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Comparing core competencies for diabetes specialist nurses across different countries: a scoping review

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Abstract

Aims This review aims to identify the current status of the core competencies of Diabetes Specialist Nurses (DSNs) as referenced in available international literature. It identifies specific categories and important components of the core competencies identified internationally, which lacks attention for now.

Methods A scoping review was conducted using electronic databases including CINAHL (EBSCO), Embase, PubMed, Scopus, and Web of Science. The latest Joanna Briggs Institute (JBI) scoping review methodology was aligned with.

Results After initial analysis, 27 competencies were extracted from 11 studies, and then categorized into eight domains: Diabetes professional knowledge, Supporting self-management, Clinical Management Practice and Integration, Administration and research, Professional technique, Complication care, Teaching and learning, and Cultural Competence. The PRISMA extension for Scoping Reviews (PRISMA-ScR) was applied.

Conclusions The compilation of the currently identified core competencies for DSNs, coupled with an analysis of the core competency standards in the assessment of these professionals, can contribute to facilitate the establishment of a uniform standard of professionalism in the delivery of diabetes care on a global scale. This would facilitate the development of an internationally applicable core competency framework for DSNs.

Clinical trial number Not applicable.

What is already known

Core competencies for diabetes specialist nurses seek to define the fundamental knowledge, skills and abilities required at each level of the wider continuum of diabetes care.

Some countries have developed a core competency framework in accordance with their respective medical systems and the specific requirements of diabetes prevention and control.

At present, the training model of diabetes specialist nurses is still in the exploratory stage, and its core competency has not been established in some developing countries.

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What this paper adds

To the best of our knowledge, this scoping review is the first to search and collate the current literature on the core competencies of diabetes specialist nurses.

This paper explains the importance and specific requirements of cultural competence, an important component of DSNs' core competencies nowadays.

This study extracted the most frequently mentioned core competencies of diabetes specialist nurses.

Keywords Nurse specialists, Chronic disease management, Professional competence, Diabetes, Healthcare management

Introduction

A recent study updates the challenges of leadership in nursing management [1] including the acknowledgment that the future of nursing success depends on knowledgeable, capable, and strong leaders with a support of well-defined and evidence-based set of education on specific challenging competencies to support their decisions. Our study expands from this perception and focuses on the specific challenging context of Diabetes and the role of nursing management.

The prevalence of diabetes has reached epidemic proportions globally, with approximately 537 million adults worldwide living with diabetes, equivalent to 1 in 10 adults [2]. Globally, diabetes has become a serious and rapidly growing chronic disease. It is associated with a range of serious, debilitating, and costly complications, as well as a shortened life expectancy. *The condition of people with diabetes is inherently complex and dynamic, necessitating prolonged monitoring and management by qualified nursing professionals. To provide comprehensive nursing care for people with diabetes, nursing staff need to accurately assess the patient's condition, be proficient in basic skills [3], and understand multidisciplinary knowledge [4].* The complexity and specialised nature of diabetes management has led to the emergence of a category of health professionals who have received systematic theoretical and practical training and are able to use the knowledge and techniques of diabetes specialist care to provide professional care for people with diabetes, formally recognised as diabetes specialist nurses (DSNs) [3].

Competence can be defined as a synthesis of knowledge, abilities, values and attitudes that collectively underpin effective performance in each profession. Core competencies seek to define the fundamental knowledge, skills and abilities required at each level of the wider continuum of diabetes care [5]. Internationally, countries have developed standards for DSNs in accordance with their respective medical systems and the specific requirements of diabetes prevention and control. In the United States, the Association of Experts in Diabetes Care and Education describes core competencies as the ability to practice and integrate clinical management, communication and advocacy, research and quality improvement,

systems-based practice, and professional practice [6]. In New Zealand, the core competencies of DSNs include specialist nursing, complication care, care of pregnant women, health education, and management of children and adolescents, and the content is more detailed [7]. *In China, current core competency framework for diabetes specialist nurses does not involve nursing research and management competencies. To date, only competency framework for primary-level specialist nurses has been established, which fails to address the complex demands of advanced nursing specialists in diabetes care [8]. Variations in core competency standards for diabetes nurses across countries are associated with differences in healthcare priorities, cultural contexts, and resource allocations.* These disparities hinder the harmonization of professional standards and international collaboration, consequently fragmenting care delivery models, impeding workforce mobility, and generating non-comparable educational outcomes across different healthcare systems. Evidence links competency gaps to compromised care quality, including preventable complications and suboptimal self-management adherence [9].

With the development of new technologies in the field of diabetes nursing, requirements for DSN's roles and competencies have also been broadened. Consequently, a systematic scoping review of global diabetes specialist nursing competencies is necessary to identify similarities, discrepancies, and gaps [10]. This process would support the future development of a flexible international competency framework that integrates global evidence while remaining adaptable to regional healthcare needs. Such a framework could narrow disparities and elevate the quality of diabetes care worldwide.

A review of the literature has been conducted to ascertain the core competencies of diabetes educators (DEs). Although the two concepts are not entirely distinct from each other, they do have some differences. For instance, both require a solid understanding of diabetes [11]. However, there are notable differences in the certification methods and role positioning. The background of a DE may be drawn from a variety of disciplines, such as health education and nutrition [12]. *While it is a requisite for DSNs to have undergone specialized nursing education and obtained certification in the field of diabetes*

nursing [13]. DEs are able to provide educational service in a variety of settings, including communities and health-care facilities. DSNs primarily work in healthcare settings, such as diabetes inpatient wards or outpatient clinics in hospitals [14]. Currently, numerous countries are engaged in the active promotion of the development of diabetes specialist nurses, competency frameworks and have issued new guidelines. Therefore, there is an urgent need to conduct a review of competencies of DSNs.

Also, competency assessment could assist DSNs to evaluate their own progress in diabetes care and management and enable them to provide high-quality care for people living with diabetes. Globally, assessment tools for diabetes nurse specialists' core competencies remain under-developed. China has developed evaluation indicator systems, while lacking validated scales for widespread use [8]. Australia and New Zealand have published competency assessment tools, but their content and applicability exhibit divergence [15, 16].

Objectives

This scoping review will identify and clarify the specific categories and important components of DSN's core competencies, as well as their assessment tools. The findings are expected to inform the training, assessment and career development of DSNs, and optimize diabetes care.

Methods

Study design

A scoping review methodology is suitable because it is designed to map the available evidence on a particular topic to clarify broad review questions [17]. The reporting recommendations of the PRISMA extension for scoping reviews (PRISMA-ScR) [18] were followed.

Identify research questions

The research questions of this review were as follows:

1. What are the core competencies reported for diabetes specialist nurses?
2. What are the tools for evaluating the core competencies of diabetes specialist nurses?

Eligibility criteria

Population

Registered nurses with formal DSN certification, regardless of gender, age, or ethnicity were included. They should hold a bachelor's degree or higher. For countries without established DSN certification systems, nurses who have completed specialized training in diabetes care and passed competency assessments to perform roles analogous to DSN were eligible. Exclusion criteria were as following: (1) practitioners engaged solely in basic diabetes care (e.g., routine blood glucose monitoring); (2) non-specialized

nursing personnel; or (3) experienced practitioners without formal diabetes-specific training or certification.

Concept

The proposed review was designed to describe core competencies of DSN. Therefore, all literature with a focus on competencies, including guidelines were considered. In alignment with patient-centered care principles, evidence regarding patient perspectives on DSN's core competencies was also systematically synthesized alongside professional standards.

Context

This scoping review adopted an international perspective, not restricted to nations with established Diabetes Specialist Nurse (DSN) certification systems or formalized training programs. Additionally, the practice settings encompassed all healthcare environments, including but were not limited to outpatient clinics, inpatient wards, and community-based care contexts. Studies conducted in any medical institution (e.g., hospitals, regional health centers, or specialized diabetes facilities) were eligible.

Types of study design

Eligibility criteria was designed to capture diverse evidence on DSN's core competencies. We included quantitative, qualitative, mixed-method studies, reviews, Delphi studies, and grey literature. Studies were excluded if they do not focus on DSN competency frameworks. Thematic boundaries were strictly aligned with the PCC framework.

Search strategy

The electronic databases CINAHL (EBSCO), Embase, PubMed, Scopus, and Web of Science were searched from inception to 4 October 2024. The following keywords or search terms were used: "Diabetes Mellitus," "diabetes," "nurse specialists," "specialist nurses," "Disease Management," "core competencies," "core competencies framework," "Professional Competence," and "educators." A sample search strategy for the PubMed database is provided as online supplemental appendix 1. Researchers also utilized some sophisticated Boolean operators, truncation, phrase searches, and medical subject headings to ensure obtaining the best results from each database.

Additionally, grey literature was retrieved through OAlster, Google Scholar, and OpenGrey, supplemented by targeted manual searches of official websites of key organizations, including: national diabetes associations of different countries (e.g., American Diabetes Association, Diabetes UK, the International Diabetes Federation (IDF), and Training Research and Education for Nurses in Diabetes-UK(TREND-UK)) to identify unpublished English-language documents and international guidelines on Diabetes Specialist Nurses. Finally, reference lists of all

included studies were manually screened to locate other relevant studies.

Data selection

Literature retrieved from databases and other sources ($n=1117$) was imported into ENDNOTE 20.0. After removing duplicates, two members of the research team, namely YWL and QXT, performed the preliminary screening of titles and abstracts of the literature in accordance with the inclusion and exclusion criteria. Subsequently, they conducted full-text screening. During the screening procedure, any discrepancies were resolved through consensus-building. If necessary, consultation with the third reviewer (YFL) was undertaken. Risk of bias was not formally assessed, because the purpose of this review was an exploration of practices and applications of competencies of DSN, rather than a formal evaluation of the quality of studies.

Data extraction and charting

The data extraction table was prepared in advance by QXT, and the final data chart was determined in the iterative process. The information extracted from each study included title, country, year of publication, professional organization, specialty members, definition, and competencies. YWL and XCL independently extracted data according to the key information in the table, cross-checked the data extraction results, and discussed the results and continuously updated the data charting form in an iterative process. Any disagreement was resolved by discussion between two reviewers or further ruling by third-party reviewers.

Using a meaning-sharing approach (i.e. pooling all elements with a common theme) and setting a minimum number of mentions of competency elements (that is, the competency must be mentioned in at least four publications), the scoping review resulted extraction of the core competencies that diabetes specialist nurses must possess. Initially, competencies were extracted independently by two researchers, with the mention frequency of each competency quantified. Results were cross-compared to ensure consistency, and any discrepancies were resolved through discussion until consensus was reached or by final arbitration from a third researcher. Subsequently, through focus group, competencies were categorized into domains based on shared characteristics.

Results

Search results

A total of 1,117 records were identified from five electronic databases. Subsequently, 472 duplicate records were removed, and 645 records were screened based on titles and abstracts. Among these, 607 records were marked as “excluded”. The full texts of the remaining 38

records were retrieved for eligibility assessment. After the full-text screening process, 27 studies were excluded. The detailed reasons for the exclusion are presented in Fig. 1. In addition, one relevant study was added through the reference search. Ultimately, 11 studies were encompassed in the scope evaluation, encompassing 10 English studies [6, 8, 15, 16, 19–22, 24] and 1 Spanish study [23]. The PRISMA flowchart of the study selection is depicted in Fig. 1.

Characteristics of included studies

A total of 11 articles were included in this scoping review, including 2 peer-reviewed studies. One is from China [8], and the other is from Turkey [25]. The included 9 professional organizations publications were issued by Association of Diabetes Care & Education Specialists (ADCEA) [6], The Australian Diabetes Educators Association (ADEA) [16, 19], International Diabetes Federation (IDF) [2], Trend Diabetes [22], Aotearoa College of Diabetes Nurses [15], The Spanish Diabetes Society (SED) [23], and American Association of Diabetes Educators (AADE) [24] respectively (Table 1).

The contents of the included studies are divided into two forms: competency framework and assessment questionnaire. Among studies focusing on competency framework, two of them solely describe cultural competence and cultural sensitivity, which are important aspects of core competencies [24, 25]. Therefore, they are also included in this study to make the index system more complete.

Core competency framework for diabetes specialist nurses

This section includes a peer-reviewed study and three professional organizations' competency frameworks. Study by Qiuling XING et al. [8] was based on the British “integrated career and competency framework for diabetes nursing model”, and the Delphi method was employed to construct a core competency framework for primary nurse specialists in diabetes care, comprising six primary indicators (diabetes professional knowledge, diabetes-related knowledge, communication skills and health education ability, specialized skills, clinical judgement, and specialty development capacity), 23 secondary indicators, and 87 tertiary indicators. The difference compared with the UK's is that the framework primarily reflects the competency requirements for specialist nurses in hospitals and does not address the care of people with diabetes in prisons and nursing homes. The framework is based on professional knowledge, clinical practice, and education and training. Research and leadership competencies were not included because the researchers felt they were more appropriate for diabetes advanced care professionals. Additionally, the framework did not include content related to cultural competence, which may be attributed

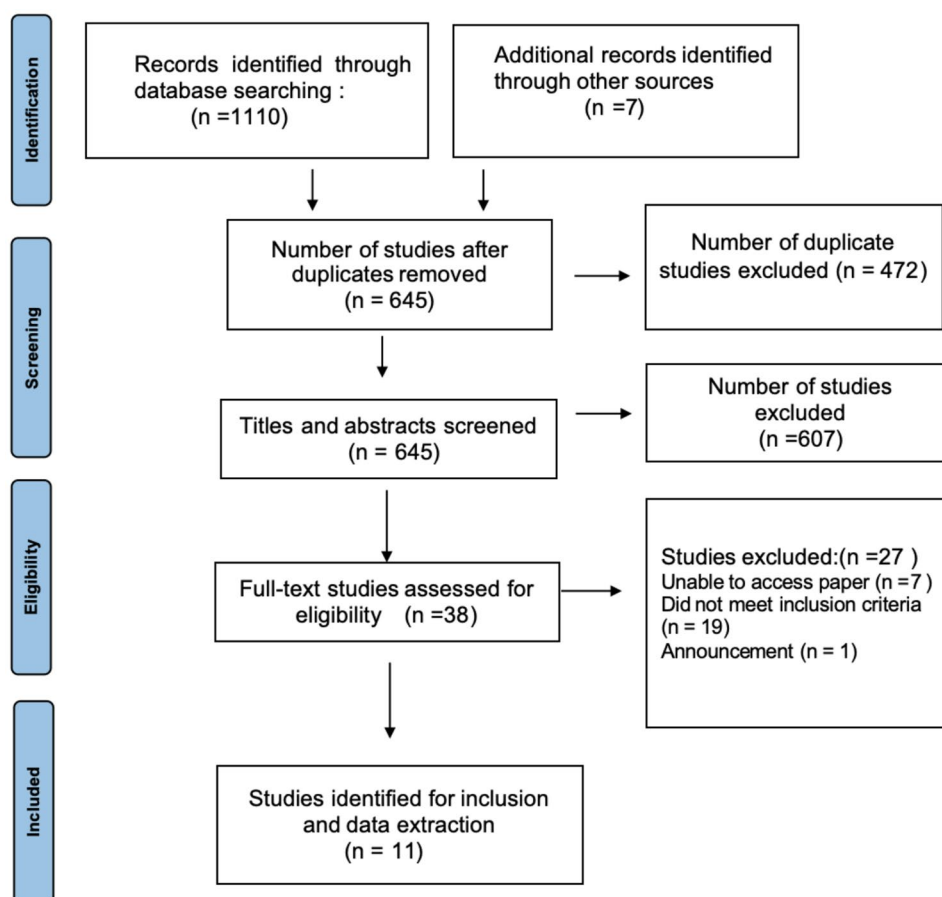


Fig. 1 Flow chart of study selection process

to the relatively minor discrepancies in cultural beliefs among ethnic groups in China.

The Competencies for Diabetes Care and Education is the inaugural revised competency document published by ADCES in 2020 for the specific knowledge, skills, and abilities of diabetes care and education specialists [6]. This document was published in consequence of the change of DSNs to Diabetes Care and Education Specialists in 2019. It establishes a framework for interprofessional practice based on clinical experience and suggests that nurse specialists need to provide person-centered, lifelong care and education, but it does not address the related components of education and training.

The Association of British Clinical Diabetologists and Trend Diabetes published an Integrated Career and Competency Framework for Adult Diabetes Nursing in 2020 [22]. The document provides clear diabetes care competency guidance for all nurses and now has 28 topic areas ranging from screening and early diagnosis of type 2 diabetes to end-of-life care for people with diabetes, with recommended competencies categorized into five levels. The research framework provides a complete set

of competencies for different groups, including senior practitioner or expert nurse.

A document from Spain describes a competency framework that encompasses five areas [23]: pathophysiology, epidemiology, and clinical guidelines, cultural appropriateness, pedagogical skills, self-management education, and planning, management.

Hierarchical competency framework

The core competency framework of diabetes nurses in the two guidelines was divided into different levels [19, 20]. In 2017, ADEA published National Competencies for Credentialed Diabetes Educators (CDE) [19]. Professions eligible to apply for CDE status include registered nurses and other professions that are involved with the care and management of people living with diabetes. In the guidance, it was noted that core competency domains for CDE include diabetes education and management, which seem applicable to DSNs. Consequently, their core competencies are equally informative. ADEA proposes that competencies be classified into five domains: clinical practice, education and counselling, research and quality improvement, management and administration, and

Table 1 Core competencies for diabetes specialist nurses

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
1 The Development of a Standardized Framework for Primary Nurse Specialists in Diabetes Care in China: A Delphi Study	China	2019 [8]	The Chinese Nursing Association Diabetes Professional Committee	Primary Nurse Specialists in Diabetes Care	N/A	I. Diabetes professional knowledge 1. The epidemiological trends of diabetes 2. Classification and characteristics of diabetes 3. Pathophysiology characteristics of diabetes 4. Knowledge of complications of diabetes 5. Knowledge of hypoglycemia II. Diabetes-related knowledge 1. Nutrition knowledge 2. Kinematics knowledge 3. Psychological knowledge III. Communication skills and health education ability 1. Ability to communicate with patients 2. Ability to assess diabetes education needs 3. Ability to organize and plan diabetes education 4. Ability to express and explain health knowledge IV. Specialized skills 1. Specialized nursing skills 2. Emergency response capacity V. Clinical judgment 1. Clinical evaluation capacity 2. Ability to judge social support 3. Ability to analyze potential risk 4. Understand the relevant laws and ethics VI. Specialty development capacity 1. Teaching ability 2. Training ability 3. Team coordination ability 4. Continuous nursing ability 5. Learning ability

Table 1 (continued)

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
2 Competencies for Diabetes Care and Education Specialists	US	2020 [6]	The Association of Diabetes Care & Education Specialists (ADCES)	Diabetes Care and Education Specialist (DCES)	N/A	Domain 1: Clinical Management Practice and Integration 1.Clinical Management of diabetes and cardiometabolic conditions. 2.Clinical practice: healthy coping. 3.Clinical practice: reducing risks. 4.Clinical practice: taking medication. 5.Clinical practice: healthy eating. 6.Clinical practice: monitoring. 7.Clinical practice: being active. 8.Clinical practice: problem solving. Domain 2: Communication and Advocacy. Domain 3: Person-Centered Care and Counseling Across the Life Span. 1.Assessment. 2.Care delivery for individual. 3.Care delivery for population. Domain 4: Research and Quality Improvement. Domain 5: Systems-Based Practice. 1. Business management 2.Systems practice 3.Population health management. Domain 6: Professional Practice. 1. Lifelong learning. 2. Professionalism.
3 National Competencies for Credentialed Diabetes Educators	Australia	2017 [19]	Australian Diabetes Educators Association (ADEA)	Credentialed Diabetes Educator (CDE)	Competency: can be defined as “the state of having the knowledge, judgement, skills, energy, experience and motivation to respond adequately to the demands of one’s professional responsibility”	Clinical Practice: 13 items Education and Counselling: 7 items Research and Quality Improvement: 10 items Management and Administration: 11 items Leadership and Advocacy: 8 items

Table 1 (continued)

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
4 International Standards for Education of Diabetes Health Professionals	International Diabetes Federation (IDF)	2015 [20]	International Diabetes Federation (IDF)	Health professionals in diabetes care	N/A	1. Prevention of diabetes and public health 2. Diagnosing diabetes 3. Diabetes self-management 4. Diabetes self-management education 5. Emergencies and acute complications 6. Long-term complications 7. Diabetes in pregnancy 8. Diabetes and surgery 9. Complementary and alternative therapies 10. Utilising research and delivering evidence-based practice
5 Professional Competencies for Diabetes Technology Use in the Care Setting	US	2022 [21]	The Association of Diabetes Care and Education Specialists (ADCES)	Diabetes technology requires /Diabetes Care and Education Specialists	N/A	Domain 1: Staff Knowledge (3 levels) Domain 2: Device Data (2 levels) Domain 3: Glycemic Targets and Diabetes Management (4 levels) Domain 4: Patient Education, Preparation for Onboarding, and Durability of Use (4 levels) Domain 5: Clinical Processes, Billing, and Coding (3 levels) Domain 6: Psychosocial (3 levels) Domain 7: Schools and Camps (4 levels)

Table 1 (continued)

Title	Country	Year	Professional Organization	Speciality members	Definition	Competencies
6 An Integrated Career and Competency Framework for Adult Diabetes Nursing	UK	2022 [22]	Trend Diabetes	Nurses working in diabetes	N/A	1. Screening, prevention and early detection of type 2 diabetes. 2. Newly diagnosed type 1 diabetes. 3. Established type 1 diabetes. 4. Promoting self-care. 5. Emotional well-being. 6. Nutrition. 7. Urinary glucose and ketone monitoring 8. Blood glucose and ketone monitoring. 9. Safe use of glucose sensor technology. 10. Oral therapies. 11. Injectable therapies. 12. Continuous subcutaneous insulin infusion (CSII). 13. Hypoglycaemia 14. Hyperglycaemia. 15. Inter current illness. 16. Managing diabetes in hospital (General admission). 17. Managing diabetes and after surgery. 18. Preconception care. 19. Antenatal and postnatal care. 20. Cardiovascular disease (CVD). 21. Neuropathy. 22. Foot care. 23. Chronic kidney disease. 24. Retinopathy. 25. Mental health. 26. Residential evidential and nursing homes. 27. Prison and secure units. 28. End of life care.

Table 1 (continued)

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
7 National Diabetes Nursing Knowledge and Skills Framework 2018	New Zealand	2018 [15]	Aotearoa College of Diabetes Nurses	Specialist Diabetes Nurse	Competencies are observable behaviors that encompass the knowledge, skills, attitudes, values and abilities required effective work performance and the application of knowledge and skills to meet all competencies at that level	1.Diabetes. 2.Glycaemic control-oral therapy. 3.Glycaemic control-Insulin pumps. 4. Monitoring glycaemic control. 5. Nutritional plan and weight. 6.Promoting self-management of diabetes, healthy lifestyle and well-being. 7.Hypoglycaemia. 8.Hyperglycaemia. 9. Complications. 10.Hypertension/ Cvdypertension/CVD. 11. Retinopathy. 12. High risk foot. 13. Neuropathy. 14. Nephropathy. 15. Oral health. 16. Identification & treatment during concurrent illness. 17. Managing diabetes in hospital. 18. Bariatric surgery. 19. Travel health. 20. Pregnancy-ore-conception care for women with pre- existing- diabetes. 21.Pregnancy - antenatal and postnatal. 22. Children & youth. 23. Leadership & management.

Table 1 (continued)

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
8 National Diabetes Nursing Education Framework 2020–2022	Australia	2020 [16]	Australian Diabetes Educators Association (ADEA)	All nurses delivering diabetes care	Competence is a combination of knowledge, skills, attitudes, values and abilities that underpin effective performance in a profession rising and Midwifery Board of Australia. Decision-making framework for nursing and midwifery.	1. Diabetes prevention, screening and diagnosis 2. Lifestyle factors – nutrition, alcohol and other drugs, smoking, physical activity, weight, stress and sleep 3. Mental and emotional health 4. Cultural safety for Aboriginal and Torres Strait Islander people 5. Cultural safety for Culturally and Linguistically Diverse people 6. Supporting self-management 7. Blood glucose and ketone monitoring 8. Medication monitoring – oral glucose lowering medication 9. Medication monitoring – injectable therapies 10. Hypoglycaemia 11. Hyperglycaemia 12. Macro-vascular-related health issues – hypertension, cardiovascular disease and peripheral vascular disease 13. Micro-vascular-related health issues – neuropathy, nephropathy, retinopathy and the high-risk foot 14. Sick day management 15. Travel health 16. Managing diabetes in hospital 17. Bariatric-metabolic surgery 18. Disability, community and aged care 19. Palliative care 20. Pregnancy – pre-conception care for people with existing diabetes 21. Pregnancy – antenatal and postnatal care 22. Children and adolescents
9 Posicionamiento de la Sociedad Española de Diabetes (SED) sobre el perfil curricular y profesional de los profesionales de enfermería expertos en la atención de las personas con diabetes, sus familiares o cuidadores	Spain	2014 [23]	The Spanish Diabetes Society (SED)	Diabetic patient care professionals	N/A	Domain I. Pathophysiology, epidemiology, and clinical guidelines for diabetes mellitus. The specialist nurse has the ability to demonstrate knowledge of pathophysiology, epidemiology, and clinical guidelines related to the provision of evidence-based DM care at different levels of care. Domain II. Lifetime, culturally competent care. The ability to support the care of people with diabetes and their family members or caregivers in a culturally competent manner throughout the life cycle (from children with diabetes to the elderly). Domain III. Teaching and learning skills. Being able to apply the principles of teaching, learning and / or behavior change to improve self-care skills together with people with diabetes, their family members or caregivers. Domain IV. Treatment of self-management education. Have the ability to work with the care team in an interdisciplinary manner and to adapt / consent to educational interventions for self-management treatment according to the individual needs of each patient. Domain V. Planning, management, and research. Have the ability to plan, manage, and evaluate structured educational programs to achieve effective self-management of DM.

Table 1 (continued)

Title	Country	Year	Professional Organization	Specialty members	Definition	Competencies
10 Cultural Sensitivity: Definition, Application, and Recommendations for Diabetes Educators	America	2002 [24]	American Association of Diabetes Educators(AADE)	The Diabetes Educator	Cultural Sensitivity: the extent to which ethnic/cultural characteristics, experiences, norms, values behavioral patterns, and beliefs of a target population's relevant historical, environmental, and social forces are incorporated in the design, delivery, and evaluation of targeted health promotion materials and programs	1.Understand how ethnic groups view themselves regardless of how the group is classified by others. 2.Incorporate into current programmes research findings that examine the role that culture plays in shaping behaviors. 3.Become involved in continuing education to help overcome the ethnocentric tendency to view other cultures as inferior to one's own. 4.Learn about cultural variations in families, health beliefs, socioeconomic status, environmental surroundings, and the perception and experience of racism shared by patients who come from similar work and residential settings. 5.Apply findings generated in multicultural counseling research to current education programs. 6.Provide diabetes education to diverse populations that is consistent with the culture and experience of the ethnic groups. 7.Practice active listening, which may help identify what is meaningful to people. 8.Replace deficit-based or problem-weakness-based philosophies and intervention planning with those that focus on individuals' and communities' historical and current strengths, skills, and natural and human resources. 9.Strategize and implement principles of participatory action research, which advocate active involvement of populations affected in all aspects of planning programs.

Table 1 (continued)

Title	Country	Year	Professional Organization	Speciality members	Definition	Competencies
11 Investigation of the Cultural Competence Levels of Diabetes Care	Turkey	2022 [25]	N/A	diabetes nurses	Cultural Competence: In the context of health care, appreciating, accepting, and respecting the values, beliefs, and preferences of different cultures is defined as cultural competence	Cultural Knowledge: 1. I can use examples to illustrate communication skills with clients of diverse cultural backgrounds 2. I am familiar in health- or illness-related cultural knowledge or theory 3. I can list the methods or ways of collecting health-, illness-, and cultural-related information 4. I can compare the health or illness beliefs among clients with diverse cultural background 5. I can easily identify the care needs of clients with diverse cultural backgrounds 6. I can explain the possible relationships between the health/illness beliefs and culture of the clients Cultural Skills: 1. I can teach and guide other nursing colleagues about the differences and similarities of diverse cultures. 2. I can teach and guide other nursing colleagues about planning nursing interventions for clients from diverse cultural backgrounds. 3. I can teach and guide other nursing colleagues about the communication skills for clients from diverse cultural backgrounds 4. I can explain the influences of cultural factors on one's beliefs/behaviour towards health/illness to clients from diverse ethnic groups 5. To me collecting information on each client's beliefs/behaviour about health/illness is very easy 6. I can teach and guide other nursing colleagues about the cultural knowledge of health and illness 7. I can teach and guide other nursing colleagues to display appropriate behaviour, when they implement nursing care for clients from diverse cultural groups 8. I can explain the influence of culture on a client's beliefs/behaviour about health/illness 9. I can establish nursing goals according each client's cultural background 10. When implementing nursing activities, I can fulfil the needs of clients from diverse cultural backgrounds 11. When caring for clients from different cultural backgrounds, my behavioural response usually will not differ much from the client's cultural norms 12. I can use communication skills with clients of different cultural backgrounds Cultural Sensitivity: 1. I usually actively strive to understand the beliefs of different cultural groups 2. I usually discuss differences between the client's health beliefs/behaviour and nursing knowledge with each client

leadership and advocacy. For each of the five domains, a set of social exchanges, knowledge, and values that constitute the competency are included. Furthermore, the framework delineates the criteria for core competencies at three levels in five domains.

The International Standards for Education of Diabetes Health Professionals, issued by IDF in 2015, cover all aspects of educational programs for diabetes nurse specialists, and this document is divided into four standards: structure, process, competencies, and outcomes [20]. It contains core competencies for DSNs, including prevention, diagnosis, self-management, complication care, gestational diabetes, curative and alternative therapies, and perioperative diabetes management. The content standards for the core competencies are categorized as Level 1 and Level 2. In terms of content, therapeutic and alternative therapies and management of the perioperative people with diabetes is a distinctive feature of the IDF document.

Competencies on newly emerging technologies

In 2020, the ADCES released Professional Competencies for Diabetes Technology Use in the Care Setting [21]. It proposes 7 domains: staff knowledge, device data, glycemic targets and diabetes management, patient education, preparation for onboarding, and durability of use, clinical processes, billing, and coding, psychosocial schools and camps. Within each domain, the competencies are organized by 4 practice levels: Basic, Fundamental, Intermediate, and Advanced. It highlights the importance of using information technology to optimize diabetes care.

Cultural competence

The study conducted by Derya Çinar demonstrated the significance of cultural competence in the practice of DSNs [25]. Cultural competence enables DSNs to mitigate racial and cultural discrepancies and to recognize, accept and respect the values, beliefs and preferences of people from diverse cultural backgrounds, thereby enhancing the quality of diabetes care [26]. The domain includes three dimensions of cultural knowledge, cultural skills, and cultural sensitivity.

In light of the growing global cultural diversity and the advancement of person-centred care, there is a growing emphasis on the importance of cultural competence in the context of diabetes care. In 2002, AADE published a report on cultural sensitivity containing nine competencies [24]. Cultural sensitivity is now regarded as a key aspect of cultural competence, and a peer review of cultural competence for nurses specialising in diabetes is included in this scoping review. In order to enhance the comprehensiveness of the core competency framework, articles on cultural competence were also incorporated into this review.

Assessment tools for diabetes specialist nurse's core competencies

A review of the literature revealed two questionnaires pertaining to the assessment of the knowledge and skills of DSNs [15, 16]. New Zealand's National Diabetes Nursing the Knowledge and Skills Framework specifies the knowledge and skills requirements of nurses at different levels of practice. The literature assesses the knowledge and skills of all Diabetes Nurses, Proficient Diabetes Nurse, and Specialist Diabetes Nurse in the form of a scale, categorized into Not Applicable, Developmental, Competent and Met with Requirement to Enhance four levels in the form of self-assessment and other assessment, and only Specialist Nurse Competency Requirement section was selected for this study. In terms of questionnaire content, in addition to the areas of disease-related knowledge, glycemic control, self-care, complication care, pregnancy-antenatal and postnatal, attention was paid to travel health and bariatric surgery, as well as diabetes as an impact on the developmental and neurological effects of blood glucose for infants, toddlers, and children.

The National Diabetes Nursing Education Framework includes an assessment questionnaire that evaluates the observable behaviors expected of DSNs at different levels of practice related to various aspects of diabetes care and management [16]. The questionnaire contains 22 domains of assessment, categorized into Developing, Competent, Excellent, and Not applicable. The questionnaire reflects a focus on cultural competence and palliative care compared to the New Zealand questionnaire.

Identification and distribution of the core competencies

The current study identified 27 core competencies using a meaning-sharing approach (i.e., pooling all elements with a common theme) and a method of setting a minimum number of mentions of a competency element (i.e., the competency must be mentioned in at least four publications), as shown in Table 2. The three competencies with the most mentions are Diabetes Prevention, Screening and diagnosis, Supporting Self-management, and Cultural Competence. The most comprehensive documents covering these core competencies are Competencies for Diabetes Care and Education Specialists and An Integrated Career and Competency Framework for Adult Diabetes Nursing [6, 22].

Discussion

To develop and establish the focus of this research we have considered recent trends in clinical research trends [27–29], ethical challenges in healthcare research [30] and recent challenges on nursing management developments [31, 32].

Table 2 Frequency of competencies in peer-reviewed studies and professional organisations

Competencies/Publications*	CN	TR	US	AU	IDF	US	UK	NZ	AU	ES	US
Diabetes professional knowledge	1		1	1	1		1	1	1		1
Diabetes prevention, screening and diagnosis											
The risk factors for type 2 diabetes	1		1		1		1	1			
Types of diabetes mellitus and its diagnosis, clinical indicators, clinical manifestations	1		1	1	1		1		1		
Supporting self-management		1	1	1	1		1		1	1	1
Taking medication	1		1	1	1		1	1	1		
Healthy eating	1		1	1	1		1	1	1		
Physical activity	1		1	1	1		1	1	1		
Travel health	1				1			1	1		1
Clinical management of diabetes and cardiometabolic conditions			1	1			1	1	1		
Diabetes and surgery					1		1	1	1		
Pregnancy – antenatal and postnatal care for women with pre-existing diabetes and Gestational Diabetes Mellitus (GDM)					1		1	1	1		
Clinical evaluation	1		1		1		1	1	1		
Disability, Community and aged care					1		1	1	1		
Knowledge of relevant laws and ethics	1		1			1	1				
Team coordination	1		1	1			1		1	1	
Interdisciplinary cooperation			1	1	1		1		1		
Research and Quality Improvement	1		1	1	1		1				
Insulin injection	1				1		1	1			
Professional nursing technique	1		1			1	1	1	1		
Etiology, characteristics, outcome and nursing points of complications	1		1		1		1	1	1		
Hyperglycaemia			1		1		1	1	1		
Hypoglycaemia	1		1	1	1		1	1	1		
Emergencies and acute complications	1		1		1		1				
Education and Counselling	1		1		1		1				
Person-Centered Care and Education Across the Life Span	1		1		1		1				1
Lifelong learning	1		1	1				1			1
Cultural Competence		1	1	1	1		1	1	1	1	1
culturally competent care											

CN: China, TR: Turkey, US: United States, AU: Australia, UK: United Kingdom, NZ: New Zealand, ES: Spain

The purpose of this scoping review was to compile the currently identified core competencies for DSNs and to compare tools for assessing core competencies for DSNs in different countries. A total of 11 publications were reviewed for this study, of which 9 were related to full scope of core competencies and 2 were related to cultural competency. The 11 literatures were pooled and analyzed, and a total of 27 highly recognized core competencies for DSNs were extracted.

The hierarchical framework of core competencies provides a clear direction of career development for nurses specialising in diabetes. Different levels of nursing competency requirements correspond to different career stages and development goals, enabling nursing staff to clearly identify where they are in their career and where they are heading towards. *Practice nurses constitute the largest group of primary healthcare nurses in New Zealand, working predominantly in general practice. District nurses (or mobile nurses), employed by secondary care services, deliver home-based care. The three groups of specialist nurses in New Zealand include DSNs who mostly work in secondary care and chronic care management nurses who predominantly work in general practice and nurse practitioners [33].* Nursing staff at different levels play different roles in clinical practice, teaching, and research. ADEA does not intend that all CDE's must advance from level 1 to level 3 on a linear continuum or be equally proficient in all areas. Some DSNs may choose to develop their personal careers in clinical or educational areas, while others may be successful in management or research. All DSNs maintain a minimum level of competence (Level 1) in all areas regardless of their scope of practice.

Being based on clinical practice is the biggest difference between a DSNs or diabetes care and education specialist and a diabetes educator [6]. The above point is well illustrated by the fact that in the competency frameworks included in the current study, clinical practice occupies an important place in all of them. The framework sets out detailed criteria for clinical practice competency domains such as familiarity with preventive screening and diagnosis of diabetes mellitus, proficiency in specialized nursing techniques (e.g., glucose meters, continuous glucose injection systems, and standardized insulin injection therapy), and mastery of appropriate communication skills. This review finds that three mostly emphasized competencies are Diabetes prevention, screening and diagnosis, Supporting self-management, and Cultural competence. *In the process of providing self-management support for people living with diabetes, DSNs often act as key coordinators of multidisciplinary care for complex cases, especially in the organization of care plans [34]. Ross et al. observed that DSNs employ more holistic, knowledge-based clinical decision-making than*

other nursing staff [35]. Crucially, DSNs operate at a higher decision-making level—prioritizing critical evaluation of clinical complexity over rigid protocol adherence. They need to work closely with personnel from other disciplines, coordinate resources from all parties, and play a coordinating and communicating role in multidisciplinary collaboration [36]. Through interdisciplinary cooperation, the professionalism and relevance of care can be improved, thus improving the quality of care and ensuring that people receive timely and effective care.

The care of complications is mentioned in all the reviewed literature. Care of diabetic complications occupies an important position in the care of people with diabetes, and it plays a key role in the overall health status of the people [37]. The International Diabetes Federation describes the standards of care for diabetic ketoacidosis, hyperosmolar hyperglycemic syndrome (HHS) in some detail [20]. Repeated hypoglycemia may cause brain damage and affect cognitive function, and publications from China, IDF, and UK suggest that DSNs should have the ability to assess and respond to hypoglycemia and acute complications [8, 20, 22]. Five publications listed highlight diabetes-specialist nurses' care for people with diabetes in the perioperative and bariatric surgery periods [15, 16, 20, 22, 25]. In the presence of hyperglycemia during the perioperative period, specific postoperative complications are more likely to occur, such as delayed wound healing, infections, and cardiac arrhythmias, so attention should be paid to the people's glycemic profile during the surgical period [38]. In addition, the high blood glucose will affect the local microenvironment of the oral cavity, providing favorable conditions for bacterial growth. Severe oral infections, such as periodontitis, cause the body to develop an inflammatory response that releases inflammatory factors into the circulation, affecting insulin sensitivity and making glycemic control more difficult [39]. Only two publications emphasized the need to address oral health issues, noting that DSNs need to have adequate knowledge of oral health [15, 20]. Therefore, other countries are prompted to focus on perioperative and oral care of people in the training and assessment of diabetes nurse specialists.

The DSNs needs to be a lifelong learner. Recognizing the importance of personal learning, attending diabetes continuing education courses to learn new knowledge and information related to advanced diabetes care. *A study found that systematic training has equipped most diabetes specialist nurses with the skills to identify clinical problems, research solutions using literature, and apply them based on practical experience. However, their ability to advance nursing research is hindered by a lack of supervision, support, recognition, guidance, time, resources, and funding [10]. To strengthen nursing research capabilities, nurse managers and specialist nurses must collaborate*

to establish essential infrastructure—including management, academic, material, and cultural support [40]. The advent of new and emerging technologies has transformed the landscape of diabetes care and education [41]. Following The ADCES guiding principles, Allyson S. et al. [21] employed the Delphi methodology to understand better and develop diabetes technology competencies. Their study created efficient processes to improve diabetes care workflow and program sustainability, strengthen diabetes technology education and support, recognize and prevent technology burnout by people with diabetes, and reduce disparities in technology use. It is important to remember that technology uptake and continuation is often a complicated process and affects all members of the diabetes care team.

Appreciation, acceptance and respect for the values, beliefs and preferences of different cultures are defined as cultural competence in the context of health care [42]. Cultural competence necessitates an appreciation of the means by which cultural divergences may be diminished and culturally appropriate care provided. An individual's cultural norms and values have a significant impact on their understanding of health and illness, lifestyle, and behaviour [43]. Research confirms stigma associated with chronic conditions (including Type 2 Diabetes) in multiple African nations [44], despite robust family support systems. Cultural consistency strongly predicts higher communication quality [45]. Therefore, specialist nurses should be aware of differences in people's family composition, health beliefs, and socioeconomic status, as well as perceptions and experiences of racism among people from different work and residential settings.

Some countries have developed assessment tools for competencies of DSNs. The Competency assessment Scale of New Zealand is based on the Learning Nurse.com Rating Scale for Nursing Competency Self-assessment [15]. Each item includes six response options: Not Applicable, Developmental, Competent, Requirement Enhancement, Excellent. This assessment tool is designed for DSNs to conduct a holistic self-assessment of their clinical competencies. In Australia, firstly, an individual nurse should reflect on their practice to determine a self-rating assessment against competencies in line with the scale. Then a nurse who is a specialist or expert in the aspect of care can conduct an assessment and determine a rating in line with the scale. Subsequent structured consensus discussions based on the results mitigate potential subjective bias [16]. Given the multidimensional nature of diabetes core competencies, scale-based assessments alone may inadequately capture nurses' authentic proficiency levels. Therefore, both tables conclude with the imperative to implement multimodal evaluations for comprehensive assessment: clinical competency demonstrations, care planning and assessment exercises,

case review presentations, critical exemplar analyses and structured practice reflections. These methods collectively enable outcome measurement, reflective practice, knowledge advancement, and personalized development planning.

Strengths and limitations

This study compares diabetes specialist nurse competency frameworks across diverse countries (e.g., China, US, New Zealand, Australia), revealing both commonalities and variations in core competency frameworks. These findings provide critical evidence for advancing global standardization initiatives. Additionally, we synthesize two competency assessment tools, offering methodologies for evaluating diabetes specialists' professional proficiency internationally. A total of 11 literatures were included in this study, the majority of which were from developed countries. This does not provide a comprehensive picture of the development of DSNs globally, particularly in developing countries. *The time, content and form of training for specialist nurses vary in different countries. This scoping review did not consider the differences in this aspect. This study mainly focuses on the perspective of diabetes specialist nurses, lacking patient and public involvement perspective, which may fail to better reflect the interests and needs of people with diabetes.* The absence of patient perspectives may compromise the clinical applicability of the competency framework. Although current evidence synthesis omits this dimension, we strongly propose systematic integration of patient and caregiver input in future frameworks. Participatory methods (e.g., Delphi techniques, focus groups) should align educational objectives with authentic care needs.

Conclusion

The compilation of the currently identified core competencies for DSNs, coupled with an analysis of the assessment tools, could facilitate the establishment of a uniform standard of professionalism in the delivery of diabetes care on a global scale. This would ensure that DSNs in different countries and regions possess comparable levels of expertise and skills. This scoping review has identified future research that should be conducted in order to develop an internationally applicable core competency framework for DSNs. This would allow nurses to operate in a more standardised manner and would also serve to reduce the variation in the quality of care that is currently being observed due to regional differences. *In the future study, researchers could pay more attention to the perspectives of patients and the public, to further improve the core competency framework of DSNs.*

Supplementary Information

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Supplementary Material 1

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The reporting recommendations of the PRISMA extension for scoping reviews (PRISMA-ScR) were followed and the research protocol was preregistered on the Open Science Framework. (Registration DOI: <https://doi.org/10.17605/OSF.IO/EWJA9>).

Author contributions

YWL and QXT: Study design and Original draft writing. YFL and TFJ: Search strategy formulation. YWL and XCL: Data collection and analysis. QXT and YFL: Revising and Improving. JPM: validation and manuscript revision;

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Data availability

The data supporting the results of this study are available from the corresponding authors upon reasonable request.

Declarations

Ethics approval and consent to participate

A scoping review does not involve human subjects, human material, human tissues or human data. Therefore, the approval of an ethics committee was not necessary.

Consent for publication

As this was a scoping review, patient-informed consent was not required.

Competing interests

The authors declare no competing interests.

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