Supplementary File S1. Supplementary Materials: Literature Review

Literature Review

To assess whether our findings were unique or reflected broader trends, we conducted a targeted literature review (TLR) that contributed to our discussion section. In context of limited resources, a TLR offers a pragmatic approach by concentrating on the most relevant evidence to contextualize and interpret survey results, rather than aiming for an exhaustive compilation of all available studies.

Materials and Methods

On February 3, 2025, we searched PubMed and Cochrane using the following keywords: knowledge OR skills OR confidence AND nurses AND diabetes self-management education. Filters were applied to include only English-language articles published in the past five years. Articles were excluded at the title, abstract, and full-text screening stages if they did not meet the pre-defined PECOS criteria (Population = nurses; Exposure = diabetes education; Comparator = any; Outcomes = knowledge, confidence, skills; Study design = practice guidelines, observational and other studies).

To enhance comprehensiveness, an updated search was performed on May 20, 2025, in both CINAHL and PubMed using the same keywords and PECOS criteria, but with an expanded publication window of the past 10 years and no language restrictions. The updated PubMed search was limited by study design, and excluded low-level evidence such as letters, editorials, and commentaries, as well as paywalled articles. Additionally, we conducted a manual search of reference lists from included articles, incorporating any additional studies deemed critical to the review. To ensure rigour in the selection process, two reviewers independently screened all eligible studies. The PRISMA flow diagram for the review is presented in Supplementary Figure S1.

Results

The TLR identified 174 articles, of which 84 were excluded after title screening. Of the 90 abstracts screened, 52 were excluded and 38 full-texts were reviewed. Finally, a total of 14 articles were accepted for inclusion; 11 after full-text review and 3 identified through hand searching. These 14 articles were published between 2016 and 2024, and represent numerous countries, including Australia, China, Denmark, Iran, New Zealand, Saudi Arabia, South Africa, and the USA. Overall, the studies vary significantly in sample size, from as few as 12 diabetes-specialized nurses [1] to over 4,000 respondents [2]. The populations studied also differ, including general nursing staff, diabetes specialists, nursing students, and midwives. Methodologically, the studies utilized a mix of cross-sectional surveys (both self-developed and validated questionnaires), meta-analysis, focus groups, and interviews. The findings of these studies reflect the universal challenges nurses face in providing diabetes education, such as gaps in knowledge, low confidence, and systemic barriers, and the unique factors that influence how diabetes care is delivered in different contexts; contributing to the Discussion section. See Table 1 for a summary of the included studies.

Limitations

Our targeted literature review excluded paywalled articles to ensure equitable access for the entire project team and future readers—an approach that aligns with identified barriers related to the cost of educational resources [3]. While this may have reduced the comprehensiveness of the evidence base and introduced potential publication bias, it reflects a practical and inclusive strategy. The initial search was limited to studies published within the past five years to capture current trends, innovations, and practice environments. However, in response to reviewer feedback and in recognition of post-pandemic shifts in healthcare delivery, the search window was extended to 10 years in an updated review conducted on May 20, 2025, to ensure the inclusion of relevant literature [4].

Table 1. Summary of the Targeted Literature Review

First Author	Year	Title	Country	Sample Size	Setting	Methods	Key Findings
Ahn [5]	2024	Diabetes Education Program for Nursing Students: A Systematic Review and Meta-Analysis	South Korea	13 studies	Academic	Systematic review and meta-analysis	Technology-based diabetes education programs for nursing students have been shown to enhance knowledge, confidence, clinical skills, and learning satisfaction.
Albagawi [6]	2023	Levels and predictors of nurses' knowledge about diabetes care and management: disparity between perceived and actual knowledge	Saudi Arabia	325	Hospitals and Primary Care	Cross-sectional Survey (DSRT and DBKT)	There was a marked discrepancy between perceived and actual diabetes knowledge. Advanced education and experience correlated with higher actual knowledge, while lack of guideline access was problematic.
Aloitabi [7]	2016	Diabetes knowledge of nurses in different countries: An integrative review	Global	25 studies	General Hospitals, Community, Tertiary, Specialized, Private	SLR	Widespread deficits in nurses' knowledge were evident, covering oral hypoglycaemic agents, insulin therapy, and nutritional management, across various countries.
Daly [8]	2023	Trends in the primary healthcare nursing workforce in managing diabetes from two sample surveys in 2006-2008 and 2016 in Auckland, New Zealand	New Zealand	623	Primary Care	Surveys	Compared to earlier surveys (2006–2008), nurses in 2016 were younger, more educated, and demonstrated improved knowledge of diabetes and its complications, although gaps in guideline use and support persisted.
Duprez [9]	2016	The development and psychometric validation of the self-efficacy and performance in self-management support (SEPSS) Instrument	Belgium/ Netherlands	523*	Academic, Hospital, Psychiatric, Primary & Elderly Care	Psychometric Instrument Validation (SEPSS)	Nurses scored higher in self-efficacy and performance than nursing students; advanced degrees (master's) were associated with higher performance.
Farzaei [10]	2023	Nurses' knowledge, attitudes, and practice with regards to nutritional management of diabetes mellitus	Iran	160	Med-Surg Teaching Hospitals	Cross-sectional Survey	Nurses showed moderate knowledge and positive attitudes toward nutritional management of diabetes; however, most had not received refresher training since university.
Holton [11]	2022	Nurse, midwife and patient perspectives and experiences of diabetes management in an acute inpatient setting: a mixed-methods study	Australia	14	Public Health Service	Focus Group	Nurses and midwives reported lacking confidence and up-to-date knowledge on evolving diabetes medications, emphasizing the need for ongoing, structured education and a dedicated resource person.

First Author	Year	Title	Country	Sample Size	Setting	Methods	Key Findings
Hu [2]	2024	Assessing perceptions of nursing knowledge, attitudes, and practices in diabetes management within Chinese healthcare settings	China	4,011	Clinics, Hospitals, Private Practice	Survey	93% reported good practice with strong glucose monitoring (96%), yet 49% lacked confidence in identifying hypo/hyperglycaemia. Gaps persisted in pharmacological treatments and psychological support; 80% participated in multidisciplinary meetings.
Kaisen [12]	2020	"Finding the Balance": A Qualitative Study of the Experience of Nurses and Patients with Diabetes on an Insulin Pump in the Hospital	USA	16	Academic Hospital	Interviews	Nurses' confidence in managing insulin pumps was closely linked to their perceptions of patients' self-management abilities; significant knowledge gaps in pump operation and safety were noted.
Kashani [13]	2020	Challenges and Strategies of Needs Assessment Implementing in Diabetes Self-management Education in Iran: A Qualitative Study	Iran	20	Academic	Interviews	Diabetes educators lack knowledge about educational principles, and courses are too few, too seldom, in English which is difficult to understand, and too costly.
Landu [14]	2023	Primary health care nurses' knowledge, self-efficacy and performance of diabetes self-management support	South Africa	100	Primary Care	Questionnaire (DBKT)	High performance (17.8/24) and knowledge scores (11.9/14) overall, with 75% scoring ≥75%, except for understanding hyperglycaemia causes (45%). Barriers included high workload, resource limitations, and environmental challenges.
Mafusi [15]	2024	Knowledge, attitudes and practices on diabetic foot care among nurses in Kimberley, South Africa	South Africa	105	Primary Care Clinics	Descriptive Cross-sectional	Moderate-to-good knowledge in diabetic foot care, though many nurses had never attended training on foot care or screening tools, indicating a need for targeted training programs.
Olsen [16]	2024	Healthcare professionals' competencies and confidence in managing hospitalized patients with type 2 diabetes	Denmark	101	Hospital	Cross-sectional Survey (Self-developed Questionnaire)	Nurses reported high comfort levels in in-hospital diabetes management (mean scores of 8.4/10 for management and 8.0/10 for glucose monitoring), though certain knowledge gaps (e.g., hyperglycaemic thresholds) remain.
Stenov [1]	2024	An Evidence-Based Nurse-Led Intervention to	Denmark	12	Specialized Diabetes Centers	Interviews, Workshop	Highlighted the need for enhanced training, including roleplaying

First Author	Year	Title	Country	Sample Size	Setting	Methods	Key Findings
		Reduce Diabetes Distress Among Adults With Type 1 Diabetes and Diabetes Distress (REDUCE): Development of a Complex Intervention Using Qualitative Methods Informed by the Medical Research Council Framework					and supervision, to effectively deliver interventions aimed at reducing diabetes distress.

*Note: Duprez et al. (2016) combined 472 nurses with 51 nursing students for a total of 523 participants.
Abbreviations: DBKT, Diabetes Knowledge and Beliefs Test; DSRT, Diabetes Self-Reported Test; Med-Surg, Medical-Surgical; SEPSS, Self-Efficacy and Performance in Self-Management Support; SLR, Systematic Literature Review.

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