







REVIEWS AND COMMENTARIES

Are we confident that final-year medical students know at least basics about diabetes?: A preliminary report from the multicenter, survey-based Diabetes Know-Me study

Agata Chobot¹  | Zuzanna Gosławska² | Elisa Giani^{3,4} |
Sirisha Kusuma Boddu⁵  | Malgorzata Mysliwiec⁶ | Rasha Odeh⁷  |
Claudia Piona⁸  | Joanna Polanska⁹  | Meng-Che Tsai¹⁰ | Carine de Beaufort^{11,12} |
Klemen Dovc¹³  | ISPAD JENIOUS

¹Department of Pediatrics, Institute of Medicine, University of Opole, Opole, Poland

²Department of Children's Diabetology, School of Medicine in Katowice, Medical University of Silesia, Katowice, Poland

³Department of Biomedical Sciences, Humanitas University, Milan, Italy

⁴Department of Pediatrics, V. Buzzi Children's Hospital, University of Milan, Milan, Italy

⁵Department of Pediatric Endocrinology, Rainbow Children's Hospital, Madhapur, Hydernagar, Hyderabad, India

⁶Department Of Pediatrics, Diabetology and Endocrinology, Medical University of Gdansk, Gdansk, Poland

⁷Department of Pediatrics, School of Medicine, University of Jordan, Amman, Jordan

⁸Pediatric Diabetes and Metabolic Disorders Unit, Regional Center for Pediatric Diabetes, University Hospital of Verona, Verona, Italy

⁹Department of Data Science and Engineering, The Silesian University of Technology, Gliwice, Poland

¹⁰Department of Pediatrics, National Cheng Kung University Hospital, College of Medicine, National Cheng Kung University, Tainan, Taiwan

¹¹Department of Pediatric Diabetes and Endocrinology, Pediatric Clinic/Centre Hospitalier de Luxembourg, Luxembourg

¹²Department of Pediatric Endocrinology, UZ Brussels, Jette, Belgium

¹³Department for Paediatric Endocrinology, Diabetes and Metabolic Diseases, UMC - University Children's Hospital, Ljubljana, Slovenia

Correspondence

Agata Chobot, Department of Pediatrics,
Institute of Medical Sciences, University of
Opole, Al. W. Witosa 26, 45-418 Opole,
Poland.

Email: agata.chobot@uni.opole.pl

Abstract

Background: We present the results of the pilot study of a multinational “Diabetes Know-Me” project investigating knowledge regarding diabetes of medical students. This is the first collaborative project of the ISPAD JENIOUS group.

Methods: Students of the final year of medical studies from six countries answered a 25-question survey regarding basic knowledge concerning diabetes (1091 surveys handed out, response rate 86%).

Results: Among the responders (58% female) 90% confirmed attending diabetology classes; 11% planned to specialize in diabetology. There were significant differences between countries in the median score of correct answers ranging from 10/25 to 22/25. Attending diabetes classes (20 vs. 13/25, $p < 0.0001$) was the strongest factor associated with improved knowledge about diabetes (other factors analyzed were: gender, familiar/personal experience of diabetes, interest to specialize in diabetology).

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2021 The Authors. *Pediatric Diabetes* published by John Wiley & Sons Ltd.

Conclusions: Basic knowledge about diabetes remains a challenge. Participating in classes concerning diabetes contributed the most to the diabetes-related knowledge among students of the final year of medical faculties.

KEYWORDS

curriculum, diabetes, diabetes knowledge, medical students, medical studies

1 | INTRODUCTION

The World Health Organization calls for action to improve the quality of care for persons with diabetes.¹ Currently, hundreds of millions are affected by or at risk of diabetes² and consequently all physicians are very likely to provide care for persons with diabetes, regardless of their specialty. Thus, it seems rational that diabetes-related knowledge should be one of the priorities during medical training. Such a priority or basic skill should be for example also the measurement of blood pressure (BP), yet a recent report shows that medical students do not attain mastery of the skills required to measure BP accurately.³

Data concerning the diabetes knowledge among final-year medical students—soon to be physicians—are scarce. We present a multinational pilot study to evaluate diabetes-related knowledge of these students.

2 | METHODS

Diabetes centers that collaborate with the medical faculty in their city were invited to participate in the study through the JENIOUS—young investigators' group of the International Society for Pediatric and Adolescent Diabetes (ISPAD). Centers from six countries (Poland, Jordan, Italy, Slovenia, Taiwan, and India) joined the project. A 25-question survey regarding diabetes management (multiple choice with a single best answer; good internal consistency, Cronbach alpha: 0.85) in a paper version was distributed to medical students in their final year on the occasion of one of the exams. The questions were constructed based on the content of international textbooks for medical students. Additionally participating centers analyzed whether they covered the topics, that are discussed during the medical studies and that would be required also for a final exam at the end of studies (board) or equivalent. The surveys were performed in each country in the language of the medical studies. To ensure the correctness of translation we used a reverse translation to English and comparison with the original survey. Consistency indices were verified at the global and local level. We also collected information regarding gender, diabetes in the responder's family, attended diabetology classes during the study curriculum, the respondent's intentions to specialize in diabetology, and her/his attitude toward managing persons with diabetes. The Bioethical Committee of the Medical University of Silesia after obtaining full information regarding the study's protocol (anonymous survey, no data that allow personal identification) declined the need to approve it as a human study and the obligation to obtain informed consent from the participants.

The highest total score that could be obtained was 25 points—one point for each correct answer (incorrect or “I do not know” responses counted as 0 points). Questionnaire internal consistency was tested with Cronbach's alpha. The Kruskal-Wallis analysis of variance (ANOVA) followed by pairwise comparisons (Mann-Whitney test with Bonferroni correction) was used to equate the final score among groups. G likelihood-ratio test with William's correction was applied to statistically compare responses to particular questions while McNemar test and Yule's Q statistics were used in the between-question correlation analysis with phi correlation coefficient serving as the effect size measure. Significance level was set to 5%. All calculations were done in R (www.bioconductor.org).

3 | RESULTS

Out of 1091 approached students, 948 (86%; 58% female) answered the survey and provided data for analysis: 264 from Poland, 188 from Jordan, 186 from Italy, 92 from Slovenia, 68 from Taiwan, and 150 from India; 90% of them attended diabetology classes and 11% intended to specialize in diabetology. There were significant differences between countries in the median score of correct answers ranging from 10/25 to 22/25. Frequency of correct and incorrect answers to specific questions are presented in Table 1. Only 80% of students knew that type 1 diabetes (T1D) cannot be cured (Question 1, Q1) and even fewer that individuals with it cannot stop insulin treatment, even when fasting (Q2). Many were unfamiliar with hyperglycemia symptoms (Q7) and causes (Q14), or with treatment of hypoglycemia (Q10), with only half aware of the correct blood glucose level to diagnose hypoglycemia (Q15). Interestingly, most students were familiar with diabetic ketoacidosis (DKA) treatment (Q22), basic facts regarding technologies (insulin pumps, continuous glucose monitoring: Q16–18), and monogenic diabetes. However, 13%–30% students lacked basic knowledge regarding type 2 diabetes treatment (Q21, Q24, Q25).

Attending diabetology classes was significantly associated with knowledge about diabetes (mean score 20/25 vs. 13/25, $p < 0.0001$). Female graduates ($p = 0.003$), graduates without personal or family experience of diabetes ($p = 0.009$), and graduates not interested to specialize in diabetology ($p = 0.0002$) tended to have slightly (by 1–2 points) higher total score. Those who declared they were unprepared to take care of people with diabetes (20%), had the lowest score (14/25), compared to graduates who indicated better levels of preparedness for diabetes management ($p < 0.0001$).

TABLE 1 The numbers and frequency of correct, incorrect, and “I don't know” answers to the questions of an anonymous survey regarding basic diabetes related knowledge that was handed out to medical students at their final year of studies in six different countries worldwide

| Question | Correct answer | | Incorrect answer | | I do not know | |
|----------|----------------|----|------------------|----|---------------|----|
| | n | % | n | % | n | % |
| 1 | 762 | 80 | 160 | 17 | 26 | 3 |
| 2 | 710 | 75 | 182 | 19 | 56 | 6 |
| 3 | 784 | 83 | 149 | 16 | 15 | 2 |
| 4 | 524 | 55 | 167 | 18 | 257 | 27 |
| 5 | 674 | 71 | 188 | 20 | 86 | 9 |
| 6 | 761 | 80 | 143 | 15 | 44 | 5 |
| 7 | 707 | 75 | 213 | 22 | 28 | 3 |
| 8 | 590 | 62 | 203 | 21 | 155 | 16 |
| 9 | 771 | 81 | 148 | 16 | 29 | 3 |
| 10 | 774 | 82 | 149 | 16 | 25 | 3 |
| 11 | 816 | 86 | 102 | 11 | 30 | 3 |
| 12 | 684 | 72 | 168 | 18 | 96 | 10 |
| 13 | 473 | 50 | 446 | 47 | 29 | 3 |
| 14 | 762 | 80 | 85 | 9 | 101 | 11 |
| 15 | 500 | 53 | 384 | 41 | 64 | 7 |
| 16 | 383 | 40 | 349 | 37 | 216 | 23 |
| 17 | 674 | 71 | 96 | 10 | 178 | 19 |
| 18 | 680 | 72 | 77 | 8 | 191 | 20 |
| 19 | 750 | 79 | 75 | 8 | 123 | 13 |
| 20 | 693 | 73 | 173 | 18 | 82 | 9 |
| 21 | 669 | 71 | 196 | 21 | 83 | 9 |
| 22 | 789 | 83 | 105 | 11 | 54 | 6 |
| 23 | 886 | 93 | 32 | 3 | 30 | 3 |
| 24 | 749 | 79 | 128 | 14 | 71 | 7 |
| 25 | 821 | 87 | 67 | 7 | 60 | 6 |

Note: The whole survey is available online as a supplementary file.

4 | DISCUSSION

There were some major steps forward in diabetology in the past decades. Regardless of these, the incidence of diabetes among adults and children is still rising and the prevalence of diabetes ketoacidosis observed at onset in the pediatric population remains high—due to delayed or unrecognized diagnosis.^{2,4} The current study concerned only basic knowledge of diabetes, which were part of the curricula: no advanced topics were discussed. Therefore, the median of 79% (19.75/25) correct answers is striking, with some issues particularly of concern. Potentially life-threatening issues included 25% of the students not knowing that insulin treatment cannot be stopped in T1D; 17% having problems recognizing DKA and 17% in treating it; and 16% willing to administer insulin to treat hypoglycemia. It is worrisome that almost a fifth of these students that considered T1D a contraindication for pregnancy (Q9). In general, there was greater lack of

knowledge in practical aspects of diabetes care than in more theoretical aspects, indicating the need for greater emphasis on teaching real-life aspects of diabetology in clinical practice. Importantly, approximately one-third of students described themselves as unprepared to take care of patients with diabetes, whereas it is very likely that many of them will have to deal with such patients during their career, probably often, maybe even daily. We found that only attending diabetology classes had a meaningful impact on students' knowledge, which emphasizes the need for such classes in medical curricula.

One limitation of this pilot study may be that it was carried out in countries with different national guidelines and diabetes prevalence. Nonetheless, we examined only basic knowledge, which should not differ worldwide. The differences between countries may partially reflect different curricula and the number of hours devoted to diabetology (seminars, lectures, and exercises). We did not enquire about these aspects. Although the results of individual medical faculties are not generalizable to the countries, or worldwide, they do suggest a need for larger studies.

In summary, our results demonstrate that medical students from several parts of the world are falling short in knowledge about diabetes, which is worrying, given the fact that the prevalence of diabetes and its complications are continuously increasing. Since participation in classes concerning diabetes was the most important factor in improving diabetes knowledge, great attention seems warranted by medical schools and international societies to providing sufficient and effective practical clinical content to medical students. More comprehensive studies seem necessary to evaluate this issue globally.

ACKNOWLEDGMENTS

The study was conducted on behalf of ISPAD group of young investigators—JENIOUS. The authors would like to thank A. Alassaf (University of Jordan, Jordan), P. Jarosz-Chobot, and M. Szczepanska (both Medical University of Silesia, Poland) for supporting this project. Joanna Polanska was co-financed by Silesian University of Technology grant for Support and Development of Research Potential 02/070/BK_21/0019.

CONFLICT OF INTEREST

The authors have no relevant relationships and activities to declare.

AUTHOR CONTRIBUTIONS

Agata Chobot and Zuzanna Gosławska were involved in the conception and design of the study. Agata Chobot, Elisa Giani, Sirisha Kusuma Boddu, Małgorzata Mysliwiec, Rasha Odeh, Claudia Piona, Meng-Che Tsai, and Klemen Dovc collected data. Agata Chobot, Carine de Beaufort, and Klemen Dovc were responsible for drafting of the manuscript. Joanna Polanska did the statistical analysis. Agata Chobot and Joanna Polanska are the guarantors of this work and, as such, had full access to all of the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. All authors were responsible for acquisition or interpretation of data, critical revision of the manuscript for important

intellectual content, and final approval of the version to be published.

PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/pedi.13240>.

DATA AVAILABILITY STATEMENT

Data available on request from the authors

ETHICS STATEMENT

The Bioethical Committee of the Medical University of Silesia after obtaining full information regarding the study's protocol (anonymous survey, no data that allow personal identification) declined the need to approve it as a human study and the obligation to obtain informed consent from the participants.

ORCID

Agata Chobot  <https://orcid.org/0000-0002-9622-4433>

Sirisha Kusuma Boddu  <https://orcid.org/0000-0003-4921-8062>

Rasha Odeh  <https://orcid.org/0000-0002-8419-0547>

Claudia Piona  <https://orcid.org/0000-0001-5168-8317>

Klemen Dovc  <https://orcid.org/0000-0001-9201-2145>

REFERENCES

1. International Diabetes Federation (2015) IDF Diabetes Atlas 7th Edition. <http://www.diabetesatlas.org/>. Accessed April 15, 2020.
2. World Health Organization (2016) Global report on diabetes. <https://www.who.int/publications/i/item/9789241565257>. Accessed June 14, 2020.
3. Abbasi J. Medical students fall short on blood pressure check challenge. *JAMA*. 2017;318(11):991-992. <https://doi.org/10.1001/jama.2017.11255>
4. Cherubini V, Grimsmann JM, Åkesson K, et al. Temporal trends in diabetic ketoacidosis at diagnosis of paediatric type 1 diabetes between 2006 and 2016: results from 13 countries in three continents. *Diabetologia*. 2020;63(8):1530-1541. <https://doi.org/10.1007/s00125-020-05152-1>

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

How to cite this article: Chobot A, Gośławska Z, Giani E, et al. Are we confident that final-year medical students know at least basics about diabetes?: A preliminary report from the multicenter, survey-based Diabetes Know-Me study. *Pediatr Diabetes*. 2021;22(6):850-853. <https://doi.org/10.1111/pedi.13240>