or avoid situations where complex learning is required. Patients often give incorrect answers when questioned about what they've read.

Powers et al. provide a review of the 10 most common health literacy assessment tools.[19] They identify the Rapid Estimate of Adult Literacy in Medicine (3 minutes), the Test of Functional Health Literacy in Adults (7 to 12 minutes), and possibly the Medical Term Recognition Test (2 minutes) as the most accurate tools for identifying patients with limited health literacy. Cooper-Bailey et al. also provide reviews for several diabetes-specific assessment tools such as the Diabetes Numeracy Test-15, DNT-Adolescent and DNT-14 Adolescent, Diabetes-specific Health Literacy Index, Literacy Assessment for Diabetes, and Spoken Knowledge in Low Literacy in Diabetes scale.[3]



Lack of health literacy may lead to medication errors, adverse medical outcomes, and lower patient satisfaction.

One succinct method proposed to determine health literacy is asking the following three simple questions:
• How confident are you when filling out medical forms by yourself?
• How often do you have someone help you read hospital materials?
• How often do you have problems learning about your medical condition because of difficulty understanding written information?[20]

However, Johnson et al. didn't find single-item questions (as above) used to screen for written health literacy to be effective screening tools for health numeracy.[21] They did find that a low education level is a specific predictor of low health numeracy. Therefore, despite the available literacy tools, it's probably best for the busy clinician to use a Health Literacy Universal Precautions approach when dealing with all patients and their families. (See *Additional health literacy resources*.)

This means clinicians should assume all patients have some measure of limited health literacy and numeracy.[22] Using this approach will ensure that clinicians will be communicating information in a way that can be understood by the half or more of the population with low literacy skills.

Various communication methods to overcome low literacy and numeracy barriers are presented here to help optimize diabetes education and the nurse's impact on care.

Nursing interventions

When communicating with any patients and families, and especially those suspected of limited health

Teach-back tips for patients with low literacy

- Use a caring tone of voice and attitude.
- Display comfortable body language and make eye contact.
- Use plain language.
- Ask patients to explain back, using their own words.
- Use nonshaming questions. For instance, instead of asking patients if they can read, ask them if they have any trouble with written directions on their medications.
- Use open-ended questions. Avoid questions that can be answered with a simple yes or no.
- Emphasize that the responsibility to explain clearly is on you, the provider.
- If patients can't teach-back correctly, explain again and reassess.
- Use reader-friendly print materials to support learning.
- Document use of, and the patient response to, teach-back.

Source: Always Use Teach-back! 10 elements of competence for using teach-back effectively. 2016. www.teachbacktraining.org. Developed by Health Literacy Iowa.

literacy and numeracy, an important first rule is to limit or "chunk" needed information into small pieces. This way, teaching can be done slowly and the patient can be evaluated for understanding. The Agency for Healthcare Research and Quality (AHRQ) suggests breaking healthcare information into three main parts, from the patient's perspective:

- Explain what's wrong (briefly).
- Why is it important to me?
- What do I need to *do* and why?[22]

Keep patient communication simple and focus on action steps rather than on complicated explanations and pathophysiology. Make sure information is culturally sensitive by asking if there's anything you should know about their culture, beliefs, or religious practices that would help you take better care of them. Then make a note of it. Use active voice; for example:

- Take this insulin daily.
- Carry glucose tablets for low blood sugar.

Simple communication strategies, which are also important, should focus on the "need to do" rather than on "nice to know." Always begin by asking patients at each visit what's important to them or what brings them in for a visit. Explore what they want to know to make informed decisions and to execute day-to-day management of their disease. When focusing on specific "need to do" activities, a return demonstration is a must to ensure comprehension and accuracy. Some additional strategies include the following.

- Use plain language (avoid medical jargon).
- Prioritize learning goals.
- Focus on action, not information.
- Use concrete and specific phrases.
- Provide multiple communication forms: printed, verbal, and visual, which include hands-on learning with a real syringe and needle or video information.

Example of a simple pill card

Follow this guide to organize information for the pill card.

Medicine	Important Information, in Simple Terms	Incorporating This Information into a Pill Card	Possible Graphics Used
 Simvastatin 20mg	• Take 1 pill at night • For cholesterol	• Picture of one pill at night/bedtime (shown by moon)	• Night/bedtime 
 Furosemide 20mg	• Take 2 pills in the morning and 2 pills in the evening • For fluid	• Picture of two pills in the morning (shown by rising sun) and two pills in the evening (shown by setting sun)	• Morning  • Evening 
Insulin 	• Inject 24 units before breakfast and 12 units before dinner • For diabetes (sugar)	• Picture of syringe in the morning (shown by rising sun) and evening (shown by setting sun). • Picture of bag of sugar	• Syringe  • Sugar  • Morning  • Evening 

Source: AHRQ Publication No. 08-M016. www.ahrq.gov/patients-consumers/diagnosis-treatment/treatments/pillcard/pillcard.pdf. 2008.

- Confirm that the patient understands the teaching.
- Encourage questions.

Be sure to use words that patients are familiar with such as "blood sugar" instead of "glucose." Focus instructions on actions you expect them to do at home related to their blood sugar. Explaining the pathophysiology of diabetes will just confuse a patient with low literacy skills. Concrete instructions are best. For instance, say, "Check your blood sugar three times a day before meals, treat low blood sugar of 70 or lower with 4 glucose tablets, and recheck your blood sugar in 15 minutes." Always provide directions in large print, preferably using one- or two-syllable words.

After information has been communicated, make sure to confirm patient comprehension. The teach-back method encourages patients to use their own words to describe what they've learned.[23] (See *Teach-back tips for patients with low literacy.*) AHRQ states three benefits to using the teach-back method:

- It improves patient understanding and adherence.
- It decreases call backs and cancelled appointments.
- It improves patient satisfaction and outcomes.

Comprehension of patient teaching needs to be confirmed in patients managing diabetes. Examples include how to appropriately treat hypoglycemia. A good way to enlist patient feedback might be to ask something like this: "To make sure I explained how to treat a low blood

sugar the right way, can you tell me in your own words how you'd describe this to a family member?"

Provide clear instructions to notify the healthcare provider in instances of hypoglycemia or hyperglycemia and review these guidelines at each visit to ensure patient safety.

Remember that the basic health literacy rules apply to printed instructions as well. Multiple programs are available online to assess the reading grade level of printed materials and determine appropriate formats. A simple practical rule for the busy nurse is to use plain language and keep all words to one or two syllables when speaking or providing printed instructions. Educational material should be clear and uncluttered. Sentences should be short, with headings and subheadings to break up the text.

The National Diabetes Education Program reminds clinicians to assess for a sufficient amount of white space; otherwise, an education sheet can look overwhelming to a patient with low literacy.[24] Also, including color photos whenever possible always makes the material more appealing.

Some examples of creative solutions and resources for patients with low literacy include using pill cards with pictures, diagrams created for patients, and free online instructional videos, such as those provided by manufacturers of glucometers and insulin pens. (See *Example of a simple pill card.*) Try to include family members or other community support help and resources. For patients with limited numeracy skills, use a picture showing a plate with a healthy meal instead of teaching carbohydrate counting.[25] (See *Using Choose My Plate*.) Incorporating a teach-back demonstration of correct insulin administration technique is a must.

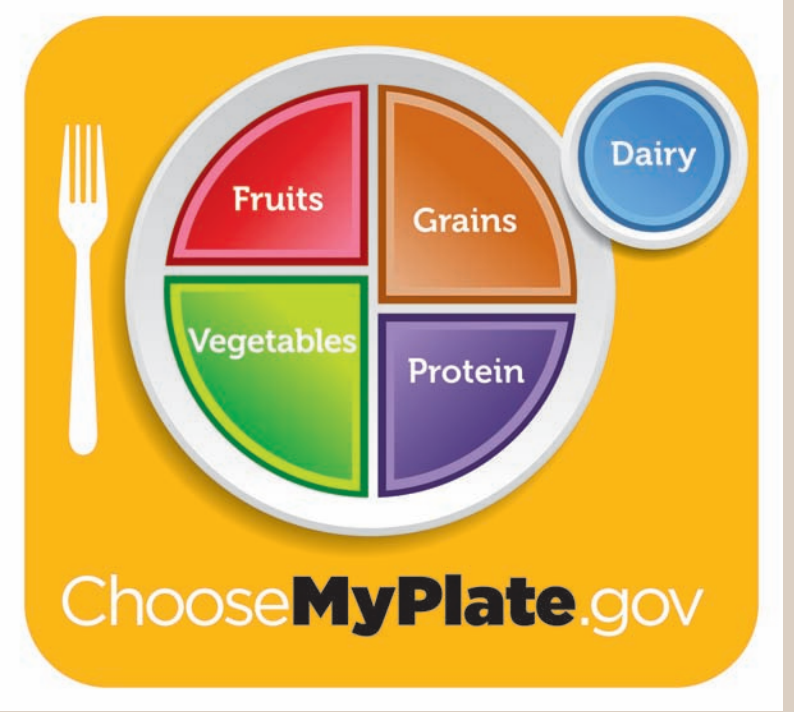
White, Wolff, Cavanaugh, and Rothman have created an extensive Diabetes Literacy and Numeracy Education Toolkit.[26] This toolkit can be requested from its authors. AHRQ also has an extensive online toolkit noted in the resource section of this article. Use this and online literacy and numeracy education toolkits.

Making a point

In summary, nurses need to understand the impact of health literacy and numeracy deficits on the day-to-day self-management of chronic diseases such as diabetes. Using the simple assessment and universal precautions intervention strategies outlined here can improve the quality of life for patients with diabetes who also have health literacy and numeracy barriers. Ultimately, diabetes care can be enhanced with decreased episodes of hypoglycemia and hospital readmissions by helping patients achieve their diabetes self-management goals and health outcomes. ■

Using Choose My Plate

My Healthy Plate can be used as a teaching tool for nutrition.



Source: U.S. Department of Agriculture. Center for Nutrition Policy and Promotion, 2011. CNPP-25. https://www.choosemyplate.gov/.

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