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ORIGINAL ARTICLE

Impact of a professional development strategy for family physicians on older adults with Type 2 Diabetes

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ABSTRACT

Introduction: The rapid scientific and technological advances in Geriatric Diabetology require targeted professional development programs to enhance the knowledge, performance, and clinical competence of family physicians.
Objective: To evaluate the impact of a professional development strategy on the management of type 2 diabetes mellitus (T2DM) in older adults by family physicians, including the development of local research theses in each territory.
Methods: A quasi-experimental mixed-methods study was conducted from January 2016 to June 2025 across 11 municipalities in Pinar del Río province and two polyclinics in Artemisa province. Impact assessment was structured along three dimensions: attributable change, depth of change, and territorial contextualization.
Results: Implementation of the strategy led to significant improvements in clinical performance and health outcomes. Physicians' knowledge increased by 38 % (from 62.4 to 86.1 points). Glycemic control improved, with HbA1c levels decreasing from 8,4 % to 7,1%. Early detection of microvascular complications rose by 45 %, and therapeutic adherence improved by 27 % for medications and 33 % for lifestyle modifications. A total of 39 local research theses were produced, each offering context-specific improvement proposals. Ninety-four percent of participating physicians rated the strategy positively, highlighting its flexibility and utility during the pandemic.

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Conclusions: Continuous professional development of primary care providers is a cornerstone for strengthening integrated, high-quality care for older adults with T2DM.

Keywords: Aged; Diabetes Mellitus, Type 2; Education, Continuing; Health Impact Assessment; Health Evaluation.

INTRODUCTION

Within the framework of Primary Health Care (PHC), comprehensive care must be provided to individuals of all ages, including the implementation of key public health programs—such as those addressing chronic diseases like diabetes mellitus (DM) and care for older adults (OA). At this level, the health system must resolve the majority of health problems, requiring a qualified, committed, and empathetic workforce capable of identifying both individual and community needs. Family physicians must integrate clinical, epidemiological, and social methods with knowledge from biological, behavioral, and societal sciences to deliver holistic care to individuals, families, and communities—necessitating ongoing professional development.[1]

Professional development in Cuba is organized through systems, programs, models, and strategies. The authors selected a *strategy* due to its capacity to yield short-, medium-, and long-term results and its alignment with national health and education initiatives led by the Ministry of Public Health and its network of training and research centers for health workers.[2]

Various strategy typologies exist—pedagogical, didactic, methodological, educational, professional development, and school-based. The chosen approach is a professional development strategy, defined by Masó Galán,[3] as "a process (...) in which strengths and weaknesses in professional, pedagogical, and human performance are identified, along with upgrading needs driven by workplace education demands and the incorporation of cutting-edge technologies."

Given the rapid evolution of Geriatric Diabetology, systematic theoretical–practical updating is essential to enhance the professional performance, cultural competence, and clinical effectiveness of family physicians.

Diabetes is a major global public health challenge. One in ten older adults lives with diabetes; nearly half of the estimated 539 million affected individuals remain undiagnosed. By 2045, the International Diabetes Federation projects 783 million cases worldwide, with a 48 % increase (to 49 million) expected in Central and South America among adults aged 20–79.[3] This growing burden demands urgent, coordinated responses.

The World Health Assembly has adopted measures to confront this crisis, including the WHO Global Diabetes Compact—a critical initiative to improve prevention, care, and alignment with global targets for reducing premature mortality from non-communicable diseases.[4]

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In Cuba, diabetes prevalence rose from 66,7 to 71,3 per 1,000 population between 2019 and 2024. The most affected age groups are 60–64 years (193,8/1,000) and ≥65 years (155.6/1,000), with women disproportionately affected (201,0 and 173,1/1,000, respectively). Diabetes ranks 8th in potential years of life lost (2,1 per 1,000 population aged 1–74) and 10th among the top 35 causes of death (2,515 deaths; rate: 25.4/100,000). Pinar del Río's rate (76,5/1,000) exceeds the national average. [5] This trend is linked to rising obesity rates and accelerated population aging.

Therefore, innovative professional development approaches are needed to enhance family physicians' capacity to deliver comprehensive care to older adults with T2DM. Integrated, tiered postgraduate formats should enable clinicians to transition from theoretical knowledge to practical problem-solving in geriatric diabetology.

In response, this study evaluated the impact of a professional development strategy targeting family physicians across Pinar del Río's 11 municipalities (2016–2025), with an emphasis on locally driven research theses.

METHODS

A quasi-experimental mixed-methods impact evaluation was conducted from January 2016 to June 2025. The intervention targeted family physicians in all 11 municipalities of Pinar del Río province. Additionally, two pilot studies were carried out in Artemisa province:

- At the Adrián Sansaricq Polyclinic (Artemisa municipality), in the dentistry department
- Across 11 family physician-and-nurse offices in Basic Working Group (GBT) No. 1 of the Orlando Santana Valdés Polyclinic (Mariel municipality)

Both Artemisa projects contributed to master's theses in Primary Health Care at the National School of Public Health (Table 1). Due to feasibility and author discretion, Artemisa was not included in subsequent phases.

Table 1. Distribution of research projects conducted in Pinar del Río province by municipality in the health system.

Municipality	Number of Investigations	Academic Output
Pinar del Río (4 health areas)	22	17 TTE in Family Medicine, 1 TTM in Pharmacoepidemiology, 4 TTE in Hygiene & Epidemiology
Minas de Matahambre (3 areas)	3	3 TTE in Family Medicine
Los Palacios	3	2 TTE in Family Medicine, 1 TTM in Nursing Sciences
Sandino	2	2 TTE in Family Medicine
San Luis	1	1 TTE in Family Medicine
Consolación del Sur	1	1 TTE in Family Medicine
La Palma	1	1 TTE in Family Medicine
Viñales	1	1 TTE in Family Medicine
Mantua	1	1 TTE in Family Medicine
Guane	1	1 TTE in Family Medicine
San Juan y Martínez	1	1 TTE in Family Medicine

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The study involved a universe of 39 professionals; ultimately, the sample selected through non-probabilistic convenience sampling consisted of 35 of them who met the following criteria: family physicians engaged in healthcare functions within Primary Health Care (PHC). Exclusion criteria included: physicians who had received any form of postgraduate training on the subject, health professionals who contributed to the research but were not physicians, and those who did not provide informed consent yet participated in the working sessions.

The professional development strategy between 2023–2025 was conducted in a non-face-to-face modality, due to restrictions imposed by the COVID-19 pandemic and transportation limitations.

From a methodological standpoint, the impact evaluation was structured into three dimensions:

- **Attributable change:** Clinical and professional performance indicators were compared before and after the intervention, allowing precise assessment of the strategy's effect on DM2 management. Medical knowledge tests, self-assessment surveys, and analysis of patient medical records attended by participating physicians were employed.
- **Depth of change:** The magnitude of improvements in metabolic control (HbA1c), therapeutic adherence, detection of microvascular complications, and application of clinical guidelines was assessed. Quantitative data were processed using descriptive and inferential statistics (paired Student's t-test, $p<0.05$), validating the significance of the observed changes.
- **Territorial contextualization:** In each municipality, a research thesis was developed as part of specialty or master's programs, enabling adaptation of the strategy to local realities and generating evidence useful for decision-making. These theses addressed topics such as access to services, diabetes education, community follow-up, and organization of the basic health team.

Digital platforms were used for tutoring, distribution of materials, and discussion of clinical cases. Triangulation of sources—including surveys, clinical indicators, and documentary analysis—strengthened the internal validity of the study.

Qualitative analysis

Semi-structured interviews were conducted with a sample of participants, whose testimonies were coded and thematically categorized. This analysis captured perceptions regarding the usefulness of the strategy, barriers encountered, and proposals for improvement.

To minimize selection bias, all active family physicians in each municipality were invited. Triangulation of sources, clinical indicators, surveys, interviews, and theses reinforced the internal validity of the study. The absence of a control group was compensated through pre-post analysis and comparison across municipalities.

The study was approved by the Ethics Committee of each institution and their Department Heads, as well as by the Head of the Family Medicine Specialty at the University of Medical Sciences of Pinar del Río. All participants signed informed consent. Confidentiality of data, anonymity in the presentation of results, and adherence to ethical principles of health research were guaranteed.

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RESULTS

The implementation of the professional development strategy between 2016 and 2025 generated significant changes in the clinical performance of family physicians and in the health indicators of patients with type 2 diabetes mellitus (DM2) treated in the 11 municipalities of Pinar del Río.

- **Improvement in professional knowledge:** The average score in knowledge tests increased from 62.4 to 86.1 points ($p<0.001$), representing a 38% improvement in understanding of clinical guidelines, therapeutic algorithms, and follow-up criteria.
- **Glycemic control:** The average HbA1c in patients decreased from 8.4% to 7.1% within six months after the intervention, indicating improved metabolic control attributable to stricter application of clinical protocols.
- **Detection of complications:** Early identification of microvascular complications (retinopathy, nephropathy, neuropathy) increased by 45%, thanks to systematic use of complementary tests and strengthened clinical follow-up.
- **Therapeutic adherence:** A 27% increase in adherence to pharmacological treatment and a 33% increase in lifestyle changes were observed, according to clinical records and patient interviews.
- **Scientific production:** A total of 37 research theses were developed across the 11 municipalities of Pinar del Río province and two in Artemisa province, addressing the impact of the strategy in specific contexts. These theses generated improvement proposals adapted to local conditions, such as reorganization of consultations, community diabetes education, and home follow-up.
- **Professional satisfaction:** 94% of physicians positively evaluated the strategy, highlighting its practical applicability, participatory approach, and academic value of the theses. Interviews revealed that the non-face-to-face modality was perceived as flexible, accessible, and useful during the pandemic and post-pandemic periods.

DISCUSSION

The results obtained confirm that a well-designed professional development strategy, contextualized and adapted to epidemiological and logistical conditions, can have a significant impact on the quality of DM2 management in older adults at the primary care level.

The improvement in medical knowledge and in patients' clinical indicators suggests that the intervention succeeded in strengthening professional competencies and translating them into more effective clinical practices. The reduction in HbA1c levels and the increase in complication detection reflect more proactive, patient-centered care, consistent with previous studies on the role of family physicians in the management of chronic diseases.[6,7,8]

The development of theses across the three provinces, and specifically in the 11 municipalities of Pinar del Río, not only reinforced the academic component of the strategy but also allowed actions to be adapted to the specific realities of each territory. This territorial approach facilitated knowledge appropriation by professionals and the implementation of concrete improvements in the care of patients with DM2, in line with other authors.[9]

ISSN: 1561-3194 **RNPS:** 1877
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Although initially conceived as a solution to COVID-19 restrictions, the non-face-to-face modality proved to be a viable alternative for continuous training in rural and dispersed contexts. Flexibility, access to digital resources, and remote tutoring were positively valued by participants, consistent with international experiences in virtual medical education.[10,11]

From the perspective of impact evaluation, the methodological design allowed attribution of the observed changes to the intervention, measurement of their depth, and contextualization of the results. Source triangulation and the mixed-methods approach strengthened the internal validity of the study, despite the absence of a control group.

In this regard, agreement is found with authors such as Travieso Ramos N, Bandera Sosa L, [12] who state that impact evaluations constitute a particular type of evaluation aimed at answering questions about cause and effect. Unlike general evaluations, which can address many types of questions, impact evaluations focus on determining the causal effect of a program on an outcome of interest—that is, the direct effect it has on those results.

The Cuban National Health System (NHS), structured into three levels of medical care, has the need, political will, and legal instruments to increase the rigor in the training and professional development of its human resources, as an important means of improving service quality. Professional development influences service quality, satisfaction levels, and social recognition; the family physician is the cornerstone of population health achievements. Providing them with the necessary tools and guidance contributes to better comprehensive medical care for the assigned community.[13,14]

Agreement is found with Martí-Martínez et al.,[15] in that the results of the strategy are reflected in the demonstrated transformation of performance, based on leveraging opportunities and assessing risks faced by primary care physicians in the management of DM patients. The authors also adhere to the position of Candelaria Brito,[16] that the proposed professional development strategy carries a strong commitment to social responsibility, promotes education in PHC, reinforces political commitment and coordination between health and education (universities), and achieves an educational transformation supported by the use of ICTs, multidisciplinary and team-based learning, improved educational infrastructure, incorporation of research and evaluation, and enhanced interoperability of medical education. At the same time, it demonstrates the importance of comprehensive patient care through actions that, harmoniously and integrally, foster better quality of life outcomes for older adults.

CONCLUSIONS

Continuous professional development of primary care providers is a cornerstone for strengthening health systems—particularly in managing chronic conditions like T2DM in aging populations. The strategy implemented in Pinar del Río demonstrates that contextualized, flexible, and research-integrated training not only updates knowledge but transforms clinical practice, fosters scientific production, and empowers local problem-solving. The integration of territorial relevance, adaptive delivery modalities, and academic rigor creates a sustainable culture of quality improvement. This model offers a scalable blueprint for enhancing the role of the family physician, elevating care standards, and building local capacity to address contemporary health challenges. The experience in Pinar del Río provides valuable lessons for Cuba and similar health systems seeking to bridge the gap between clinical practice, education, and community needs through innovative, equity-oriented professional development.

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RECOMMENDATIONS

1. Institutionalize this strategy as a core component of the National Health System's continuous medical education program.
2. Expand the model to other provinces, adapting content to local epidemiological profiles.
3. Maintain the mixed-methods, territorial approach in future educational interventions to ensure relevance, equity, and sustainability.
4. Strengthen digital infrastructure to support remote learning, mentorship, and knowledge sharing across rural and urban settings.
5. Link professional development explicitly to clinical performance indicators and patient outcomes for ongoing quality monitoring.

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