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Mark Atkinson, PhD
JDRF’s Network for Pancreatic Organ donors with Diabetes (nPOD) program has served as a stimulus to the formation of many new programs directed at studies of the human pancreas, both within the United States and Europe. Studies of the human pancreas have not only lead to major improvements in our understanding of the pathogenesis of Type 1 diabetes but are poised to provide for advances in the diagnosis and treatment of the disease as well as potentially a means to prevent and/or cure it.

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With more than 30 million Americans having diabetes, nurses play a number of vital roles in providing the extensive care and education that diabetes management requires.
Basal-IQ Technology helps reduce the frequency and duration of hypoglycemia by predicting glucose levels 30 minutes ahead and suspending insulin if expected to drop below 80 mg/dL. And, with Dexcom G6® continuous glucose monitoring (CGM) integration, Basal-IQ Technology works with no fingersticks* required for calibrations or mealtime dosing.

CLINICAL STUDY RESULTS:

Less time low
31% relative reduction in sensor time spent below 70 mg/dL, with no evidence of rebound hyperglycemia compared to a sensor-augmented pump without the Basal-IQ feature.*

Simple to use
91% of study participants said the Basal-IQ feature on the t:slim X2 Insulin Pump was easy to use.*

To learn more, visit www.tandemdiabetes.com/providers

Basal-IQ Technology is not a substitute for active self-management of your diabetes. Visit www.tandemdiabetes.com/tslimx2#use for more information.

* If glucose alerts and CGM readings do not match symptoms or expectations, use a blood glucose meter to make diabetes treatment decisions.
EDITOR'S NOTE

November is National Diabetes Awareness Month. One in 10 Americans has diabetes—more than 30 million people; an additional 84-plus million have prediabetes. Unfortunately, about 30 percent of the population with diabetes are unaware they have it. Experts estimate that nine out of 10 adults with prediabetes aren’t diagnosed.

We have a lot of work to do!

There is no time like the present to recommit our professional awareness. Quality. Education. Research. Innovation. I have a framed picture with these terms in my office as a daily reminder of my dedication to excellent diabetes care. As editor of Practical Diabetology, my commitment to you is that these elements are reflected in our ongoing effort to provide timely quality information with educational value to you as well as your patients with diabetes. Articles are evidence-based and strive to provide insight into high-level published research. We are all in this together, so please share. Consider submitting a manuscript for publication in Practical Diabetology to PDeditor@madavor.com. We look forward to hearing from you!

As the end of 2018 approaches, remain cognizant of your own risk for diabetes. Age is an ongoing risk factor for both prediabetes and Type 2 diabetes. With another year under your belt, now is the time to assess your risk based on the Centers for Disease Control and Prevention’s CDC Prediabetes Risk Test at https://bit.ly/2eQY249 or the American Diabetes Association’s Type 2 Diabetes Risk Test at https://bit.ly/1bQd2r2.

Have a happy and healthy holiday season!

Editor
Laura Hieronymus
Since the 1970s, when the notion that Type 1 diabetes (T1D) represented an autoimmune disease was established, much of our knowledge regarding the pathogenesis developed from analysis of serum and peripheral blood lymphocyte obtained from patients with the disorder. Utilizing these samples, investigators discovered evidence of both humoral and cell-mediated autoimmunity to islet cell antigens, identified gene variants conferring susceptibility to the disease, uncovered evidence of compromised immune regulation, and much more. At the same time, efforts involving animal models of diabetes, especially non-obese diabetic (NOD) mice, were also utilized for this goal, to perhaps an even greater degree (in terms of sheer numbers of publications) in an attempt to define how T1D develops. From these collective efforts, many pathogenic and natural history models for the disease were developed, some eventually taking on the form of intellectual “dogmas”.

Times are changing...dramatically. This, as recent efforts, including those investigating the actual target of T1D-directed autoimmunity in humans, the pancreas and its insulin producing beta cells, have resulted in a situation where multiple long-standing dogmas are actively undergoing major reconsideration and readdress. Much of this revolution in thought has been driven over the last...
decade from knowledge gains resulting from studies involving JDRF’s Network for Pancreatic Organ donors with Diabetes (nPOD) program (www.jdrfnpod.org).

The primary reason studies of serum and peripheral blood have predominated T1D research relates to the fact that investigations of the pancreas in those with or at increased risk for the disease (i.e., autoantibody positive non-diabetic individuals) are limited by difficulties in obtaining suitable tissue. Historically, the most common source of pancreatic specimens from such subjects involved retrospective collections of pancreas obtained at autopsy from individuals, a small portion of who died at or near the time of their disease diagnosis. This autopsy-based approach was hampered by several significant limitations; the pancreatic tissues were often subject to a pronounced degree of autolysis, were of limited quantity (i.e., one or a limited number of tissue blocks) and, these samples were most often formalin-fixed; all factors that significantly limited the range of information that could have been gleaned from studies on these otherwise highly valuable-pancreas.

It was on these notions that nPOD was founded in 2007. The organizers (self-included) thought, and continue to believe, high quality pancreas obtained from organ donors in the United States, when combined with modern assessments of metabolic activity, immune function, clinical history, beta cell biology, developmental biology, as well as new technologies, should allow for major improvements in our understanding of the pathogenesis of T1D. From an organizational perspective, nPOD also needed to overcome a series of challenges related to external views of our proposed operational model. First among those were common beliefs that organs cannot be recovered from subjects with T1D and moreover, that tissues cannot be obtained with a degree of quality that would yield valuable information. Thankfully, these “misconceptions” have been overcome. As a result, in the Fall of 2018, with nearly 500 cases in the nPOD biobank, investigators around the world (some 230 projects in 21 countries) are, in effect, “re-writing the textbooks on how T1D develops.” What are some of those changing views? Here, we list just 10 of the many concepts, from some six major areas (see table, above), that have changed dramatically.

**Dogma 1:** At time of T1D diagnosis, 90-95 percent of the insulin producing beta cells have been destroyed (note: a concept often shared with patients and their family members).

**Reality:** Beta cell loss at disease diagnosis is quite variable, being more severe in younger children, but in many patients it is significantly less than 90 percent. Overall, across all ages, 40-90 percent of beta cells are lost at time of T1D diagnosis, and the remaining ones may not function properly. Through targeted therapies at diagnosis, hope exists that the function of remaining beta cells to produce insulin may be restored and maintained.

**Dogma 2:** Within weeks to a few months after T1D diagnosis, the pancreas will be devoid of insulin producing cells.

**Reality:** nPOD studies of T1D pancreas reveal that in many patients not all beta cells are lost, even decades after diagnosis. These findings are consistent with recent studies of living patients demonstrating the ability of persons with T1D to make exceedingly small amounts of insulin. While these remaining beta cells are too few to prevent the need for insulin injections, identifying why they are preserved may provide clues as to how to best exploit what function there is, how to prevent beta cell destruction, and possibly to generate new beta cells.

**Dogma 3:** With long-standing T1D, the ability to produce insulin or its hormonal precursors is lost.

**Reality:** In addition to the persistence of some beta cells in the pancreas of donors with T1D, nPOD researchers discovered that these cells are inefficient at producing insulin. But they do produce proinsulin, the precursor of insulin, which implies a functional defect exists for the production of mature (and more potent) insulin. The development of novel therapies may correct this deficiency and benefit patients.

**Dogma 4:** Beta cells are passive participants in their own immune-mediated death.

**Reality:** Evidence from nPOD samples suggests that beta cells may contribute to their own demise. In fact, nPOD investigators find evidence that beta cells in T1D patients are stressed and under such conditions, become more visible to the immune system and less able to resist inflammatory insults. Hence therapies that support beta cells and protect them from stress and inflammation could also help quell autoimmunity in T1D.

**Dogma 5:** Beta cells regenerate in response to a variety of conditions including pregnancy, obesity,
and pancreatic injury (note: a concept based on studies utilizing mice).

**Reality:** nPOD studies show that beta cell replication and growth are more sustained in early life. While replication is possible in adults, it is exceedingly rare. nPOD scientists are seeking to uncover how regeneration occurs (especially with the influence of age) so that growth of new beta cells may someday be possible.

**Dogma 6:** New beta cells are generated by other beta cells dividing.

**Reality:** Using nPOD samples, researchers have discovered a possible new source of regenerating beta cells in another type of cell that looks like an immature beta cell. These new cells can make insulin, but don’t have the receptors to detect glucose; thus, while they can’t function as a full beta cell, they represent an important step in the rare transformation of glucagon-producing cells into insulin-producing beta cells. Understanding how these new cells mature could lead to therapies that allow for replenishment of beta cells that are lost in T1D.

**Dogma 7:** T1D is a disease that only affects the insulin-producing beta cells (part of the endocrine tissue) in the pancreas, while the rest of the organ (exocrine tissue) is unaffected.

**Reality:** nPOD investigators studied the pancreatic weights of healthy individuals compared to those in various stages of T1D and found the size of the diabetic pancreas is smaller. This finding suggests that the exocrine cells in the pancreas, and not just the endocrine beta cells, are affected in T1D and opens new avenues for research on how this interaction may contribute to this disease.

**Dogma 8:** T1D results from a viral infection.

**Reality:** After years of intensive research related to viruses and the pancreas, nPOD has not, as yet, found evidence that viral infections can acutely lead to beta cell loss and T1D. Nonetheless the role of viruses remains under active investigation and holds the potential to lead to a vaccination strategy and other novel interventions.

**Dogma 9:** What is researched in blood samples may not be reflective of what actually occurs in the T1D pancreas.

**Reality:** nPOD has isolated living pancreatic islets from donors with T1D and identified many forms of self-reactive immune cells similar to those observed in peripheral blood. Thus, nPOD is helping to validate disease biomarkers that can be assessed in living subjects that will benefit diagnostic approaches, risk assessment and ultimately new, more effective, and safer therapies.

**Dogma 10:** T1D is a singular disorder.

**Reality:** T1D is not just one disease; nPOD researchers have noted that patients differ in having different types and severity of alterations in the pancreas, the nature of the autoimmune responses, and the type of genetic background that contributes to T1D development. The disease process may lead to beta cell dysfunction and beta cell loss in different ways, but in the end, all have somewhat similar symptoms and insulin deficiency. Understanding this may lead to improved diagnosis and disease management.

Based in part on these and other success stories, over recent years, nPOD has served as a stimulus to the formation of many new programs directed at studies of the human pancreas, both within the United States (e.g., the National Institutes of Health’s Human Islet Research Network’s (HIRN), Human Pancreas Analysis Program (HPAP), the Leona M. and Harry B. Helmsley Charitable Trust’s Handel-P program) and Europe (e.g., EuPOD). As presented herein, studies of the human pancreas have not only lead to major improvements in our understanding of T1D's pathogenesis but are poised, in ensuing years, to provide for advances in the diagnosis and treatment of the disease, as well as potentially...a means to prevent and/or cure it.

**General References**


**About Network for Pancreatic Organ donors with Diabetes (nPOD) program**

JDRF developed the Network for Pancreatic Organ Donors with Diabetes (nPOD) program in 2007 as the world’s largest tissue bank dedicated to the study of the human pancreas in Type 1 diabetes (T1D). The nPOD program collects and processes pancreatic and other tissues from organ donors who had or were at increased risk for T1D and makes them available to investigators around the world for research. nPOD and other initiatives are actively transforming T1D research by advancing the number of investigations performed using human samples, including almost 250 studies by nPOD scientists today.
**RESEARCH**

**CARING FOR SENIOR ADULTS WITH TYPE 2 DIABETES**

Diabetes is a chronic and complex disease impacting the lives of more than 30 million Americans. For those 65 years of age and older, approximately 25 percent have diabetes. Senior adults physiologically have unique needs, and adding diabetes to the mix further complicates these needs. Health-care professionals must understand the specific care needs of seniors with diabetes, provide comprehensive monitoring and develop appropriate treatment regimens.

**PATIENT CASE**

PW, 72-year-old African American female, presents to clinic for three-month follow-up visit.

- Personal medical history: dyslipidemia, osteoarthritis, hypertension, Type 2 diabetes mellitus, depression, mild dementia
- Current medications:
  - metformin 1,000 mg BID
  - glyburide 5 mg BID
  - lisinopril 10 mg QD
  - amlodipine 5 mg QD
  - acetaminophen 500 mg BID PRN
- BG averages: fasting 200 mg/dL and bedtime 250 mg/dL
- 90 kg
- A1c: 9%
- BP 145/85
- eGFR 50 mL/min/1.73 m²

**Table 1**

<table>
<thead>
<tr>
<th>Comorbidities</th>
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<tbody>
<tr>
<td>Fatty liver disease</td>
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<tr>
<td>Obstructive sleep apnea</td>
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<tr>
<td>Cancer (liver, pancreas, endometrium, colon, breast, bladder)</td>
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<tr>
<td>Arthritis</td>
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<tr>
<td>Risk for fractures</td>
</tr>
<tr>
<td>Low testosterone in men</td>
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<tr>
<td>Periodontal disease</td>
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<tr>
<td>Hearing impairment</td>
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</table>

**Specific Care Needs**

Many factors can compromise glycemic control in older adults. Table 1 lists the comorbidities that have the potential to adversely affect diabetes outcomes. Other functional disabilities that need to be evaluated include social isolation and depression. Both can disable a person when the inability to cope interferes with self-management of the day-to-day responsibilities of diabetes such as blood glucose monitoring, medication management, insulin administration, food preparation and decision-making. Diabetes is associated with an increased risk for cognitive decline and dementia; therefore, screening of cognition is recommended. Additionally, coexisting diseases such as hypertension, cardiovascular disease, stroke and chronic kidney disease significantly correlate to the macrovascular and microvascular changes that occur with chronic hyperglycemia. These comorbidities must be treated and managed concurrently with diabetes.

Other important areas that need to be assessed in older adults with diabetes include attitudes toward diabetes self-care to make changes in diabetes management, current self-care knowledge and the ability to perform self-care practices. Assess each person’s ability to read, write and use language and numbers so that appropriate resources are provided for the person to better understand information and skills. The ability to use technology is important if new treatment choices are being offered to an older adult, allowing for time to assimilate and practice these changes with daily care. Family and social support figure significantly in a person’s level of self-care. Social isolation and the inability to obtain and afford food and prescriptions or to travel to scheduled health-care appointments are significant factors that can have negative outcomes to diabetes care.

Older adults with diabetes are also at risk for geriatric syndromes (Table 2). They may suffer from urinary tract infections due to chronic hyperglycemia and urinary retention. Adults may experience chronic constipation with fecal impactions due to medications and lack of adequate fluids and fiber in the diet. And as the older adult loses flexibility and balance, takes psychotropic medications or has...
hazardous conditions in the home, the risk for falls increases by 50 percent.

Older adults with diabetes are at high risk for hypoglycemia due to potential physiological changes such as a slowed glucagon response, inadequate food intake and renal insufficiency. These physiological changes can delay a person’s response in recognizing the signs and symptoms of hypoglycemia, which can lead to hypoglycemic unawareness. Education on the signs and symptoms of hypoglycemia with appropriate treatment is important for recovery. Older adults taking beta blockers need to be instructed that symptoms of a rapid heart rate or tremors/shakiness may be masked. The threshold of a higher blood glucose level to initiate treatment may need to be considered. Severe hypoglycemia with blood glucose below 40 mg/dL may have a negative outcome such as unconsciousness or seizure activity. Family members need to be instructed on recognizing the neurological symptoms and the catecholamine responses with hypoglycemia and on appropriate treatment, including glucagon administration.

Hypersmolar hyperglycemia state (HHS) is a life-threatening condition that can occur with older adults with diabetes. This condition is usually precipitated by infections, medications or dehydration. The onset may be insidious with a gradual onset, and frail adults in long-term care facilities are at highest risk. They may lack the ability to ask for fluids to stay hydrated or describe changes in their general well-being. There is a high mortality risk if left the condition is undiagnosed, and it may require emergent resuscitation in an acute care setting.

**Monitoring and Treatment Regimens**

**American Diabetes Association (ADA) Glycemic Targets**

When one is caring for older adults with diabetes, it is vital to consider the customization of glycemic targets based on health status. Hypoglycemia is a major concern because it increases risk of cognitive decline and falls. Glycemic targets and pharmacological therapy should be adjusted accordingly to prevent hypoglycemic episodes. Glycemic targets are individualized to optimize outcomes and overall health status (Tables 3 and 4).

Encouraging self-monitoring of blood glucose (SMBG) is an integral part of a patient’s diabetes management plan. Patterns in blood glucose guide treatment decisions in terms of initiation, adjusting and discontinuing drug therapy as well as the

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**Table 2**

**Geriatric Syndromes**

<table>
<thead>
<tr>
<th>Syndrome</th>
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</thead>
<tbody>
<tr>
<td>Urinary incontinence</td>
</tr>
<tr>
<td>Injurious falls</td>
</tr>
<tr>
<td>Persistent pain from arthritis</td>
</tr>
<tr>
<td>Neuropathic pain</td>
</tr>
</tbody>
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**Table 3**

**ADA Glycemic Goals for Nonpregnant Adults with Diabetes**

<table>
<thead>
<tr>
<th>A1C</th>
<th>Preprandial</th>
<th>Peak Postprandial</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7%</td>
<td>80–130 mg/dL</td>
<td>&lt;180 mg/dL</td>
</tr>
</tbody>
</table>

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**Table 4**

**ADA Glycemic Goals for Seniors**

<table>
<thead>
<tr>
<th>Type of Patient</th>
<th>A1C</th>
<th>Preprandial</th>
<th>Bedtime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Healthy</td>
<td>&lt;7.5%</td>
<td>90–130 mg/dL</td>
<td>90–150 mg/dL</td>
</tr>
<tr>
<td>Complex/intermediate</td>
<td>&lt;8%</td>
<td>90–150 mg/dL</td>
<td>100–180 mg/dL</td>
</tr>
<tr>
<td>Very Complex</td>
<td>&lt;8.5%</td>
<td>100–180 mg/dL</td>
<td>110–120 mg/dL</td>
</tr>
</tbody>
</table>

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**PATIENT CASE**

**What are PW’s glycemic targets?**

This patient is complex/intermediate (primarily due to the mild dementia) therefore goals are A1c <8%, preprandial 90 – 150 mg/dL and bedtime 100 – 180 mg/dL.

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* = multiple co-existing chronic illnesses or 2+ instrumental activities of living impairment or mild to moderate cognitive impairment (per ADA)
Overall treatment plan. When using SMBG as part of a management plan, knowledge and understanding must be assessed and continuous instruction must be given because of cognitive impairment or functional status.

Comprehensive Monitoring
When one is monitoring the health of senior adults with diabetes, several considerations are unique to this patient population. Blood glucose target ranges are individualized based on the complexity and life expectancy. Seniors with greater complexity of disease states and limited life expectancy have relaxed glycemic targets compared to those who are less complex with longer life expectancy. Additionally, prevention of hypoglycemia is a key goal in managing glycemia in the older population. Thus, assessing for hypoglycemia is vital. Similarly, blood pressure goals are individualized. According to the ADA, elderly patients with diabetes should be screened for depression. In those 65 years of age and older, annual screening for mild cognitive impairment or dementia is vital. The Mini Mental State Examination is one tool for cognitive impairment screening. Due to an increased risk of ulcers and amputations with diabetes, an annual comprehensive foot examination that assesses feeling, smaller and large fiber function and current symptoms of neuropathy and vascular disease is recommended. During each clinic visit, patients with diabetes should have their feet inspected. Another common complication of diabetes in older adults is nephropathy, so at a minimum, measuring urinary albumin and estimated glomerular filtration rate (eGFR) to assess kidney function is vital. This population has several recommended immunizations due to their increased risk of complications from illnesses such as cold or flu.

- Pneumococcal: PCV-13 and PPSV-23
- Influenza
- Herpes zoster
- Td/Tdap
- Hepatitis B

Meal Planning
These adults should have medical nutrition therapy provided by a dietitian. A thorough review of dietary intake, physical activity and supplementation (i.e., vitamins) should be assessed. For obese patients, moderate caloric restriction is recommended. Carbohydrates should be distributed consistently throughout the day. Alcohol consumption must be assessed because it contributes to overall caloric intake and has potential to cause hypoglycemia. Adequate dentition should be assessed and the patient should be referred as needed to a dental specialist for dentures to ensure the patient is able to consume adequate nutrition. Access to food and meal preparation abilities are vital in the overall nutrition of senior adults. For those older adults without adequate access to food, referrals to community programs such as Meals on Wheels is key. Constipation is a common condition in older adults, so review bowel function and assess for need of medications or supplements to prevent or treat constipation.

Physical Activity
Being physically active is essential for seniors with diabetes. Evaluation of physical activity ability must be completed prior to making specific exercise recommendations. Several conditions can limit the types of exercises that these adults can safely perform (see Table 6). General principles guiding physical activity in seniors are being as active as possible and incorporating exercises that maintain or improve balance and resistance exercise (i.e., free weights or weight machines) twice weekly. These exercises improve flexibility and decrease risk for falls.

Drug Therapy
When one is determining an appropriate diabetes medication regimen for older adults, many
factors must be considered, including renal and hepatic function (Table 7). Due to concern about hypoglycemia, medication classes with high risk of hypoglycemia should be avoided (Table 8). It is preferable to use medicines from classes with low risk of hypoglycemia, such as metformin. If metformin is prescribed, discuss possible supplementation of vitamin B12 due to its association with decreased levels. Even for those senior adults not on metformin, evaluating vitamin B12 status is important.

Another common issue in senior adults is overtreatment, which can also lead to hypoglycemia. To prevent overtreatment, avoid complex regimens and simplify the pharmacotherapy plan to regimens with fewest number of drugs and less frequent dosing. Metformin is the first-line agent for Type 2 diabetes. However, the use of metformin is contraindicated in patients with advanced renal impairment. Also, it should be used cautiously in those with impaired hepatic function or congestive heart failure, which increases the risk of lactic acidosis. Thiazolidinediones should be used cautiously in patients with or at risk of congestive heart failure. Incretin-based therapies such as DPP-IV inhibitors and GLP-1 agonists may not be feasible for older adults due to their higher costs. SGLT-2 inhibitors have limited long-term experience and should be avoided in advanced renal impairment. The use of insulin requires the patient or caregiver have good cognitive function, vision and motor skills. The use of once-daily basal insulin may be a reasonable option for these patients based on minimal adverse effects and simplicity of regimen.

When choosing a regimen for older adults, socioeconomic status and the presence of support systems must also be considered. The patient’s income is perhaps the most important factor to consider. Insurance formularies should always be consulted when initiating or adjusting a medication regimen to ensure the most affordable option is selected. An established support system may also play a vital role in the management of diabetes. Family members or caregivers are essential to ensure emotional and social support, adherence to medication, monitoring of blood glucose and overall lifestyle changes associated with diabetes.

### Conclusion

Diabetes is certainly not a one-size-fits-all condition. Especially with geriatric adults with diabetes, customization of the treatment plan with consideration of specific and unique needs of this population is key. Comorbidities and potential geriatric syndromes must be assessed prior to setting goals and developing a care plan. Glycemic targets must be developed with consideration of current health status. A treatment plan must incorporate comprehensive monitoring, meal planning, physical activity and drug therapy. One of the keys with drug therapy is prevention of hypoglycemia due to its serious consequences. Integration of multiple factors and considerations into the care of older adults with diabetes is essential to ensure safe and effective management of diabetes while maintaining an optimal quality of life. PD

### Table 7

<table>
<thead>
<tr>
<th>Considerations When Initiating and Adjusting Diabetes Medications</th>
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<tbody>
<tr>
<td>Kidney and liver function</td>
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<tr>
<td>Comorbidities</td>
</tr>
<tr>
<td>Risk for hypoglycemia</td>
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<tr>
<td>Cost</td>
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</table>

### Table 8

<table>
<thead>
<tr>
<th>Diabetes Medications with Increased Risk of Hypoglycemia</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drug Class</strong></td>
</tr>
<tr>
<td>Insulin</td>
</tr>
<tr>
<td>Sulfonylureas</td>
</tr>
</tbody>
</table>

### REFERENCES

Read all of this issue’s references online at bit.ly/2DxxSMA

### PATIENT CASE

PW’s current meds: metformin 1,000 mg BID, glyburide 5 mg BID, lisinopril 10 mg QD, amlodipine 5 mg QD, acetaminophen 500 mg BID PRN. Her A1c is 9%.

**What diabetes medication adjustments should be made?**
- Discontinue glyburide because it is a sulfonylurea and A1c is not controlled.
- Continue metformin because eGFR is not <30 ml/min/1.73 m²
- Initiate basal insulin 10 units at bedtime or weight based (9-18 units/day)

### Conclusion

Diabetes is certainly not a one-size-fits-all condition. Especially with geriatric adults with diabetes, customization of the treatment plan with consideration of specific and unique needs of this population is key. Comorbidities and potential geriatric syndromes must be assessed prior to setting goals and developing a care plan. Glycemic targets must be developed with consideration of current health status. A treatment plan must incorporate comprehensive monitoring, meal planning, physical activity and drug therapy. One of the keys with drug therapy is prevention of hypoglycemia due to its serious consequences. Integration of multiple factors and considerations into the care of older adults with diabetes is essential to ensure safe and effective management of diabetes while maintaining an optimal quality of life. PD
COMMENTARY

DIABETES LANGUAGE STATEMENT: THE LANGUAGE WE USE CAN IMPACT DIABETES CARE

The manner, tone and words we use to communicate as health-care professionals can significantly impact the lives of people with diabetes. Words are powerful and can positively or negatively influence the way people view themselves and can affect self-management, emotional well-being and provider relationships. A task force consisting of representatives from the American Association of Diabetes Educators (AADE) and the American Diabetes Association (ADA) developed practical guidelines to assist health-care professionals, family members/significant others and the community at large to better serve and support people with diabetes.

The four guiding principles for communication with and about people living with diabetes follow.

◆ Diabetes is a complex and challenging disease involving many factors and variables.
◆ The stigma that has historically been attached to a diagnosis of diabetes can contribute to stress and feelings of shame and judgment.
◆ Every member of the health-care team can serve people with diabetes more effectively through a respectful, inclusive and person-centered approach.
◆ Person-first, strengths-based empowering language can improve communication and enhance the motivation, health and well-being of people with diabetes.

The power of words
According to Jane K. Dickinson, RN, PhD, CDE, and language guideline co-author, “The words we use and the messages we send are part of the context created for people with diabetes. When they hear messages that are judgmental or impart blame, shame or guilt, they are less likely to trust us and more likely to feel discouraged.”

Dickinson, who has been living with Type 1 diabetes for over 40 years, believes in language that is empowering and focuses on the entire person and his or her goals, needs and individualized care. “When we focus on what’s important to the person and acknowledge his or her whole story, people with diabetes are more likely to partner with health-care providers in managing their diabetes.”

Tools you can use
The words health-care professionals choose may influence whether an individual follows up with self-care and can determine the effectiveness of future relationships with the health-care team. Think about words that may be commonly used during appointments, classes or virtual sessions. Instead of using words such as “control,” “compliance” or “adherence,” Dickinson suggests using language that focuses on the person and improves engagement. For example, if a person with diabetes is working on blood glucose management, center the discussion around that specific issue. Discuss time in range, or HbA1c or glycemic response, rather than the term “control,” which isn’t useful and can cause an individual to feel discouraged.

Begin with simple swaps. Instead of labeling a person as “diabetic,” say “a person with diabetes.” Rather than ask someone to “test” blood glucose (which denotes pass or fail), suggest “check” blood glucose. The AADE has developed helpful language resources for health-care professionals, the community at large and the media. These resources can be accessed free of charge at diabeteseducator.org.

Neutral, non-judgmental and action-oriented
According to the task force, we as health-care professionals need to use language that is neutral, non-judgmental and based on specific actions and facts. Dickinson is encouraged to see health-care professionals starting to use this person-centered approach to language. “The hardest thing is how ingrained the negative words are in the diabetes and health-care communities,” she says. “We say what we know and hear and read every day. In fact, many people living with diabetes still refer to themselves using words we are trying to eliminate. We are asking health-care professionals to lead by example, stop using judgmental language and start using empowering language. For so long the emotional side of diabetes has not been recognized, which has led to the negative, judgmental and shaming language we are so used to. Many providers don’t even hear themselves using it. The first step is to become aware of the problem. Listen for these words and then work toward changing them.” PD
**Study Title:** Canagliflozin and Renal Outcomes in Type 2 Diabetes

**Study Title Acronym:** CANVAS-R, CANVAS

**ClinicalTrials.gov Identifier:** NCT01989754 (CANVAS-R), NCT01032629 (CANVAS)

**References:**

**Sponsor:** Janssen Research & Development

**Study design:** Two (CANVAS-R and CANVAS) double-blind, randomized trials of canagliflozin versus placebo with combined data to investigate renal outcomes in patients with Type 2 diabetes mellitus who either had symptomatic atherosclerotic vascular disease or at least two cardiovascular risk factors

**Primary outcome:** Composite and individual outcomes of sustained and adjudicated doubling in serum creatinine, end-stage kidney disease, death from renal causes, annual reductions in estimated glomerular filtration rate and changes in urinary albumin-to-creatinine ratio

**Results:** After 188 weeks of follow-up in the CANVAS trial and 108 weeks in the CANVAS-R trial, the composite outcome of sustained doubling of serum creatinine, end-stage kidney disease and death from renal causes occurred less frequently in the canagliflozin group compared with the placebo group at a rate of 1.5 per 1000 patient-years in the canagliflozin group compared to 2.8 per 1000 patient-years in the placebo group (HR 0.53, 95% CI 0.33-0.67). Glomerular filtration rate decline in patients treated with canagliflozin was slower by 1.2 mL/min per 1.73 m² per year (95% CI 1.0-1.4). Mean urinary albumin-to-creatinine ratio was 18% lower in participants treated with canagliflozin (95% CI 16–20). The reductions in albuminuria in the canagliflozin group were similar and significant after adjustment for change in A1C.

**Summary:** These data suggest that canagliflozin reduces albuminuria and stabilizes renal function in patients with Type 2 diabetes mellitus. The effect of canagliflozin on reducing albuminuria was independent of A1C lowering, suggesting an additional mechanism of action that has positive effects on the kidneys. Further clinical trials will need to be conducted to determine if the nephroprotective effects of canagliflozin are significant enough to actually prevent or possibly even treat chronic kidney disease related to diabetes.
**Study Title:** Outcomes in Obese Patients with Type 2 Diabetes 3 Years after Gastric Bypass Versus Intensive Lifestyle Management  

**Study Title Acronym:** SLIMM-T2DM  

**ClinicalTrials.gov Identifier:** NCT01073020  


**Sponsor:** Joslin Diabetes Center  

**Study design:** Randomized trial comparing Roux-en-Y gastric bypass surgery versus intensive medical diabetes and weight management  

**Primary outcomes:** Fasting blood glucose less than 126 mg/dL and A1C less than 6.5%  

**Other outcomes:** Change in weight, quality of life surveys and Problems Areas of Diabetes Survey (PAID)  

**Results:** After 3 years, 42% of patients in the Roux-en-Y group achieved the primary outcome of an A1C <6.5% with a fasting blood glucose <126. No patients in the intensive lifestyle management group achieved the goal A1C and fasting blood glucose. Patients in the Roux-en-Y group had a greater change in A1C, -1.79% versus -0.39% (P < 0.001). There was greater weight loss in the Roux-en-Y group, with a mean weight loss of 24.9 kg versus 5.2 kg in the intensive lifestyle management group (P < 0.001). Greater improvement in quality of life surveys was also noted in the bariatric surgery group (P <0.001). PAID survey scores improved in both groups, but there was no significant difference between the two. Serious adverse events were more common in the Roux-en-Y group. Four patients in the Roux-en-Y group required repeat gastrointestinal surgery for complications related to the initial bariatric surgery. There were no deaths in either group.  

**Summary:** Although this trial is relatively small (88 patients), it illustrates the potential benefits of bariatric surgery for the treatment of obese patients with Type 2 diabetes mellitus. Bariatric surgery showed an effect on body weight and glycemic control in patients with obesity and Type 2 diabetes mellitus after three years of follow-up. An improvement in quality of life was also demonstrated following bariatric surgery. It is important to note that there were more adverse events in the patients who underwent the Roux-en-Y procedure, and four of the patients required gastrointestinal surgery to correct complications. Patients and clinicians should discuss the potential benefits and risks of bariatric surgical procedures before patients decide on what method of weight loss is best for them. For some obese patients with diabetes, especially those who are excellent surgical candidates, the potential benefits of bariatric surgery greatly outweigh the risks.
Study Title: Trial Comparing Efficacy and Safety of Insulin Glargine 300 Units/mL Versus 100 Units/mL in Older People with Type 2 Diabetes

Study Title Acronym: SENIOR

ClinicalTrials.gov Identifier: NCT02585674

Reference:
Ritzel R, Harris SB, Baron H, et al. A randomized controlled trial comparing efficacy and safety of insulin glargine 300 Units/mL versus 100 Units/mL in older people with type 2 diabetes: Results from the SENIOR study. Diabetes Care. 2018;41(8);1672-1689. doi:10.2337/dc18-0168

Sponsor: Sanofi

Study Design: Randomized trial comparing glargine 300 units/mL versus glargine 100 units/mL in patients over 65 years old

Primary outcome: Change in A1C

Main secondary outcome: Percentage of patients with one or more confirmed blood glucose ≤70 mg/dL or severe hypoglycemic events

Results: There was no statistical difference in A1C reduction between the two groups. There was also no statistical difference between the percentage of patients experiencing one or more confirmed blood glucose ≤70 mg/dL or severe hypoglycemic events in the two groups. In the subgroup of patients ≥75 years of age, the incidence of documented, symptomatic hypoglycemia (blood glucose <54 mg/dL) was significantly lower with glargine 300 units/mL (relative risk of 0.33, 95% CI 0.12-0.88).

Summary: Hypoglycemia is a major concern in the treatment of older patients with diabetes mellitus. Finding therapies that improve glycemic control while minimizing hypoglycemia is challenging. Some patients notice that glargine 100 units/mL has a peak effect that can sometimes result in hypoglycemia. Glargine 300 units/mL may have less of a peak effect than glargine 100 units/mL. This trial showed that A1C reductions are similar with both concentrations of glargine. Although rates of hypoglycemia were similar with both basal insulins, the subgroup of patients over age 75 did have a statistically lower rate of symptomatic hypoglycemia with glargine 300 units/mL. Glargine 300 units/mL may prove to be helpful in managing patients over 75 years old, especially those who are having recurrent hypoglycemic episodes.

Study Title: Efficacy and Safety of Degludec/Liraglutide Fixed Combination versus Basal-bolus Insulin in Patients with Uncontrolled Diabetes Mellitus Type 2 on Metformin and Basal Insulin

Study Title Acronym: DUAL VII

ClinicalTrials.gov Identifier: NCT02420262

Reference:

Sponsor: Novo Nordisk

Study Design: Randomized trial comparing a fixed ratio of degludec/liraglutide versus glargine 100 units/mL and aspart (basal-bolus insulin therapy) in patients with uncontrolled Type 2 diabetes

Primary outcome: Reduction in hemoglobin A1C

Results: After 26 weeks, the mean A1C decreased from 8.2% to 6.7% in patients treated with degludec/liraglutide and in patients treated with basal-bolus insulin therapy (estimated treatment difference of -0.02%, P <0.0001). There was an 89% lower rate of severe or confirmed symptomatic hypoglycemic episodes with degludec/liraglutide versus basal-bolus insulin therapy (estimated ratio of 0.11, P < 0.0001). Observed mean body weight decreased by 0.9 kg with degludec/liraglutide, and body weight increased by 2.6 kg in patients on basal-bolus insulin (estimated total difference of -3.6 kg, P < 0.0001).

Summary: The potential advantages of fixed ratio degludec/liraglutide over basal-bolus therapy in Type 2 diabetes mellitus include fewer injections (degludec/liraglutide is given once daily), less hypoglycemia and a potential decrease in body weight. This study shows that degludec/liraglutide also effectively lowers hemoglobin A1C in patients with uncontrolled Type 2 diabetes mellitus. This study only included patients with baseline hemoglobin A1C of 7.0%-10.0%. Further investigation is needed to assess how degludec/liraglutide compares to basal-bolus therapy in patients with a hemoglobin A1C greater than 10%. PD
The last thing an educator wants to be described as boring. Start by thinking about what makes a presentation boring to you. Perhaps a monotone presenter, reading slides, dry facts with no emotion and/or taking too long to make a point. To keep presentations engaging to your audience, you want to avoid those pitfalls. People learn by different styles based on gender, culture, generation and a multitude of other factors. Let’s take a look at some ways you can grab and hold your audience’s attention.

**Be present, both physically and mentally.** This goes for you and your audience. Imagine how many distractions you are competing with. Minds tend to wander to home, work, school, children, lunch—the list goes on and on. Consider how many times you have been in a class or presentation and spent your time thinking about and maybe even doing something else. Adult learners want to know the information will benefit them. Explain how your presentation is going to enlighten or help them. In other words, show them why they should focus on your presentation.

**Prepare for your presentation.** If possible, know the size and layout of the room and have a general idea about your target audience. You may be doing a presentation for an audience of professional colleagues, a class for clients or a talk for the general public. Plan your presentation accordingly. Know the material you are presenting and the points you want to convey. Depending on the presentation, you may be drawing from your experiences or educating on subject matter. Spend time researching your subject and have a plan for how you will present the information. Speak to your audience about how they might benefit from the information presented. Arrange the room in a way that is conducive to learning. Think of how you are most comfortable presenting and from where you like to present. Do you move around or are you stationary? Be part of the group you are teaching—connect with your audience. For example, in small groups where everyone is sitting, you may want to sit and talk with the audience. In larger audiences, you may want to walk around and make eye contact with people in the audience. Be sure to pause to let them process information. Watch for verbal and non-verbal affirmation: a word of understanding, a nod and/or a smile.

**Presenting to a diverse audience.** Remember that generations may have different learning styles. For example, Traditionalists, Baby Boomers and...
Generation Xers tend to expect to work for their learning. Generation Y and Millennials tend to want the answer at their fingertips. They are accustomed to being able to access everything with a touch of a button at any time. Gender differences play a role in learning and class participation. Males tend to speak and process information in facts and straightforward answers. Females, on the other hand, tend to be storytellers and enjoy more emotion in learning. Culture may play a role in your teaching. For example, making eye contact with an authority figure is considered disrespectful in some cultures, while it can signal disinterest or inattentiveness in others.

Incorporate activities into your presentations. Activities can be a great way to help your audience be more involved and feel a part of the experience. If you use a presentation style that involves hands-on learning, explain what you are planning, but give them a choice to not participate and be spectators. To solicit involvement, you may ask questions or allow sharing of experiences. Other ways to encourage involvement include having the participants demonstrate what they have learned or to invest emotionally by storytelling (saying how they would do it). A good way to gain participation may be by providing incentives, recognition or giveaways. Thank your audience for their willingness to participate in activities.

Involving your audience. You want your presentation or class to be memorable and useful. Benjamin Franklin once said, “Tell me, and I forget. Teach me and I remember. Involve me and I learn.” Involve your audience by giving them the opportunity to be part of the presentation process. You might use a heartwarming story about something that worked for someone else, a humorous tale of experiences with family and/or friends or another experience to add to the information being presented.

Adding humor. Humor is a great way to stay involved and connect with your audience. Be careful to ensure your humor has a point. It should add to your presentation and help strengthen the points you are trying to make. Be careful to use humor in a way that is not offensive to your audience. What is funny to you may not be funny to everyone. Watch for laughter, body language and approval as you integrate new humor.

Practice. The more you practice presenting, the more chances you have to polish and refine your presentation skills. Before the actual presentation, practice in front of your friends or co-workers and solicit constructive criticism that you can use to make the final product better. Ask for clarification about why they think something needs to be changed. Remember that it is your decision to make or not make changes based on the advice of others. Be comfortable with the presentation material and style. If your presentation starts to feel boring to you, change it up—be creative and/or add something new—while still getting the same points across.

Have fun with your presentations. Use these tips to avoid the boredom pitfalls and provide your audience with a stimulating learning environment.
IMPROVING DIABETES PATIENT CARE THROUGH NURSING

Diabetes care is complicated, expensive, and time consuming. The American Diabetes Association’s (ADA) Standards of Care call for educating patients about diet, exercise, medications and glucose testing. The medical doctor (MD) providing diabetes care should screen for and treat complications, and maintain patients’ glucose, blood pressure and lipids within their individualized target ranges. Patients with diabetes are often hospitalized and need specialized care in the hospital.

Clearly, medical doctors cannot provide all this care, especially at authorized payment rates. Diabetes care is more than prescribing medicines and doesn’t fit well in 10–15 minutes appointments. Fortunately, other health-care professionals, especially nurses, can help.

There are about 3,000,000 registered nurses (RNs) and 700,000 vocational nurses (LVNs or LPNs) in the U.S. (compared to about 1,000,000 MDs), who can provide care to people with diabetes in many levels of the health-care system.

**Nurse care managers**

Care managers are usually RNs who have been trained in monitoring, scheduling, database management, care coordination and educating patients.

A study at Johns Hopkins of 542 low-income African-Americans found that those who consulted with a nurse manager and received visits from community health workers (CHWs) had 47 percent fewer emergency department (ED) visits and 56 percent fewer hospitalizations than a usual care group.

Care managers addressed obstacles to management, such as depression, poverty and “household problems interfering with medication adherence.” According to the study, both CHWs’ and nurses’ visits focused on health education, nutrition, foot care, medication adherence and assistance accessing the health-care system.

“The study created an alternative way to get problems addressed,” said Martha Hill, dean of the Johns Hopkins University School of Nursing.

*The reviewer of this article is an employee of the Department of Veterans Affairs. However, the views expressed in this article are the author’s personal views. They do not necessarily represent the views of the Department of Veterans Affairs or of the United States government.*
“Patients could see the nurse the next day instead of waiting long periods for physician visits or going to the ED.”

**Diabetes specialist nurses**
Diabetes specialist nurses have received training and/or certification and hold an advanced practice registered nurse (APRN) license and assist in the medical management of diabetes. These nurses can be especially valuable in individualizing treatment, which is called for by the ADA Standards of Care. An English study reported that “Nurses are best placed to implement guidance on caring for frail, elderly diabetes patients.”3

“We have now established guidance about which medications should and shouldn’t be given to different patients,” said Dr. David Strain, a lead author of the study. “Nurses may be better placed than doctors to make these decisions. They often get more time to talk to people with diabetes, so they have often been able to elicit potential complications of treatment that may get overlooked during shorter consultations with doctors.”

Diabetes specialist nurses can also treat patients in the hospital, where patients often need additional attention to manage blood glucose levels.4 Preventing and managing hypoglycemic episodes in the hospital is also a responsibility for nurses. In some hospitals, after the patient has been assessed to be safe, patients using an insulin pump for diabetes management may continue to self-manage their diabetes control, which nurses can facilitate.

**Primary-care nurse practitioners**
Nurse practitioners (NPs) are registered nurses who have continued their education by obtaining either a Master of Nursing (MSN) or Doctor of Nursing Practice (DNP) from a nurse practitioner program, preparing them for the APRN role. They usually work in collaboration with an MD. They prescribe medications as well as order tests.

Researchers at Kaiser Permanente wrote, “There is evidence that nurse practitioners improve clinical outcomes for patients with Type 2 diabetes in primary-care practices through their capacity to initiate, change and adjust medications without physician authorization. Their willingness to embrace alternate methods of patient communication (via telephone, e-mail or e-visits) has been shown to increase the convenience and quality of care while reducing costs and improving glycemic control.”5

An article in Diabetes Spectrum reported that “Studies have suggested that the quality of care provided by primary-care nurse practitioners is equal to that provided by physicians.”6 A paper in JAMA concluded care by NPs leads to the same outcomes as care provided by primary-care physicians.7

**Nurses in the office and community**
Patients with diabetes need to have their feet examined and be screened for peripheral neuropathy.8 Office nurses can learn to do this. Patients with diabetes may have a variety of difficult problems such as sleep apnea or sexual dysfunction, and nurses who have formed relationships and trust with patients often learn important patient history that the individual may have not or been too embarrassed to share with their doctors.

In the community, nurses can screen large numbers of people for diabetes with blood tests. This early detection may enable people to change behavior or start medications before complications can develop.

Nurses in the clinic and community can be RNs, who have an Associate’s or Bachelor’s degree in nursing. A Licensed Practical Nurse (LPN) or Licensed Vocational Nurse (LVN), who usually has 12–18 months of training to prepare for the license exam, can also work in a clinic or community setting. Some programs employ nursing assistants or CHWs who do not hold a license.

Visiting nurses (usually RNs) can assess and treat patients who need skilled care at home. In the home, they can see and evaluate the problems patients are having managing various issues, such as diet and self-care.

Nurses who have a high rate of contact with patients who have diabetes can learn diabetes screening, teaching and coaching skills such as those used in motivational interviewing.9 There is training, education and/or certification available for all levels of nursing practice.

**Diabetes educators and advance diabetes managers**
Registered Nurses, including nurse practitioners, dietitians, pharmacists, physicians and many other health professionals who are qualified can be trained and certified as certified diabetes educators (CDEs). CDEs can teach patients to self-manage and can help them address problems and barriers that come up throughout their life with diabetes.

In 2001, the American Diabetes Association and the American Association of Diabetes Educators jointly created a Board Certified Advanced Diabetes Manager (BC-ADM) credential, which is available to certain health-care disciplines holding a Master’s degree or higher.10 ADMs must demonstrate skills in clinical practice, assessment, diagnosis/problem identification, planning and intervention, clinical coordination and case management. They must also have a range of professional competencies such as collaborating, consulting and quality improvement.

With more than 30 million Americans having diabetes, nurses play a number of vital roles in providing the extensive care and education that diabetes management requires.
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REFERENCES

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IMPROVING DIABETES CARE THROUGH NURSING


