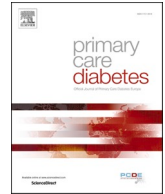




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Assessment of diabetes self-management education guideline content across Spanish regions: a document-based comparative analysis

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ABSTRACT

Objective: This study aims to evaluate the content, structure, and alignment with international standards of Diabetes Self-Management Education guidelines across Spain's regional healthcare systems. It focuses on comparing the guidelines and documents used in these programs against international standards to identify key patterns, disparities, and areas for improvement.

Methods: The study employed a comparative descriptive analysis, systematically reviewing and contrasting 13 relevant documents from the Spanish Ministry of Health and regional health authorities. The evaluation was based on international standards for DSME, set by the American Diabetes Association and the Global Diabetes Survey. Key aspects assessed included program structure, target population, content delivery, healthcare provider involvement, and quality management.

Results: The results revealed significant variability in the DSME guidelines, with most emphasising individualised education and a multidisciplinary approach. However, there were gaps in addressing psychosocial factors, dietary support and the inclusion of vulnerable populations. Additionally, quality management and evaluation processes were inconsistently described, with some regional guidelines lacking systematic assessment frameworks.

Conclusion: The study highlights the need for harmonising DSME guidelines across Spain. It recommends improving inclusivity, psychosocial support, multidisciplinary involvement, quality monitoring, and digital delivery to strengthen diabetes education and reduce regional inequalities nationwide.

1. Introduction

Diabetes mellitus is a major global health concern [1]. The International Diabetes Federation (IDF) estimates that approximately 589 million adults worldwide were living with diabetes in 2024, a number projected to rise to 853 million by 2050 [2]. Diabetes affects about 10.3% of the adult population in Spain, mirroring global trends, although with significant variation across the country's 17 regions [2–4]. This high prevalence is partly attributed to lifestyle factors such as sedentary behaviour and poor dietary habits, and demographic characteristics, including ageing populations [3,4].

Diabetes Self-Management Education (DSME) is crucial to comprehensive diabetes care [5]. It empowers individuals with diabetes to

manage their condition through health education, [5–7] and has been shown to improve glycaemic control, reduce diabetes-related complications, and enhance quality of life [8–10]. These educational programs equip patients with the knowledge and skills necessary to make informed decisions about their health, fostering greater independence and better health outcomes [5,6].

The American Diabetes Association (ADA), the IDF and the National Institute for Health and Care Excellence (NICE), all emphasise the importance of DSME as part of diabetes management protocols [2,6,11]. Effective DSME programs can lead to significant improvements in clinical outcomes, such as lower HbA1c levels, reduced hospital admissions, and decreased healthcare costs. Additionally, DSME can enhance patients' psychological well-being by reducing diabetes-related distress

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and improving their confidence in managing the disease [7–10].

International organizations have set forth standards and guidelines to ensure the efficacy of DSME programs. The ADA advocates for DSME to be a fundamental part of diabetes care, recommending that education be tailored to each patient's needs, based on a patient-centred model that adapts to the individual's cultural context, literacy levels, and personal preferences [5,6].

Similarly, the IDF provides global standards, stressing the need for culturally appropriate education and regular updates to the DSME curriculum based on emerging evidence. It also highlights the importance of integrating DSME into routine diabetes care and ensuring that healthcare professionals are adequately trained to deliver these educational programs [12]. NICE guidelines also support structured education programs, recommending them to all individuals with diabetes soon after diagnosis. These guidelines advocate for ongoing education that adapts to the patient's changing needs, ensuring that they remain engaged and informed [11]. The European Association for the Study of Diabetes (EASD) echoes these recommendations, highlighting the necessity of a patient-centred approach and the role of multidisciplinary teams in delivering comprehensive DSME [13].

In Spain, the legal framework governing diabetes care and DSME is structured at both national and regional levels, [14] setting the foundation for the provision of health services, including diabetes education, within the National Health System (SNS). This mandates the inclusion of DSME as part of standard diabetes care, ensuring that all patients have access to essential educational resources [15].

Additionally, the Spanish Ministry of Health has developed the Strategy for Diabetes, which outlines specific aims and actions to improve diabetes care, including DSME [16]. This strategy focuses on enhancing the quality of diabetes care, promoting early diagnosis and improving patient outcomes through comprehensive education programs. At the regional level, health authorities have the competence to implement health policies and programs related to diabetes education [14–16].

However, significant disparities exist in diabetes care across different regions in Spain. Studies highlight these regional differences, with areas facing higher socio-economic challenges often showing poorer diabetes outcomes and lower access to comprehensive DSME programs. These disparities highlight the uneven implementation of national diabetes strategies at the regional level, leading to variations in patient outcomes and quality of care [17–20].

Previous European studies have examined DSME at the member-state level, but none have undertaken an intra-national comparative analysis within a single country [21,22]. This is particularly relevant in decentralised systems such as Spain's, where aggregated national data risk masking important regional differences [23]. Assessing the alignment of regional DSME related documents with international standards may help characterise variation across regional health services.

The primary objective is to conduct a comprehensive comparative analysis and evaluation of guidelines and key documents related to DSME across Spain's regional health services, assessing their alignment with international standards and identifying gaps and areas for improvement.

2. Methods

2.1. Study design

A comprehensive search was carried out during January and February 2024 across the Spanish Ministry of Health website, the official health portals of each of the 17 regional health authorities, and the National Health System (SNS) online publications repository.

2.2. Inclusion and exclusion criteria

All identified documents underwent an initial review to ensure they

met the established inclusion criteria. Throughout this article, the term guideline refers to the published document analysed, program refers to the broader educational framework described within the guideline, and implementation refers to the actual clinical application of a program, which was not assessed in this study. These criteria included relevance to diabetic comprehensive care programs; publication by a Spanish health authority; publicly available; and up to date. For the purpose of this review, documents were considered up to date when they represented the most recent version available from the corresponding health authority at the time of the search. Documents that did not meet these criteria were excluded from the analysis.

Subsequently, the remaining documents were thoroughly reviewed, and those that did not explicitly reference diabetes self-management education, diabetes education, or educational therapy were also excluded.

2.3. Selection and evaluation process

The guideline selection and review process was independently conducted by two reviewers who are experts in diabetes care (A.E-F and J.R.M). The expertise of the reviewers was assessed beforehand using an adapted version of the Fehring criteria [24].

Eligible guidelines were independently assessed based on standards derived from the Global Diabetes Survey (GDS) questionnaire [25] and the 2022 ADA National Standards for Diabetes Self-Management Education [6]. These standards were categorized into eight main areas: general information, implementation, target group, content, strategy and structural organization, standardisation and materials, quality management and regional program implementation modality, with 174 items used to evaluate the eight areas comprehensively. (Supplementary file: compliance standards).

Operationally, the service-quality criteria of the 2022 ADA Standards were transcribed largely verbatim [6], while the descriptive items were adapted from the GDS wiki tool, a Delphi-developed multilingual instrument for mapping DSME programs across EU member states [21]. Items were grouped into the eight domains following the logical sequence of a diabetes education program and given equal weight, as the aim was to describe and compare compliance rates rather than generate a composite score. Discrepancies between reviewers were resolved by structured discussion, with a third expert (A.C-C.) consulted where consensus could not be reached.

2.4. Data analysis

The analysis of the documents was conducted using a descriptive and comparative approach. For each item, the proportion of guidelines that met the criterion was calculated and expressed as a percentage, providing a quantitative measure of compliance across the various health councils and offering insight into how far each program adhered to the recommended standards. This approach allowed patterns and trends in compliance to be identified, highlighting areas where programs consistently met standards and areas where there were gaps or inconsistencies.

3. Results

A total of 21 documents were identified in the initial search. After applying the inclusion criteria 15 documents were retained. Following full-text review, a further 2 documents were excluded because they contained no explicit reference to DSME, diabetic education, or educational therapy, leaving 13 documents for complete assessment. Of these 13, one was published by the Spanish Health Ministry and the remainder by regional health authorities. None were exclusively dedicated to DSME; however, all included dedicated sections on diabetes education. (Fig. 1).

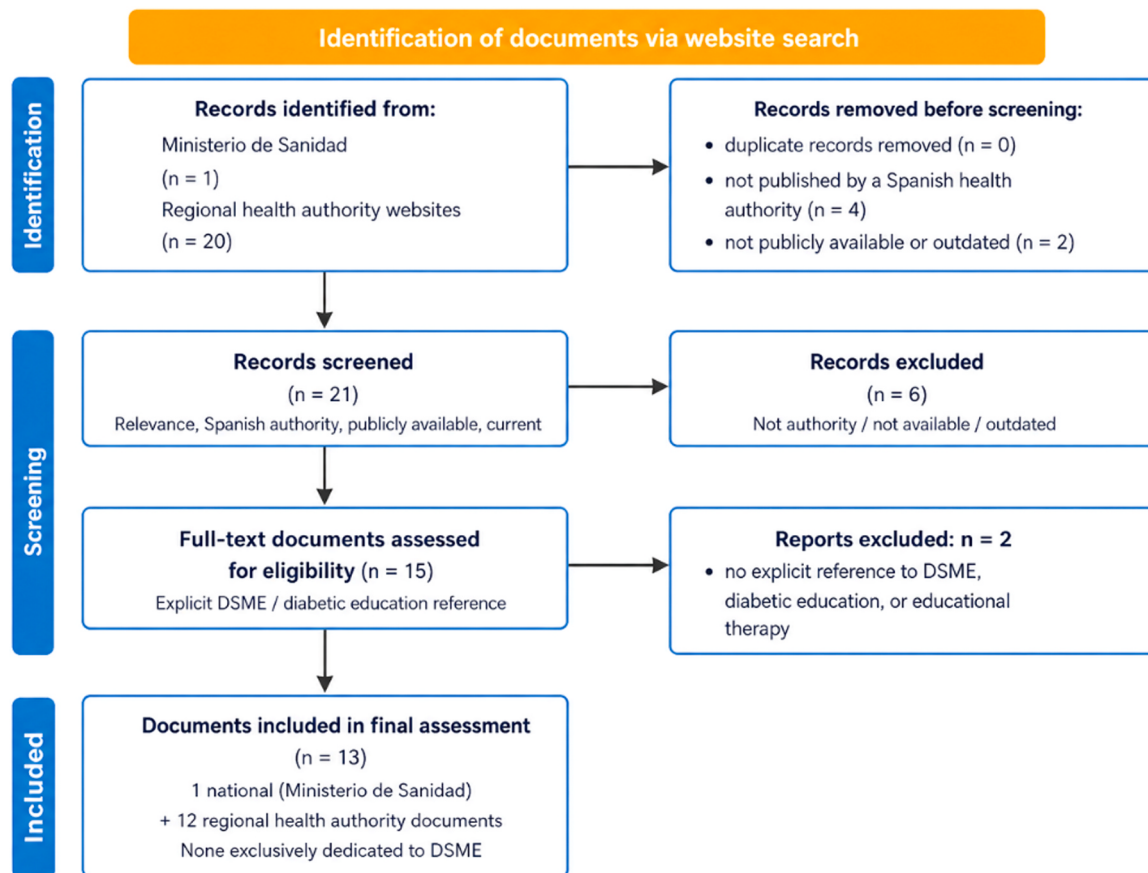


Fig. 1. PRISMA-adapted flow diagram of the document selection process [26].

3.1. Program structure

The DSME guidelines analysed in this study employed various methodologies to deliver their content. All included one-on-one education sessions, underscoring the emphasis on personalized learning. The majority (around 70%) incorporated practical training, while more than half included group activities. A discussion-based approach, allowing participants to learn from each other's experiences, was present in about a third of the guidelines. Only a minority of guidelines included behavioural training and role play, and less than 20% used online interactive learning or traditional lecture formats.

Regarding the number of educational sessions recommended, more than half of the guidelines (53.9%) did not specify an exact number. Among those that did, the average number of sessions suggested was seven, with a range from a minimum of four to a maximum of twelve.

In terms of clinical context, all guidelines established DSME in community-based primary care and hospital-based settings, both in outpatient clinics and inpatient units. Only one program included a diabetes specialty care unit, and none were based in a non-clinical community setting.

3.2. Target population

All diabetes guidelines analysed are primarily designed for adults, with 100% targeting this group. In contrast, only a small fraction (15.4%) are intended for children aged 6–12, and just for adolescents aged 13–17 (7.7%). None of the guidelines focus on parents of diabetic children or geriatric patients.

Regarding specific types of diabetes, all guidelines address Type 2 diabetes (DM2). A smaller portion (38.5%) also covers gestational diabetes, 30.8% focus on Type 1 diabetes, and 23% target individuals with

diabetes and other chronic conditions.

The guidelines address various therapies, with all including lifestyle modifications like diet and exercise, as well as oral antidiabetic medications and insulin therapy. However, only 38.5% cover patients using insulin pumps.

In terms of specific considerations, none of the guidelines are tailored to gender, ethnic, or minority groups. However, 15.4% are designed to be accessible to individuals with lower literacy, education, and language proficiency. Additionally, 69.2% of the programs reflect the demographics of the target population, 46.2% align with prevalent types of diabetes, 23.1% consider barriers to accessing DSME services, and only 15.9% address the preferences and needs of DSME participants.

3.3. Patient education content and delivery

A written curriculum is crucial for ensuring that the content delivered is both evidence-based and comprehensive. The majority of guidelines (76.9%) include a curriculum covering topics like diabetes pathophysiology, healthy eating, physical activity, medication management, glucose monitoring, and the prevention and treatment of complications. Nearly all guidelines (84.6%) also incorporate lifestyle and coping strategies, with many addressing diabetes distress and the need for support.

Empowerment strategies are key to achieving DSME goals, focusing on increasing participants' knowledge, changing attitudes, and enhancing self-care skills. Most guidelines emphasise boosting patient self-efficacy, while fewer encourage self-reflection. Cognitive behavioural therapy and social support strategies are less commonly included.

Assessment is a crucial part of DSME, with all guidelines covering key areas such as diabetes pathophysiology, treatment options, and lifestyle management. Most also consider clinical history and document

DSME plans (92.3%), though fewer document each session (53.9%) or evaluate diabetes distress (30.8%) and health literacy (7.7%).

The educational content of DSME programs is highly comprehensive, covering seven critical areas essential for effective diabetes management. (Table 1).

3.4. Healthcare provider training and support

The implementation of diabetes education necessitates the involvement of a diverse array of healthcare professionals. Physicians and nurses are integral, featuring in all guidelines. Diabetes nurses and social workers are included in over half of the guidelines (53.9%), while dietitians, nutritionists and psychologists are involved in a lesser portion (38.5%). Physiotherapists and pharmacists also contribute, reflecting a multidisciplinary approach. Peer involvement, highlighted in nearly a third of programs, underscores the value of community support.

Certain guidelines incorporate specialized professionals, such as chiropractors, endocrinologists, diabetes educators and vascular surgeons, further emphasising the comprehensive nature of DSME. Teachers are included in a few cases, broadening the scope of educational support.

Professional training is deemed essential for successful implementation, with most guidelines requiring evidence of prior training or experience (76.9%). Supervision by a professional DSME team member

Table 1

Key areas and content coverage in DSME programs (%).

Key Area	Specific Content	% of Programs
Healthy Eating	Meal planning	100%
	Weighing and measuring food	69.2%
	Carbohydrate counting	53.9%
	Label reading	30.8%
Self-Monitoring	Self-monitoring of blood glucose technique	100%
	Recording blood glucose values	92.3%
Problem Solving	Equipment use and care	69.2%
	Hypoglycemia treatment	100%
	Glucagon administration	53.9%
	Use of blood glucose data for appropriate action	76.9%
Living with Diabetes	Goal setting and development of individual targets	100%
	Action planning	84.6%
	Building self-efficacy	53.9%
	Coping strategies	46.2%
	Problem-solving in everyday situations	61.5%
	Dealing with depression	30.8%
	Understanding one's clinical picture	46.2%
Physical Activity	Dealing with legal aspects of the disease	0%
	Developing appropriate activity plans	100%
	Increasing frequency, duration, and intensity of activity	100%
Taking Medication	Preparation, technique, and administration	92.3%
	Safe handling and disposal of equipment	38.5%
	Dose adjustment	84.6%
	Recognition, treatment, and prevention of low blood glucose	92.3%
Reducing Risks of Diabetes Complications	Foot self-examination	100%
	Self-management of blood pressure	84.6%
	Self-management of blood glucose	100%
	Maintaining personal care records	84.6%
	Staying in contact with diabetes care professionals	46.2%
	Support in finding additional resources	15.4%
	Smoking cessation	92.3%

is mandated in over half, ensuring the delivery of high-quality education and support.

3.5. Quality management and evaluation of DSME programs

The monitoring and evaluation frameworks described in DSME guidelines are crucial indicators of their commitment to maintaining and improving effectiveness. Quality assurance measures are incorporated in the majority of the guidelines (76.9%) ensuring that educational services provided meet established standards. All guidelines emphasise the importance of identifying and aggregating participant behavioural goal outcomes, including healthy eating, physical activity, and medication adherence.

The commitment to continuous quality improvement (CQI) varies across guidelines. A significant portion (84.6%) establish specific project outcome targets. Over half (53.9%) acknowledge the importance of baseline CQI project data, and the same percentage include provisions for service improvement or change. These guidelines also include plans to address identified gaps or the need for service modifications.

3.6. Spanish regional variability and consistency in DSME guideline content

These figures indicate that while the core content of DSME guidelines is relatively homogeneous across Spain, the structural and quality management dimensions are highly inconsistent. For example, a region with 28.6% compliance in 'Implementation and Support' describes a far less structured educational framework than a region achieving 85.7%, a gap that reflects substantial differences in the documented educational frameworks across regions and may influence the consistency of the educational approaches described in these guidelines. Overall average compliance across all categories is illustrated in [Graphic 1](#).

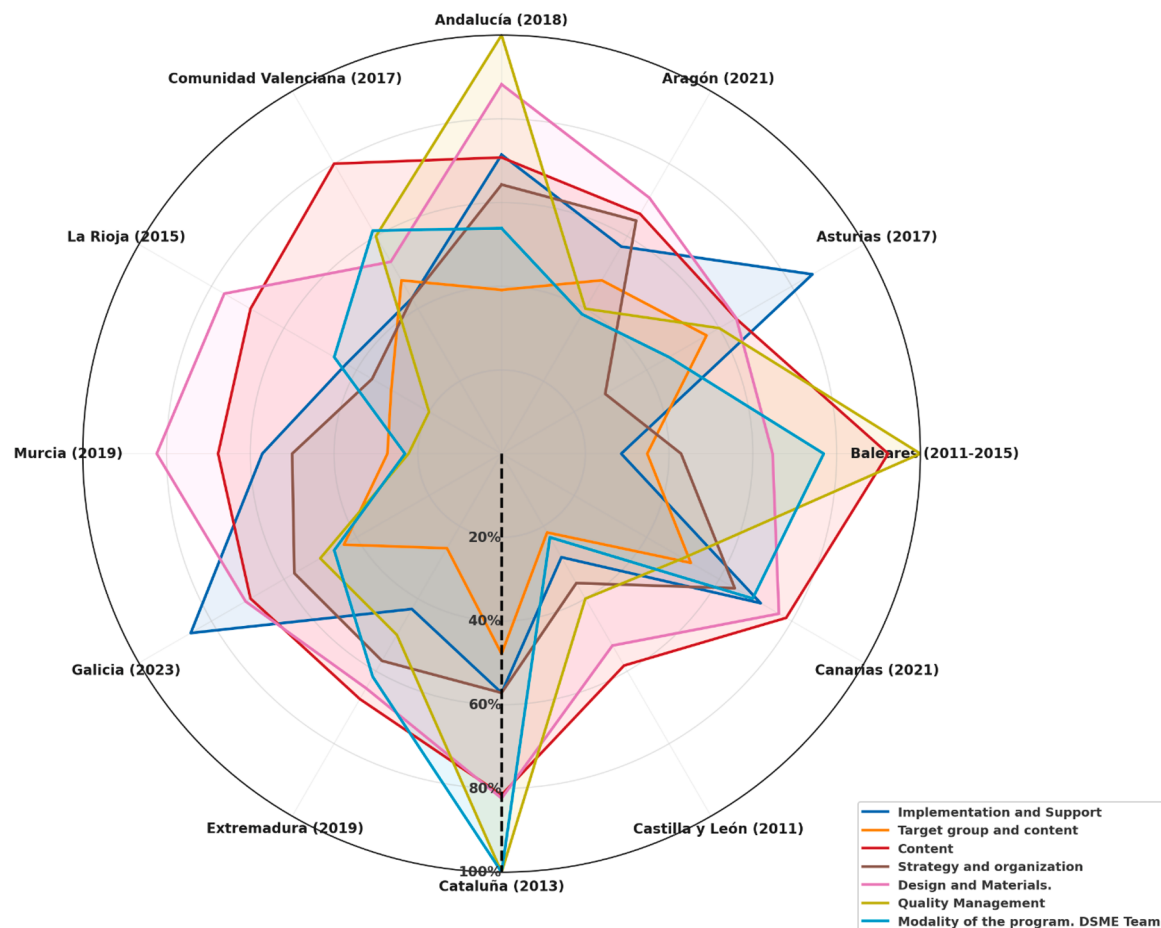
4. Discussion

The analysis of DSME guidelines across most Spanish healthcare authorities reveals several key insights into the current situation of diabetes education in Spain. It is important to note that this study's conclusions are limited to the content and structure of the analysed documents, which does not extend to clinical delivery. The study identified a diverse range of methodologies employed, with a predominant focus on individualised education. This emphasis on personalised and interactive approaches aligns with global trends in DSME, which underscore the importance of tailoring education to individual needs to enhance patient engagement and outcomes [7,10,13]. Given the central role of primary care in diabetes management in Spain, greater harmonisation of DSME guideline content may facilitate a more consistent educational approach across healthcare settings [27].

The involvement of multidisciplinary teams in DSME is documented as a strength, as it reflects a holistic approach to diabetes care. However, the study reveals variability in the presence of certain healthcare professionals across guidelines, with some critical roles like psychologists and nutritionists underrepresented. This could limit the comprehensiveness of the education described, particularly in addressing the psychological and nutritional aspects although whether it extends to everyday practice would require direct observational or survey-based research [5,6,11,28,29].

Another key finding is the emphasis on quality management and continuous improvement. Most guidelines include mechanisms for monitoring and evaluating outcomes, crucial for ensuring the effectiveness, but the frequency and structure of these evaluations varies substantially across regions, with some lacking regular assessment [6, 11].

While all guidelines include fundamental aspects such as healthy eating, self-monitoring, and physical activity, there is less uniformity in addressing psychosocial factors like diabetes distress and the broader



Graphic 1. Radar chart: regional variability and consistency in the implementation of the DSME program.

coping mechanisms necessary for managing a chronic condition like diabetes [30,31]. Limitations in the scope are also evident while adults with diabetes are covered by all, provision for adolescents, children, or elderly patients is limited, which may leave educational needs unmet among these populations [32,33]. The absence of guidelines tailored to specific ethnic or minority groups likewise suggests a gap in culturally competent content, which is increasingly recognised as essential for effective diabetes management [34–36].

The variability in adherence across regions is most pronounced in 'Implementation and Support' (28.6%–85.7%) and 'Quality Management' (40%–100%), suggesting these are the dimensions most in need of harmonisation. Previous European studies documented broad patterns of DSME variability across EU member states [21,22], including the notable absence of diabetes educators in Spain's reported workforce [22], but none examined variation within a single country which the present study addresses directly.

Several questions arise that cannot be answered by document review alone. To what extent is DSME implemented in daily practices, and how well do these practices adhere to international standards? Addressing these would require direct survey methods or observational research beyond the scope of the present study.

Several difficulties were also met. Access to some regional guidelines was limited, and were not always current or specific to DSME, impeding assessment of their alignment with the latest practices [1,6,37]. On appraisal, although discrepancies were resolved through structured discussion and a third expert opinion when needed, no formal inter-rater reliability statistic was calculated so agreement should be interpreted as consensus. Finally, the study drew only on publicly available official documents; undocumented local practices and unpublished materials

were not included, with findings reflecting the documented framework rather than the full scope of regional activity.

A notable strength of this study is the use of a standardised international assessment framework enabling structured comparison of heterogeneous regional documents using consistent evaluation criteria. By mapping where regional guidelines converge and diverge, this work provides a clear foundation for a more harmonised national DSME framework supporting more consistent, equitable, and high-quality diabetes education across Spain.

5. Conclusion

This study provides a structured comparative analysis of DSME guidelines across Spanish regional health services, highlighting both strengths and areas for improvement. While most regions show a strong foundation, with widespread access to evidence-based guidelines, gaps remain in inclusivity, content coverage and quality management, leaving the coverage of vulnerable populations and the consistency of quality frameworks as the dimensions most in need of harmonisation.

To strengthen DSME guidelines and, by extension, the programs they describe, future revisions should address several specific areas. In terms of guideline content, all should explicitly address psychosocial support, diabetes distress screening, and health literacy assessment, alongside clinical content already well represented. The composition of the multidisciplinary team should be defined in order to mandate the involvement of nutritionists and psychologists as core members alongside physicians and nurses. Monitoring a shared set of outcome indicators with defined minimum evaluation intervals should be adopted, enabling meaningful comparison of documented quality. Provisions

should be extended to include children, adolescents, elderly patients, and ethnic or linguistic minorities, with culturally adapted content where relevant. Finally, guidelines should incorporate digital or hybrid delivery options to address geographical and access barriers.

Addressing these gaps would help Spanish healthcare authorities strengthen the quality and consistency of their DSME guidelines, providing a necessary foundation for improving diabetes education and health outcomes nationwide. In a decentralised system such as Spain's, this alignment may also help reduce regional inequalities in access to high-quality diabetes education.

Declaration of Generative AI and AI-assisted technologies in the writing process

During the preparation of this manuscript, the authors used ChatGPT (OpenAI) to assist with language editing and readability improvements, and in the design of Fig. 1 and Graphic 1. Following the use of this tool, the authors thoroughly reviewed and edited all content, and took full responsibility for the accuracy and integrity of the published work. This use complies with the journal's authorship and AI disclosure guidelines.

Declaration of Competing Interest

We, the undersigned authors, declare that we have no competing interests.

None of the authors has any financial or personal relationships that could inappropriately influence or bias the content of this manuscript.

This statement is made in accordance with the journal's conflict of interest policy.

Appendix A. Supporting information

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.pcd.2026.07.005](https://doi.org/10.1016/j.pcd.2026.07.005).

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