



Diabetes specialist nursing in the UK: the judgement call?

A review of existing literature

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Background

Janet Kinson – a nurse, innovator and educator – recognised the need for effective education within diabetes management, and developed the first training programme for nurses working in diabetes. Janet was a supporter and ambassador for diabetes specialist nursing and her pioneering work formed the foundation for today's continual professional development (CPD) programmes. Diabetes UK has recognised the importance of her work and named a lecture in her honour. This article was presented as the Janet Kinson Lecture at the 2010 Diabetes UK Annual Professional Conference held in Liverpool, UK.

Introduction

The diabetes specialist nurse (DSN) role exists to educate and support people living with diabetes and their families, at all stages in their lives.¹ This role, first introduced over 70 years ago, became more common in

Summary

The role of the diabetes specialist nurse (DSN) has evolved since its inception over 70 years ago. Now, 1363 DSNs work in the UK, in various health care settings. The need to work within a culture of evidence-based practice and clinical and cost effectiveness, along with a perceived lack of evidence within diabetes specialist nursing, has prompted investigation into the role and efficacy of UK-based DSNs.

This review discusses the workforce demographics of DSNs employed in the UK, the evolving specialist nurse role and the clinical and cost effectiveness of specialist nursing. The DSNs' roles and workforce issues were assessed using existing surveys and reports. Clinical and cost effectiveness of DSNs were explored using a systematic literature review. This article is based on the Janet Kinson Lecture given at the 2010 Diabetes UK Annual Professional Conference in Liverpool, which gave an overview of specialist nursing, current literature supporting DSN practice and insights into challenges facing the profession in the current NHS culture of efficiency savings.

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Key words

diabetes specialist nursing; role; clinical effectiveness; cost effectiveness; United Kingdom

the 1970s with the advent of differing strengths of insulin and the introduction of self-monitoring of blood glucose.² In 2009, 1363 DSNs worked in primary and/or secondary care settings in the UK.³ Government policies and strategies aiming at improving the care of people with diabetes have influenced and changed the DSN role.^{4,5} These measures, along with a fundamental shift in the setting where care should be delivered,⁶ have led to a culture of target driven, evidence-based, cost effective care.^{7,8} Recently, many people (including those working in diabetes) have debated the role of specialist nurses, the use of the title 'specialist nurse', the qualifications and competencies required for specialist roles and their clinical and cost effectiveness.^{9,10}

This review examines existing knowledge around the specialist nurse profession including workforce

development, training and clinical and cost effectiveness. It also provides an overview of specialist nursing, current literature supporting DSN practice and an insight into challenges facing the profession in the current NHS culture of efficiency savings.

Diabetes specialist nursing, past and present

In the 1950s, the physician Joan Walker took on responsibility for managing people with diabetes attending the Leicester Royal Infirmary. Dr Walker soon recognised the impact that nurses could have on the care of people with diabetes, and appointed the first diabetes health visitors in the UK. One of these was Joan Wilson. Speaking in an interview for an internet-based resource, Joan explained how the work began:¹¹

'It was Dr Joan Walker's idea that she would like patients to be visited at home

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and taught how to live their lives at home, and she foresaw that health visitors were the best people to be involved in this work. It was my duty to visit all new patients, and some elderly ones that didn't come to clinic so often...'

Joan described the days of urine testing, glass syringes, sterilisation techniques and the dietary advice given at that time. She tells how newly diagnosed patients were often kept in hospital for some time and described how her role changed this:

'One child was taken in – Mum was expecting a baby – a good family. This dear little thing was on the ward in the hospital and I went to see her. The parents were standing up against the wall and the little girl was with them. When I spoke to the paediatrician he said, "Really, the little girl could go home, Joan, but it's Saturday," and I said, "Send her home and I will go in in the morning from home".'

This work formed the foundation for diabetes specialist nursing; today, DSNs work entirely in diabetes care and may be employed in primary or secondary care, or across both settings. Their caseloads might encompass the care of adults, children or both.¹ The role is described in a 1989 report as encompassing specific elements including leadership, innovation, research and education, while emphasising that DSNs should work within multi-disciplinary teams with a consultant physician or paediatrician as their clinical lead.¹ This definition could be considered outdated; therefore, to ensure its current applicability and to gain more information about the DSN workforce, a review of three surveys about the DSN role was undertaken.¹²⁻¹⁴

DSN demographics: roles and responsibilities

A study by Winocour and colleagues¹² was part of a series investigating specialist diabetes services in the UK, in 2000. A postal survey was sent to 456 consultant physicians in 238 acute

	Hospital DSN n=132 %	Community DSN n=104 %	Paediatric DSN n=67 %	Nurse consultant in diabetes n=29 %	P-value
Patient management	99.2	96.2	92.5	75.9	NS
Prescribing	48.5	55.8	26.9	65.5	NS
Non-medical prescribing	47.0	46.2	9.0	55.2	NS
Dose adjustment only	68.2	61.5	62.7	17.2	NS
Pump training*	55.3	35.6	43.3	20.7	0.003
Hypertension clinic*	22.0	10.6	4.5	20.7	0.019
Cardiovascular disease	29.5	20.2	3.0	27.6	NS
Foot clinics*	34.1	13.5	1.5	10.3	0.000
Renal clinics*	27.3	8.7	1.5	13.8	0.000
Inpatient work*	97.7	35.6	53.7	24.1	0.000
Antenatal clinics*	72.0	40.4	11.9	34.5	Not Given
Pre-assessment clinics prior to surgery*	22.7	4.8	0	6.9	0.000
Education for nursing staff*	97.7	89.4	88.1	89.7	0.007
Education for medical staff*	92.4	80.8	73.1	75.9	0.008
Education for other allied HCPs	90.9	91.3	70.1	79.3	NS
Education for patients	93.9	95.2	74.6	75.9	NS

DSN, diabetes specialist nurse; HCPs, health care professionals. *Significant differences between hospital and community DSNs.

Table 1. Specific roles undertaken by diabetes specialist nurses. (© 2009 Wiley-Blackwell [reproduced from: James J, et al. *Diabet Med* 2009;26:560-5])¹³

trusts and included 92 questions, of which 15 referred to DSN staff provision, roles and responsibilities. This study¹² demonstrated that while the numbers of DSNs had increased, 52% of bids for new DSN posts had failed:

only 13% of responding trusts met the Diabetes UK recommendations at that time, for one whole-time equivalent DSN per 250 000 head of population.¹⁵ Winocour's study also revealed limited DSN involvement in



outpatient clinics and a low number of DSNs working in extended roles.¹² When published, this survey was probably the most comprehensive investigation into UK DSN staffing levels and roles.¹² The paper explored the input provided in patient education programmes in depth, but provided no clarity about specialist activities offered by the profession. While predicting the impact that the advent of nurse consultant posts and non-medical prescribing might have on the care of people with diabetes, as nurses took on more direct responsibility for patient care, Winocour's work also raised concerns around the focus of diabetes nursing transferring into the primary care setting, and the lack of access to appropriate training for DSNs.¹²

When Diabetes UK and the Association of British Clinical Diabetologists re-assessed specialist services in 2007, a separate survey examining DSNs' working practices and specific roles was sent to all UK DSNs.¹³ Although the response rate was lower than in the earlier study (44%), this survey yielded valuable information about how the DSN role had evolved (Table 1). DSNs were now taking on more complex aspects of clinical care:

- Over 96% were involved in patient management.
- Over 46% had undergone non-medical prescribing training.
- 55% had received insulin pump training.
- 72% participated in diabetes antenatal clinics.

New roles had developed, such as the diabetes nurse consultant and the diabetes care technician (the latter being undertaken by appropriately trained health care assistants). Concerns were raised, however, about the lack of access and funding for CPD, with only 48% having access to CPD and 15% having funded study leave. In addition, it was identified that one-third of

- Primary research related to the topic, including all published full-length papers relating to the clinical and cost effectiveness of diabetes specialist nurses (DSNs) working in the UK
- Papers published between 1997 and 2008, to ensure that information studied was current
- English articles referring to diabetes UK DSN working practices, as the role of nurses working in other countries is inherently different. For example, in America and Canada, diabetes educators are employed; they are educated to degree level and offer only diabetes education. Few prescribe autonomously, as the legislation is not in place in most states/provinces to enable this
- Randomised controlled trials, meta-analyses or cohort studies looking at the effectiveness of DSNs were considered eligible for the purposes of this review as they met the criteria for the strongest level of acceptable evidence ('National Service Framework for Diabetes: Standards.' Department of Health, 2001)⁵

Box 1. Inclusion criteria for an investigation into the effectiveness of UK diabetes specialist nursing

DSNs were employed on short-term contracts and there was a reduction in the amount of research undertaken by DSNs, from 48% in 2000 to 22% in 2007. The workforce database report of DSNs later demonstrated that this figure had fallen to 10% by 2010.⁴ The 2007 survey also acknowledged that services were becoming increasingly fragmented, with fewer DSNs working across both primary and secondary care: the percentage of nurses working in both settings had reduced from 85% to 38%.¹³ By 2010, this figure had reduced to 28%.¹⁴

The workforce database report of UK DSNs was designed to ascertain the numbers of UK DSNs, their titles, work settings, qualifications and clinical leads, in order to inform future workforce planning.¹⁴ A total of 838 of the 1363 DSNs responded (61%), and 238 job titles were identified, of which 76% were DSNs and 2.3% were nurse consultants. Seventy-six percent of respondents worked with adults, 41% with inpatients, and 23% with children. Over half were employed full time (57%) and 98% were employed within the NHS; 83% were employed at either Band 6 (specialist nurse) or Band 7 (nurse advanced), of whom 49% were at the top of their pay band. Forty-four percent of

DSNs expected to retire within the next decade.

With regard to qualifications, 74% had a diabetes diploma or certificate, around half had completed *ad hoc* degree-level modules (including 40% who had completed non-medical prescribing courses and 17% who had obtained diabetes-related degrees). Eighteen percent had undertaken *ad hoc* master's-level modules, with 8% gaining a master's qualification in diabetes.

Clinical leads were identified by 89% of respondents, with 85% of these being a consultant physician and 9% a nurse; 11% did not have a clinical lead.

Clinical effectiveness

Although a Cochrane report on the effectiveness of specialist nursing was included in the Cochrane Database in 2003,¹⁶ strict adherence to its agreed inclusion and exclusion criteria meant that no British papers were included in the analysis. The review used the reduction of glycosylated haemoglobin (HbA_{1c}) as a primary outcome measure and revealed that specialist nurses working in diabetes were effective at reducing this, at least in the short term. It can be argued that the roles of health care professionals providing



Study	Design	Population	Intervention	Reduction in length of stay	P-value
Davies <i>et al.</i> (2001) ²	Randomised controlled trial	300 inpatients with diabetes: 152, routine care; 148, intervention arm	DSN care/usual care over 21 months	Median LOS reduced by 3 days	<0.01
Cavan <i>et al.</i> (2001) ¹⁹	Prospective observational study	792 inpatients with diabetes	Routine care/inpatient DSN service over 24 months	Median LOS reduced by 3 days in both the medical and surgical cohorts	<0.001
Pledger J (2005) ²⁰	Retrospective observational study	Inpatients with diabetes	Input from a ward based DSN over 6 months	LOS reduced by 1.14 days in those with primary or secondary diagnosis; LOS reduced by 3.1 days in those with diabetes as a secondary diagnosis	Not given
Sampson <i>et al.</i> (2006) ²¹	Retrospective observational study	14 722 medical and surgical ward inpatients with diabetes	DISN service over 2 years compared with previous 4 years	Reduced mean LOS in <60-year-olds by 0.7 days Reduced LOS in 61–75-year-olds No reduction in LOS in >75-year-olds Median LOS reduced by 2 days	<0.003 <0.008 <0.05
Courtenay <i>et al.</i> (2007) ²²	Prospective observational study	Medical (n=187, 6 wards) and surgical (n=256, 5 wards) inpatients with diabetes	Non DSN intervention/ DSN nurse prescriber care over 3-month periods	Significant correlation between LOS and number of prescribing and management errors	<0.001
Flanagan <i>et al.</i> (2008) ²³	Audit	Inpatients with diabetes	DISN service, 5 nurses: 3 whole-time equivalent posts. Data compared over 6-year period	Reduction in mean LOS of 0.5 days following the intervention in emergency admissions Reduction of mean LOS of 0.7 days in medical patients	<0.001

DSN, diabetes specialist nurse; LOS, length of stay; DISN, inpatient DSN service.

Table 2. Collation of reviewed inpatient studies

the intervention, who ranged from case managers to certified diabetes educators, did not mirror those of UK DSNs; there was significant variability within roles and in various cohort populations, and in particular in the ability to advise independently on medicines management.¹⁶ The role of the UK DSN incorporates a substantial degree of autonomy around medicines management, with many DSNs being able to prescribe independently and all being able to advise on medicines management.

As the Cochrane report has the potential to influence how UK health service managers perceived specialist nursing, a separate investigation into the effectiveness of UK diabetes specialist nursing took place in 2008.

This investigation, which formed part of a master's-level study, used

the principles of systematic literature review to investigate existing and extended UK DSN roles and their clinical and cost effectiveness. Inclusion criteria are shown in Box 1. Papers were excluded if they were >10 years old, if they reviewed care from non-UK countries, or if the intervention was multiprofessional. In total, 447 papers were reviewed, of which 11 studies met the inclusion criteria.⁵ All papers were analysed using appropriately designed and tested critical analysis tools.^{17,18} Two distinct themes emerged: six articles related to inpatient care (Table 2)^{2,19–23} and five to diabetes nurse-led clinics.^{24–28} All were quantitative studies, initiated and delivered in secondary care.

Inpatient studies

All of the inpatient studies described how DSNs provided

elements of care for adult inpatients with diabetes, and outlined their responsibilities for the education and advice given to inpatients and the training and education of ward-based staff (Table 1). Each focused primarily on hospital length of stay (LOS) and bed occupancy (Table 2). Diabetes medicines management was part of the DSN intervention in all of the inpatient studies, but only one used the skills of the nurse prescriber to identify diabetes medication and management errors, and prescribe, where deemed necessary.²²

Secondary outcome measures included in two inpatient studies were patient satisfaction and quality-of-life;^{2,22} the effect on patient knowledge was included in one study.² The effect of the DSN intervention on nursing and medical



staff knowledge was used as a secondary measure in one paper.¹⁹

Length of hospital stay

All six inpatient studies that were reviewed demonstrated a reduced length of hospital stay.^{2,19–23} In the five papers that presented formal statistical analysis, these results were highly significant (Table 1).^{2,19,21–23}

Other results

In the Leicester study, the intervention group was more satisfied than the routine-care group with all aspects of their diabetes care ($p < 0.001$). Although there were no statistically significant differences in diabetes knowledge at baseline, knowledge scores improved in the intervention group post-discharge ($p < 0.001$). The number of community DSN contacts following patient discharge was not statistically significantly different in either cohort in this study. However, the number of general practitioner contacts in the intervention group was lower ($p < 0.001$, 95% confidence intervals [CI] -1.0 to 0.2).²

The Peterborough and Reading study reviewed patients' ability to self-manage as a secondary measure, but reported no statistically significant differences between the two cohorts studied. By contrast, the median number of medication errors reduced from six (interquartile range 2.5–15) in the pre-intervention group to four (interquartile range 0–3) in the intervention group ($p < 0.01$).²²

Nurse-led clinic studies

All five nurse-led clinic studies focused on the effectiveness of DSNs in reducing cardiovascular risk as a primary outcome measure. All studies used systolic blood pressure (BP), BP management and serum cholesterol levels as primary outcome measures.^{24–28} Two studies also used HbA_{1c} as an outcome measure.^{25,28}

Lipid management

The Salford randomised controlled trial (RCT) reported a significant reduction in total cholesterol in the lipid arm of their trial, with 53% (n=180) achieving the target total cholesterol of <5mmol in the nurse-led hyperlipidaemia clinic compared with 40% (n=139) in the usual-care group ($p = 0.0004$, 95% CI -0.44 to 0.13). The authors reported that, in a secondary analysis, targets were achieved more frequently in the nurse-led hyperlipidaemia clinic (odds ratio [OR] 1.69, 95% CI 1.25–2.29, $p = 0.0007$) than in the nurse-led hypertension clinic (OR 1.14, 0.86–1.51, $p = 0.37$).²⁴

The Liverpool team provided three studies investigating the nurse-led management of cardiovascular risk,^{25–27} two of which published results relating to lipid management.^{25,27} The first cohort study revealed that total cholesterol was reduced in their population ($p < 0.001$) and reported an improvement in cholesterol/high-density lipoprotein (HDL)-cholesterol ratios ($p < 0.003$). The number of patients taking lipid-lowering treatments increased from 50% to 69% ($p = 0.006$) in the third Liverpool study.²⁷ This work also found a statistically significant improvement in HDL-cholesterol, from 1.2±0.5mmol/L to 1.4±0.5mmol/L ($p = 0.004$) with nurse intervention, but no statistical improvement in total cholesterol levels.²⁷ The Wolverhampton study found no statistical improvements in lipid profiles in their nurse-led hypertension study: the mean total cholesterol was 4.8±1.3mmol/L at baseline and 4.3±0.9mmol/L at discharge. The mean HDL-cholesterol was 1.4±0.5mmol/L at baseline and 1.3±0.4mmol/L at discharge.²⁸

Blood pressure

Mean systolic BP reduced from 153±24mmHg at baseline to 133±20mmHg at discharge in 33

patients with type 2 diabetes ($p < 0.001$) in the first Liverpool study. Mean diastolic BP in this cohort reduced from 85±11mmHg at baseline to 77±9mmHg at discharge ($p < 0.001$).²⁵ The third Liverpool study revealed that by using a protocol-driven nurse-led clinic, cardiovascular risk factors (including BP) could be significantly reduced:²⁷ they demonstrated a mean reduction in systolic BP from 178±18mmHg at baseline to 150±17mmHg ($p < 0.001$) at the nine-month review, in their cohort of 110 patients.²⁷ This study also assessed treatment modalities and found that the mean number of antihypertensive agents significantly increased from 1.7±0.9 at baseline to 2.4±0.9 at discharge ($p < 0.001$).²⁷ The audit by the Wolverhampton investigators found a significant BP reduction in 124 high-risk patients with diabetes, using a protocol-driven nurse-led hypertension service. This resulted in a mean fall in systolic BP from 186±24mmHg at baseline to 139±12mmHg post intervention ($p < 0.001$); mean diastolic BP also fell from 85±13mmHg to 67±11mmHg post intervention.²⁸ A total of 61% of participants achieved the target systolic BP of <140mmHg.²⁸

Glycosylated haemoglobin

A significant reduction in HbA_{1c} levels was demonstrated in two studies; a reduction from a mean of 9.3±1.7% (range 7.5–14.2) at baseline to 7.5±1.1% (range 5.4–10.6) post intervention was shown in the first Liverpool study ($p = 0.001$).²⁵ Mean HbA_{1c} was recorded as 8.4±1.8% at baseline and 8.0±1.7% at discharge in the Wolverhampton study ($p < 0.01$).²⁸

Other results

The Salford team, assessing all-cause mortality following inclusion into either the hypertension or lipid study arm or both, revealed a statistically significant reduction in all-cause mortality through nurse



intervention (OR 0.55, 0.32–0.92, $p=0.02$).²⁴ The third Liverpool study revealed that the number of patients with microalbuminuria reduced from 41 (47%) to 25 (28%) ($p=0.02$), with a fall in the urinary albumin:creatinine ratio from 3.0mg/mmol (range 1.3–7.9) to 1.8mg/mmol (range 1.0–5.0); ($p=0.001$).²⁷ The Wolverhampton group identified a reduction in cardiovascular risk following DSN intervention ($p<0.001$), and that the number of smokers also reduced significantly ($p<0.01$).²⁸

Cost effectiveness

Four of the 11 studies assessed cost effectiveness as an outcome measure;^{2,20,22,24} three of these were inpatient studies.^{2,20,22} The Leicester team aligned cost to DSN pay and patient or control-group intervention; the mean cost for an individual inpatient stay was reduced by £436. The authors stated that reduced LOS could therefore offset any additional DSN costs.² The Bedford study estimated a cost of £170 per inpatient day; reduced LOS subsequently led to an estimated saving of £222 530 over six months.²⁰ The Peterborough and Reading authors described estimated cost savings following reduced LOS of £132 500 over three months on five wards, as a result of the DSN intervention.²² This figure was based on a costing of £250 per day, as indicated by the Department of Health.

The Salford work²⁴ was the only included nurse-led clinic study to review cost effectiveness systematically; their findings were also published in an American journal.²⁹ The findings aligned with cost effectiveness findings in two other studies.^{30,31} Using these as a baseline, it was hypothesised that BP lowering was cost effective and life prolonging (\$1400 per quality adjusted life year [QALY]), whereas lipid-lowering was highly cost effective (\$8230 per

QALY). It was estimated that investing in nurse-led clinics in Salford offered additional financial benefits, in that treatment effectiveness (\$4020 per QALY) and lipid-lowering (\$19 950 per QALY) were enhanced. Combining the intervention arms resulted in an estimated cost effectiveness of \$9070 per QALY.

Study limitations

The literature search revealed only quantitative studies. Although relevant search terms were used, it may be that using other terms may have yielded more papers. For example, the word 'effectiveness' was used, and this could be open to many interpretations; another word such as 'efficacy' may have led to other articles being assessed. In some studies, nurses had received additional training in specific areas such as non-medical prescribing²² and management of hypertension or hyperlipidaemia.²⁴ Protocols and guidelines were used to support medicine titration in four studies.^{25–28}

The diversity of studies meant that no meta-analysis of results could be undertaken. However, pooled results from various papers provide reliable evidence that DSNs are both clinically effective and cost effective.

Discussion

The role of the DSN has developed into one that is robust and complex, in response to government policies and workforce demands. DSNs now work independently, running nurse-led clinics, and have increasing responsibility for direct patient care as predicted by Winocour and colleagues.¹² Of concern, however, is the lack of protected funding and time for CPD, the low levels of formal qualifications and the variability in access to consultant physicians for specialist advice. There needs to be consistency around the title 'specialist nurse' and the qualifications and competencies required, to ensure

that people living with diabetes and employers know the standard of care expected. In diabetes, the specialist nursing profession is becoming fragmented, with more defined barriers emerging between community and hospital-based DSNs. This concept is an anathema, considering the move to provide integrated care nationally.

The systematic review provides evidence of both the clinical and cost effectiveness of DSNs, but there is a dearth of good-quality papers, with only two RCTs. No papers emerged relating to the effectiveness of either paediatric specialist nurses or community DSNs. The diabetes nursing profession, as a whole, is significantly less engaged in research than it has previously been, but still needs to address the lack of good evidence supporting DSNs' roles, particularly as the NHS moves into a culture of efficiency savings. In these challenging and difficult times, where each health care professional needs to justify their place in the health system, it is of particular concern that 44% of DSNs expect to retire in the next decade: recruitment freezes and job losses will inevitably impact on succession planning. Health service managers, diabetes teams and DSNs need to consider whether a world without these specialist nurses will truly benefit the growing number of health care organisations and people with diabetes.

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Declaration of interests

There are no conflicts of interest declared.

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