

SHORT THESIS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY (PHD)

QUALITY ASSESSMENT OF CARE FOR CHRONIC PATIENTS

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The Examination takes place at the Library of Bldg. A, Department of Internal Medicine Faculty of Medicine, University of Debrecen, 23 February 2026 at 9.00 a.m.

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The background and objectives of the doctoral thesis

Diabetes mellitus is one of the most important public health problems of the 21st century (EMMI Directive 2020). In 2021, 537 million people worldwide were living with diabetes. This number is projected to rise to 783 million by 2045. In Europe, the number of people with diabetes is expected to reach 69 million by 2045. 1.1 million people died from diabetes in 2021 (IDF 2020).

In 2019, of the 27 EU countries, Germany (10.4%) and Portugal (9.8%) had the highest prevalence of diabetes, while Ireland (3.2%) had the lowest. Compared to the EU average (6.2%), Hungary (6.9%) also had an extremely high prevalence (IDF 2020). In our country, the prevalence of adult-onset diabetes is estimated at 6-7%, of which more than 90% is thought to be type 2 diabetes (Boncz 2019).

In Hungary, diabetes care is provided in primary care and/or specialist care. Type 1 diabetics are typically treated in specialist care, while Type 2 diabetics are treated in primary care, but prescribing or changing medication requires a specialist recommendation. Other specialties may also be involved in the care of patients. Care of elderly patients with multiple chronic conditions may also be provided in inpatient care (NEAK 2020)

According to the professional guidelines of the Hungarian Diabetes Association (MDT), the most effective treatment of diabetics can be provided in primary care.

A characteristic feature of chronic diseases is that they often require long-term monitoring, observation, and care. Primary care is therefore one of the most appropriate care settings for the management of chronic conditions. Countries with strong primary care systems tend to achieve better health outcomes at lower costs (Philips 2003).

The Chronic Care Model (CCM) was developed to improve the quality of care for chronic patients. The CCM is one of the best known and most widely used models aimed at improving patient-centred, evidence-based care for chronic patients. (Grover 2015; Wagner 1996) The 6 elements of the model operate in the context of the individual, the community, the provider, and the health system.

The 20-item Patient Assessment of Chronic Illness Care (PACIC) questionnaire was developed and validated by R.E Glasgow and his colleagues to assess the congruence of the health care

provided through the chronic care model. The 20 questions of the PACIC questionnaire can be grouped into five topics: patient activation; delivery system/practice design; goal setting/tailoring; problem solving; and follow-up/coordination). For each question, patients rate the quality of care they received in primary care in the past 6 months on a scale from 1 (never) to 5 (always). The score is calculated by averaging the scores for each item (hereafter referred to as the PACIC score average) (Glasgow 2005).

Objectives of our study

- Development of the Hungarian adaptation of the Patient Assessment of Chronic Care (PACIC) questionnaire to assess the quality of chronic care, examination of the internal relationships of the questionnaire.
- Quality assessment of type 2 diabetes care in Hungarian primary care using the PACIC questionnaire.
- Quality assessment of health care for diagnosed type 2 diabetics based on patients' assessment at national and regional levels in Hungary.

Research questions

- 1) What other chronic diseases do people with type 2 diabetes have and which are the most common ones?
- 2) Is there a correlation between patient satisfaction (PACIC score averages) and patient demographics?
- 3) How do changes in the number of illnesses affect patient satisfaction in primary care?
- 4) Are patients with other chronic conditions in addition to diabetes more likely to see their GP or specialist?
- 5) Are patients who see their GP or specialist monthly more satisfied with the care than the counterparts who see their doctors less frequently?
- 6) How satisfied are the patients with the GP's care?
- 7) Is there variation in patient satisfaction at regional level?

Validation of the PACIC questionnaire

The validation of the PACIC questionnaire in Hungarian was tested for the following psychometric properties: content validity, internal consistency, and reliability. Descriptive data for predefined subscales and full scales were also presented. The validation analysis showed good reliability and internal consistency reliability. The Cronbach's α was 0.936 for the full scale, while the subgroup values were greater than 0.800, except for the decision support subgroup of the delivery system domain, where the Cronbach's α was 0.730. The overall PACIC scale approximated the normal distribution. In terms of acceptability, there were only two items where the floor or ceiling effect exceeded the 30% threshold, and no there was no subscale where the floor or ceiling effect exceeded the more stringent 20% threshold.

The study population

Our national survey was conducted in 2018 among registered patients with type 2 diabetes in primary care. We used a two-stage sampling procedure: in the first stage, GP practices in Hungary were randomly selected from official registers, while in the second stage, we randomly selected the sample from a group of diabetic patients arranged in birth order. Thus, 800 diabetic patients from 20 GP practices in 7 regions were selected for our cross-sectional study. Selection criteria were as follows:

- Patients over 18 years old,
- Patients with type 2 diabetes diagnosed with the disease at least 6 months ago,
- Patients attending a particular GP practice for at least 6 months.

The questionnaires were delivered in person, with the help of community nurses working with GPs, before paying a visit to chronic diabetic patients. Written informed consent was obtained from participants. The physician and nurses were informed about the research design and survey objectives in advance. Anonymity was paramount so that the identity of the GP could not influence the responses. Completed questionnaires were placed by patients in a sealed collection box in the waiting room.

Statistical methodology

Independent samples t-test, ANOVA, Kruskal-Wallis or Mann-Whitney U tests, Spearman ρ - rank correlation coefficient were used to present the prevalence indices and their 95% confidence intervals (95% CI), and to analyse correlations (regarding demographic characteristics, number of chronic conditions, and number of visits).

Exploratory Factor Analysis (EFA) was conducted using the PACIC questionnaire to explore the latent characteristics of the structure of the 20-question scale. Sampling adequacy (Kaiser-Meyer-Olkin criterion ≥ 0.50) and multicollinearity (Bartlett's test for sphericity with P-value < 0.05) had been performed prior to factor extraction to ensure that scale items were adequate for principal component analysis. EFA produced solutions from one to six factors. The computational results were measured using several fit indices. The degree of fit was assessed with chi-square test (degree of freedom, associated p value); comparative fit index (CFI, Hull method); and Tucker-Lewis index (TLI; > 0.95 very good, > 0.90 good). We even used the root mean square error of the approximation (RMSEA; $0.06 >$ very good; > 0.08 good). SPSS and R statistical programs (versions 22.0 and 4.02) were used to record and analyse the data.

Results

Validity measures and results of the questionnaire

Floor and ceiling effect

Floor and ceiling effects showed large variations regarding each question, but they were low in both the subscales and the full PACIC scale. The floor effects ranged between 1.6% and 30.2% ($> 30\%$ for one item), while the ceiling effects ranged between 11.3% and 33.6% ($> 30\%$ for two items). Item 9 ("Given a copy of my treatment plan.") showed the highest floor effect, while the ceiling effect was more than 30% for item 5 ("Satisfied that my care was well organized.") and item 20 ("Asked how my visits with other doctors were going."). On subscales the highest value (ceiling effect) was 10.1% for Follow-up/coordination, however there was no floor/ceiling value, which exceeded the 20% limit on subscale level. Based on the responses of the quality survey of care, the mean total PACIC score was 3.24 (SD 0.85). The total PACIC scale approached the normal distribution; however, it was moderately skewed (skewness 0.530, kurtosis - 0.248). The five subscales means moved in a narrow range, ranged from 2.99 (1.02) for Goal setting/tailoring to 3.53 (0.93) for Delivery system design/decision support.

Cronbach's α values and correlation coefficients

In terms of reliability, the Cronbach's α value for the full scale was 0.936, while the Cronbach's α values per subgroup were as follows: patient activation 0.818 (Question 3), delivery system characteristics/decision support 0.730 (Question 3), tailoring 0.823 (Question 5), problem solving 0.830 (Question 4) and follow up/coordination 0.815 (Question 5). The correlation between the subscales (Spearman ρ) ranged from medium to high. The highest correlation was between the problem solving and tailoring (0.752; $p < 0.001$), and between tailoring and decision support (0.660; $p < 0.001$), while the follow-up/coordination scale correlated least with the other scales, showing the lowest value with the patient activation scale (0.489; $p < 0.001$). The tailoring (0.881; $p < 0.001$) and problem solving (0.892; $p < 0.001$) scales correlated the highest with the overall PACIC scale, and the follow-up/coordination scale correlated the least (0.725; $p < 0.001$).

Exploratory factor analysis

Factor analysis (EFA Promax rotation) was used to explore the relationships between the 20 questions on quality of care. The names of the groups generated by the factor analysis reflect the Hungarian situation. The first group of questions covers the definition of goals. The seven questions in this group (T₁; T₂; T₃; T₅; T₆; T₇; T₈) are composed of questions from several of the topics included in the original group breakdown. All the questions from the patient activism theme used in the original study (T₁; T₂; T₃) are included in this group, but it also includes 2-2 questions from the delivery system characteristics and tailoring groups (T₅; T₆; T₇; T₈).

The second "involvement of specialists" group consists of questions (T₁₄; T₁₅; T₁₈; T₁₉; T₂₀) which present to which specialists the primary care staff referred the patients. They also show how the GP helped the patients to adapt the information, which they got while consulting specialists and professionals of additional services, to their own life.

In the third "patient motivation" group, questions (T₁₀; T₁₁; T₁₇;) were asked to provide an idea of patient satisfaction with the community programmes and group activities recommended by the GP to maintain quality of life.

The fourth group of questions (T₄; T₉; T₁₂; T₁₃; T₁₆) examines the tailoring of the treatment plan based on the cooperation between the GP and the patient. The responses indicate whether the treatment plan was developed considering the patient's belief and value system,

and to what extent the patient received help in adapting the treatment plan to their daily life. The responses also indicate how the care and follow-up of patients is implemented in primary care.

Results of the national survey

Out of 800 questionnaires distributed to people with type 2 diabetes (response rate: 85.50%), a total of 684 questionnaires were returned, all of which were assessable. The mean age of the respondents was 63.19 years (SD=12.79 years), and 51.61% of them were female.

Correlation between PACIC score averages and demographic groups

We examined whether there is a correlation between the average PACIC scores of different demographic groups, but the analysis found no significant differences between PACIC averages and gender, age, marital status, and education.

Prevalence of chronic diseases among people with type 2 diabetes

Apart from diabetes, 11.14% of respondents have no other diagnosed chronic conditions, 24.34% have one chronic condition, and 18.34% have four or more chronic conditions. The highest prevalence rate was found for hypertension (74.7%), but the prevalence of arthritis (36.11%) and chronic pain (22.81%) is also prominent.

Correlation between the number of illnesses and the number of visits to general practitioners and specialists

As the number of illnesses increases, so does the number of visits to general practitioners and specialists. There is a weak but significant association between the number of illnesses and GP visits (Spearman's correlation coefficient $r=0.245$; $p<0.001$). A similarly weak but significant association is found between visits to a specialist and the number of illnesses (Spearman's correlation coefficient $r=0.198$; $p<0.001$).

Correlation between the number of visits to the GP / specialist and average PACIC scores

We also found a significant association between the number of visits to GP / specialist and the mean PACIC scores (Table 4). Patients who make GP and specialist appointments more

often are more satisfied with their care than their counterparts who make GP and specialist appointments less often.

Patient satisfaction with primary care among type 2 diabetic patients based on PACIC averages

The 20 questions on the quality of care for patients were grouped into 5 topics: patient activation; delivery system characteristics / decision support; tailoring; problem solving; and follow-up / coordination. Based on the responses to the quality assessment, the PACIC averages for the 5 topics are almost identical. Overall, patients rate the quality of their care with score three. Patients rated the delivery system with the highest PACIC average, while the lowest scores were given to the questions in the tailoring topic (patient activation – 3,32; delivery system characteristics / decision support – 3,53; tailoring – 2,99; problem solving – 3,23; follow-up / coordination – 3,29).

Regional patient satisfaction among type 2 diabetic patients based on PACIC averages

In the regional analysis, the results of the regions of Southern Great Plain and Southern Transdanubia were not included because of the small number of elements. The omission of these two regions did not change the results.

Besides diabetes, there is a significant relationship between chronic diseases and regions. The prevalence of ischaemic heart disease and hypertension is significantly lower in Northern Hungary compared to the other regions ($p < 0.001$). There is a significant difference between regions in the prevalence of COPD and chronic renal failure. The prevalence of both diseases is higher in Western Transdanubia compared to other regions.

The proportion of respondents who visit their GP only once is highest in Northern Hungary. The proportion of patients visiting their GP 4-5 times is significantly higher in Central Transdanubia compared to the other regions.

In the national survey, the PACIC average for patient activity was 3.32. When the five regions were examined, the average was 3.29. Significant differences were found between Central Hungary, Central Transdanubia and the other regions. In these regions, we found lower PACIC averages for the patient activity than in the other regions examined.

We looked at how satisfied patients are with their care. The national PACIC mean for the topic of care system characteristics is 3.53, and the PACIC mean for the 5 regions is 3.54. The PACIC averages for the care system characteristics in each region are almost identical (Northern - Great Plain – 3,80; Northern Hungary – 3,50; Central Hungary – 3,10; Central Transdanubia - 3,42; Western Transdanubia - 3,60). Significant differences can be seen for Central Hungary compared to the PACIC averages of the other regions.

New findings from our investigation

The results of our study show that the Hungarian adaptation of the PACIC questionnaire is a reliable tool for measuring the quality of care of chronic patients, including type 2 diabetic patients. The use of this tool provides an opportunity for health care professionals to learn about patients' perceptions of their care, thus improving the quality of care for diabetic patients in primary care and increasing patient satisfaction with their care.

No significant differences were found between PACIC means and gender, age, marital status, and education.

The average PACIC scores for the delivery system, care, problem solving and goal setting did not change with the change in the number of illnesses.

We found a significant relationship between the number of GP and specialist visits and the average PACIC scores. Patients who attend GP and specialist appointments more often are more satisfied with their care than their counterparts who attend GP and specialist appointments less often.

Based on the responses to the quality care, the PACIC averages for the 5 topics are almost identical. Overall, patients rate the quality of their care with a score three. Patients rated the delivery system with the highest PACIC average, while the lowest scores were given to the questions in the tailoring topic.

At regional level, significant differences were found between the PACIC averages of Central Hungary, Central Transdanubia and the other regions. These regions have lower PACIC averages for patient activity than the other regions.

The PACIC averages for the delivery system characteristics of each region are almost identical. A significant difference can be seen in Central Hungary compared to the PACIC averages of the

other regions. A significant difference is found between West Transdanubia, with the highest PACIC average, and the other regions.

Significant differences can also be seen in problem solving. The highest PACIC average was measured in Western Transdanubia, while the lowest PACIC average was measured in Central Hungary and Central Transdanubia.

Among the 5 regions surveyed, the PACIC averages for the follow-up/coordination question group are highest in Western Transdanubia and lowest in Central Hungary.

Our survey provides a picture of the areas of primary health care that need to be developed to improve care for people with diabetes. Our findings show that there is a need to strengthen tailored care for patients, which can clearly be developed in primary care. By assessing and evaluating the satisfaction of patients in chronic care and the factors that influence satisfaction, the quality of life of patients can be improved.

Summary

The aim of our study was to prepare a Hungarian adaptation of the Patient Assessment of Chronic Disease Care – PACIC questionnaire, which is used to assess the quality of chronic patient care, and also to assess the quality of healthcare, based on patient evaluations, that is provided to diagnosed type 2 diabetic patients in Hungary.

In the national cross-sectional study conducted in 2018, up to 684 diabetics of type 2 were enrolled from 20 GPs' practices in 7 regions. The survey was conducted using a self-administered questionnaire (Patient Assessment of Chronic Illness Care - PACIC), which consists of demographic data and 20 questions regarding the quality of care, and are grouped into 5 topics: patient activation; delivery system/practice design; goal setting/tailoring; problem-solving/contextual counselling; follow-up/coordination. Data recording and analysis were performed by the SPSS 19.0 statistical program.

The average age of the respondents was 63.19 years, and 51.6% of them were female. Overall, the patients rated the quality of their care as average. The highest PACIC average was seen in the topic of 'delivery system/practice design' while questions on goal setting/tailoring received the lowest scores. In a regional breakdown when examining 5 regions, this average was 3.29. We found a significant difference when comparing the regions of Central-Hungary and Central

Trans-Danubian with the other regions. In these regions, the topic of 'patient activity' was given lower PACIC averages than in the other regions examined.

We analysed the relationships between the 20 questions of quality of care using exploratory factor analysis. The names of the four groups generated by the factor analysis reflect the Hungarian conditions (goal setting, involvement of specialists, encouragement of patient activity, and tailoring). Our results are in line with international findings. The results of our study show that the Hungarian adaptation of the PACIC questionnaire is a reliable tool for measuring the quality of care provided for chronic patients. The use of this tool gives healthcare professionals the opportunity to learn about patients' opinions of the care provided, to improve the quality of care for diabetic patients in primary care, which can increase patient's satisfaction with the care.



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List of publications related to the dissertation

1. **Törő, V.**, Radó, S. I., Szelesné Árokszállási, A., Kósa, Z., Sárváry, A.: Access to primary health care and changes in quality of life of patients with type 2 diabetes during the COVID-19 pandemic in Hungary.
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IF: 1 (2024)
2. **Törő, V.**, Kósa, Z., Takács, P., Széll, R. F., Radó, S. I., Szelesné Árokszállási, A., Ujváriné Siket, A., Sárváry, A.: Patients' Assessment of Chronic Illness Care (PACIC): validation and Evaluation of PACIC Scale among Patients with Type 2 Diabetes in Hungary.
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List of other publications

3. Sałacińska, I., Trojnar, P., Gebriné Éles, K., **Törő, V.**, Sárváry, A., Więch, P.: A comparative study of traditional high-fidelity (manikin-based) simulation and virtual high-fidelity simulations concerning their effectiveness and perception.
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4. Radó, S. I., Molnár, M. J., Széll, R. F., Szöllősi, G. J., **Törő, V.**, Shehab, B., Manios, Y., Anastasiou, C. A., Iotova, V., Tsochev, K., Chakarova, N., Giménez-Legarre, N., Miguel-Berges, M. L., Schwarz, P. E. H., Rurik, I., Sárváry, A.: Association between Screen Time and Sociodemographic Factors, Physical Activity, and BMI among Children in Six European Countries (Feel4Diabetes): a Cross-Sectional Study.
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13. Harsányi, T. G., Papp, K., **Törő, V.**, Ujváriné Siket, A.: Kórházi közmunkaprogram ápoló
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16. Papp, K., **Törő, V.**: Palliatív ápolás jellemzői.
Hematológia-transzfuziológia. 1, 71-73, 2007.

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