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Identification of Generalist Registered Dietitian Nutritionist Knowledge Gaps in Diabetes Medical Nutrition Therapy Compared to Diabetes-Credentialed Registered Dietitian Nutritionists: Results of a Survey to Inform Educational Opportunities

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The Figure appears at www. jandonline.org.

A S OF 2015, THE PREVALENCE of undiagnosed and diagnosed diabetes mellitus is 30.3 million in the United States.[1] Estimates indicate there are an additional 84.1 million Americans with prediabetes.[1] Medical nutrition therapy (MNT) is considered an essential component of diabetes management,[2] yet there are only 8,107 registered dietitian nutritionists (RDNs) in the United States with a diabetes credential (7,988 Certified Diabetes Educators, [CDE][3] and 119 with Board Certification in Advanced Diabetes Management [BC-ADM] (personal communication, J. Johnson, American Association of Diabetes Educators, July 31, 2017). The implication is that it would be virtually impossible for all patients with diabetes to see an RDN who is also a CDE or BC-ADM. The high prevalence of diabetes in the US population (9.4%)[1] is such that most RDNs in practice will frequently encounter and care for patients with diabetes. Therefore, it is important that RDNs with and without a diabetes credential are able to provide competent and evidence-based diabetes care.

There are a variety of resources to assist with the goal of competent diabetes care, including the Standards of Practice (SOP)/Standards of Professional

Performance (SOPP) in Diabetes Care,[4] which describe practice and performance standards for each level of practice (generalist, specialty, and advanced). The standards are a tool for self-evaluation to assess current practice and professional development needs for advancement of practice in diabetes care and education. In addition, the Academy of Nutrition and Dietetics' (Academy) Evidence Analysis Library has published evidence-based nutrition practice guidelines for type 1 and 2 diabetes,[5] gestational diabetes,[6] and the prevention of diabetes.[7] Furthermore, the Diabetes Care and Education Dietetic Practice Group (DCE DPG) and other organizations create webinars, conference sessions, and more to provide continuing professional education. However, research indicates that practitioners may not be aware of new guidelines[8] and, in particular, generalist RDNs may struggle to keep up with advances in specialty areas. There are abundant resources for CDEs/BC-ADMs to keep up with advances in diabetes, but generalists might need other resources. Therefore, the DCE DPG added a goal to their strategic plan to develop an Online Certificate of Training (OCoT) in Diabetes. The goal of the OCoT is to elevate knowledge and practice of generalist RDNs providing diabetes care and ultimately improve patient outcomes. However, given the breadth of topics that diabetes encompasses, a first step toward this goal was to determine gaps in knowledge of generalist RDNs who counsel patients with diabetes.

Therefore, the purpose of this survey was to assess the current knowledge and practice of RDNs who counsel patients with diabetes to identify gaps between generalists and diabetes credential holders. The ultimate intent is to use the data gathered to inform content for a future OCoT in diabetes nutrition.

SURVEY DEVELOPMENT
The survey was developed by a workgroup of content experts (the authors) in the fall of 2016. The survey sections were demographic questions, self-rating of knowledge and practice, a quiz to test knowledge of the SOP/SOPP and diabetes MNT concepts, short vignettes to elicit practice actions, and questions about use of and desire for professional education on various topics. Each section was assigned to one to two authors to develop a draft, which was then revised by the entire workgroup. The complete survey was sent to beta testers identified by the workgroup to represent diabetes experts and generalists. Beta-testing with eight individuals in December 2016 demonstrated that the survey was too long, but that questions were generally clear. Because the quiz questions comprised the majority of the survey and were contributing to the length, the survey was revised so that respondents would be randomly assigned to see one-third (n=7) of the diabetes MNT quiz questions and all respondents would see two standard SOP/SOPP quiz questions. This reduced

the length of the survey adequately, as confirmed in a second beta test with 11 individuals in January 2017. The protocol was approved by the American Academy of Family Physicians Institutional Review Board.

The survey (Figure; available at www.jandonline.org) was e-mailed to 15,819 individuals—DCE DPG members, Dietetics Practice-Based Research Network members, and a 10% random sample of credentialed RDNs in March 2017. Participants read an online consent statement, with consent implied if the participant continued to the next page. A reminder was sent 10 days after the first message. The first page of the survey was a screening question, asking whether or not the respondent currently counseled patients with diabetes. Those who replied "no" were not presented with any further questions. Participants who completed the entire survey were eligible to enter a drawing for one of four $100 gift cards.

Data were downloaded from SurveyMonkey.com into IBM SPSS Statistics for Windows.[9] The number of missing responses from each individual was counted and those with more than 100 missing responses (the top 10th percentile of missing data) and those who did not identify as RDNs were deleted. Participants could skip any question, leading to different number of responses to each question; therefore, the number is reported for each question.

Frequencies were used to describe the demographic characteristics of the sample. χ^2 Tests were used to compare those with a diabetes credential (CDE or BC-ADM) to those without a diabetes credential (generalists). For questions with only two choices (eg, sex), or those for which multiple options could be selected (race/ethnicity, credentials), a two-sided Fisher's exact test was used. For questions with only one answer allowed (eg, highest degree, practice area, practice setting, and years in practice), the omnibus Pearson's χ^2 result is reported, and if the omnibus test was significant, group differences were tested with Bonferroni post hoc testing.

In the entire sample, self-rated diabetes knowledge by self-rated nutrition/dietetics knowledge was cross-tabulated and compared using a Pearson's omnibus χ^2, followed by Bonferroni post hoc testing. The proportion of respondents who answered

each question correctly, incorrectly, or said they did not know the answer was determined. The mean self-rated familiarity with each type of diabetes and the SOP/SOPP (on a 5-point Likert scale) was compared between generalists and diabetes credential holders using a two-sided t-test.

The number of correct and "don't know" responses to the quiz questions by each respondent was counted. A comparison of the mean quiz score between generalists and credential holders was determined using a two-sided t-test, with equal variances not assumed if Levene's test for homogeneity of variance was significant. The proportions of individuals in the generalist and diabetes credential groups who answered each question as wrong, right, or "don't know" were compared using Pearson's omnibus χ^2 test. If the omnibus test was significant, the answer proportions were compared by group using Bonferroni post hoc tests.

In the practice vignettes section, more than one answer was allowed/expected, therefore, a series of Fisher's exact (two-sided) tests was used to compare the proportions of generalists and diabetes credential holders who selected each option. The practice vignette regarding the first step in the Nutrition Care Plan allowed only one answer, so the Pearson's omnibus χ^2 test was completed. If the omnibus test was significant, the answer proportions were compared by group using Bonferroni post hoc tests.

RESULTS

A total of 1,379 participants were screened and 1,206 were eligible. After deletion of the non-RDNs and those with excessive missing data, the final number was 1,048 participants, or a 6.6% response rate.

Participant characteristics are reported in Table 1. The generalists and credential holders were similar in sex and race/ethnicity, with the majority being female and white. Credential holders were significantly more likely to report ≥11 years of experience. Overall, the sample was very experienced, with 36.7% reporting more than 25 years of experience. Credential holders were most likely to rate themselves as experts in both nutrition and dietetics (63.1%) and diabetes (75.8%) compared to generalists, who

were most likely to select proficient for both topic areas (45.9% and 56.2%, respectively). Degrees, employment status, and employment setting did not vary between the two groups. The most common practice area for generalists was clinical nutrition (34.4%) and for diabetes credential holders was diabetes care (52.5%). Compared to practicing RDNs as a group, the sample had slightly more females (98.9% vs 95%) and was similar in racial/ethnic makeup.[10] The generalist group was similar in their attainment of a Master's degree.[10] There were fewer participants in clinical nutrition (57% according to the Compensation and Benefits survey),[10] but this is logical, given that the target group for the present survey included diabetes specialists as well as generalists.

For each level of self-rated knowledge in nutrition, the most frequent diabetes rating was equivalent (ie, competent in both) (Table 2), and 8.7% of the sample rated themselves more highly on diabetes than general nutrition.

Credential holders rated their familiarity with each diabetes-related topic higher ($P<0.001$ for all), with a difference ranging from 0.36 points (prediabetes) to 0.75 points (gestational diabetes) (Table 3). Type 1 diabetes was also an area where credential holders were 0.72 points higher than generalists. Both groups were lowest in their familiarity with the SOP/SOPP.

The average number of correct answers on the quiz (two standard SOP/SOPP questions plus a random set of seven diabetes MNT questions) was 5.65 ± 2.10 among all respondents (Table 4). This was more than 1 point higher among diabetes credential holders compared to generalists, which was statistically significant. There was also statistical significance in the number of "don't know" answers, with diabetes credential holders having an average of 0.52 ± 0.83 compared to 1.12 ± 1.40 for generalists.

For all questions in which there was a difference in knowledge between generalists and credential holders, the credential holders had a higher proportion of selecting the correct answer (Table 5). The performances of the two groups were equivalent on questions 17, 25, and 26, which covered SOP/SOPP, sodium recommendations, and sucrose recommendations. For the