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Exploring the provision of diabetes nutrition education by practice nurses in primary care settings.

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CG designed the study, performed the data collection and analysis and was the main author on the paper. MJ provided supervision throughout the study and co-authored the paper.

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Abstract:

Background

High quality nutrition education is recommended as an essential component of diabetes care. In the UK there has been a gradual shift of inter-professional boundaries for providing nutritional care for people with type 2 diabetes. Only a minority now regularly receive advice from a dietitian. Instead, increased demands for nutrition education are being absorbed by practice nurses. This study seeks to explore this situation through the views of practice nurses, on the services they provide and the issues they face.

Methods

A qualitative approach using semi structured interviews was used. Practice nurses were recruited using purposive sampling and nine were interviewed. Data was analysed using the Framework Method. The Theoretical Domains Framework from the COM-B model of behaviour change,

increasingly used to explore the behaviour of health care professionals, was used to further frame the findings.

Results

Practice nurses reported that on-going diabetes nutrition education only took place at annual review appointments and was limited to five to ten minutes. They described how they are expected to take on a more advanced role in diabetes nutrition education than they can provide and are becoming increasingly isolated in this role due to a lack of time; practical and informational support and training standards and provision.

Conclusion

A range of service improvements led by dietitians, which focus on strengthening the working environment and enhancing professional support available for practice nurses who provide diabetes nutrition education, could improve quality of care and health outcomes in people with diabetes within current time restraints.

Keywords: diabetes; diet; education; primary care; practice nurse

Introduction

The on-going provision of dietary advice to people with diabetes (PWD) from diagnosis is recommended by NICE as an essential component of diabetes care[1]. To be effective, this should be individualised and provided by health care practitioners with specific expertise and competencies in nutrition[1,2].

As the incidence of diabetes has increased, previous recommendations that all PWD should be referred to a registered dietitian (RD) for diabetes nutrition education (DNE) at diagnosis and annual review have become unachievable[3,4] and new models of care have evolved. At diagnosis, DNE is provided within diabetes self-management education (DSME) by trained and quality assured educators including dietitians[5]. Primary care staff, in particular practice nurses (PN), now have a pivotal role in providing on-going DNE.

Providing nutrition education (NE) for primary prevention has been regarded as a role of primary care teams for decades[6–8] but NE for chronic disease management such as diabetes is a more recent development. The role has evolved as the involvement of general practice in diabetes care[9,10] has proved essential to maintain access to services with the increased incidence of diabetes in the UK[11,12]. Care provision is monitored and incentivised through the audit and the Quality Outcome Framework (QOF)[13].

The critical role of PNs in the provision of diabetes care is well reported[14–20] but there are no studies looking specifically at their role in the provision of DNE in the UK. Potential advantages to a model where PNs are the main providers of DNE include convenience and continuity of care from trusted and influential health care professionals (HCP)[21–25] but its effectiveness is uncertain[25] . Having sufficient time is an important factor in bringing about lifestyle change [24]. However, lack of available time is reported as being the greatest barrier to DNE[26] and general NE in primary care[6,8]. A minimum of two hours of NE over six months is recommended for effective dietary change[24,27,28] yet time for nutrition consultations is reported to be falling to between 4 to 25 minutes[29,30]. The time required to undertake physical checks and tasks for QOF could be contributing to this.

An alternative approach is for PNs to provide only brief interventions, which re-enforce more expert and detailed advice provided by other sources[23]. However, this requires primary care to refer

PWD to other sources of NE such as dietetics and DSME and despite evidence that it is beneficial, referral discussions with PWD are reported to be infrequent and tentative[26,30,31].

A UK competency framework outlines the minimum competencies required for non-dietitians who provide DNE[32]. However since the removal of DNE related QOF indicator DM013 there is less incentive to meet these[33]. Subsequently, provision and uptake of DNE training to PNs remains opportunistic and ad hoc[14,16] and knowledge and skills levels variable[34].

In summary, relevant literature suggests that the rising numbers of PWD in the UK and changes in the way diabetes services are provided has led to PNs now being a main provider of DNE yet little is known about this aspect of care. Therefore, this study aims to explore the views of practice nurses to find out more about the services they provide and the issues they face.

Methods:

As this is a relatively unexplored topic, a qualitative approach was chosen so that the findings could inform subsequent research[35,36]. Resource was limited due to the study being part of a Masters degree carried out by one of the authors (CG). Therefore only one professional group was chosen, and all the interviews and analysis were undertaken by the one researcher (CG). Semi structured interviews were chosen to encourage individuals' own interpretations of the questions and allow the iterative development of these over the study as new relevant topics emerge[37]. These also allowed for representation of the diversity of the nurses and their workplace[36] as described in Table 1.

Ethical approval was granted by the University of Sheffield Research Management System (URMS 143367).

Setting

The study took place in a UK city with a population of 550,000 and a diabetes prevalence of 6.1%. The provision of community dietitians for people with diabetes was 1.5 whole time equivalents.

Sampling

Taking into consideration the limited resource, the aim was to recruit a purposive sample of up to 10 PN currently providing diabetes care from 88 general practices. [38,39]

To obtain a diverse sample, albeit within a relatively narrow group, a sampling frame which included 58 practices was produced based on demographic and national audit data across target

practices available at the time[40] (Supplementary information 1). From this a typology of practices was used to select iteratively those agreeing to participate, in order to represent a diverse range of characteristics[41].

Recruitment

Of the 58 practices, permission to contact PN was granted from 19 practice managers. Information letters from the Clinical Lead for Diabetes were sent out in two waves to assess response rates and to meet the recruitment target. From the respondents of the first wave, six interviews were arranged and completed. Following this, the diversity of the sample was reviewed, and further targeted recruitment then followed. In total, 10 nurses agreed to be interviewed.

Data Collection

The interview topic guide is provided. (Supplementary information 2). Of the ten interviews scheduled, nine went ahead with one nurse withdrawing due to lack of time. Although the sample was small, there appeared to be no new information coming out of the final interviews.

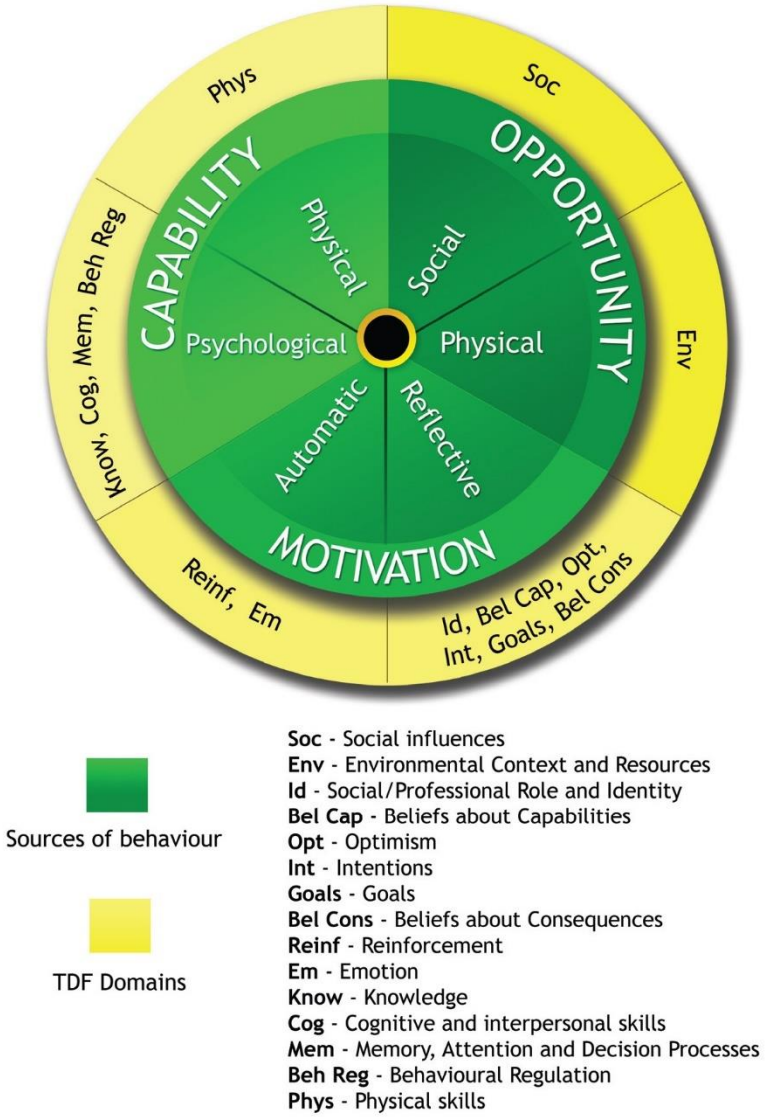
Data Analysis

The data was transcribed verbatim, anonymised and imported into NVivo v10 qualitative software package (QSR International, Cambridge, MA,USA). Identifiers were pseudonymised. It was analysed using the Framework Method[42] which fits well with the study aims and timescale, and provides transparency to the data analysis[35]. Themes and subthemes were identified following categorisation within the software. During the late stages of analysis, the COM-B model of behaviour and associated Theoretical Domains Framework (TDF) shown in Figure 1 was identified as relevant to the category groupings. The model detailed in supplementary information 3, recognises that behaviours (B) come about through the interaction of capability, opportunity, motivation (COM) and the TDF has 14 domains each linked to one of the COM components[43–46]. It is used most commonly to inform the implementation of health care interventions, but also at any stage of health research[45]. This includes using it at the descriptive and analytical stages of qualitative research as has been done in this study[46].

The TDF structure was found to be useful for capturing and presenting relevant data and developing explanatory accounts by providing an understanding of how the categories were related, supporting the meaning of explanations. Questioning the data was also an important part of developing explanations. Considerations included: how outcomes changed under different conditions; the

strategies nurses were using in their work and the possible reasons behind these; and the impact of the environmental context they were working in.

Figure 1: Theoretical Domains Framework linked to COM-B components. Reproduced with permission[47] .



Results

Characteristics of the nurses and practices

Of the final sample of nine nurses, all were female. Five were employed as PNs and their experience in this role ranged between one and 10 years (median average of 7 years). Four were

employed at the higher grade of Advanced Nurse Practitioner (ANP) with practice nursing experience ranging from 10 to 26 years (median average of 24 years). An overview of the general practice demographics can be found in Table 1. Three of the practices (P1, P3,P5) had high numbers of patients from BME groups. All practices had a higher prevalence of diabetes than the national or city average .

Table 1: Description of General Practice population and staff

Practice identifier	Participant identifier	Deprivation score∞ 1 to 5 (1 = lowest level)	Diabetes Prevalence ∞ (% of practice with Diabetes)	% of patients with optimal blood glucose control∞	Total number of patients in practice β	Number of Staff β GP:Nurse:Health care assistant
City Average[1]			6.1	62		
P1	N1	4	8.1	66	9000	10:3:3
P2	N2	1	6.5	69	9500	9:3:3
P3*	N3, N9	5	8.2	55	6500	4:2:3
P4	N4	3	7.6	51	8000	6:3:2
P5	N5	4	9.7	56	2600	1:1:0
P6	N6	4	7.1	64	8000	8:4: NK
P7	N7	3	8.6	63	7500	7:5:2
P8	N8	2	7.2	63	18000	NK:6:2

∞ Source [40]; β estimated by nurse;* P3 employed two of the nurses N3 and N9; NK = not known

Care provision

In all practices, DNE occurred in one to one diabetes clinic appointments. This was always provided by nurses but their grade varied between practices. ANP made autonomous decisions about diabetes management and diabetes medications including insulin initiation. The PN role differed in that they followed care plans provided by GPs. Experience of working in diabetes ranged from a few months to twenty years. Newly diagnosed patients were offered on average three diabetes appointments over three months, each of 15 to 30 minutes duration. For most with established diabetes, review appointments were offered annually and ranged from 10 to 30 minutes. The consultation was structured around meeting QOF indicators for diabetes using an electronic template as a prompt. Any remaining time, estimated to be five to ten minutes, was spent on education, with nutrition and physical activity mentioned most often.

Themes

Seven domains of the TDF were identified as relevant to this study and used as themes: environmental context and resources; social influences; knowledge; skills; professional role and identity; beliefs about capabilities; and beliefs about consequences.

Environmental Context and Resources

Nutrition education within the primary care Diabetes Service

Despite attempts to free up more nursing time for education by utilising health care assistants to perform essential health checks, DNE provision was still estimated to be limited to five to ten minutes annually. Meeting service demands for people with diabetes was mentioned frequently and described as challenging and overwhelming. Nurses with the least support and skills felt the most time pressure when providing DNE.

N6 *'We don't have enough time. That's quite important, I think. You know what I have to do in 10 minutes is not enough because that is the whole basis of diabetes when you think about it. It is diet. And if they can't get that right you know it's, you're on a losing battle if you don't spend time. Because we've got so much to do with them.'*

Dietary educational resources were valued, and most nurses wanted a wider range of resources. There was no consistency across practices in the choice of patient literature used and all preferred to print off these off from websites as required.

Nutrition education outside the primary care diabetes service

Nurses regularly referred PWD to DSME programme DESMOND and the local weight management service. Positive patient feedback following attendance at these services increased referrals. Dietetic services however were rarely utilised. A number of reasons were given for this including: lack of awareness of dietetic service provision and the referral process; strict referral criteria; location of clinics; and high rates of non-attendance.

N8 *'I know, you know a few years ago they seemed to be more prominent, the dietitians and then again it's been a while since I've seen anyone and we never really seem to get to find out what services are available and what's no longer available in terms of things like that.'*

Social influences

Support from other health care professionals, mainly related to medical management, was identified as a main influence on nurses delivering diabetes care. Nurses had higher levels of job satisfaction and self-efficacy when supported by GPs, and Diabetes Teams.

N1 *'I feel really happy with the way it's organised here to be honest; I do. I think that's why if we do seem like a reasonably good practice it's because it is well organised and we do have good time for our diabetes patients and I get the debrief with Dr and we've got access to people outside the practice who are experts. '*

Whereas, inadequate support from the GPs isolated nurses which impacted on their confidence.

N8 *'Yeah you know if somebody did question something and I was like I don't know but if I knew that I could go to somebody , one of them and ask. I mean we will send them messages and ask and see if they know the answer but a lot of the time they don't. So, then we are looking elsewhere for the answers.'*

Some practice staff felt they benefited from shadowing diabetes nurses in clinics, observing DSME and from opportunities to discuss complex cases at practice meetings with diabetes teams. Generally, nurses did not seek out support specifically relating to DNE due to insufficient time and a lack of certainty about where to access it, although ANP were more likely to do so. Nurses with inadequate support expressed feelings associated with isolation, uncertainty and despair.

Knowledge and skills

All nurses made reference to shortfalls in their knowledge and skills to provide DNE. Commonly, nurses felt unable to answer patient questions on diet or provide sufficient detail, including practical suggestions. Having to respond with a 'best guess' had a negative impact on their self-efficacy.

N6 *'....when someone asks you how many slices of bread, they should have a day and things like that. Because you don't have ongoing education and things sometimes, I think , "Do you know, I've got absolutely no idea." So, it affects your confidence quite a bit that you've got no idea.'*

Training in NE

Training levels in diabetes care were highly variable and did not necessarily relate to the grade, position or length of experience of the nurse. No reference was made to the national dietetic competencies for healthcare professionals working in diabetes[32] and of those asked, none were aware of them. National recommendations for nurses to be skilled in DNE were not reflected in available local training. For example, the twelve-month PN induction programme contained no education on diabetes or nutrition in relation to chronic disease management.

Although practice management supported requests for training, they did not actively propose any minimum levels of training. One nurse recalled this had been different in the past when dietary advice was briefly made a QOF indicator.

N3 *'So what we did then was, because we were saying, we can't legitimately tick that they've had the thing. So that's when I suggested, if I go and do the Blatcham diabetes thing [Diploma in Primary Care Management of Diabetes], because there's quite a big dietary section in that, you were able to give advice. So, we were sort of saying that I could educate other members of staff and would that count for our…? Yes, we were sort of using me as a suitably qualified health professional.'*

Commonly, nurses obtained nutritional information from patient resources and personal experiences. Training by dietitians was helpful but was ad hoc, infrequent and felt too advanced to less experienced nurses. Nurses identified a need for tiered levels of formal and informal training and support, provided locally and regularly, containing a practical element.

Professional role and identity

Aside from diabetes, primary care nurses provided nutrition advice to people of all ages for a range of reasons. Consequently, most nurses perceived providing DNE as their responsibility and did not seek out alternative sources of education for patients. It was suggested that this was also the expectation of patients and GPs. For some, this led to working at a more advanced level than they felt capable of. One exception to this was an ANP who described seeking alternative sources of NE for PWD to supplement what she could provide with her limited time and skills.

N1 *' I think I am a bit of a signpost person. So yes, I'll talk to people about healthy eating but I'll also see who else could get involved because I think it's important because they only see me fairly rarely so try and get as many people on board as possible actually.'*

With little contact with dietitians, there was a lack of clarity about the dietitian's role especially with less experienced nurses, which affected referrals.

N9 *'Probably not for diabetes. You know if there was somebody that had got an oesophageal cancer or something, we would refer them to dietitians for that, but it is really quite specific things that we would do that for.'*

Beliefs about capabilities

The awareness of gaps in their nutritional knowledge and skills, negatively influenced nurses' belief in their capabilities to provide DNE.

N6 *'….when someone asks you how many slices of bread they should have a day and things like that. Because you don't have ongoing education and things sometimes, I think do you know, I've got absolutely no idea. So it affects your confidence quite a bit that you've got no idea.'*

Yet other factors seemed to have a more positive impact. The most commonly reported one being the confirmatory messages they received from GPs and PWD that they were the nutrition experts within the practice. Not having the opportunity to compare levels of competency with experts such as dietitians, appeared to make it more difficult for nurses to reflect objectively on their own practice, also positively influencing belief in their capabilities.

Belief in consequences

All nurses held a strong belief in the impact of dietary change on the physical wellbeing of PWD and this appears to be one of the most significant factors motivating nurses to provide DNE.

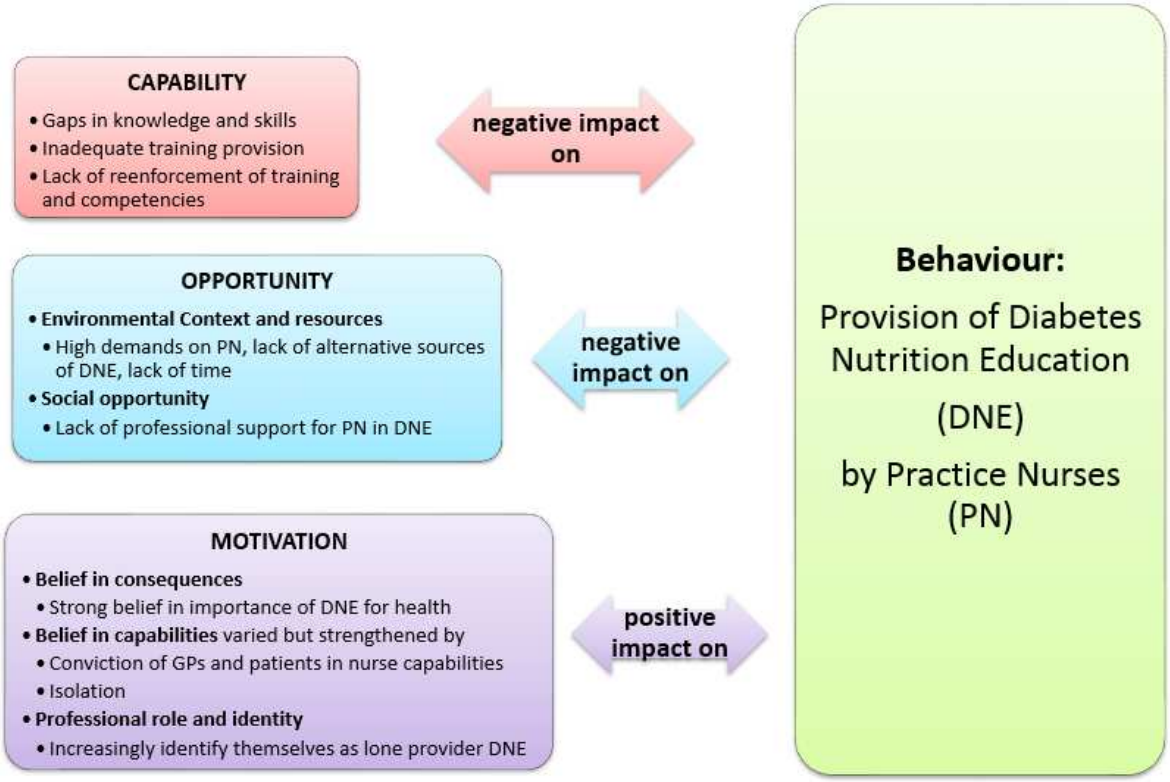
N1 *'I can think of quite a few people who have lost weight and their diabetes has practically disappeared.'*

Discussion

Themes from the data are presented using the relevant domains of the TDF and associated COM-B model to describe the influences on DNE provided by nurses. This is presented in Figure 2. Nurse **capabilities** in NE were negatively affected by a lack of knowledge and skills in this area and a shortage of appropriate training provision. The absence of any mandate for training and competency

standards in NE[48] may in part contribute to this situation. **Opportunities** to provide effective DNE were negatively affected by; the high demands on nurse time; inadequate referral rates to alternative sources of NE; and inadequate support from within the primary care team and the wider diabetes specialist team including dietitians. In many cases, this lack of support led to nurses being isolated, negatively impacting further on capability and opportunity. Unexpectedly though their **motivation** to provide DNE seemed unaffected by this possibly due to situations that arose from it. Working in isolation led to nurses not being able to recognise what they did not know and compounded their perception of being solely responsible for DNE.

Figure 2: TDF domains identified as themes and their impact on Diabetes Nutrition Education



Comparison with existing literature

This is the first UK study to specifically explore the PN role of providing DNE. Similarities were found with other studies which examined primary care NE more broadly for disease prevention and chronic disease management.

The time reportedly spent on NE was similar to that reported in other studies and was significantly less than that suggested as adequate[27,28]. Despite this, there are advantages to receiving NE in primary care such as; improved uptake of care; good relationships; and short, frequent

appointments[21–25]. This study supports the suggestion that increasing levels of professional support could have the biggest impact on nurse behaviours and improve the quality of care within this current model[29]. Yet as identified elsewhere, this can be adhoc and access inequitable[14].

Feelings of isolation experienced in particular by PN compared to ANP is recognised in other studies and is suggested to be due to the wider range of duties of PN compared to ANP and the uncertainty this brings to their roles[49]. The lack of inter-professional working between nurses and dietitians identified in this study and found elsewhere, appears to worsen the situation for a number of reasons[26] including undefined professional roles and no clear pathway for when to refer on. Despite nurses recognising that they should only provide 'basic' care, this situation appears to lead to nurses providing DNE beyond their skill level[34,50].

It was more likely for PNs to feel their level of knowledge and skills was insufficient for this role, compared to ANPs. This diabetes knowledge gap is reported elsewhere [26,50,51] as a consistent feature of nursing in a range of settings [34]. The lack of courses was cited as the main obstacle to training, however other studies highlight more barriers[16,50,52]. QOF incentives may have increased demand for training in DNE in the past, but with this now removed and no current mandated minimum level of competency, these barriers will remain. As significant numbers of nurses in primary care reach retirement age[53] an increasing proportion of inexperienced PNs and health care and physician assistants, will provide diabetes care. Competency levels could therefore fall further if training levels remain unchanged.

Nurses' strong belief in the benefits of NE on health outcomes was evident in this study. Subsequent dissemination of the DiRECT study findings, which demonstrates diabetes remission is attainable through weight loss, should strengthen this further[54–56]. As a result of DiRECT, services are re-designing diabetes care to introduce a local remission service. The trial used expert dietitians to provide training and on-going support to dietitians and PNs who delivered the remission service in primary care. Our findings highlight how important the training and support element will be for the continued success of remission services outside of the trial.

Implications for future care.

This study suggests that the quality of DNE for people with Type 2 Diabetes in the UK could be improved by developing a robust support system for primary care nurses to improve the environment within which the PN provides DNE and the range of support received.

The environmental context could be improved by agreeing an expected level of DNE provision in primary care through a local review of interprofessional roles and boundaries. This would raise

awareness among GPs, support PN to work within these boundaries and identify training and service needs. Resources which provide accessible, up to date information on services, referral criteria and processes, educational resources and patient information could improve referral rates and improving consistency of care[57].

Professional support through improved access to dietitians including shadowing, responsive email access for troubleshooting, service updates and coaching could reduce isolation, increase knowledge of sources of NE outside of the practice and be a valuable opportunity for skill development particularly for less experienced nurses[58,59].

An alternative model which fits with NHS strategic plans to make better use of wider primary care workforce is the expansion of dietitians into the primary care team[60] and this is currently being evaluated[61]. Practice staff could be upskilled[58] and provide brief nutrition interventions to re-enforce advice from elsewhere, but the burden on the PN described in this study would reduce.

Nationally more consideration could be given to how to reinforce training and competency standards. Education and training should continue to be developed in a variety of forms to meet the diverse needs of the primary care team[58]. Innovative approaches such as webinars, e-learning and video as well as innovative face to face training could improve uptake and support translating knowledge into practice[33,34].

Strengths and limitations of the study

This study had several strengths. The broad research question was useful for this area which has not been previously researched. The iterative recruitment process led to a diverse sample for the study and by selecting just one stakeholder sufficient depth of data was generated to enable the development of explanatory accounts. Using the TDF as a framework for data analysis strengthened the study by providing an understanding of how the themes related to one another and a broader range of factors that impact on behaviour were considered. Although there is a risk in using such a model, of only reporting data that fits the model (and losing data that doesn't), care was taken to ensure all relevant information in the data was captured by at least one domain of the TDF.

This study was part of a degree and therefore with resource limited to one researcher, this had the potential to introduce bias and limited the sample size. The Framework Method used was a systematic and thorough approach to the data analysis which aimed to reduce personal opinion, increase rigor and providing transparency. In the development of explanatory accounts, the data was always revisited to verify or dismiss ideas, and empirical studies also supported the generation of

hypotheses. Data saturation appeared to be achieved within the sample recruited. However, if the sample had been larger, it would have been more likely that nurses who regularly referred PWD to dietitians would have been recruited, providing another perspective.

Various factors affected the representativeness of the sample including the willingness of practices to engage in the study. Practices with a greater interest in diabetes care were more likely to respond positively. With none of the nurses given time during work to be interviewed, this suggests that participants were enthusiastic and committed to improving diabetes care. Finally, this study took place in one geographical location in the UK. With local services for diabetes varying, the findings may not be directly transferable to other settings but the details provided should assist the reader in assessing generalisability[62].

Conclusion

It appears that over time with health service changes and increased service demands for diabetes care, there has been a shift in interprofessional boundaries for providing DNE. Structured education is providing DNE for more of those newly diagnosed, however primary care nurses are now one of the main providers of on-going dietary advice to people with diabetes in the UK.

This study has identified a number of concerns with the current situation which could be impacting on the effectiveness of on-going diabetes nutrition education and consequently on morbidity and mortality in T2D and the rising costs of diabetes. Nurses in this study had become isolated in this role and this led to an expectation that they take on this role despite insufficient support, resources, time and skills to do so.

However, this study hypothesises that significant improvements could be made to the quality of nutrition education by primary care nurses, by making improvement to their working environment and level of professional support through a range of strategies.

Transparency Declaration

The lead author affirms that this manuscript is an honest, accurate, and transparent account of the study being reported. The lead author affirms that no important aspects of the study have been omitted and that any discrepancies from the study as planned (University of Sheffield RMS143367) have been explained.

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Supplementary information 1 : Study Sampling frame (Based on data available at the time of the study [40])

Deprivation score (5 = highest deprivation)	**Diabetes Prevalence in practice compared to city average**	**Number of practices with**	
		ABOVE average number of patients with optimal blood glucose control	**BELOW average number of patients with optimal blood glucose control**
5	**Highest prevalence**	**5**	**3**
4	**Highest prevalence**	**0**	**7**
4	**Above average prevalence**	**4**	**4**
4	**Average prevalence**	**1**	**2**
3	**Above average prevalence**	**2**	**4**
3	**Average prevalence**	**0**	**1**
2	**Above average prevalence**	**5**	**1**
1 to 2	**Below average prevalence**	**12**	**3**
1	**Lowest prevalence**	**0**	**4**

Shaded boxes indicate practice(s) involved in study

Supplementary information 2 : Interview Topic Guide

1. **Scene setting – background information about you, your practice, patients, diabetes service and provision of nutrition eduction (be clear about what this means)**
   - Background information on **nurse** – yrs as nurse, yrs as practice nurse, grade/job title
   - Background information on **general practice demographics** and **structure of diabetes care**
     - Size, demographics of patients,
     - no of nurses and GPs
     - How is the DM care organised – who's responsible, who's involved, general or specialist clinics, time slots
   - What is interviewees **specific involvement** in diabetes care and **history** to this.
     - What do they provide – prevention, screening, diagnosis, education, support, management. How much of daily work taken up with diabetes?
   - What is **specific involvement in nut education** – solely diabetes or prevention, treatment of other conditions.
   - **How frequently** are you discussing food and nutrition in general – dm, non dm

2. **Consultations – How you provide nutrition education at the moment. If I was to be a fly on the wall – what would I see?**
   - How **opportunities** for nutrition education come about.
     (planned/unplanned, solely nutrition education/combined with other aspects of diabetes care/ duration)
   - A **typical consultation** and the different stages of the consultation
     - Length of time
     - assessment/ review, sharing info- negotiating change, goal setting, education, action planning
   - What **skills** are you using?
   - What educational **resource**s do you use – during , written info
   - How **individualised** do you make it
     - What do you do to individualise it
   - What would be required to make it **more** individualised
   - How much **behaviour change counselling** incorporated?
     - Motivational interviewing
     - Goal setting and action planning
     - Behavioural strategies
   - Whats **good about current model**
   - Whats **not so good** about way nut advice provided currently

3. **Experiences – consider your experiences in giving nut advice, primarily in dm but other conditions as well**
   - **Positive experiences** of giving nutrition education and thoughts on this.
     - What works well and why
     - What's worked well in the past
   - **Negative experiences** of giving nutrition education and thoughts on this
     - What's not worked so well
     - What's not worked so well in the past
   - What **affected your confidence** over time in giving advice in these areas? Support from PM, GPs for training and peer support, support from specialists, more time for pts/less time
   - Based on your experiences, **what changes would you make** if you could to how nut care is provided?

4. **Challenges of providing nutrition education - if not discussed already. Identified in literature**
   - What **gets in the way** of giving nutrition education**? Patients – nurse – organisation**
   - Time limitations – what else could be done?
   - Patients response to education
   - Educational resources
   - Knowledge and skills
   - Complexity

- Incidence
- QOF

5. **HCP involved - Roles - Whats your view of the role you provide?**
    - Who else is involved in nutrition ed for your patients?
    - How do you **think of your role** and **where it fits** within this other care?
    - How are you supported in this role?
    - How do you see this role changing in the future?
    - What may affect your role in the future

6. **Additional provision of nutrition education**
    - Thoughts and exp of referring **to groups**
    - **Circumstances for referral**
    - Perceived **advantages and disadvantages** of referral to education groups etc

    - Thoughts and exp of referring **to dietitian**
    - **Circumstances for referral**
    - Perceived **advantages and disadvantages** of referral to dietitian
    - Comparison of **practice nurse vs dietitian role**? Similarities and differences

    - Where else may people get nutritional advice? Formal and informal

7. **Training and competencies**
    - Where is your information on diet and nutrition obtained from?
    - Training received – informal and formal
        - How does training come about – self, GP etc
        - What's been good about this
        - How has it affected practice
    - What further training and support do you need to undertake your role
        - ?Perceived gaps in knowledge, skills, confidence
        - What form would you like this to take place – formal or informal
    - Is knowledge keeping up with complexity
    - What guidelines and pathways are used

8. **Future provision**
    - How sustainable do you feel this model is for the future
    - Suggestions for improving the future provision of nutrition education in primary care/ involving others to ensure future care.

Supplementary Information 3: Theoretical Domains Framework: Domain definitions, links to COM-B components, theoretical constructs and example questions [47]

COM- B Component	Domain definition linked to COM-B component	Theoretical constructs represented within each domain	Example questions
Capability	**Knowledge** An awareness of the existence of something	Knowledge (including knowledge of the condition /scientific rationale; procedural knowledge; knowledge of task environment	*Do you know about x?*
	Skills An ability or proficiency acquired through practice	Skills; skills development; competency; ability; interpersonal skills; practice; skills assessment	*Do you know how to do x?*
	Memory, attention and decision processes The ability to retain information, focus selectively on aspects of the environment and choose between two or more alternatives	Memory; attention; attention control; decision making; cognitive overload/tiredness	*Is x something you usually do?*
	Behavioural regulation Anything aimed at managing or changing objectively observed or measured actions	Self-monitoring; breaking habit; action planning	*Do you have systems that you could use for monitoring whether or not you have carried out x?*

Opportunity	**Environmental context and resources** Any circumstance of a person's situation or environment that discourages or encourages the development of skills and abilities, independence, social competence and adaptive behaviour	Environmental stressors; resources /material resources; organisational culture/climate; salient events /critical incidents; person x interaction; barriers and facilitators	*To what extent do physical or resource factors facilitate or hinder x?*
	Social influences Those interpersonal processes that can cause individuals to change their thoughts, feelings or behaviours	Social pressure; social norms; group conformity; social comparisons; group norms; social support; power; intergroup conflict; alienation; group identity; modelling	*To what extent do social influences facilitate or hinder x?*
Motivation	**Professional role and identity** A coherent set of behaviours and displayed personal qualities of an individual in a work setting	Professional identity; professional role; identity; professional boundaries; professional confidence; group identity; leadership; organisational commitment	*Is doing x compatible or in conflict with professional standards/identity?*
	Beliefs about capabilities Acceptance of the truth , reality or validity about outcomes of behaviour in a given situation	Self-confidence; perceived competence; self efficacy; perceived behavioural control; beliefs; self esteem; empowerment; professional confidence	*How difficult or easy is it for you to do x?*
	Optimism The confidence that things will happen for the best or that desired goals will be attained	Optimism; pessimism; unrealistic optimism; identity	*How confident are you that the problem of implementing x will be solved?*

	Belief about consequences Acceptance of the truth, reality or validity about the outcome of a behaviour in a given situation	Beliefs; outcome expectancies; characteristics of outcome expectancies; anticipated regret; consequents	*What do you think will happen if you do x?*
	Intentions A conscious decision to perform a behaviour or a resolve to act in a certain way	Stability of intentions; transtheorectical model and stages of change model	*Have they made a decision to do x?*
	Goals Mental representations of outcomes or end states that an individual wants to achieve	Goals; goal priority; goal/target setting; action planning; implementation intention	*How much do they want to do x?*
	Reinforcement Increasing the probability of a response by arranging a dependent relationship or contingency, between the response and a given stimulus	Rewards; incentives; punishment; consequents; reinforcement; contingencies; sanctions	*Are there incentives to do x?*
	Emotion A complex reaction pattern involving experiential, behavioural and physiological elements by which the individual attempts to deal with a personally significant matter or event	Fear; anxiety; affect; stress; depression; positive/negative affect; burnout	*Does doing x evoke an emotional response?*