DOI: 10.2478/pielxxiw-2020-0019

The need for updating nurses' knowledge and skills in the field of recommendations for diabetes care

Zapotrzebowanie pielęgniarek na aktualizację wiedzy i umiejętności z zakresu zaleceń w opiece diabetologicznej

Alicja Szewczyk[1], Ewa Kobos[2]

[1]The Children's Memorial Health Institute, Department of Endocrinology and Diabetology; Diabetes Clinic, Warsaw; Polish Federation for Education in Diabetology/ Klinika Endokrynologii i Diabetologii, Poradnia Diabetologiczna, Instytut „Pomnik-Centrum Zdrowia Dziecka", Warszawa; Polska Federacja Edukacji w Diabetologii
[2]Department of Development of Nursing, Social and Medical Sciences, Faculty of Health Sciences, Medical University of Warsaw; Polish Federation for Education in Diabetology/ Zakład Rozwoju Pielęgniarstwa, Nauk Społecznych i Medycznych, Warszawski Uniwersytet Medyczny; Polska Federacja Edukacji w Diabetologii

CORRESPONDING AUTHOR:
Alicja Szewczyk
The Children's Memorial Health Institute, Department of Endocrinology and Diabetology; Diabetes Clinic
Al. Dzieci Polskich 20, 04-730 Warsaw
e-mail: alicja.szewczyk@gmail.com

STRESZCZENIE

ZAPOTRZEBOWANIE PIELĘGNIAREK NA AKTUALIZACJĘ WIEDZY I UMIEJĘTNOŚCI Z ZAKRESU ZALECEŃ W OPIECE DIABETOLOGICZNEJ

Cel pracy. Określenie zapotrzebowania pielęgniarek, na aktualizację wiedzy i umiejętności z zakresu zaleceń w opiece diabetologicznej.

Materiał i metodyka. W badaniu uczestniczyło 580 pielęgniarek, studentów studiów magisterskich. W celu zebrania materiału badawczego wykorzystano test wiedzy obejmujący 20 pytań dotyczących 10 procedur zawartych w zaleceniach. W badanej grupie zawodowo pracowało 93,3% studentów.

Wyniki. Do zaleceń w opiece diabetologicznej zdecydowany dostęp w miejscu pracy miało 11,9% badanych. Największy deficyt wiedzy wykazano odnośnie: czasu pozostawienia starej kaniuli w terapii ciągłym podskórnym wlewem insuliny przy użyciu pompy insulinowej w ciągu 2-3 godzin, w celu wchłonięcia się zgromadzonej w tym miejscu insuliny po założeniu nowej; czasu w jakim należy po założeniu elektrody pomiarowej do systemów ciągłego monitorowania glikemii (CGM) skalibrować system za pomocą pomiaru stężenia glukozy we krwi włośniczkowej; wskazań do pomiaru glikemii z miejsc alternatywnych. Niedostateczny poziom wiedzy na temat zaleceń wykazano u 12,8% badanych, dostateczny u 84,3% badanych, dobry u 2,9% badanych.

Wnioski. 1) Poziom wiedzy studiujących pielęgniarek z zakresu zaleceń opieki diabetologicznej jest niezadowalający. 2) Pielęgniarki posiadające specjalizację, uczestniczące w diabetologicznych szkoleniach wewnątrzzakładowych oraz deklarujące dostępność do zaleceń w miejscu pracy posiadają wyższy poziom wiedzy. 3) W związku z rozwojem nowych technologii medycznych, zakłady pracy powinny organizować pielęgniarkom w miejscu pracy cykliczne warsztaty umiejętności praktycznych umożliwiających korzystanie ze sprzętu służącego do podawania insuliny oraz monitorowania glikemii.

Słowa kluczowe: pielęgniarstwo diabetologiczne, zalecenia, wiedza, cukrzyca

ABSTRACT

THE NEED FOR UPDATING NURSES' KNOWLEDGE AND SKILLS IN THE FIELD OF RECOMMENDATIONS FOR DIABETES CARE

Aim. The aim of this study was to assess the need for updating nurses' knowledge and skills in the field of diabetes care recommendations.

Material and methods. The study included 580 nurses who were master's degree students. A knowledge test including 20 questions on 10 procedures mentioned in the recommendations was used to collect research data. A total of 93.3% of students in the study group were professionally active.

Results. A total of 11.9% of respondents had access to diabetes care recommendations. The largest knowledge deficits were found for: leaving an 'old' cannula for continuous insulin infusion using an insulin pump for 2-3 hours in place to allow for absorption of the accumulated insulin after inserting a new one; the time it takes to calibrate a continuous glucose monitoring (CGM) system by measuring capillary blood glucose after insertion of a CGM electrode; and indications for alternate site testing. Poor, fair, and good level of knowledge on recommendations was found in 12.8%, 84.3%, and 2.9% of respondents, respectively.

Conclusions. 1) The level of knowledge of studying nurses on diabetic care recommendations is unsatisfactory. 2) Specialised nurses, as well as those participating in in-house training courses on diabetes and those declaring the accessibility of recommendations at workplace show a higher level of knowledge. 3) In the light of the development of new medical technologies, periodic workshops focusing on practical skills should be organised for nurses in their workplace, enabling the use of equipment for insulin administration and glucose monitoring.

Key words: diabetic nursing, recommendations, knowledge, diabetes

INTRODUCTION

With regard to diabetes, the Polish Diabetes Association has developed and annually updates clinical recommendations for the management of diabetic patients, while the Polish Federation for Diabetes Education (PFED) published a set of diabetes care procedures in the form of guidelines recommended by PFED, national consultants in the fields of nursing, diabetic nursing, gynecological and obstetric nursing, as well as epidemiological nursing [1,2].

For over three decades, the number of patients with diabetes has been growing rapidly worldwide [3]. As a result of demographic changes, the problem of diabetes prevention and treatment will continue to grow and the role of nursing staff in diabetes therapy will increase. Therefore, preparation of nursing students and nurses to use diabetic care recommendations in clinical practice is an important educational aspect of diabetic care.

The need to shape nursing so as it could address not so much the needs of the healthcare system, but the human health needs, is the key issue determining the development of diabetology in nursing. Diabetes nursing practice should focus on promoting and maintaining good health and preventing the disease; involving individuals, families and communities in diabetic care activities, as well as enabling them to take more responsibility for their health; supporting interdisciplinary and intersectoral cooperation; ensuring proper quality of diabetic nursing care and adequate use of new technologies; restructuring, refocusing and reinforcing basic diabetic nursing educational programmes necessary to prepare nurses capable of undertaking the above tasks both in healthcare facilities and community settings [4].

The wide offer of postgraduate courses in diabetes for nurses and midwives allows for expanding knowledge and skills, as well as enables interdisciplinary collaboration in a workplace providing care of varying specificity [5], and allows for continuous expansion of the scope of nurses' competencies [6,7].

AIM

The aim of this study was to assess the need for updating nurses' knowledge and skills in the field of diabetes care recommendations.

MATERIALS AND METHODS

The study was conducted in 2019 at three universities providing master's degree in nursing, after obtaining written consent of the Deans of nursing faculties and oral consent of students to participate in the study. Students expressed their consent to take part in the study voluntarily and principles of Helsinki Declaration was followed to protect students privacy and anonymity when collecting data.

An originally designed questionnaire including demographics and a 20-question knowledge test based on PFED diabetes care recommendations was used. There were four distractors for each question, including the "I don't know" response category, coded as an incorrect answer during analyses. Three levels of knowledge were defined for the purpose of analyses: poor (a score of 0-6), fair (7-14), and good (15-20).

STATISTICA 10.0 was used for statistical analysis. Descriptive statistics were calculated for quantitative variables. Statistical hypotheses were verified using the Pearson correlation coefficient, the Mann-Whitney U test, and the Kruskal-Wallis rank ANOVA test. A p-value <0.05 was considered statistically significant.

A total of 580 first-year and second-year students of master's degree studies in the field of nursing, with women accounting for 97.9%, were included in the study. Mean age of respondents was 34.9 years (SD=11.4). A total of 93.3% of respondents were professionally active, with hospital reported as the main place of work (74.1%). Nurses with work experience of up to 10 years (4.6%) were the largest group. A total of 20.2%, 18.1%, and 11.2% of respondents worked in surgical, internal medicine and anaesthesiology/intensive care wards, respectively. Nursing specialisation was reported by 65.7% of nurses. A total of 72.6% of respondents have never participated in diabetes training courses. A total of 28.6% and 7.4% of respondents, respectively, managed between 1 and 10 and between 11 and 20 patients in the 3-month period. Almost a quarter of the respondents (23.1%) believed that the recommendations for diabetes care are rather available, and 11.9% thought that such recommendations were definitely available in their workplace.

RESULTS

In the knowledge test, most respondents (81.4%) correctly answered that patient's therapeutic decisions are based on capillary blood glucose measurement, and that a glucose load of 75 g is used in oral glucose tolerance test for pregnant women (79.0%). The largest knowledge deficit regarded leaving an 'old' cannula for continuous insulin infusion using an insulin pump for 2-3 hours in place to allow for absorption of the accumulated insulin after insertion of a new cannula (91.0%), and the time it takes to calibrate a continuous glucose monitoring (CGM) system by measuring capillary blood glucose after insertion of a CGM electrode (89.1%) (Tab. 1.).

Overall, the average number of correct answers in the knowledge test was 9.62 (SD=2.84). The highest score was 18. Poor, fair and good level of knowledge on diabetic care recommendations was reported for 12.8%, 84.3% and 2.9% of respondents, respectively (Tab. 2.).

The conducted analysis showed no significant relationship between age (p=0.310) and years of service (p=0.271) and the score in the knowledge test. Also, no statistically significant differences were found in the score between the groups of students employed in different workplaces (p=0.110), or depending on the public and private institution (p=0.253). Statistically significant differences (p=0.003) in the level of knowledge were found between nurses specialised vs. those non-specialised in internal medicine nursing, as well as nurses specialised vs. those non-specialised in nursing other than internal medicine (p=0.041).

Tab. 1. The percentage of correct and incorrect answers in the knowledge test

Question	Correct answers (%)	Incorrect answers (%)
The type of blood glucose measurement that is the basis for making therapeutic interventions by a diabetic patient	81.4%	18.6%
Recommendations on alternate site testing	14.5%	85.5%
Recommended sites for glucose sensor implantation in flash glucose monitoring	46.2%	53.8%
The time it takes to calibrate a continuous glucose monitoring (CGM) system by measuring capillary blood glucose after insertion of a CGM electrode	10.9%	89.1%
Type of manufacturer and inserting an insulin cartridge into a reusable pen	64.1%	35.9%
Storage place for an insulin pen currently used by the patient	57.9%	42.1%
The possibility of injecting insulin at an angle of 90° without forming a skin fold.	71.2%	28.8%
Time to remove insulin from refrigerator when changing the cartridge in the pen	46.6%	53.4%
The length of time to leave an old cannula in the subcutaneous tissue to absorb the accumulated insulin after inserting a new one when changing the cannula in continuous subcutaneous insulin infusion therapy	9.0%	91.0%
Components of an infusion set (insertion of IV cannula) used in continuous subcutaneous insulin infusion therapy using a personal insulin pump	50.5%	49.5%
Glucose load used in oral glucose tolerance test for pregnant women	79.0%	21.0%
Management of vomiting after ingestion of a glucose solution for oral glucose tolerance testing	67.9%	32.1%
Management in a conscious diabetic patient presenting with the symptoms suggestive of hypoglycaemia who does not have a glucose meter	76.2%	23.8%
The time during which a subcutaneous or intramuscular injection of 1 mg of glucagon should be administered to increase blood glucose levels in the case of severe hypoglycaemia	18.6%	81.4%
The time of re-measurement of blood glucose after oral glucose administration in an event of mild hypoglycaemia	39.0%	61.0%
The type of insulin solution used for intravenous infusion	60.5%	39.5%
Route of insulin administration in major surgeries in diabetic patients	65.7%	34.3%
Equipment used for pain sensation testing as a basic test in diabetic patients	15.3%	84.7%
Risk factors of callus formation in a diabetic patient	62.9%	37.1%
The frequency of physical examination of the skin as part of prevention of insulin complications in diabetic patients on insulin therapy	24.8%	75.2%

Tab. 2. Respondents' knowledge of diabetic care recommendations

Level of knowledge	%
Poor	12.8
Fair	84.3
Good	2.9

Tab. 3. Participation in postgraduate education and knowledge of diabetic care recommendations

Type of postgraduate education	n	M	MED	SD	Z	p
Internal medicine nursing						
Yes	42	10.36	11	3.45	-2.93	**0.003**
No	479	9.42	9	2.79		
Other fields of nursing						
Yes	154	9.79	11	3.01	2.03	**0.041**
No	381	9.44	9	2.73		
Diabetes training courses						
No	421	9.36	10	2.83	-3.32	**0.000**
Yes	159	10.29	11	2.75		

n – number of respondents; M – mean; SD – standard deviation; MED - median;
Z – statistic of the Mann-Whitney test; p – statistical significance

Tab. 4. The number of patients under the care of the respondents and respondents' knowledge on diabetic care recommendations

Number of patients	n	M	MED	SD	H	p
None	205	8.86	9	3.07	22.00	**0.002**
1-10	166	10.03	10	2.59		
11-20	88	10.02	11	2.57		
21-40	54	10.00	10	2.62		
> 40	63	10.12	10	2.79		
No data	3	-	-	-	-	-

n – number of respondents; M – mean; SD – standard deviation; MED - median;
H – statistic of the Kruskal-Wallis test; p – statistical significance

Tab. 5. Availability of diabetic care recommendations and respondents' knowledge of these recommendations

Availability of recommendations	n	M	Med.	SD	H	p
Definitely available	69	11.07	11	2.52	26.90	**0.000**
Rather available	134	9.85	10	2.51		
Not sure	209	9.11	9	2.74		
Rather not available	71	10.07	10	3.07		
Definitely not available	56	9.03	9	3.23		

n – number of respondents; M – mean; SD – standard deviation; Med. - median;
H – statistic of the Kruskal-Wallis test; p – statistical significance

Significant differences were found in the students' knowledge on diabetic care recommendations depending on participation in diabetes courses (Tab. 3.).

A statistically significant (p=0.002) difference was found in the respondents' knowledge depending on the number of managed diabetic patients in a given workplace (Tab. 4.). Nurses who had no patient assignment presented with a different level of knowledge compared to those who managed between 1 to 10 (p=0.001), between 11 and 20 (p=0.008), and > 40 patients (p=0.047).

A statistically significant (p=0.000) difference was found in the respondents' knowledge depending on the availability of diabetic care recommendations at workplace (Tab. 5.). Nurses who definitely had access to diabetes recommendations presented with a different level of knowledge compared to those who rather had access to such recommendations in their workplace (p=0.021), who had definitely no access, and those unsure about the availability of such recommendations (p=0.000).

DISCUSSION

What differs diabetes from other chronic diseases is the fact that patients can have an influence on its course by their own therapeutic actions based on self-care, self-monitoring and self-control. Effective self-control in diabetes (i.e. coping with the disease and accepting the disease) is something that patients need to learn. This is quite difficult as it requires medical knowledge, consistency and a lot of discipline. Therefore, these patients need therapeutic education. A nurse or a midwife is the primary teacher for a patient – a diabetes educator [8]. PTD guidelines emphasise that all patients with diabetes should have access to education and training courses, and that diabetes education should focus on the patients and their individual needs. Education is the basis of effective care for patients with diabetes and effective prevention of diabetes [1]. Also, the PFED recommendations, whose aim is to improve the quality of diabetes care, have been published since 2006. The recommendations concern the basic and the most important nursing procedures performed in patients with diabetes [2].

This study included master's degree students, who already held a professional nurse diploma and a bachelor's degree. They implemented learning outcomes associated with the management in diabetic patients as part of internal, paediatric and geriatric nursing during first cycle degree programme, while second cycle degree students – additionally, as part of diabetic nursing [9]. Up to 97.6% of students were professionally active, which should additionally increase their experience in caring for patients with diabetes and increase their knowledge of the recommendations on the management of these patients. However, this group of respondents had a mean score of 9.62 out of 20 in the knowledge test. Only 2.9% of respondents had a good level of knowledge. There were no significant differences in the students' knowledge on recommendations depending on the length of service despite the fact that about 40% of respondents had 11-30 years of work experience. A study assessing knowledge of diabetes among nurses also confirmed that longer length of service does not guarantee better knowledge on diabetes, and that nurses with shorter work experience may present with better knowledge [10,11]. It may be therefore assumed that periodic updating of knowledge in the form of training courses and workshops to improve professional skills could contribute to the maintenance of a high level of knowledge and skills in the field of recommendations on the management of diabetic patients.

Nurses acquire competences necessary for diabetic nursing care and active involvement in the therapeutic process also in the course of postgraduate education. The ordinance of the Minister of Health on the type and scope of services provided by a nurse or a midwife without a doctor's order enables nurses to, among other things, educate diabetic patients and their families. This service may be provided by nurses who completed a specialist or qualification course, or hold the title of a specialist in nursing provided that the specialisation or the course covered the educational content in this field. Furthermore, this service may be provided independently by a nurse with a master's degree, without a medical order [6]. In the study group, 65.7% of nurses completed specialisation in nursing, 13.4% completed qualification courses, and 27.4% participated in diabetes training courses. In the present study, significantly higher levels of knowledge of diabetic care recommendations were reported for specialised nurses and those participating in diabetes training courses. Other authors also showed that these factors were associated with better knowledge of diabetes [12,13,14,15].

In their studies in a group of 2,605 nurses working in surgical and internal medicine departments, Kózka et al. showed that reduced quality of nursing services is closely correlated with an increased number of patients managed by the nursing personnel. The quality of care was rated high by nurses who were responsible for less patients requiring assistance in their everyday functioning [16]. Our data analyses showed that the level of knowledge on recommendations did not differ depending on the workplace as opposed to the number of patients. Students managing a larger group of diabetic patients had higher levels of knowledge on recommendations. This may indicate that students are more likely to seek access to knowledge on diabetic care recommendations.

Our study showed that students who definitely had access to diabetes recommendations in their workplace scored higher in the knowledge test. Considering that they accounted for only 12% of study participants, it would be worth considering how to disseminate the recommendations and increase their availability. Given the fact that the PFED recommendations are available in a limited number of printed versions and in the form of data posted on the PFED website, their dissemination via e-mail, in-house and online training courses may be considered.

Kosicka and Wrońska [17] showed that nurses are the primary diabetes educators. Wojciechowski et al. reported that according to patients, 46% of diabetes education is provided by a nurse [8]. In order to be able to do it professionally, nurses should be highly competent and have up-to-date knowledge in this subject area. A study assessing knowledge on diabetes among primary care nurses, the implementation of national guidelines, perception of both nurses' ability to advise patients with diabetes and their preferences in terms of further diabetes-related education demonstrated that 44% of nurses applied national guidelines for the management in type 2 diabetes mellitus, most nurses considered that they had sufficient knowledge to advise diabetic patients about lifestyle to improve laboratory results, and that significantly less nurses considered that they had sufficient knowledge to advise patients on pharmacotherapy. Specialised nurses had the highest level of knowledge on good practices [18].

The present study revealed the largest gaps in the knowledge of insulin pump therapy, blood glucose measurements using a continuous monitoring system, and alternate site testing. Due to the development of new medical technologies, the use of continuous monitoring systems either independent of or integrated with personal insulin pumps has become increasingly common among patients. Employers should organise periodic training courses and

practical skill workshops for nurses, enabling the use of equipment for insulin administration and glucose monitoring. According to epidemiological data, the number of people with diabetes will rise [3]. This is a major challenge for the healthcare system. Many patients already remain under the care of GPs instead of diabetes clinics due to their limited availability. In such cases, primary care personnel, nurses in particular, are responsible for educating these patients. On the other hand, nurses working in hospital wards have direct contact with patients diagnosed with diabetes during hospital stay for other reasons or patients with long-term diabetes as a comorbidity. Insufficient level of nurses' knowledge was also confirmed by the results of Berezowska et al. [19]. The authors showed that nurses' knowledge on hypo- and hyperglycaemic symptoms and the interpretation of diabetes control markers is relatively good, whereas the knowledge on the key elements of health education among diabetic patients is insufficient. Similar observations with regard to nurses' knowledge on diabetes were made by Drzewoski et al., who pointed to the need for participation in professionally planned and organised diabetes training courses [20]. The need for supplementary and knowledge-expanding courses was also postulated by Bronisz et al., who pointed out that additional qualifications are necessary for providing care for diabetic patients [21]. Significant deficits in this area have been found in many studies assessing knowledge of diabetes among nurses and other healthcare professionals [10,12,13,14,22].

Despite the increasing availability of recommendations on diabetes care and access to postgraduate education in the field of diabetic nursing, the level of knowledge on the use of these recommendations among master's degree nursing students remains unsatisfactory. The obtained results indicate the need for diabetes training courses for all nurses working in hospital wards and primary care facilities. This is especially important given the growing number of diabetic patients who are often hospitalised for other reasons and in different departments.

CONCLUSIONS

1. The level of knowledge of studying nurses on diabetic care recommendations is unsatisfactory.
2. Specialised nurses, as well as those participating in in-house training courses on diabetes and those declaring the accessibility of recommendations at workplace show a higher level of knowledge.
3. In the light of the development of new medical technologies, periodic workshops focusing on practical skills should be organised for nurses in their workplace, enabling the use of equipment for insulin administration and glucose monitoring.

ORCID

Alicja Szewczyk https://orcid.org/0000-0003-4167-0361
Ewa Kobos https://orcid.org/0000-0001-7231-8411

REFERENCES

1. Zalecenia kliniczne dotyczące postępowania u chorych na cukrzycę 2020. Stanowisko Polskiego Towarzystwa Diabetologicznego. Diabetologia Praktyczna. 2020;6(1):1-105.
2. Szewczyk A, Tobiasz-Kałkun N, Stefanowicz A, i wsp. Zalecenia w opiece diabetologicznej Polskiej Federacji Edukacji w Diabetologii (PFED), konsultantów krajowych w dziedzinach pielęgniarstwa, pielęgniarstwa diabetologicznego, pielęgniarstwa ginekologicznego i położniczego oraz pielęgniarstwa epidemiologicznego, 2018 rok. Magazyn Pielęgniarki i Położnej; 2018.
3. IDF Diabetes Atlas Ninth edition 2019. International Diabetes Federation. https://diabetesatlas.org/upload/resources/material/20200106_152211_IDFATLAS9e-final-web.pdf (2019). Dostęp 10.07.2020.
4. Szewczyk A, Czupryniak L. Rola pielęgniarki w opiece diabetologicznej. [w:] Sieradzki J, red. Cukrzyca. Gdańsk: ViaMedica; 2016, s. 903-906.
5. Rozporządzenie Ministra Zdrowia z dnia 12 grudnia 2013 r. w sprawie wykazu dziedzin pielęgniarstwa oraz dziedzin mających zastosowanie w ochronie zdrowia, w których może być prowadzona specjalizacja i kursy kwalifikacyjne. Dz.U. 2013 poz. 1562.
6. Rozporządzenie Ministra Zdrowia z dnia 28 lutego 2017 r. w sprawie rodzaju i zakresu świadczeń zapobiegawczych, diagnostycznych, leczniczych i rehabilitacyjnych udzielanych przez pielęgniarkę albo położną samodzielnie bez zlecenia lekarskiego Dz.U. 2017 poz. 497.
7. Rozporządzenie Ministra Zdrowia z dnia 18 stycznia 2018 r. w sprawie wykazu substancji czynnych zawartych w lekach, środków spożywczych specjalnego przeznaczenia żywieniowego i wyrobów medycznych ordynowanych przez pielęgniarki i położne oraz wykazu badań diagnostycznych, na które mają prawo wystawiać skierowania pielęgniarki i położne (Dz.U. 2018 poz. 299).
8. Wojciechowski P, Kulig M, Małowiecka M, i wsp. Edukacja w cukrzycy. Brakujące ogniwo do osiągniecia sukcesu. Kraków: HTA Consuling; 2015.
9. Rozporządzenie Ministra Nauki i Szkolnictwa Wyższego z dnia 26 lipca 2019 r. w sprawie standardów kształcenia przygotowującego do wykonywania zawodu lekarza, lekarza dentysty, farmaceuty, pielęgniarki, położnej, diagnosty laboratoryjnego, fizjoterapeuty i ratownika medycznego (Dz. U. z 2019 r. poz. 1573).
10. Odili VU, Eke I. Knowledge of Diabetes Mellitus among Registered Nurses in Benin City. International Journal of Health Research. 2010; 3:145-151.
11. Oyetunde MO, Famakinwa TT. Nurses' knowledge of contents of diabetes patient, education in Ondo – state, Nigeria. J Nurs Educ Pract. 2014;4:91-98.
12. Mogre V, Ansah GA, Marfo DN, et al. Assessing nurses' knowledge levels in the nutritional management of diabetes. International Journal of Africa Nursing Science. 2015; 3:40-43.
13. Alotaibi A, Gholizadeh L, Al-Ganmi A, et al. Examining perceived and actual diabetes knowledge among nurses working in a tertiary hospital. Appl Nurs Res. 2017;35:24-29.
14. Abduelkarem AR, El-Shareif HJ. Assessment of diabetes-related knowledge among nursing staff in a hospital setting. J Diabetes Nurs. 2013;17:207-218.
15. Alotaibi A, Al-Ganmi A, Gholizadeh L, et al. Diabetes knowledge of nurses in different countries: An integrative review. Nurse Educ Today. 2016;39:32-49.
16. Kózka M, Gabryś T, Brzyski P, i wsp. Wybrane czynniki determinujące ocenę jakości opieki pielęgniarskiej w szpitalach pełniących stały dyżur. Wyniki projektu RN4CAST. Zdrowie Publiczne i Zarządzanie. 2012; 10B: 277-287.
17. Kosicka B, Wrońska I. Rola pielęgniarki w edukacji chorych na cukrzycę. Problemy Pielęgniarstwa. 2007; 15 (2): 187–191.
18. Daly BM, Arroll B, Scragg R. Diabetes knowledge of primary health care and specialist nurses in a major urban area. J Clin Nurs. 2019;28:125–137.
19. Berezowska E, Kunecka D, Drozd-Dąbrowska M, i wsp. Ocena poziomu wiedzy pielęgniarek na temat cukrzycy. Family Medicine & Primary Care Review. 2006; 8, 2: 189 -191.
20. Drzewoski J, Cypryk K, Czupryniak L, i wsp. Kompleksowy model edukacji pielęgniarek w dziedzinie diabetologii jako sposób realizacji wtórnej prewencji cukrzycy. Diabetologia Polska. 2002; 9: 19-22.
21. Bronisz A, Hołojuch E, Sobiś-Żmudzińska M, i wsp. Ocena stopnia wiedzy pielęgniarek przed i po kursie z zakresu diabetologii. Medycyna Metaboliczna. 2005; tom IX; 1: 16-22.
22. Kamińska A, Reyer D, Polaszewska-Muszyńska M, i wsp. Ocena wiedzy pielęgniarek uczestniczących w Regionalnym Programie Warsztatów Edukacji Diabetologicznej — doniesienie wstępne. Clinical Diabetology. 2013; 2:79-86.

Manuscript received: 15.07.2020
Manuscript accepted: 03.08.2020

Translation: Lingua Line