

Integrating diabetes specialist nurses into healthcare systems: A key strategy for improving outcomes and reducing complications in diabetes management

Η ενσωμάτωση εξειδικευμένων
νοσηλευτών στο διαβήτη
στα συστήματα υγειονομικής
περίθαλψης

Περίληψη στο τέλος του άρθρου

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Abstract: Diabetes mellitus (DM) poses a growing public health and economic challenge worldwide, necessitating innovative approaches to care delivery. The Diabetes Specialist Nurse (DSN) has emerged as a pivotal figure in optimizing DM management through advanced clinical expertise, patient education, and leadership within multidisciplinary teams. DSNs contribute to improved clinical outcomes and cost-effectiveness by coordinating care, supporting self-management, and leading quality improvement initiatives. To maximize the impact of DSNs, investment in specialized education, ongoing professional development, and supportive policy frameworks is essential. Strengthening these areas will empower DSNs to deliver high quality, patient-centered diabetes care and address the evolving demands of DM management in the 21st century.

Keywords: Diabetes mellitus, diabetes specialist nurse, chronic disease management, nursing care

Introduction

Diabetes mellitus (DM) is one of the most threatening public health diseases of the 21st century. Its continuous increase in incidence worldwide, the complexity of its management and the large economic burden it imposes on health systems make the disease a priority for countries and public health organizations. The World Health Organization (WHO) recognizes DM as a global epidemic, predicting that by 2045 more than 783 million people will be living with the disease, with a disproportionate increase in low- and middle-income countries.¹

Diabetes is not a uniform condition. It presents in several forms, with type 1 DM, type 2 DM, and gestational DM being the most common. Type 2 DM represents about 90% of all cases and is linked to lifestyle factors including obesity, lack of physical activity, and poor dietary habits.² The rising prevalence of diabetes leads to significant complications at both microvascular and macrovascular levels, impacting patients' quality of life, productivity, and long-term survival.³

At the same time, this disease has a significant burden on health structures, causing an increased need for care, frequent visits to primary and secondary care units, repeated hospitalizations, as well as the need for complex pharmacotherapy. The management of diabetes is not limited to medication but requires ongoing patient education, modification of their daily lives and multifactorial support, which requires the coordination of health professionals.¹⁻³

The Diabetes Specialist Nurse (DSN) has emerged as a key professional figure in this environment. The presence of DSNs has been associated with improved glycemic control, reduced complications, increased adherence to treatment guidelines, and better communication between healthcare professionals and patients. Internationally, DSNs are recognized as key members of multidisciplinary diabetes teams, with an important role in both clinical care and education.⁴

Epidemiology

The global epidemiology of DM reflects the dynamic spread of the disease and its serious public health impact. DM continues to rise at an alarming rate worldwide, with over 800 million adults affected and major gaps in diagnosis and treatment, especially in low- and middle-income countries. The global burden is projected to increase significantly by 2050, underscoring the urgent need for improved prevention, early detection, and equitable access to care. According to the latest data from the International Diabetes Federation (IDF)

2025 Diabetes Atlas, as of 2024, the number of adults living with DM worldwide has surpassed 800 million, more than quadrupling since 1990. Nearly one in nine adults, 589 million people aged 20–79, are living with DM globally. The IDF projects this number will rise to 853 million by 2050. Diabetes prevalence in adults rose from 7% to 14% between 1990 and 2022, with the highest increases seen in low- and middle-income countries. Over 3.4 million deaths annually are attributed to DM and the global diabetes population is expected to reach 1.3 billion by 2050 if current trends continue.⁵

The distribution of the disease is not homogeneous. Middle- and low-income countries bear the greatest burden, with approximately 80% of diagnoses occurring in these regions. Socioeconomic inequalities, rapid urbanization, poor diet and limited access to health services contribute to the increased incidence of the disease.⁶ Furthermore, an estimated 1 in 2 adults with diabetes is undiagnosed, revealing a vast population with undiagnosed or uncontrolled disease that progresses silently and causes complication.⁷ Hyperglycemia during pregnancy affects approximately 16.7% of all pregnancies, while type 1 diabetes affects 1.2 million children and adolescents under 20 years of age worldwide.⁸

Diabetes is responsible for a huge economic burden on health systems. In 2024, global diabetes-related health expenditures surpassed one trillion US dollars for the first time, up from \$966 billion in 2021. These costs are related to direct medical needs (hospitalization, medication, doctor visits), but also to indirect costs, such as loss of productivity, disabilities and premature mortality. These costs are expected to continue rising in the coming years due to the increasing prevalence of DM worldwide. The economic burden is significant especially in low- and middle-income countries where three-quarters of adults with DM live.⁵

The social dimension of the problem is equally important. Diabetes adversely affects the quality of life of patients, causing psychological effects such as anxiety, depression and social exclusion. The need for constant care, dietary discipline and monitoring leads many patients to emotional exhaustion (diabetes burnout), especially when they are not supported by specialized personnel.⁹

The role of the Diabetes Specialist Nurse

A nurse specialist is a licensed general nurse who has successfully finished an educational program that adheres to the established standards for specialized

nursing practice, in addition to possessing significant professional experience in a particular nursing field. This nurse is permitted to operate within a defined scope of practice in a specialized nursing area, offering advanced care and guidance.¹⁰

A Clinical Nurse Specialist (CNS) is a highly trained healthcare professional who delivers specialized clinical care grounded in established diagnoses. They work in specialized clinical areas and apply a systemic approach to the provision of care, functioning as a member of the healthcare team, contributing significantly to the holistic treatment of patients. To obtain the title, a prerequisite is the certification of attendance of a postgraduate and/or doctoral program of study. The CNS is a highly advanced and adaptable role that emphasizes direct and individualized patient care tailored to the specific needs of the patient. Duties include clinical practice, counseling, patient and staff education, conducting research, and managing or leading healthcare teams.¹⁰⁻¹²

The CNS is a critical member of the interdisciplinary team and focuses on specialized areas of clinical care, such as oncology, cardiology, diabetes care, intensive care, geriatrics, pediatrics and other categories of patients with complex needs. They apply clinically documented interventions, manage acute and chronic diseases and contribute to the improvement of clinical outcomes. They take an active role in the education of patients and their families, support self-management of health, as well as the prevention of complications, through the continuous monitoring and assessment of the patient's condition. They implement best practice protocols, contributing to the improvement of the quality and efficiency of healthcare. They actively participate in clinical research and continuing education, ensuring the implementation of innovative therapeutic interventions and improving patient care through evidence-based medical practice. Their impact on the health system is broad, as their presence leads to a reduction in complications, hospital-acquired infections and mortality rates, while increasing overall patient satisfaction with care services. However, the professional demands and high responsibility that accompany this role make the specialized clinical nurse vulnerable to burnout, especially in health systems that do not adequately recognize their importance. Despite these challenges, their contribution to improving clinical practice and ensuring the quality of care is irreplaceable, especially in a health system that is constantly evolving and facing challenges such as the aging population and the

increase in chronic diseases.¹²

The DSNs has comprehensive, specialist, practical and theoretical knowledge in the field of diabetes, which they use to solve clinical problems and make decisions that require analysis and interpretation. They also act as educators for both patients and healthcare professionals. Professionals in this role are classified at NHS Band 6 and are committed to gaining a Postgraduate Diploma (PG Diploma) in a diabetes-related field within 12 months of their appointment.¹²

The DSN role is central to the provision of care and support for people with DM. The DSNs work independently within the organization's policies, national and local guidelines, and professional practices. They have a bachelors degree, and at least two years' post-qualification and registration experience. A DSN must have detailed professional and clinical knowledge in the field of DM and be competent in the management of both types. Their duties include providing care to a defined patient population in a variety of clinical settings, such as hospitals and home or community visits.¹³⁻¹⁵

DSNs offer vital stage-specific interventions throughout the diabetes care continuum:

- At diagnosis: Deliver comprehensive education on diabetes pathology, lifestyle changes, and self-monitoring techniques.
- During acute episodes: Manage insulin titration, identify and treat hypoglycemia or ketoacidosis, and guide patients through complex transitions.
- In long-term management: Promote adherence through structured education, lifestyle support, regular glycemic monitoring, and psychological encouragement to combat diabetes burnout.
- During complication management: Coordinate referrals, interpret lab data, and guide self-care for comorbidities such as nephropathy or retinopathy.
- In palliative and end of life care: Adapt regimens, prioritize comfort and safety, and collaborate closely with caregivers and geriatric teams.¹²⁻¹⁵

In the United Kingdom, the TREND-UK programme defines clear grades for the DSN role (General Nurse, DSN, Senior DSN, Lead DSN), while continuing education programmes are a criterion for assessment and promotion.¹⁶ In Ireland, DSNs are interconnected in hospitals and the community,¹⁷ while in the Netherlands, DSNs have a leading role in primary care.¹⁸ Expanding beyond Europe, Nordic countries such as Sweden and Norway have well-established specialist nurse roles embedded in primary care, supported by robust academic training

and research cultures that enhance nursing competencies and leadership in diabetes care.¹⁹ In Japan, inspired by the Swedish model, specialist nurses collaborate closely with general practitioners to share workload and improve continuity of care, helping to reduce physician overload and hospital stays.²⁰

Similarly, Australia has developed nurse-led models that provide autonomous, holistic diabetes care, including diagnostic testing and prescribing, which improve access and patient education in both urban and rural settings.²¹ These international examples highlight the adaptability of the DSN role across diverse healthcare systems and underscore the importance of integrating specialist nurses within multidisciplinary teams to optimize diabetes outcomes globally.

Competencies of DSNs

DSNs possess a unique blend of clinical, educational, and leadership skills that enable them to deliver high-quality, patient-centered diabetes care. Below is an overview of the core competencies every DSN should demonstrate (figure 1).

Clinical assessment and management

- Comprehensive patient assessment: Skilled in interpreting medical histories, physical examination findings, and laboratory data (e.g., blood glucose trends, HbA1c, renal function) to formulate individualized care plans.

- Therapeutic decision-making: Expertise in selecting and titrating insulin regimens (multiple daily injections, insulin pump therapy) and adjunctive glucose-lowering agents based on patient needs, comorbidities, and lifestyle.

- Acute dysregulation support: Capable of rapidly recognizing and managing acute metabolic derangements, including hypoglycemia, diabetic ketoacidosis, and hyperosmolar hyperglycemic state.^{22,23}

Patient and family education

- Health literacy adaptation: Tailors education to each patient's literacy level, cultural background, and learning style, ensuring comprehension of disease mechanisms and self-management skills.²⁴

- Self-Management coaching: Teaches carbohydrate counting, insulin injection technique, blood glucose



Figure 1. Core competencies of DSNs.

monitoring, and sick-day rules, empowering patients to make informed decisions daily.²⁵

- Behavior change facilitation: Performs motivational interviewing and goal-setting techniques to foster long-term adherence to diet, exercise, medication, and monitoring regimens.²⁶

Multidisciplinary collaboration

- Team integration: Acts as a central coordinator within the diabetes care team (endocrinologists, dietitians, pharmacists, podiatrists, and mental health professionals) to ensure, holistic care.²⁷

- Care pathway development: Contributes to the design and implementation of standardized clinical pathways, protocols, and patient flow processes that optimize resource use and patient outcomes.²⁸

- Referral and liaison: Identifies patients requiring specialist input (e.g., ophthalmology for retinopathy screening) and smoothly facilitates referrals and follow-up.²⁷

Quality improvement and audit

- Data-driven practice: Collects and analyzes service metrics (e.g., average HbA1c reduction, hospitalization rates) to identify gaps in care and drive continuous improvement initiatives.²⁹

- Protocol evaluation: Reviews and updates departmental guidelines in line with evolving evidence and

professional standards.^{27,30}

- Patient safety leadership: Champions safe insulin prescribing and administration practices, reducing medication errors and adverse events.^{27,29,30}

Professional leadership and research

- Mentorship and training: Provides formal and informal teaching to nursing colleagues, medical staff, and students on diabetes management best practices.

- Evidence-based practice: Critically appraises emerging research and integrates validated findings into clinical protocols.

- Research participation: Leads or supports clinical audits, observational studies, and quality-improvement projects that expand the evidence base for nursing-led diabetes interventions.^{31,32}

By mastering these competencies, the DSN not only optimizes glycemic control and reduces complication rates but also elevates the standard of diabetes care within the entire healthcare system.³²

Benefits of DSN

Integrating DSNs into healthcare systems yields substantial benefits across clinical outcomes, patient experience, and system efficiency (figure 2). Embedding DSNs within healthcare systems optimizes clinical out-



Figure 2. Benefits of DSNs in healthcare systems

comes, reduces costs, enhances patient empowerment and strengthens multidisciplinary collaboration, making them a linchpin of high-value diabetes care.

Improved glycemic control and reduced complications

DSNs bring advanced expertise in insulin titration, carbohydrate counting and continuous glucose monitoring, which translates into tighter glycemic control. Multiple studies have shown that DSN-led interventions lower average HbA1c by up to 0.5–1.0%, reducing the incidence of microvascular complications such as retinopathy, nephropathy and neuropathy. By proactively adjusting therapy and providing rapid response during episodes of dysglycemia, DSNs also decrease rates of severe hypoglycemia and diabetic ketoacidosis.³²⁻³⁴

Fewer hospitalizations and lower healthcare costs

Enhanced outpatient management by DSNs prevents many avoidable admissions. DSN-coordinated care pathways reduce hospital length of stay by an average of 1.5 days and cut 30-day readmission rates by over 20%. Fewer inpatient days and emergency visits translate into significant cost savings: integrating DSNs has been associated with a 10–20% reduction in overall diabetes-related healthcare expenditures.^{27,30,35}

Enhanced patient education, self-management and satisfaction

Through individualized education and motivational interviewing, DSNs strengthen patients' self-management skills; covering topics from insulin injection techniques to lifestyle adjustments. This empowerment fosters greater adherence to treatment plans, healthier behaviors and higher patient satisfaction scores. Patients report feeling better supported, more confident in day-to-day decision-making, and less anxious about potential complications.^{35,36}

Stronger multidisciplinary collaboration and care coordination

As care navigators, DSNs link endocrinologists, primary care providers, dietitians, pharmacists and other specialists. They ensure timely referrals (e.g., retinal screening), streamline communication and implement standardized clinical protocols. This cohesive team approach eliminates fragmentation, avoids duplicated services and accelerates decision-making.^{27,37}

Quality improvement and workforce development

DSNs lead audits and monitor key performance indicators; such as glycemic targets and complication rates, to drive continuous quality improvement. They mentor other nurses and allied health professionals, disseminating best practices in diabetes management. Over

time, this elevates the skill level of the entire care team and embeds evidence-based protocols across the system.^{32,35,38}

Challenges

Despite the numerous advantages, DSNs have yet to receive approval or recognition in certain countries for a variety of reasons. These are the restrictive government regulations, inadequate infrastructure related to hospital settings, insufficient training for nurses, a lack of awareness and trust in the care provided by nurses, disagreements and a lack of acceptance among colleagues and patients, the perceived lower status of the nursing profession, and weak nursing leadership may all contribute to this situation. Additionally, the potential of nurses is frequently underestimated, unacknowledged, and underutilized, as many nurses with specialized qualifications continue to work as general nurses or nurse educators.³⁹ Nevertheless, due to the absence of a clearly defined scope of practice within the Nursing Practice Act, which encompasses specific licenses, practice titles, and a staffing structure for nurses in the healthcare system, no measures have been implemented to fully acknowledge the valuable nursing potential.⁴⁰

Evidence indicates that DSNs are facing a growing restriction in their access to professional development, study leave, and research opportunities. This implies that the enhancement of DSNs' skills and knowledge encounters significant obstacles.⁴¹ Such a situation has been characterized as "concerning" and, when coupled with insufficient long-term job security, may result in challenges related to recruitment and retention.⁴² Furthermore, there are specific "invisible" barriers that hinder the advancement of nursing research competence, including negative attitudes towards the implementation of research-based practices, a lack of self-efficacy in this domain, and insufficient information literacy skills.³¹

Future Development

The evolution of the DSN's role necessitates a thorough educational framework that will improve nurses' knowledge and skills while providing them with contemporary tools and certifications. It is essential to develop specialized training programs and establish postgraduate studies within nursing schools that concentrate on contemporary diabetes management techniques, patient self-management, innovations, and new technologies, including insulin pumps and glucose monitoring systems.⁴³

In addition, it is important to organize seminars and lifelong learning, so that nurses remain informed about

the latest developments. Particular emphasis should be placed on collaboration with international bodies, such as the International Diabetes Federation (IDF) and the European Federation of Diabetes Nurses (FEND), which can offer internationally recognized certifications, increasing the prestige of the profession and ensuring the implementation of best international practices. Through such collaborations, nurses can participate in international conferences, exchanging knowledge and experiences with colleagues from other countries, thus improving the skills and quality of care they provide to patients. Strengthening the educational framework and obtaining specialization and certifications will not only upgrade the role of the specialized nurse in the field of diabetes mellitus, but will also contribute to more effective management of the disease, offering better prevention, treatment and support to patients.^{44,45}

Finally, to enhance the nursing research capabilities, hospital managers and specialist nurses should work together to provide the necessary infrastructure to ensure that research activities can operate as efficiently and effectively as possible in terms of administrative support, academic support, material support and research culture. Accumulation of work experience, continuous development of nursing knowledge and skills, and improvement of the academic level and functional capacity of nurses contribute to strengthening their core competencies. Training in this area, in turn, leads to the emergence of a positive feedback mechanism as their core competencies improve.

Conclusions

The need to strengthen the role of the DSN is more relevant than ever. Data show that its integration can make a significant contribution to reducing complica-

tions, decongesting the health system and increasing the effectiveness of treatment. To fully harness the potential of DSNs in improving DM care, targeted policy actions are essential. Health authorities should formally recognize and integrate DSNs within national diabetes care frameworks, ensuring clear role definitions, appropriate funding, and inclusion in multidisciplinary teams. Policies must also promote standardized protocols that empower DSNs to practice autonomously and lead quality improvement initiatives.

Reforming nursing education systems is critical to support this integration. Curricula should incorporate specialized diabetes management training at both undergraduate and postgraduate levels, emphasizing clinical competencies, patient education, and leadership skills. Expanding access to continuing professional development and international certification programs will further enhance DSN expertise and adaptability.

Future studies ought to emphasize comprehensive cost-effectiveness analyses to measure the economic advantages of DSN-led interventions in a variety of healthcare environments. Moreover, research that investigates the flexibility of the DSN role within different health systems, taking into account cultural, organizational, and resource disparities, will inform scalable implementation approaches. Assessing patient-centered outcomes and long-term effects will further enhance the optimization of DSN contributions to sustainable, high-quality diabetes care. By promoting policy, education, and research initiatives, healthcare systems can fortify the DSN workforce, ultimately leading to improved clinical results, decreased complications, and a reduction in the escalating burden of diabetes globally.

ΠΕΡΙΛΗΨΗ

Η ενσωμάτωση εξειδικευμένων νοσηλευτών στο διαβήτη στα συστήματα υγειονομικής περίθαλψης: Μια βασική στρατηγική για τη βελτίωση των αποτελεσμάτων και τη μείωση των επιπλοκών στη διαχείριση του διαβήτη

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Ο σακχαρώδης διαβήτης (ΣΔ) αποτελεί μια αυξανόμενη πρόκληση για τη δημόσια υγεία και την οικονομία παγκοσμίως, καθιστώντας απαραίτητες καινοτόμες προσεγγίσεις στην παροχή φροντίδας. Ο Εξειδικευμένος Νοσηλευτής Διαβήτη (ΕΝΔ) έχει κεντρικό ρόλο στη βελτιστοποίηση της διαχείρισης του ΣΔ μέσω προηγμένης κλινικής εμπειρογνομosσύνης, εκπαίδευσης των ασθενών και ηγεσίας εντός διεπιστημονικών ομάδων. Οι ΕΝΔ συμβάλλουν στη βελτίωση των κλινικών αποτελεσμάτων και της σχέσης κόστους-αποτελεσματικότητας, συντονίζοντας τη φροντίδα, υποστηρίζοντας την αυτοδιαχείριση και ηγούμενοι πρωτοβουλιών βελτίωσης της ποιότητας φροντίδας. Για τη μεγιστοποίηση του αντίκτυπου των ΕΝΔ είναι απαραίτητη

η επένδυση στην εξειδικευμένη εκπαίδευση, τη συνεχή επαγγελματική ανάπτυξη και τα υποστηρικτικά πλαίσια πολιτικής. Η ενίσχυση αυτών των τομέων θα ενδυναμώσει τους ΕΝΔ ώστε να παρέχουν υψηλής ποιότητας, ασθενοκεντρική φροντίδα για τον διαβήτη και να αντιμετωπίζουν τις εξελισσόμενες απαιτήσεις της διαχείρισης του στον 21ο αιώνα.

Λέξεις ευρετηρίου: Σακχαρώδης διαβήτης, εξειδικευμένος νοσηλευτής διαβήτη, διαχείριση χρόνιων παθήσεων, νοσηλευτική φροντίδα

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