30th November 2020

Final Report

The impact of dietitians in the multi-disciplinary practice team within primary care

Dr Avril Collinson

Dr Jenny Child

Professor Mary Hickson

Plymouth Institute of Health Research, University of Plymouth,

Contents

Dissemination and Publications

The following publications and presentations have been delivered or are planned.

1. Presentation 'The impact of dietitians in the multi-disciplinary GP practice team' at BDA research symposium, 2018.
2. Hickson M, Wanner A, Collinson A. Dietitian-led clinics in primary care: a scoping review protocol. JBI Database of Systematic Reviews and Implementation Reports. 2019. 17(12) 2525-2531. doi: 10.11124/JBISRIR-D-19-00025
3. Presented at the Best Practice Conference, 9th Oct 2019, NEC, Birmingham.
4. Hickson M, Wanner A, Collinson A. Dietitian-led clinics in primary care: a scoping review. JBI Database of Systematic Reviews and Implementation Reports. Submitted
5. Hickson, M, Collinson, A, Child, J. How dietitians support primary care. Practice Management, 2020 (published)
6. Poster and oral presentations from this work accepted for ICD2020, S Africa (postponed to September 2021 due to COVID-19).
7. Presentation of this work scheduled for Primary Care conference 12-13th May 2021 (tbc due to COVID-19).
8. Presentation of this work scheduled for BDA Research symposium 2nd Dec 2020.

Acknowledgements

We would like to thank the four dietitians involved in these service evaluations; Lisa Ledger, Sam Hannam, Lisa Waddell and Amy Freeman-Hughes, for their hard work, expertise and thoughtful insights into these service models.

Introduction

The overall aim of the BDA Primary Care Project: Collate evidence relating to the dietitian in primary care identifying the strengths of service provision, cost savings, health outcomes and patient satisfaction.

Our original proposal outlined three phases of work:

1. A review of published and grey literature (scoping review, now under review)
2. A survey of dietitians working in primary care
3. Implementing and evaluating three models of care in primary care practices

Phases 1 and 2 have been summarised previously and the outputs are listed in the publications section. This report focusses on the results for the final phase and describes the three models evaluated in phase 3 and the benefits found. Papers describing this work are in preparation.

Phase 3: Implementing and evaluating three models of care in primary care practices

This service development and evaluation project was divided into three models to evaluate how dietitians could work in primary care. The three models are:

1. Dietitians working as a First Contact Practitioner to treat frailty and malnutrition within the general practice setting.
2. Dietitians working to enhance the multi-disciplinary team (MDT) within general practice.
3. Dietitians working directly with primary care to manage paediatric allergy.

Model 1: Dietitians working as a First Contact Practitioner to treat frailty and malnutrition within the general practice setting.

Background and rationale

The World Health Organization (WHO) describes primary care as "first-contact, accessible, continued, comprehensive and coordinated care. First-contact care is accessible at the time of need; ongoing care focuses on the long-term health of a person rather than the short duration of the disease; comprehensive care is a range of services appropriate to the common problems in the respective population and coordination is the role by which primary care acts to coordinate other specialists that the patient may need" (World Health Organisation, 2019)(para.3). In the UK primary care is centered around the general practitioner (GP) which is synonymous with primary care.

Several important health service documents have defined the challenges facing the health service and general practice, and proposed solutions. The NHS long term plan places primary care at the centre; looking at doing things differently through a new service model, taking more action on preventative measures, and improving care quality and outcomes for major conditions (NHS England, 2019). The General Practice Forward View (NHS England and Royal College of General Practitioners, 2016) advises making better use of the wider primary care workforce to reduce demand on General Practitioner (GP) time. The Primary Care Workforce Commission (Primary Care Workforce Commission, 2015) describes a vision in which a new 'expert generalist' healthcare professional role will emerge, with the competencies to manage significant parts of the primary care workload. The traditional model for dietetic work in primary care is through outreach clinics and education programmes, delivered by dietitians working in community or acute settings, or delivering dietetic clinics within GP surgeries taking referrals from GPs. There is now a need for new models of dietetic care to be explored to find effective and efficient modes of practice in the primary care setting.

Frailty is associated with older age and chronic disease and increases the risk of falls, disability, hospitalisation and mortality (Fried et al., 2001). Early identification and treatment may help to reduce the loss of independence associated with frailty. Frailty and malnutrition are related but distinct conditions. A systematic review has shown that a combination of muscle strength training and protein supplementation was the most effective intervention to delay or reverse frailty resistance (Travers et al., 2019). Dietitians provide high quality, complex nutritional and dietetic advice in order to contribute to the care of patients, enabling them to make informed choices about their health related behaviours. This project was designed to evaluate a model of a dietitian working as a first contact practitioner to help manage frailty and malnutrition in primary care.

The scoping review (under review with JBI Evidence Synthesis) found only eight articles relating to malnutrition in older adults. These included two randomised controlled trials with a short follow up,

which provided conflicting results (benefits in one trial, none in the other). Other articles focussed on the safe and effective prescription of nutritional products indicating that dietitians had the potential to improve outcomes after intervening. The body of evidence is limited and contradictory and so further evaluation of dietitians in such roles is essential.

Project aims

The project aimed to evaluate the benefits of a model of care in which dietitians work as a first contact practitioner to help manage frailty and malnutrition in primary care.

The objectives were:

1. Evaluate the impact of dietetic consultations on frail and malnourished patients' health outcomes.
2. Explore the effects of the service on hospital admissions and length of hospital stay, other healthcare use, prescribed antibiotics and oral nutrition supplement (ONS) prescriptions.
3. Estimated the cost of such a service and the cost effectiveness.

Methods

Design

This was a service development and evaluation project. We evaluated the benefits of a dietitian working as a first contact practitioner to help manage frailty and malnutrition in a health centre in Cornwall over a six-month period. A first contact practitioner is a registered health professional who is the first point of contact for patients, providing new expertise and increased capacity to general practice and providing patients with faster access to the right care. A detailed description of the role and responsibilities of first contact dietitians is provided in Appendix 1. In this context the dietitian was identifying those at risk of frailty and malnutrition, contacting them directly and intervening where appropriate.

Location

The primary care network included five practices in and around one town in Cornwall. They provide a full range of primary care medical services to the local population. They aspire to expand their range of services and specialist clinics, therefore volunteered to host this project.

Process

Using SystmOne health informatics (electronic Frailty Index (eFI)[a](Clegg et al., 2016) or Body Mass index (BMI)) in patients ≥65 years were screened for risk of frailty or low weight. Any patient in a care home was excluded. Patients flagged up with a moderate frailty index (eFI 0.25-0.36) or BMI <19kg/m^2 were triaged by the dietitian over the telephone using the Patients Association Nutrition Checklist, a nutrition screening tool recently validated against MUST (Murphy et al., 2020). If the patient was at risk of malnutrition they were either offered nutritional advice over the telephone, or invited to a dietetic clinic appointment. The dietitian also took direct referrals of any patients ≥65 years at risk of frailty and malnutrition from GPs and other health staff, or from the integration team when assessing patients' discharged from hospital. Patients ≥65 years who were prescribed oral nutritional supplements and were not currently under dietetic management were also offered dietetic consultations. A dietitian was employed for this project 0.2wte for a 6 month period.

[a] eFI score ranges between 0-1. Scores closer to 1 indicate a higher risk of frailty and hence vulnerability to adverse outcomes. The eFI uses existing electronic health record data to measure frailty on the basis of the accumulation of 36 deficits comprising around 2,000 Read codes.

Data collection

In order to fulfil our three objectives the following data was collected:

- Changes in patients' nutritional status and frailty scores after dietetic consultations, as well as patient satisfaction data (Appendix 2).
- Changes in ONS prescribing data to calculate costs savings from optimisation of prescribing practice.
- Number of hospital admissions, length of hospital stay, GP contact time and prescribed antibiotics during the period after the dietetic consultation up to 6 months (end of the project).
- Details of the dietitian's workload including route of referrals and whether the dietitian was acting as a first contact practitioner.

Table 1 lists the variables that were collected, the purpose and rationale. Acting as a first contact practitioner was defined as the dietitian being the only person involved in the patient's management at this point in time. It would mean that the patient had been identified and triaged by the dietitian and not referred by another health professional. In this role the dietitian took responsibility for managing these complex patients, developing integrated and tailored treatment plans in partnership with patients and reducing the need for pharmacological interventions

Ethics

Ethical approval for this service evaluation project was granted by the Faculty Research Ethics and Integrity Committee, University of Plymouth and permission obtained from Primary Care Network involved for the project to be undertaken.

Table 1: Variables collected during the evaluation of the dietetic service within the GP practice and their rationale.

Variable	Purpose	Rationale
Route of referral and whether Dietitian is acting as a first contact practitioner	Descriptive data	To evaluate the dietitians workload
Number of dietetic consultations; by telephone and face to face.	Descriptive data	To evaluate the dietitians workload
Type of advice provided by the dietitian	Descriptive data	To evaluate the scope of the dietitians work
Time taken in the appointment	Descriptive data	To evaluate the dietitians workload
Malnutrition risk screening score (taken from questions in Patients Association Nutrition Checklist)	Evaluate risk of malnutrition before seen by the dietitian and afterwards	To show efficacy of dietetic input in reducing risk of malnutrition
Patient satisfaction score	Evaluate satisfaction with the service	Demonstrate that patients are satisfied with the new service
Clinical Frailty Scale (see Appendix 3)	To assess level of frailty independently of the eFI	To demonstrate the change in a patient's level of frailty after interventions initiated or provided by the dietitian.
Number of ONS stopped, started or changed	Cost evaluation	The dietitian may stop or start ONS or change the dose. She may also refer the patient for a full pharmacy review by the pharmacist in the practice. Thus, influencing medicine costs.
Number of hospital admissions	Cost evaluation	Hospital admissions are a high cost event and thus, any that may be avoided have significant cost implications
If there was an admission the length of stay of those admissions	Cost evaluation	Malnutrition and frailty are known to be associated with longer hospital stays, thus active treatment of these conditions may influence length of stay.
Number and length of time of GP consultations	Cost evaluation and GP workload	Reducing GP workload is a key goal of introducing AHP to primary care and this will influence cost savings.

Results

A total of 186 patients were triaged by the dietitian after being screened using eFI & BMI (n=162) and prescription of ONS (n=27). From these 189 patients; 47 (25%) were not considered to be at risk of malnutrition but 142 (75%) were at risk: 15 (8%) were considered at risk but declined the dietetic consultation, four (2%) did not attend their appointments, two (1%) were admitted to hospital and 58 (30%) were not able to have an appointment booked within the timeframe of the project. A total of 63 patients were provided with a dietetic consultation and follow-up as necessary (29 (46%) telephone, 34 (54%) face to face). The dietitian acted as a first contact practitioner for 59 (94%) of these patients. Two patients were previously seen by a practice nurse and two by a GP.

The patients' characteristics are shown in Table 2. The patients were spread evenly throughout the five year age categories and many had multiple long-term conditions. Two thirds of patients were deemed at risk of frailty according to the eFI and more than half were under weight and the median BMI was less than 19kg/m^2.

Table 2: Characteristics of the patients seen by the dietitian

Characteristic	Number of patients (n=63)	%
Age group (years)		
65-69	14	22.2
70-74	11	17.5
75-79	14	22.2
80-84	8	12.7
85-89	12	19.0
90+	4	6.3
Number of diagnoses		
None	2	3.2
One	34	54.0
Two	21	33.3
Three	4	6.3
Four	2	3.2
Diagnosis (some patients had more than one diagnosis)		
CVD	33	52.0
Respiratory disease	21	33.0
Mental health conditions	7	11.0
Chronic Kidney Disease	6	9.5
Osteoporosis	6	9.5
Cancer	5	8.0
Gut disorders	4	6.0
Diabetes	2	3.0
Liver disease	2	3.0
eFI category (eFI range)		
Fit (0-0.12)	22	34.9
Mild (0.13-0.24)	18	28.6
Moderate (0.25-0.36)	13	20.6
Severe (>0.36)	10	15.9
Body Mass Index (BMI)		
<=19kg/m^2	35	55.6
>19kg/m^2	24	38.1
Missing data	4	6.3
Median (Interquartile range)	18.8 (17-20)	

Frailty status

Part of the dietitian's assessment included the Rockwood clinical frailty scale[b]. This provided a different definition of frailty (clinical descriptors as opposed to the cumulative deficit model used by the eFI) indicating the patients' frailty assessment ranged from 'apparently vulnerable' to 'severely frail' (see Table 3) pre-dietetic intervention. This scale was used because it is designed to be easy to use in clinical practice and predicts well mortality or the need for an institution (Rockwood et al., 2005).

At the end of the dietetic intervention there was a significant shift towards a less severe frailty category (Sign test (showing the direction of change within a scale) frailty score reduced=8 patients; score increased=0; no change=50 (exact significance, 2-tailed; p=0.008) suggesting that, in the short time the patients were treated and monitored, some improved their frailty status.

Table 3: Rockwood clinical frailty scale scores pre- and post-dietetic intervention

Clinical Frailty Scale	Pre-intervention (n=58) Number (%)	Post-intervention (n=58) Number (%)
1= Very fit	0	0
2 = Well	0	0
3 = Well with treated comorbid disease	0	0
4 = Apparently vulnerable	21 (36.2%)	28 (48.3%)
5 = Mildly frail	21 (36.2%)	15 (25.9%)
6 = Moderately frail	14 (24.1%)	13 (22.4%)
7 = Severely frail	2 (3.4%)	2 (3.4%)

Nutritional status

Malnutrition risk was assessed using the Patients' Association Nutrition checklist (https://www.patients-association.org.uk/patients-association-nutrition-checklist-toolkit). One point was scored for each affirmative response to questions in section B (0-10) (Appendix 4), indicating a potential issue that may increase nutritional risk. A Sign test was used to assess the changes in these scores before and after the intervention. The number of affirmative responses decreased in 21 patients; number increased=4; no change=33. This indicated a statistically significant improvement after the dietitian's intervention (exact significance, 2-tailed; p=0.001).

Anthropometric measures

Table 4 presents anthropometric measures pre- and post-dietetic intervention. Weight, BMI, hand grip, and mid upper arm circumference were all improved even within the short time frame of this project. A reduction in mortality risk has been found for every 1kg increase in handgrip strength (Cooper et al., 2010) and both right and left hand mean difference in grip strength were found to have exceeded this (Table 4), suggesting an improved clinical outcome and lower mortality risk after the dietetic consultations. The change in mid upper arm circumference, although statistically significant (i.e. a true increase rather than by chance alone), it is not clinically significant, representing only a 1% increase in the value. Similarly, BMI (0.3kg/m^2) and weight (1.7kg) both showed increases, which were statistically significant and had a medium effect size, but were not clinically significant. However, it is notable that only three patients lost weight, while 31 gained. Due to the time restrictions of this six-month project, only short term outcome measures were captured, therefore data on the longer-term implications of this dietetic intervention are not available.

[b] The Clinical Frailty Scale is a 7-point scale exploring physical, psychological and social domains of frailty to provide a global score ranging from 1 (very fit) to 7 (severely frail) (Rockwood, 2005) – see Appendix 3.

Table 4: Anthropometric measures pre- and post the dietetic intervention

Anthropometric measure	Pre	Post	Z score and effect size	P value
Median weight (kg) (IQR) n=54	46.9 (43.6-58.7)	48.6 (44.4-58.9)	*z*=4.06; r=0.39	<0.001[1]
Median BMI (kg/m^2) (IQR) n=54	18.8 (17.1-20.0)	19.1 (17.7-20.5)	*z*=4.04; r=0.34	<0.001[1]
			Mean difference (95% Confidence Interval)	
Mean left hand grip strength (kg)(sd) n=21	17.83 (7.3)	19.38 (7.07)	1.55 (0.88,2.21)	<0.001[2]
Mean right hand grip strength (kg)(sd) n=21	19.69 (6.55)	21.43 (6.61)	1.74 (1.19,2.28)	<0.001[2]
Mean mid upper arm circumference (cm)(sd) n=19	22.9 (2.18)	23.2 (2.19)	0.34 (0.18, 0.5)	<0.001[2]

Data for weight and BMI were not normally distributed. IQR=Interquartile range; [1]Wilcoxon signed rank test; [2]Paired t-test.

Dietary aims

The dietitian discussed the patient's current diet and agreed suitable patient-centred dietary aims with the patient; these are shown in Table 5. Of the 63 patients, 48 agreed two dietary aims and 15 one dietary aim. 76% (48) fully achieved their dietary aims and 16% (10) partially achieved them. Only 8% (5) patients did not achieve their dietary aims and the reasons were; one patient died, one patient had dementia, one patient was at end of life and two patients' medical conditions deteriorated.

Three patients were identified as being at risk of refeeding syndrome and were provided with nutritional support in line with NICE guidance (NICE, 2006).

Table 5: Dietary aims of consultations

Dietary aims	Number
Increase energy and protein intake	45
Increase protein intake only	1
Decrease energy intake	1
Increase fluid intake	13
Increase fibre and fluid intake	1
Increase range of micronutrients	17
Increase Vitamin D & Calcium	8
Review oral nutritional supplements	27

Cost savings

No formal economic analysis was possible but data on items that may influence the cost of care were collected including; prescription items (e.g. oral nutritional supplements and vitamins) and healthcare service use (e.g. hospital admissions, GP consultations etc.). In the event we could not use the latter data, as explained below.

Supplements were reviewed for 27 patients and eight of these had their oral nutritional supplements (ONS) stopped entirely. Six patients' ONS were reduced in volume and nine were switched to a cheaper more suitable alternative, two were both reduced and switched, and only two

were continued on the same prescription. Three of these patients had their prescribed vitamins stopped. These prescription changes for only 27 patients equated to projected total annual cost savings of £15,379. This equates 160% of the value of the dietitian's time in this project (1 day a week at Band 7 salary for 6 months; approximately £9540) (See Table 6).

In order to estimate the impact of the dietitian on other costs we needed to compare the patients seen by the dietitian with a comparative group who were not given dietetic intervention. Sampling a suitable comparative group proved impossible, because the eFI and low BMI criteria did not adequately represent the group seen by the dietitian. This was because a large proportion of patients referred by the prescribing support dietitian for review of ONS (n=27) had recently been discharged from hospital. Therefore, it was impossible to estimate the impact of the dietetic input on hospital admissions, GP contact time and prescribed antibiotics. Future evaluations need to build in better processes to assess costs of these accurately.

Nevertheless the data provided several examples of the significant impact the dietitian had which impacted on healthcare cost, patient safety and quality of care (see Box 1)

Box 1: Case studies showing the dietitian's impact on healthcare costs, patient safety and quality of care

Patient A: Presented with a low BMI (16kg/m2). The patient reported they had lost weight but had not acted on this. The patient was at risk of refeeding syndrome. Dietary advice was given and monitoring showed improvements in weight, strength and hydration. The dietitian thus ameliorated the serious risk of refeeding syndrome and therefore, possible admission to hospital, as well as improving the patient's overall health status.

Patient B: Presented with COPD and low BMI (17kg/m^2) and struggling to cope with shopping and preparing meals. Advised to increase energy and protein and facilitated social care to ensure carers were in place to help with meals. This enabled patient to stay in their own home preventing an admission to a nursing home or secondary care.

Patient C: Presented with hypertension and multiple falls. Frailty assessment indicated severe frailty and history taken during consultation showed that the patient was unable to manage at home safely. The dietitian referred the patient to the falls team and the patient ultimately opted to live in a care home with all meals and appropriate support provided. This demonstrates the dietitian's role in ensuring patient safety and quality of care.

Patient feedback

Only 21 patients returned the satisfaction questionnaire. Of these 19 (90%) were fully completed and included in the analysis. All 19 patients rated their overall satisfaction of the service as excellent, stated that the dietitian treated them with dignity and respect, and would recommend this service to family and friends. Table 7 shows that patients universally felt that the dietitian acted using a patient-centred approach.

Screening patients

We used eFI and/or low BMI to identify patients at risk of frailty who may benefit from the input of the dietitian. These criteria were used because the data is recorded routinely into the GP database and can be filtered for. Approximately a third of the patients retrieved were classified as at low risk of frailty (or 'fit') according to the eFI (see Table 2). However, the assessment of nutritional risk, using the Patients Association Nutrition Checklist, showed that these 'fit' patients were at risk of malnutrition. This illustrates how the risk of malnutrition and frailty do not necessarily always go

together. This emphasises the need for the dietitian's clinical assessment, used in this model of care, to identify patients both at risk of frailty and malnutrition.

Table 6: Savings made from changes to prescribed supplements

Pt #	Original Onral Nutritional Supplement	Dose	Change made: Switched, Reduced or Stopped	New Oral Nutritional Supplement	Dose	Savings per month	Projected savings at 6 months	Projected savings at 12 months
1	Ensure Twocal	OD	Switched	Aymes Actagain 2.4 Complete Maxi	OD	£ 26.70	£ 160.20	£ 320.40
2	Fresubin Jucy	BD	Reduced	Fresubin Jucy	OD	£ 60.30	£ 361.80	£ 723.60
3	Ensure Compact	BD	Switched and reduced	Foodlink Complete	OD	£ 82.80	£ 496.80	£ 993.60
	Complan Shake	OD						
4	Fresubin 2kcal	OD	Stopped	N/A	N/A	£ 83.10	£ 498.60	£ 997.20
	Foodlink Complete	OD						
5	Fresubin 2 kcal Crème	OD	Stopped	N/A	N/A	£ 61.20	£ 367.20	£ 734.40
6	Fresubin Energy	BD	Switched	Aymes Complete	BD	£ 17.40	£ 104.40	£ 208.80
7	Foodlink Complete	OD	Stopped	N/A	N/A	£ 18.00	£ 108.00	£ 216.00
8	Aymes Complete	OD	Switched	Foodlink Complete	OD	£ 15.30	£ 91.80	£ 183.60
9	Aymes Complete	QDS	Switched and reduced	Foodlink Complete	BD	£ 97.20	£ 583.20	£ 1,166.40
10	Aymes Complete	BD	Stopped	N/A	N/A	£ 66.60	£ 399.60	£ 799.20
11	Aymes Complete	BD	Stopped	N/A	N/A	£ 66.60	£ 399.60	£ 799.20
12	Aymes Complete	BD	Reduced	Aymes Complete	OD	£ 33.30	£ 199.80	£ 399.60
13	Ensure Plus Milkshake	OD	Switched	Foodlink Complete	OD	£ 15.30	£ 91.80	£ 183.60
14	Ensure Plus Yoghurt	TDS	Switched	Ensure Plus Yoghurt	OD	£ 24.60	£ 147.60	£ 295.20
	Complan Shake	OD		Complan Shake	TDS			
15	Fortisip Bottle	TDS	Stopped	N/A	N/A	£ 100.80	£ 604.80	£ 1,209.60
16	Aymes Complete	BD	Reduced	Aymes Complete	OD	£ 33.30	£ 199.80	£ 399.60
17	Aymes Complete	BD	Reduced	Aymes Complete	OD	£ 33.30	£ 199.80	£ 399.60
18	Aymes Complete	BD	Reduced	Aymes Complete	OD	£ 33.30	£ 199.80	£ 399.60
19	Fresubin Energy	BD	Stopped	N/A	N/A	£ 84.00	£ 504.00	£ 1,008.00
20	Ensure Plus Milkshake	OD	Switched	Foodlink Complete	OD	£ 15.30	£ 91.80	£ 183.60
21	Complan Shake	BD	Switched	Foodlink Complete	BD	£ 6.00	£ 36.00	£ 72.00
22	Ensure Plus Milkshake	BD	Switched	Aymes Complete	BD	£ -	£ -	£ -
23	Ensure Plus Commence	BD	Switched	Aymes Complete	BD	£ -	£ -	£ -
24	Aymes Complete	TDS	Continued	Aymes Complete	TDS	£ -	£ -	£ -
25	Foodlink Complete	BD	Continued	Foodlink Complete	BD	£ -	£ -	£ -
26	Fresubin 2kcal	7/day	Reduced	Fresubin 2kcal	5/day	£ 130.20	£ 781.20	£ 1,562.40
27	Fresubin 5kcal shots	30ml TDS	Stopped	N/A	N/A	£177.03	£1,062.18	£2,124.36
	Fresubin 2 kcal Crème	BD						
					Sub-total	**£ 1,281.63**	**£ 7,689.78**	**£ 15,379.56**
Vitamins and minerals saving								
a	Forceval	OD	Stopped	N/A	N/A	£ 9.92	£ 59.52	£ 119.04
b	Vitamin B co strong	TDS	Stopped	N/A	N/A	£ 12.35	£ 74.10	£ 148.20
	Thiamine (100mg)	TDS						
c	Vitamin B co strong	TDS	Stopped	N/A	N/A	£ 12.35	£ 74.10	£ 148.20
	Thiamine (100mg)	TDS						
					Sub-total	**£ 34.62**	**£ 207.72**	**£ 415.44**
					TOTAL	**£ 1,316.25**	**£ 7,897.50**	**£ 15,795.00**

OD: once/day; BD: twice/day; TDS: Three time/day; QDS: four times/day; N/A: not applicable;

Table 7: Participant feedback on the care received by the dietitian.

Question	Completely n (%)	Well n (%)	Somewhat	Poorly	Not at all
Did you feel able to raise concerns about your health?	18 (95%)	1 (5%)	0	0	0
Did you feel that your concerns were listened to and addressed?	17 (89%)	2 (11%)	0	0	0
How much did you feel you were involved in decisions about the treatment and care goals?	18 (95%)	1 (5%)	0	0	0
How well did you feel supported to achieve the goals?	17 (89%)	2 (11%)	0	0	0

Summary of results and learning points:

- Dietitians can act as a first contact practitioner in this specific area of care and this demonstrates a principle that could be extended to other diagnostic groups.
- 75% of patients screened were at risk of malnutrition indicating that there is likely a large cohort of at risk patients in need of dietetic intervention in most general practices. Research shows that treating and reversing malnutrition can reduce hospital admissions, healthcare utilisation and deterioration in health status.
- Patients improved their frailty and nutritional status following consultation with the dietitian.
- Patients improved various outcomes measures; weight, BMI and hand grip strength after consultation with the dietitian.
- Patients were able to meet dietary aims with support from the dietitian.
- Patients rated the service highly, indicating they felt the service provided patient-centred care.
- Dietitians can save money by ensuring that ONS are appropriately prescribed and monitored and this saving can fund the dietitian's time.
- There are other potential cost savings which are more difficult to quantify and require large scale research trials to accurately assess (e.g. costs of hospitalisation, health and care service use).
- Although eFI is correlated with mortality and hospitalisation it did have limitations in identifying patients who would benefit from dietetic intervention, because some people at low risk of frailty were at risk of nutritional inadequacy. Low BMI alone or combined with eFI would be the recommended measure to screen GP databases for patients suitable for dietetic triage. BMI is available for most patients in GP electronic records and is convenient to use for this purpose.
- The project illustrates the value of dietitians as a member of the multi-disciplinary practice team in primary care for the care of older people at risk of malnutrition.
- An additional project funded by HEE (NHSi project managing patients at risk of frailty and malnutrition to reduce falls) has since commenced as a follow on from this project.

Factors influencing successful model implementation:

- The dietitian had developed high level skills in influencing behavioural change.
- The primary care network was supportive and helped integrate the dietitian quickly into the team, which enabled easier signposting of patients to other services i.e. social prescriber, falls team.
- The practices had a culture which included encouraging staff to take regular breaks in a separate staff area, and this allowed networking, informal education and raised awareness of the dietitian's presence.
- The Systmone database included a 'task' module which enabled rapid communication and action between the team and the dietitian (i.e. when the dietitian logged in questions and tasks from other staff were listed).

- Dietitian was employed by the community dietetic service and this department provided the service to the primary care network. This ensured the dietitian had access to resources and professional support and education.
- The dietitian provided some education to the primary care team, but this is an area which could be developed to deliver relevant, tailored nutrition education to the whole primary care team according to their needs.

Recommendations for improving the service model:

- Administrative support would have helped the dietitian work more efficiently. A Lot of her time was spent phoning patients to make appointments, which could have been done by a receptionist. This was a discrete project and no administrative support was factored into the project budget.
- All prescription changes needed to be implemented by the GP because there was not a supplementary prescribing arrangement in place and the dietitian did not have a supplementary prescribing qualification (dietitians are not yet eligible to train as independent prescribers). Putting such an arrangement in place and ensuring dietitians receive appropriate training would support more efficient working and greater time saving for the GP.
- This service model included a proactive approach to identify patients at risk of malnutrition (database screening followed by dietetic triage). However, this was time consuming and could be managed differently. For example, healthcare assistants could be trained by the dietitian to undertake basic screening and initial nutritional advice, referring more complex patients to the dietitian. The dietitian would then have more time for managing complex patients and leading further service developments for managing patients with frailty and malnutrition.

Model 2: Dietitians working to enhance the multi-disciplinary team within general practice.

Background and rationale

Dietitians provide high quality, complex nutritional and dietetic advice in order to contribute to the care of patients, enabling them to make informed choices about their health related behaviours. Dietitians are the only health professionals qualified to assess, diagnose and treat dietary and nutritional problems at an individual and wider public health level. Dietitians can specialise in areas such as paediatrics, gastroenterology or diabetes, and have the necessary leadership skills to run primary care dietetic-led clinics. Dietetic-led clinics in the area of Irritable Bowel Syndrome have demonstrated both a reduced need for referral to secondary care and reduced GP time (Williams, 2013). Dietitians who have trained to become supplementary prescribers would be able to work in partnership with other members of the multi-disciplinary team to optimise medicines management. Even without this additional qualification, dietitians can contribute to significant cost savings by optimising medicines management in the areas of Advisory Committee of Borderline Substances (ACBS) (British Dietetic Association, 2017). There is now a need for new models of dietetic care to be explored in line with other health professionals.

This project was designed to evaluate a model of dietitians working alongside other members of the multi-disciplinary team within the GP practices in a primary care network in Devon.

Project aims

The project aimed to evaluate the benefits of a model of care in which dietitians work within a general practice multi-disciplinary team to provide appropriate care to patients and therefore reduce GP workload.

The objectives were to:

1. Evaluate the feasibility of embedding a dietitian within a multi-disciplinary team and assessing the tasks a dietitian can undertake.
2. Estimate the cost of such an enhanced service and the cost effectiveness.
3. Explore the views of the current multi-disciplinary team members, dietitian, GP and patients as to the appropriateness of the model of care.

Methods

Design

This was a service development and evaluation project in which the benefits of introducing a dietitian into the multi-disciplinary team at a primary care network in Devon over a six month period was evaluated.

The primary care network incorporates five general practices, however, for the purposes of this project the dietitian was based at only two of the Health Centres. This primary care network currently have pharmacists and paramedics working as first contact practitioners (FCP). They have recently employed a physiotherapist and would like to build up their multi-disciplinary team to include a dietitian. A dietitian, band 6, 0.6wte was employed for this project for six months.

Data collection

In order to fulfil our three objectives the following data was collected:

- Descriptive data on the patient journey, patient satisfaction and health outcomes.
- Changes in ACBS prescribing data to calculate costs savings from optimisation of prescribing practice.
- Qualitative data from focus groups or interviews with the dietitian, paramedic, pharmacist, patient and GP to understand the experience of introducing a dietitian into the team.

Table 8 provides a list of the data collected to meet objectives 1 and 2.

Qualitative data

In order to collect data to fulfil objective 3, a focus group interview was convened with the multi-disciplinary team, inclusive of a GP and dietitian. The group explored the experience of having the role within the team, and the value that it adds, taking an appreciative inquiry approach. This approach seeks to explore the positive experiences gained from the project, while discovering how the role could be amplified and further developed. The focus group was conducted by one of the research team (JC), audio-recorded and transcribed verbatim. The questions used the guide the discussion are listed in Appendix 5.

The transcribed data was analysed using a thematic approach to understand from dietitian, patient and multi-disciplinary perspectives how the new role works, exploring the added value that comes from having the role in primary care practices and the practicalities and workforce development needs when embedding the role into practice.

Feedback from patients was obtained using a short questionnaire following their consultation with the dietitian, to gain an appreciation of their experience of this clinical role (see Appendix 2).

Ethics

Ethical approval for this service evaluation project was granted by the Faculty Research Ethics and Integrity Committee, University of Plymouth and permission obtained from the primary care network for the service evaluation project to be undertaken.

Table 8: Data collected to meet the project objectives 1 and 2.

Variable	Purpose	Objective
Reason for referral	To see range of patients seen	1
Who referred	To see different referral routes	1
Age of patient	To see range of ages seen	1
How advice given i.e. face to face, telephone?	To enable costs of care to be calculated	1
Number of appointments	To enable costs of care to be calculated	1
Patient satisfaction with the service	To evaluate whether the model of care is acceptable to the user	1
Patient health outcomes	To evaluate the efficacy of care	1
Changes to ACBS prescriptions and cost savings	To enable costs of care to be calculated	2
In the area of paediatric allergy, prescription of unnecessary medications e.g. Gaviscon, Carobel, antacids, laxatives, corticosteroids when food allergy was the underlying cause.	To enable costs of care to be calculated	2

Results

Referral source, number of contacts and type of appointment

141 patients had face to face or telephone dietary consultations plus an additional 30 patients were supported by signposting to other professionals and/or discussions with the primary care team. The referral source and whether the dietitian acted as a first contact practitioner are shown in Table 9. Although referrals were predominantly from the practice nurse or GP, other primary care staff regularly referred patients as well (pharmacists, pharmacy technicians and advanced clinical practitioners (Paramedic)). The dietitian saw 77 (55%) of the patients in a first contact practitioner role; taking responsibility for managing these complex patients, developing integrated and tailored treatment plans in partnership with patients, and reducing the need for pharmacological interventions. The type and number of appointments are shown in Table 10. It should be noted that data was collected pre-COVID-19 however, the majority (57%) were conducted over the telephone.

Characteristics of the patients seen by the dietitian

Table 11 shows the characteristics of the patients reviewed by the dietitian; ranged in age from 5 weeks to 102 years, but 85% were adults. Many patients had multiple long-term conditions with complex needs, with approximately half the patients having either CVD and/or diabetes. Paediatric patients were referred primarily for food allergy and intolerance or weaning advice.

Table 9: Referral source and whether the dietitian acted as a first contact practitioner

Referral source	Number of patients (n=141)	
	n (%)	Seen as first contact practitioner n (% of those referred)
Practice nurse	53 (37.6%)	9 (17%)
GP	42 (29.8%)	27 (64%)
Pharmacist	18 (12.8%)	18 (100%)
Advanced Clinical Practitioner	16 (11.3%)	11 (69%)
Community Dietitian	11 (7.8%)	11 (100%)
Social Prescriber	1 (0.7%)	1 (100%)

Table 10: Type and number of appointment

Appointment type	Appointment number				Total contacts
	1	2	3	4	N (%)
Telephone	63	54	21	5	143 (57%)
Face to face	77	16	8	2	103 (41%)
Home visit	0	2	0	0	2 (1%)
Care Home	1	0	0	0	1 (<1%)
Total	141	72	29	7	249

Table 11: Characteristics of the patients seen by the dietitian

Characteristic	Number of patients (n=141)	%
Age group (years)		
Paediatric patients (0 weeks to 18 years)	21	15
Adult (18+ years)	120	85
Diagnosis (some patients had more than one diagnosis)		
Cardiovascular disease	79	56
Diabetes	65	46
Respiratory disease	29	21
Bone disease	31	22
Mental health disorders	28	20
Gut disorders	27	19
Paediatric dietary issues	21	15
Chronic kidney disease	18	13
Neurological conditions	8	6
Cancers	5	4
Liver disease	5	4
Other	11	8
Reasons for paediatric referral (some had more than one reason)		
food allergy and intolerance	16	76
weaning advice	11	52
colic	1	0.5
constipation	1	0.5
fussy eater	1	0.5

Examples of medication changes instigated by the dietitian

For many patients the dietitian requested medication changes, which would ultimately lead to cost savings. She worked in collaboration with the pharmacist, diabetes nurse and GP to instigate appropriate changes after dietary manipulation. Examples include:

- Medications stopped - Gaviscon, ranitidine, Movicol, insulin
- Medications reduced - oral hypoglycaemic medications and insulin
- Optimisation of oral nutritional supplements (switching, stopping and reducing as appropriate)
- Optimisation of infant milk formula (switching, stopping and reducing as appropriate)

Seventeen patients had their oral nutritional supplements reviewed and all 17 had the supplement stopped, changed or reduced. The prescription changes from just these 17 patients equated to projected annual cost savings of £5,258. This represented only a fraction of the patients prescribed ONS so additional savings could be made with on-going work.

Case studies to illustrate the impact of having a dietitian within the multi-disciplinary team

In order to illustrate the range of impacts the dietitian had on the care of patients with the practices three case studies are presented in

Box 2 to Box 4. These show opportunities for cost savings due to the optimisation of prescriptions, and improvements in the patients' condition thus preventing further healthcare service use, including GP consultation time, and potential future prevention of complications.

Box 2: Case study of an infant with suspected non-IgE-mediated cow's milk protein allergy or cow's milk protein intolerance.

PATIENT: A 24 week old infant presented with a rash on their face, being irritable after feeding, having constipation and frequent vomiting. The infant was on a standard formula feed, and the weight had dropped from the 91st centile to below the 25th centile. An antacid had initially relieved symptoms but they had since returned. The patient was referred to the dietitian by the pharmacist.

DIETETIC INTERVENTION: The dietitian recommended switching the milk formula to an extensively hydrolysed hypoallergenic formula. This resulted in cessation of the symptoms and consequently the antacid was stopped. The infants bowel movements returned to normal, they became less irritable, sleeping improved and weight started increasing. The dietitian then provided advice on weaning including advice on a dairy free diet and evidence-based guidance for the reintroduction of milk and dairy at age one year.

OUTCOMES: GP time saved, antacid prescription costs saved, infant thriving and mum happy.

Box 3: Case study of a woman with previous bariatric surgery and current weight regain

PATIENT: A 53 year old woman presented with weight re-gain following bariatric surgery 18 years ago. Post-surgery she had achieved her target weight of 57kg. 8 years ago she had been prescribed an oral nutritional supplement but this prescription had not been reviewed since. Her weight was now self-reported as between 76-88kg (BMI 30.35kg/m^2). The patient was referred to the dietitian by the pharmacist.

DIETETIC INTERVENTION: The diet history revealed adequate energy and protein intake without the need for oral nutritional supplements. The dietitian advised stopping the supplement drinks and instead starting a multi-vitamin and mineral capsule in line with national guidelines, due to the risk of micronutrient deficiency following bariatric surgery.

OUTCOMES: Weight gain stopped and aiming for gradual weight loss. The prescription change saved £58/month (£697/year).

Box 4: Case study of a man diagnosed with type 2 diabetes

PATIENT: A 57 year old man presented with type 2 diabetes, managed on metformin but with a raised HbA1c. The practice nurse referred the patient to the dietitian.

DIETETIC INTERVENTION: The dietitian provided tailored dietary advice and agreed a diet plan with the man; reduce carbohydrate food portions, reduce alcohol intake and switch snack choices. The man was followed up after 3 months and was found to be adhering well to the dietary plan.

OUTCOMES: His HbA1c reduced from 61 to 54mmol/mol (target 53mmol/mol) and BMI reduced from 26-24.4kg/m^2 (in the healthy range), thus, he was at lower risk of diabetes complications and there was potential to reduce his metformin and make a cost saving.

Clinical outcomes for patients with diabetes

In total 65 patients with diabetes and three with pre-diabetes were seen. HbA1c levels ranged from 44 – 92 mmol/mol (normal HbA1c <42mmmol/mol) before seeing the dietitian. However, only 20 patients had follow-up HbA1c results within the timeframe of this project, and two of these were started on steroids, which is known to raise glucose levels. Therefore, 18 patients had comparable data for HbA1c before and after the dietetic consultation.

Of these 18 patients 13 (72%) were given dietary advice only (no medication changes), and the remaining 5 (28%) were given both dietary advice and medication changes. Following this advice 17 patients' HbA1c levels reduced; the one patient with no response was started on weekly GLP-1 injections. The one of the patients with lowered HbA1c was no longer pre-diabetic (HbA1c reduced from 44 to 36mmol/mol), three were no longer in the diabetic range (HbA1c levels <48mmol/mol), ten had lowered their level to between 48 - 58 mmol/mol, and only three were above 59 mmol/mol. Lowering HbA1c is known to reduce the risk of complications of diabetes. In addition, there were improvement in lipids levels, reductions in blood pressure and BMI, and an improvement in fatty liver.

Diabetes education

Diabetes nutrition education was usually covered during structured group education sessions with dietary reviews offered by the practice nurse. Therefore the practice nurse had taken on a key role in diabetes nutrition education, but with little support and training. Having a dietitian working

alongside the practice nurse allowed education and support to be offered, helping the nurse feel more confident in providing appropriate dietary education and enabling her to refer more complex patients for dietetic advice within the practice team.

Previously patients who did not want to be seen in a structured group education setting, or needed to be seen individually, had long waiting times. The dietitian enabled earlier consultations for patients unwilling or unable to wait for group sessions, thus providing a significantly better quality service.

Patients seen for structured education did not receive personalised dietary advice and co-developed care plans. This can lead to misunderstandings and unsafe outcomes. For example, an elderly frail patient with diabetes said: *'After attending the structured education session I cut down on carbohydrates and started to lose weight'.* Clearly weight loss for this patient was not appropriate. Having a dietitian based at the practice meant that patients could be offered personalised dietary advice where necessary. The dietitian was able to see other complex patients (for example those with multiple long-term conditions) soon after diagnosis and provide individualised dietary plans.

Patient feedback

Twenty two (29%) out of 77 patients returned the satisfaction questionnaire. Due to the lack of administration support those who had telephone consultations could not be sent feedback forms; only patients' seen face to face were given them. Of the responses received all rated their overall satisfaction as either excellent (77%) or good (23%). All patients stated that the dietitian treated them with dignity and respect, and 21 (95%) would recommend this service to family and friends. Table 12 shows that patients felt that the dietitian used a patient-centred approach during the consultation.

Table 12: Summary of the responses from patient feedback

Question	Completely n (%)	Well n (%)	Somewhat n (%)	Poorly	Not at all
Did you feel able to raise concerns about your health?	19 (86%)	2 (9%)	1 (5%)	0	0
Did you feel that your concerns were listened to and addressed?	19 (86%)	3 (14%)	0	0	0
How much did you feel you were involved in decisions about the treatment and care goals?	19 (86%)	2 (9%)	1 (5%)	0	0
How well did you feel supported to achieve the goals?	17 (77%)	3 (14%)	2 (9%)	0	0

Qualitative data from the focus group

In order to understand the practitioners experience of the intervention a focus group working with seven inter-professional practitioners explored the affirmative experiences of having a dietitian practising within the team. In addition, four patients were individually interviewed via phone, using a semi-structured format to determine their experience of the new service. The objective of each discussion was to determine experience, value, productivity and outcomes for individual practitioner or patient, and service. These activities took place after the project intervention was completed (March 2020), enabling the researcher to capture the participant stories. These two data sets were analysed and identified overarching themes that inform the impact that the new dietetic provision had for service, practitioner and patient.

The six sub themes (Socialisation; Education; Patient safety; Quality referral; Compliance; Satisfaction) generated from the data illustrate the wide reaching influence that the dietetic service had, creating ripples of change, productivity and influence on service practitioner and patient alike. Knowledge, awareness and ownership were interesting trends that inform the outcome themes within the data where learning and education played an intricate part in helping all to develop new knowledge and understanding of this specialist subject.

Practitioners talked of the *ad hoc* learning they gained during collaborative discussions which happened in coffee breaks, where they felt able to ask the dietitian questions. They also noted how they would consult the dietitian as they were seeing a patient or how they would refer the patient directly to the dietitian. This changed the consultation process to utilise specialist knowledge and skill resource effectively.

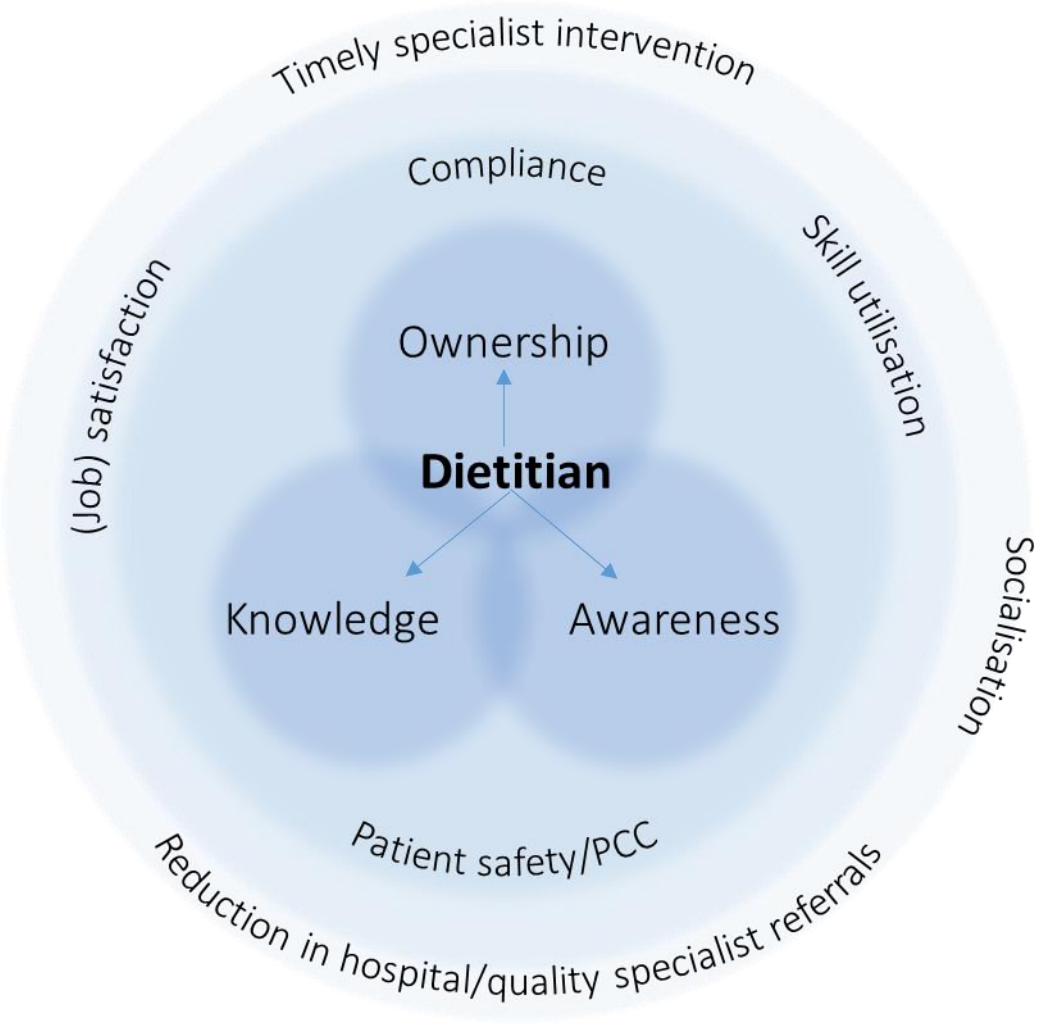
Patients discussed the change from being 'the patient' to learning about their condition, as an active participant in understanding the rationale and relevance of their treatment plan. This approach influenced their behaviour becoming advocates of their newfound knowledge, keen to share their experience and learning with others. This expert knowledge has excited greater enquiry in practitioners and patients enabling a deeper awareness that has resulted in achieving the right care and ownership.

Ownership played an important part in the analysis where compliance and socialisation held significance in the specialist consultation outcomes. Due to the nature of the collaborative relationship formed, patients engaged in the care process understanding rationale and feeling active within the plan. This promoted a safe patient pathway but also a person centred approach that engaged with the individual making the health plan workable and achievable, thereby strengthening compliance. Participant 3 said that the '*Dietitian worked with me rather than at me*', suggesting that the partnership approach of expert, and individual's experience were able to develop a comprehensive and achievable treatment plan. The influence of the dietitian's role went beyond the mere treatment plan with participant 1 stating '*I felt safe and understood*'. Here she valued the specialist knowledge held by the dietitian to accurately diagnose her baby, something that had not been achieved in a number of months. This enabled rest for the family unit, helping them to come together again, which brought security and renewed confidence in the service, but also in her ability to step outside of her home. This socialisation outcome was echoed by all four participants and was acknowledged in the focus group discussions.

The final outcome, around awareness revealed the diverse influence that the dietitian had, regarding their presence and engagement with all practitioners where their support and expertise enhanced referral processes and participant satisfaction. The pharmacist recognised patterns where traditional prescriptions were changing, where there had been a cascade of medicines prescribed, this eased, influencing the resource need and the overarching spend. This pattern was also replicated within the care home sector. An exciting outcome within this theme was the influence that the dietitian had in supporting the inter-professional team and thereby enhancing job satisfaction, by enabling skills to be utilised efficiently and with patients having a quality experience. Participant 4 said: '*she made it simple which made me confident that I could do it*'.

The employment of a dietitian in the practice had significant and wide spread effects, rather like the ripples on a pond (figure 1). Her influence was key to improved patient-centre care and compliance of patients with their necessary treatments. She altered positively the skill utilisation within the practice and enhanced staff job satisfaction.

Figure 1: The ripples on the pond illustrating the influence the dietitian had on practitioner and patient experience.



Summary of results and learning points

- Dietitians, similarly to GPs, can act as an 'expert generalist' and although the dietitian may not necessarily be the first point of contact for all patients, the dietitian can be an integral member of the multi-disciplinary team.
- A range of professionals within the GP multi-disciplinary team will refer patients to the dietitian.
- Dietitians can treat and advise patients with a wide range of diagnoses, both paediatric and adult and in various formats.
- Dietitians can save money by ensuring that oral nutritional supplements and other medications are appropriately prescribed and monitored.
- Dietitians can impact not only on costs, but can also improve patients' health and reduce the risk of complications.

- Dietitians have a large role to play in the care of patients with diabetes. They can contribute to education through training staff, as well as seeing complex patients and delivering significant clinical improvements through dietary manipulation.
- Patients value the input of a dietitian and feel they provide patient-centred care.
- Dietitians provide education to both patients and staff, and for the latter this may be informally through general discussions, as well as planned formal training.
- Dietitians can support quality patient-centred care in the primary care setting, offering a valuable and cost effective resource to general practice.
- Dietitians can enable practice managers to deliver tailored services to provide more effective and efficient care to their patient population, particularly for those with long-term conditions and conditions managed through dietary manipulation.
- There are other potential cost savings which are more difficult to quantify and require large scale research trials to accurately assess (e.g. improved diabetic control, prevention of long term conditions, costs of hospitalisation, health and care service use).
- This dietitian was employed for 0.6wte, yet at the end of the project waiting lists for her input were growing. This suggests that a dietitian could be employed for more time within this particular setting (i.e. two health centres).

Factors influencing successful model implementation:

- The dietitian was experienced and acted as an expert generalist. The job role was initially graded as band 6, however, all of the parties involved agreed it should be banded 7. However, the administrative processes required to take the job description back to the Agenda for Change panel for further review would have meant a significant delay in the start of the project. Therefore, we decided to proceed with the role at band 6 and review how it could be clearly graded at band 7 in future iterations of the job description.
- The dietitian had developed high level skills in behavioural change.
- The primary care network organised an induction programme for the dietitian ensuring she met relevant members of the team and helping her to integrate quickly.
- The practices had a culture which included encouraging staff to take regular breaks in a separate staff area, and this allowed networking, informal education and raised awareness of the dietitian's presence.
- The Systmone database included a 'task' module which enabled rapid communication and action between the team and the dietitian (i.e. when the dietitian logged in questions and tasks from other staff were listed).
- Dietitian was employed by the community dietetic service and this department provided the service to the primary care network. This ensured the dietitian had access to resources and professional support and education.

Recommendations for improving the service model:

- Administration support for the dietitian was not factored into the budget for this project. This meant the dietitian spent some of her time undertaking tasks which could have been done by a

receptionist or administrator, improving the efficiency of the role. For example, booking patient appointments.

- All prescription changes needed to be implemented by the GP because there was not a supplementary prescribing arrangement in place and the dietitian did not have a supplementary prescribing qualification (dietitians are not yet eligible to train as independent prescribers). Putting such an arrangement in place and ensuring dietitians receive appropriate training would support more efficient working and greater time saving for the GP.
- Identifying the elements of the role which could be done by healthcare assistants would further improve the dietitian's efficiency. If healthcare assistants were trained by the dietitian to undertake basic screening and initial nutritional advice, a greater number of patients could be seen and the dietitian would see the more complex patients. The dietitian would then have more time to appropriately manage complex patients and lead further service developments.
- The dietitian could provide more formal education to the primary care team to ensure nutritional issues were treated according to guidelines and identified rapidly. For example appropriate prescribing of infant formula and oral nutritional supplements.

Model 3 Dietitians working with primary care to manage paediatric allergy.

Background and rationale

In the UK, approximately 5-6% of infants & young children under 3 years of age suffer with food allergy, of which cow's milk allergy is around 2-3% (Grimshaw et al., 2015, Venter et al., 2008). The prevalence is notably increasing in some countries such as Australia, with estimates of up to 10% of infants and children now thought to have proven food allergy (Prescott et al., 2013). Paediatric food allergy is therefore an area that potentially has a high impact on the GPs' workload. Dietitians play a central role in the management of food allergies in infants and children (National Institute for Health and Clinical Excellence, 2011), where dietary avoidance is the key intervention resulting in complete or almost complete resolution of symptoms (Muraro et al., 2014). The dietitian can ensure the nutritional adequacy of allergen-elimination diets to prevent deficiency, maintain nutritional status and growth, and maximise the diversity of the diet, through the use of appropriate supplements and substitutions.

The usual pathway of care for paediatric food allergy is either for a GP to refer to a general community dietitian for management of proven/ suspected cow's milk allergy, or refer to a hospital paediatrician for exploration of a possible food allergy diagnosis, which may or may not be accompanied by referral to a hospital-based dietitian. This process often involves some delay between referral, diagnosis and dietetic management, or the family may not receive any dietetic support at any point. During this pathway, the child may experience ongoing allergic symptoms and potential delays in development and faltering growth. They are at increased risk from nutritional deficiencies due to a reduction in dietary diversity associated with exclusion of suspected allergens from major food groups, and often demonstrate a significant reduction in quality of life of the child and family.

Project aims

The project was designed to evaluate the benefits of a model of care in which paediatric food allergic patients are referred directly to a dietitian, thereby reducing the need for GP and secondary care appointments.

The objectives were to:

a) Estimate how much such a service costs to deliver in comparison to the usual pathway of care (via GP referral to secondary care) and to establish potential cost savings.
b) Evaluate the patient satisfaction with the service to determine that the service is acceptable.
c) Compare the patient journey against nationally agreed pathways for quality of care and clinical outcomes.

Methods

Design

This was a service development and evaluation project. We intended to evaluate a recent service development for paediatric allergy services. This involved the comparison of the new service model with the standard service model in terms of cost, service efficiency, acceptability and clinical outcome.

New service model: Dietetic-led care

A community dietitian specialising in paediatric allergy has developed a dietitian-led community paediatric food allergy service for the Nottingham City area. In 2019, the total population for this area was 332,900, of which 44,300 were children aged between 0-10yrs (Nottingham City Council, 2020). The model involves members of the children's public health nursing teams (predominantly comprised health visitors and also children's nurses, family nurses and children and young people's practitioners) referring children directly to the dietetic-led service (run by a small team of community paediatric dietitians), rather than referring to general practice. The children's public health nursing team are provided with training to recognise potential cases of food allergy and to undertake basic diagnostic assessment. The child's condition is then managed by the dietitian, with little direct contact with their GP. There are protocols in place to define the pathway and ensure safe and effective care, including when GP or secondary care referral is required.

The current dietetic training for children's public health nurses consists of one day, repeated quarterly, on common nutritional problems in infants (colic, reflux, constipation, gastroenteritis and cow's milk allergy). The team are taught to take an allergy focused history; a template for which is available in the Systmone electronic record, which should be completed to help identify whether cow's milk allergy is likely. If positive, a four-week trial of extensively hydrolysed formula should be instigated. The children's public health nurse then reviews the outcome and encourages the parent to re-challenge with cow's milk to confirm the diagnosis, before referring to the dietitian. This can be managed without a GP appointment being necessary, although most children's public health nurses will need to ask the GP to prescribe the formula. If the children's public health nurse is unclear whether the symptoms are due to food allergy, reflux, reactions to multiple foods or whether the patient should be referred to secondary care, they can contact the dietetic team to discuss the case prior to any referral.

The dietitians take an active role in the medicine management of allergy related symptoms, recommending the prescription of relevant items or to stop prescribing certain medications. This model is designed to provide the patient with the most rapid and effective care, and to reduce unnecessary contact with the GP and minimise prescription of medications. This service will be referred to as **Dietetic-Led Care** from here on.

Standard service comparator: Dietetic community care

Another service provider for the wider Nottinghamshire area commissioned their community dietetic services differently, resulting in a different model of care for paediatric food allergy. In 2019,

Nottinghamshire had a total population of 828,200 people, of which 103,800 were children aged between 0-10yrs (approx. 15% of these falls in the Bassetlaw area which is not covered by this dietetic service) (Nottinghamshire City Council, 2020). The area covered is therefore approximately twice the size of the Nottingham City Dietetic-Led service.

There are two regions within this service and each has slightly different referral criteria. One (Mid-Nottingham) provides services only for non IgE-mediated cow's milk protein allergy plus one other non IgE-mediated allergen (such as soya or egg). The other (South-Nottingham) provides services for both non-IgE and IgE-mediated cow's milk protein allergy plus one other allergen (such as soya or egg) as long as the infant or child is under secondary care (i.e. already see the paediatrician). Therefore, a mixture of non IgE- and IgE-mediated allergies are seen by the dietitians, with and without the input of specialist teams in secondary care. Patients are seen individually or in groups. Referrals for paediatric food allergy advice to the dietetic community service are received from GPs, members of the children's public health nursing team or paediatricians, in which dietitians see both adults and paediatrics.

Some *ad hoc* training is provided by the dietitians for health visitors, and health visitors are invited to attend the milk free group education sessions, however the take up of this is low. This model, although specific to the providers in the Nottingham area, could be described as a more common or traditional approach to managing paediatric food allergy. As such, this model of care was used to compare to the Dietetic-Led Care. This service will be referred to as **Dietetic Community Care** from here on.

It is important to note that both services were involved in the development and implementation of the Nottinghamshire Area Prescribing Committee Cow's Milk Allergy Guidelines (Nottinghamshire Area Prescribing Committee, 2018), where the overarching guidelines apply to all services and supplementary guidance supports the variations in service specific local commissioning arrangements. This may make for more coherent management in the community across both services than may be found elsewhere in the UK.

Data collection

Both service models collected relevant data from infants and children (up to 11 years of age) who were referred for suspected or confirmed food allergies. The data was extracted from Systmone electronic records. The data collection is described in Table 13.

Ethics

Ethical approval for this service evaluation project was granted by the Faculty Research Ethics and Integrity Committee, University of Plymouth and each site gained approval and registered the project within their organisation. For patient satisfaction and quality of life data parents of the child or infant was asked for verbal consent, in line with good practice.

Table 13: The data collected during the service evaluation

Variable	Purpose	Rationale
Site and service characteristics	Descriptive data	To be able to describe the models of care
Reason for referral	To identify the range of diagnoses seen	
Referral source	To identify different referral routes	
IgE mediated allergy or not	To categorise the main defining characteristic of the allergy	
Age of patient	To identify range of ages seen	
Group or individual appointment	To enable costs of care to be calculated	These may differ between the service models and these factors will affect costs
Patient time seeing the dietitian	To enable costs of care to be calculated	
Number of appointments	To enable costs of care to be calculated	
Number of GP contacts or time for allergy related symptoms/ prescription issues.	Use of other healthcare services and potential cost savings	A service based in the community/ primary care would be more responsive to patient needs and be able to work more closely with the primary care team thus reducing additional GP contacts.
Allergy related symptoms or prescription issues.	Use of other healthcare services and potential cost savings	
Other Healthcare professional contacts for allergy related symptoms/ prescription issues (health visitor, practice nurse, consultant, A&E visits, out of hours etc).	Use of other healthcare services and potential cost savings	
Parent and child satisfaction with the service	To evaluate whether the model of care is acceptable to the user	A service in the community/ primary care will be situated closer to the patients home and maintain closer communication with the primary care team, assisting in the coordination of care
Number of allergy episodes or symptoms	Clinical outcome	To evaluate the efficacy of care
Nutritional status, food diversity and quality of life (using the Nottingham outcome tool)	Clinical outcome	
Prescription of unnecessary medications e.g. Gaviscon, Carobel, antacids, laxatives, corticosteroids when food allergy was the underlying cause.	To enable costs of care to be calculated	To evaluate the efficacy of care as well as cost effectiveness
Triage rejection and reason	A measure of service efficiency	It is possible that the models of care will differ in service efficiency
Follow up rejection and reason	A measure of service efficiency	
Time to appointment from referral	A measure of service efficiency	

Results

Referral source and waiting time to the dietetic services

In total 182 paediatric patients were seen in this service evaluation; 96 from the Dietetic Community Care service (34 from Mid Nottingham and 62 from South Nottinghamshire) and 86 from the Dietetic-Led Care service. Table 14 shows the referral source for both services. Most referrals to the Dietetic Community Care service came from GPs, whereas most referrals for the Dietetic-Led Care service came from members of the children's public health nursing team. The lower rate of GP referrals for the Dietetic-Led Care service is likely due to children's public health nursing referring directly to the dietitian and bypassing the need for GP involvement. The involvement of the secondary care team can be clearly seen in the South Nottingham data.

Table 14: Referral source for the two models of dietetic care in the Nottingham area.

Referral source	Dietetic- Led Care	Dietetic Community Care	Dietetic Community Care		Total
			Mid Nottingham	South Nottingham	
Children's health team	53 (62%)	26 (27%)	8 (24%)	18 (29%)	79
GP	31 (36%)	64 (67%)	25 (74%)	39 (63%)	95
Practice Nurse	1 (1%)	1 (1%)	1 (2%)	0	2
Community paediatrics	1 (1%)	4 (4%)	0	4 (6%)	5
Hospital paediatrics	0	1 (1%)	0	1 (2%)	1
Total	86	96	34	62	182

The time in working days from receipt of referral to the patients seeing the dietitian was shorter for the Dietetic-Led Care service (mean=11.9 days, sd=6.1) compared to the Dietetic Community Care service (22.6 days, 13.1)(mean difference=10.7 days, std error=1.5, t=7.1(136); p<0.001 95% CI: 7.7, 13.6). The figures for each of the areas were; Mid Nottingham 19.0 days, (8.3), South Nottingham 24.6 days, (14.8).

Patient characteristics

Table 15 shows that more very young paediatric patients were referred to the Dietetic-Led Care service compared to the Dietetic Community Care service. This may be because of the training the children's public health nursing staff receive and GPs' case learning, which supports early recognition and diagnosis of food allergy, resulting in earlier referral for dietetic support. There were a more children who were not referred until after the age of 1 year in Dietetic Community Care (34%) compared to Dietetic-Led Care (11%), by which time there could be the potential for eating behaviour difficulties and poor nutritional status, due to either prolonged untreated symptoms, or major food group exclusion diets without dietetic supervision.

Table 16 shows the types of referrals received by the two services. The majority of referrals consisted of confirmed (symptoms resolved on elimination and recurred on re-challenge) or suspected (not confirmed by re-challenge) non-IgE mediated cow's milk allergy (shaded in the table) in both services; Dietetic-Led Care service (92%) and Dietetic Community Care service (88%). Some of these patients were suspected to have IgE-mediated food allergy following the dietetic consultation (Dietetic-Led Care service 17% and Dietetic Community Care service 6%). These patients were managed differently by the two services. The Dietetic-Led Care service would organise the allergy test via the GP and interpret the result (see medical management section), continuing to manage the patient without further referral, unless the patient was at risk of anaphylaxis in which case a secondary care referral was made. The Dietetic Community Care service

would refer the patients back to the GP who would then refer the patient to secondary care for the allergy test. Once the result was known, patients seen in the South Nottingham region would be kept under the dietetic team's care unless they were found to have multiple IgE-mediated food allergies (when they stayed in the care of the specialist team in secondary care). However, patients seen in the Mid Nottingham region would be discharged from the service if they had any IgE-mediated food allergy, since they would be cared for in secondary care.

It is not surprising that the majority of referrals were for non-IgE mediated cow's milk allergy as this would appear to be the most common food allergic presentation in infants and young children. One study showed 72% of all food hypersensitivity in the first year of life was non-IgE mediated, based on oral food challenge but by 3 years of age it became more IgE predominant (Venter et al., 2008).

Health professionals seen and appointments in secondary care prior to dietetic consultation

Many of the patients seen in both dietetic services had experienced complex journeys to diagnosis and referral. A comparison of the number of health professionals seen before reaching the dietitian was carried out.

The numbers of patients seen by health professionals and the numbers of appointments per patient with each type of health professional prior to seeing the dietitian are shown in Table 17. The majority of patients from both services were seen by a GP for their allergy symptoms prior to their dietetic appointment. A far lower number were seen by a paediatric consultant in secondary care. The number of GP and consultant contacts were significantly fewer in the Dietetic-Led Care compared to Dietetic Community Care. This is likely due to the dietitians in this service training the children's public health nursing staff to recognise potential cases of food allergy, undertake basic diagnostic assessment and then refer to the dietitian. This reduction in contacts represents significant potential cost savings if the Dietetic-Led Care model was implemented. 52% of the cost of diagnosing a food allergy in children is estimated to come from a mean of seven GP visits per patient (Sladkevicius et al., 2010). Therefore, is this figure is reduced by half (as we have shown here) the saving are considerable.

Most patients were seen by the children's public health nursing team in both services and there was no difference in the number of contacts per patient relating to allergy symptoms (Table 17). The numbers of appointments with other nursing professionals; midwives and practice nurses were very low.

Patients from both models of care had A&E or out of hours visits due to their allergy symptoms prior to their dietetic appointment. No difference was found between the A&E and out of hours visits between the two dietetic models of care.

There is the potential to calculate the costs of health professional appointments and secondary care visits for patients from both models of care however, this would require further guidance from a health economist to ensure the methodology used is robust and comparable to the literature.

Table 15: Age of referral for the two models of dietetic care in the Nottingham area.

Age	Dietetic- Led Care	Dietetic Community Care	Dietetic Community Care		Total
			Mid Nottinghamshire	South Nottinghamshire	
0-6 months	67 (78%)	38 (40%)	13 (38%)	25 (40%)	105
6-12 months	9 (11%)	25 (26%)	7 (21%)	18 (29%)	34
1-2 years	7 (8%)	20 (21%)	9 (27%)	11 (18%)	27
2-5 years	2 (2%)	10 (10%)	4 (11%)	6 (10%)	12
5-11 years	1 (1%)	3 (3%)	1 (3%)	2 (3%)	4
Total	86	96	34	62	182

Table 16: Type of referral to the two models of dietetic care in the Nottingham area.

Types of referrals	Dietetic-Led Care	Dietetic Community Care	Dietetic Community Care		Total
			Mid Nottinghamshire	South Nottinghamshire	
Confirmed non-IgE mediated CMA	31 (36%)	50 (52%)	23 (68%)	27 (44%)	81
Suspected non-IgE mediated CMA	38 (44%)	32 (33%)	8 (24%)	24 (39%)	70
Confirmed multiple non-IgE mediated food allergies	4 (5%)	2 (2%)	1 (3%)	1 (1.5%)	6
Suspected multiple non-IgE mediated food allergies	6 (7%)	1 (1%)	1 (3%)	0	7
Confirmed IgE mediated CMA	0	2 (2%)	0	2 (3%)	2
Suspected IgE mediated CMA	3 (3.5%)	3 (3%)	0	3 (5%)	6
Suspected multiple IgE mediated food allergies	1 (1%)	0	0	0	1
Confirmed multiple combined non-IgE- & IgE-mediated food allergies	0	2 (2%)	0	2 (3%)	2
Suspected multiple combined non-IgE- & IgE-mediated food allergies	0	1 (1%)	0	1 (1.5%)	1
Suspected or confirmed food allergy(ies) and faltering growth (+/-other atopic or GI symptom)	0	1 (1%)	0	1 (1.5%)	1
Suspected or confirmed food allergy(ies) + other atopic or GI symptom	3 (3.5%)	0	0	0	3
ASD and CMA +/- gluten exclusion diets	0	2 (2%)	1 (3%)	1 (1.5%)	2
Total	86	96	34	62	182

CMA: cow's milk allergy; GI: gastrointestinal; ASD: Autism spectrum disorder;

Table 17: Number of health professional appointments per patient prior to dietetic consultation

Healthcare professional	Dietetic-Led Care		Dietetic Community Care		Mann-Whitney U test to compare appointments /patient
	Number of patients	Number of appointments/patient Median (IQR, range)	Number of patients	Number of appointments/patient Median (IQR, range)	
GP	80 (93%)	3 (3, 0-12)	85 (86%)	6 (5, 0-20)	U=2446.5; p<0.001
A&E	18 (21%)	0 (0, 0-4)	18 (19%)	0 (0, 0-3)	U=4179; p=0.84
Consultant in secondary care	8 (9%)	0 (0, 0-1)	25 (26%)	0 (1, 0-13)	U=3389; p=0.002
Out of hours medic	4 (5%)	0 (0, 0-2)	8 (8%)	0 (1, 0-3)	U=4019; p=0.49
Childrens Public Health Nurse	73 (85%)	2 (3, 0-11)	63 (66%)	2 (4, 0-11)	U=4622; p=0.16
Practice Nurse	4 (5%)	3 (3, 0-14)	2 (2%)	2 (4, 0-14)	U=4581; p=0.2
Midwife	1 (1%)	0 (0, 0-1)	3 (3%)	0 (0, 0-2)	U=4046; p=0.37

Appointment type and time spent with the dietitian

In the Dietetic Community Care service 53% (51) of the patients were seen individually and 47% (45) seen in a group session. Of those seen in a group session 17 (38% of the group) had additional follow up appointments either face to face or on the telephone. All patients in the Dietetic-Led Care service were seen individually with follow up offered as either face to face, telephone or via e-mail.

Although the number of appointments and time spent seeing the dietitian was collected for this project, the data has not been included in this report. That is because many of the patients were offered an open 12 month appointment (particularly those seen in a group setting) or were still under the care of the dietitian at the time the data collection ended. For this data to be meaningful further follow up of the data is necessary.

Dietary aims and Outcome data

For the purpose of this report the dietary aims and outcome data has only been collated for the Dietetic-Led Care service (Table 18). This is because a significant amount of data was missing for the Dietetic Community Care service, predominantly due to patients being seen in a group setting. Patients seen in the group setting did not have individualised dietary goals set, and many patients had open appointments; consequently, no follow up data is available. Table 18 shows that the vast majority of patients' symptoms improved or resolved completely after the dietetic consultations (i.e. eczema flares resolved, bowels normalised, reflux resolved).

Medical management

GPs often have little knowledge in the area of paediatric food allergy. The Dietetic-Led Care service therefore asks the GP to co-ordinate a blood test, specifying what to write on the blood card to support specific IgE blood tests to confirm suspected IgE mediated food allergies, and subsequently interprets the results with the family. This suggests dietitians working in this model of care are working at an advanced clinical practitioner level. As the dietitians cannot yet order tests and change medication autonomously (they do not have independent prescribing competencies), the GP is asked to undertake these tasks. The dietetic-led service is currently exploring how to enable

dietitians to order these tests, but it is complicated by the fact that the budget for these items is held by the GP practice or primary care network, and not the Community Trust hosting the Dietetic-led service.

Both the Dietetic-led and Dietetic Community services are involved in the rationalisation of prescribable nutrition products, such as specialist milk formula. However, only the Dietetic-Led Care service takes an active role in the medical management of eczema, gastroesophageal reflux disease and constipation, which ultimately saves GP time. Table 18 shows that ten patients had medication changes recommended by the dietitian for eczema, 18 for gastroesophageal reflux disease and two for constipation, indicating 35% of patients had their symptom related medication reviewed by the dietitian. This illustrates the benefits of having dietitians working at an advanced clinical practitioner level in this area of paediatrics.

Table 18: Dietary aims and outcome data has been collated for the Dietetic-Led Care service

Question Dietetic-Led Care Service	Answer	Number	% Set of Total (86)	Achieved	Partial	Not Achieved	Achieved %	Partial Achieved %	Not Achieved %
1. Optimise Nutritional Status	keep weight/BMI centile position	37	43%	37	0	0	100%	0%	0%
	Increase weight/ BMI centile position	12	14%	7	3	2	58%	25%	17%
	Reduce weight/ BMI centile position	0	0%	0	0	0			
	Increase height/ height velocity centile position	0	0%	0	0	0			
2. Meet Energy/Protein Requirement	Keep current energy / protein intake constant	35	41%	35	0	0	100%	0%	0%
	reduce current energy / protein intake	0	0%	0	0	0			
	Increase current energy / protein intake	5	6%	5	0	0	100%	0%	0%
3. Improve micronutrient status	Increase calcium	16	19%	14	2	0	88%	13%	0%
	Vitamin D	18	21%	17	1	0	94%	6%	0%
	Iron	11	13%	10	1	0	91%	9%	0%
	iodine	7	8%	6	1	0	86%	14%	0%
	Range of micronutrients	42	49%	39	3	0	93%	7%	0%
4. Improve dietary intake	Achieve recommended dietary variety	51	59%	48	3	0	94%	6%	0%
	Improve fluid intake	0	0%	0	0	0			
	Improve mealtimes/behaviour	9	10%	6	3	0	67%	33%	0%
	Integrate in to family meals	26	30%	22	4	0	85%	15%	0%
	Texture modification/ address sensory issues	6	7%	2	4	0	33%	67%	0%
5. Rationalise use of prescribable products	First line most effective used	29	34%	28	1	0	97%	3%	0%
	Product is stopped with meeting requirements	5	6%	5	0	0	100%	0%	0%
	Product is recommended when not meeting nutrition from food	0	0%	0	0	0			
	Product is reduced as food increases	8	9%	8	0	0	100%	0%	0%
	Step up from EHF to AAF	14	16%	12	2	0	86%	14%	0%
	Step down from AAF to EHF	0	0%	0	0	0			

Question Dietetic-Led Care Service	Answer	Number	% Set of Total (86)	Achieved	Partial	Not Achieved	Achieved %	Partial Achieved %	Not Achieved %
6. Rationalise use of medical intervention for eczema	Medication rec to commence	5	6%	5	0	0	100%	0%	0%
	Medication rec to be reduced	4	5%	4	0	0	100%	0%	0%
	Medication rec to be stopped	1	1%	1	0	0	100%	0%	0%
7. Rationalise use of medical intervention for GORD	Medication rec to commence	8	9%	6	2	0	75%	25%	0%
	Medication re to be reduced	4	5%	4	0	0	100%	0%	0%
	Medication rec to be stopped	6	7%	5	1	0	83%	17%	0%
8. Rationalise use of medical intervention for constipation	Medication rec to commence	0	0%	0	0	0			
	Medication rec to be reduced	0	0%	0	0	0			
	Medication rec to be stopped	2	2%	2	0	0	100%	0%	0%
9. Improve Symptom	Improvement in overall symptoms/wellbeing	63	73%	58	4	1	92%	6%	2%
	Skin/Eczema improvement	39	45%	36	3	0	92%	8%	0%
	Bowels normalised	52	60%	48	2	2	92%	4%	4%
	Reflux improved	27	31%	26	1	0	96%	4%	0%
	Improvement in respiratory symptoms	6	7%	6	0	0	100%	0%	0%
	Improvement in Sleeping	16	19%	13	3	0	81%	19%	0%
	Improvement in Feeding	17	20%	14	2	1	82%	12%	6%
	Improvement in behaviour	3	3%	3	0	0	100%	0%	0%
10. Appropriate elimination/exclusion diet	Adhere to elimination diet	68	79%	65	2	1	96%	3%	1%
	Improved confidence with buying/cooking allergen free food	26	30%	25	1	0	96%	4%	0%
	Improved knowledge/ use of suitable alternatives	28	33%	27	1	0	96%	4%	0%
	Improved knowledge of resources	22	26%	21	1	0	95%	5%	0%
11. Reduce unnecessary Dietary restrictions	Home introduction advice/reintroduction	22	26%	20	1	1	91%	5%	5%
	Introduction of common allergenic foods	15	17%	11	3	1	73%	20%	7%
	Allergy sensitisation test obtained & discussed	7	8%	5	1	1	71%	14%	14%

Patient feedback

Patients from both dietetic services rated their experience of the service highly. The feedback from patients seen in the Dietetic Community Care service are shown in Table 19 and Table 20, and from Dietetic-Led Care in Table 21.

Table 19: Patient feedback from Dietetic Community Care service (group education session)

Question	Yes	No	Not Sure	Unanswered	Total
I was able to understand all the information that was given	26	0	1	0	**27**
I was clear about the main messages	27	0	0	0	**27**
I felt able to ask questions	27	0	0	0	**27**
My questions were answered	27	0	0	0	**27**
I feel the session has given me the confidence and knowledge to manage my child's condition	25	0	2	0	**27**
I felt the session held my attention	26	0	1	0	**27**
I felt the session would benefit from practical activities	14	3	9	1	**27**

Table 20: Patient feedback from Dietetic Community Care (individuals)

Question	Excellent n (%)	Good n (%)	OK n (%)	Poor n (%)	Very poor n (%)
What was your overall satisfaction of this service?	10 (100%)	-	-	-	-
	Completely n (%)	**Well n (%)**	**Somewhat n (%)**	**Poorly n (%)**	**Not at all n (%)**
Did you feel able to raise concerns about your child's health?	10 (100%)	-	-	-	-
Did you feel that your concerns were listened to and addressed?	10 (100%)	-	-	-	-
How much did you feel you were involved in decisions about the treatment and care goals for your child?	10 (100%)	-	-	-	-
How well did you feel supported to achieve the goals for your child?	10 (100%)	-	-	-	-
	Extremely likely n (%)	**Likely n (%)**	**Neither likely nor unlikely n (%)**	**Unlikely n (%)**	**Extremely unlikely n (%)**
How likely is it that you would recommend this service to friends and family if they needed similar care?	10 (100%)	-	-	-	-

Table 21: Participant feedback from Dietetic-Led Care

Question	Excellent n (%)	Good n (%)	OK n (%)	Poor n (%)	Very poor n (%)
What was your overall satisfaction of this service?	45 (98%)	1 (2%)	-	-	-
	Completely n (%)	**Well n (%)**	**Somewhat n (%)**	**Poorly n (%)**	**Not at all n (%)**
Did you feel able to raise concerns about your child's health?	46 (100%)	-	-	-	-
Did you feel that your concerns were listened to and addressed?	46 (100%)	-	-	-	-
How much did you feel you were involved in decisions about the treatment and care goals for your child?	45 (98%)	1 (2%)	-	-	-
How well did you feel supported to achieve the goals for your child?	46 (100%)	-	-	-	-
	Extremely likely n (%)	**Likely n (%)**	**Neither likely nor unlikely n (%)**	**Unlikely n (%)**	**Extremely unlikely n (%)**
How likely is it that you would recommend this service to friends and family if they needed similar care?	44 (96%)	2 (4%)	-	-	-

Summary of results and learning points:

- These results of this service evaluation illustrate the difference between two models of care. Neither are considered a 'gold standard' and both have been developed to provide a service within local resources and constraints. This comparison serves to illustrate the differences between the services offered to patients, and what advantages each may bring. A complete comparison was beyond the scope of this project, and further details of the resources, costs and outcomes are needed.
- Both service models provided care for similar numbers of patients within the time frame of the project.
- Referrals for dietetic care came primarily from GPs and the children's public health nursing team, the proportion depending on the service model.
- The time from referral to the patients seeing the dietitian is shorter in Dietetic-Led Care.
- The age of patients on referral appears to be lower in the Dietetic-Led Care service, which could reflect the additional time spent training children's public health nursing staff, and may mean patients are being identified and treated earlier, potentially having a positive impact on their quality of life. This offers possible advantages with this model of care.
- Non IgE-mediated food allergy is the most commonly treated by dietitians working in the community settings in both these service models.

- Patients appear to have less appointments with GPs and consultants prior to seeing the dietitian in the Dietetic-Led service, which again could reflect the time spent training children's public health nursing staff. This suggests significant costs savings may be gained from this model of care, but a full economic analysis is needed since the costs of delivering the service are different.
- The Dietetic Community service offers group education sessions, which are not available in the Dietetic-Led service. This could result in some cost savings for those who do not subsequently request individual support in addition, although the running of groups can carry significant overheads. Groups can also be a useful way to keep on top of large numbers of referrals. It enables this service to provide a flexible educational offering to patients with both group and individual options.
- The outcomes from the two service models cannot be evaluated at this time as too many patients had not completed their course of dietetic treatment and care. This shows that a six month evaluation project is not long enough to properly assess care in paediatric patient groups.
- The Dietetic-Led Care includes optimisation of medicine usage, but this requires the dietitians to be working to different competencies. The optimisation of medicines offers a further opportunity to make cost savings.
- The Dietetic-Led Care illustrates that dietitians are applying advanced clinical reasoning and working at an advanced clinical practitioner level in this specific area of care. This demonstrates a principle that could be extended to other diagnostic groups.
- Both service models demonstrate that dietitians are working collaboratively across multi-disciplinary teams to provide high quality care that is highly valued by patients.
- The Dietetic-Led Care shows how dietitians can provide expert knowledge and advice on children's nutrition to other professionals within the multi-disciplinary team.

Future recommendations

- Other nursing staff; in particular Advanced Nurse Practitioners and Practice Nurses could also be trained in the diagnosis and assessment of potential food allergy in infants and children and refer directly to a community dietitian. Very few referrals were received from these staff during this project but there is the potential for them to be more involved.
- Non-prescribing dietitians and children's public health nurses could work under a Patient Group Directive supported by Area Prescribing Committee guidelines to be able to prescribe the initial 4 week trial of extensively hydrolysed formula, thereby further reducing the need for GP involvement in an administrative capacity. This is something the Dietetic-Led Care service has been exploring.
- Dietitians could develop the systems and competencies to enable them to order specific IgE tests and interpret themselves rather than using the GP as an administrator, which could potentially save money, time and improve quality of care.

Appendix 1: What can First Contact Practitioner Dietitians do?

The following sets out the key role responsibilities for Dietitians First Contact Practitioners. The first contact practitioner dietitian will:

1) Assess, diagnose, triage and manage patients either via patient self-referrals (where systems permit) or referrals from a clinical professional within the network and take responsibility for managing a complex caseload

2) Develop integrated and tailored programmes in partnership with patients and provide first line treatment options and facilitate behavioural changes and optimise engagement with recommended treatment plans supporting fulfilment of personal goals and reduce the need for pharmacological interventions. The types of patients seen include: a variety of patients with complex needs and comorbidities including: diabetes, frail and elderly patients with comorbidities and undernutrition, weight management for the obese, cardiovascular disease, gastrointestinal conditions such as IBS and coeliac disease, paediatric allergy

3) Work as part of a multi-disciplinary team in a patient facing role, using their expert knowledge of nutrition and diet related issues across a spectrum of health conditions, to create stronger links with existing services through clinical leadership, teaching and evaluation skills.

4) Develop relationships and a collaborative working approach across the PCN supporting the integration of pathways in Primary Care.

5) Develop and make use of their full scope of practice, which, for those with the appropriate training, includes license for supplementary prescribing

6) Provide learning opportunities for the whole multi-professional team within primary care. They will also work across the multi-disciplinary team to develop and evaluate more effective and streamlined clinical pathways and services.

7) Review, pinpoint and resolve underlying issues that result in frequent visits to the GP surgery, e.g. gastrointestinal conditions, diabetes management, cardiovascular disease, food allergies, nutrition supplementation and weight management.

8) Refer to other services as required e.g. Gastroenterology, Bariatric Service, weight management programmes

9) Progress and make referrals to facilitate diagnosis and choice of treatment regime, understanding the limitations of investigations, interpret and act on results and feedback to aid diagnosis and the management plans of patients.

Tilley, C. & Instone, J. BDA, Feb 2020

Appendix 2: Satisfaction Survey

We would like to ask you some questions about the service you have received. Your feedback will be anonymous and we will not be asking for any information like your name or address. Your honest feedback will help improve this service.

Please mark one answer for each question

Overall service

	Excellent ☺☺	**Good** ☺	**OK** 😐	**Poor** ☹	**Very Poor** ☹☹
How well did the service do?	**Please mark one for each question**				
What was your overall satisfaction of this service?	☺☺	☺	😐	☹	☹☹
Was the length of time you had to wait to see a dietitian acceptable?	☺☺	☺	😐	☹	☹☹
Did the service you received meet your particular needs? (E.g. meet any disability, impairment, language, communication, lifestyle, age, belief, cultural needs).	☺☺	☺	😐	☹	☹☹
Did the dietitian treat you with dignity and respect?	☺☺	☺	😐	☹	☹☹

	Extremely Likely	Likely	Neither likely nor unlikely	Unlikely	Extremely unlikely	Don't Know
How likely is it that you would recommend this service to friends and family if they needed similar care or treatment?	☺☺	☺	😐	☹	☹☹	?

About your consultation

	Completely ☺☺	Well ☺	Somewhat 😐	Poorly ☹	Not at all ☹☹
How well did the service do?	**Please mark one for each question**				
Did you feel able to raise concerns about your health?	☺☺	☺	😐	☹	☹☹
Did you feel that your concerns were listened to and addressed?	☺☺	☺	😐	☹	☹☹
How much did you feel you were involved in decisions about the treatment and care goals?	☺☺	☺	😐	☹	☹☹
How well did you feel supported to achieve the goals?	☺☺	☺	😐	☹	☹☹

What does the service **do well?**

What could the service **do better?**

Appendix 3: Clinical Frailty Scale

The Clinical Frailty Scale (CFS) is a 7-point scale exploring physical, psychological and social domains of frailty to provide a global score ranging from 1 (very fit) to 7 (terminally ill) (Rockwood, 2005). The tool was designed to provide a straight-forward method of classifying frail individuals using simple clinical descriptors.

The development study conducted in a large cohort of older adults (Rockwood, 2005) showed high levels of correlation (r = 0.80) with the more comprehensive but onerous Frailty Index, providing an effective measure of frailty with greater ease of use (Rockwood, 2005, Chong et al., 2017). The CFS combines comorbidity, disability and cognitive impairment to make an assessment of overall frailty, correlating with existing tools for comorbidity (Cumulative Illness Rating Scale, r=0.43), functional ability (CSHA Function Score, r=0.78) and cognition (the 3MS measure, r=0.58).

One criticism of the tool is its lower sensitivity to frail people without disability or cognitive impairment (Rockwood et al., 2007a), as the scale is subjective, requiring the researcher to make a judgement based on the participant over the duration of the assessment.

CHONG, E., HO, E., BALDEVARONA-LLEGO, J., CHAN, M., WU, L. & TAY, L. 2017. Frailty and Risk of Adverse Outcomes in Hospitalized Older Adults: A Comparison of Different Frailty Measures. *Journal of the American Medical Directors Association*.

ROCKWOOD, K. 2005. A global clinical measure of fitness and frailty in elderly people. *Canadian Medical Association Journal,* 173**,** 489-495.

ROCKWOOD, K., ABEYSUNDERA, M. J. & MITNITSKI, A. 2007a. How should we grade frailty in nursing home patients? *Journal of the American Medical Directors Association,* 8**,** 595-603.

The CSHA Clinical Frailty Scale

1 **Very fit** – Robust, active, energetic, well motivated and fit; these people commonly exercise regularly and are in the most fit group for their age

2 **Well** – Without active disease, but less fit than people in category 1

3 **Well, with treated comorbid disease** – Disease symptoms are well controlled compared with those in category 4

4 **Apparently vulnerable** – Although not frankly dependent, these people commonly complain of being "slowed up" or have disease symptoms

5 **Mildly frail** – With limited dependence on others for instrumental activities of daily living

6 **Moderately frail** – Help is needed with both instrumental and non-instrumental activities of daily living

7 **Severely frail** – Completely dependent on others for the activities of daily living, or terminally ill

IADL

Activities required to live in the community

- Meal preparation
- Ordinary housework
- Managing finances
- Managing medications
- Phone use
- Shopping
- Transportation

ADL

Non-instrumental activities of daily living; related to personal care

- Mobility in bed
- Transfers
- Locomotion inside and outside the home
- Dressing upper and lower body
- Eating
- Toilet use
- Personal hygiene
- Bathing

Appendix 4: Nutrition checklist B

Yes to any question scored 1 point.

1. Do you live alone?
2. Are you concerned about your ability to shop for food?
3. Are you concerned about your ability to cook meals?
4. Are you concerned about food budgeting?
5. Are you on a special diet or do you have a condition which may impact upon eating?
6. Have you been prescribed nutrition supplements?
7. Do you have difficulty cutting food?
8. Do you have difficulty swallowing or cough while eating?
9. Do you have difficulty chewing food?
10. Are you finding it difficult to drink or drink enough?

Appendix 5: Questions asked during the focus group in model 3

The following are questions that may be asked during the focus group. The focus group is a discussion and will be led by the participants.

We will take an appreciative inquiry approach, which will focus on the positives. It involves identifying what is working well, analysing why it is working well and then doing more of it. The focus on the positive encourages creativity and innovation, as opposed to problem solving which leads to negative, critical, and spiralling diagnoses. Problems are noted but not discussed further.

Questions for the focus group

1. Let's explore the overarching value of having a dietitian in practice, for you individually and as a practice.

2. How has this project influenced the productivity of the practice, the patient experience, the staff experience?

3. As a practice team how did your activity promote and embed the dietetic role?

4. What impact has the project had on prescribing patterns, drug costs and patient compliance?

5. How has your or others' workload changed during this pilot project? Ask for examples.

6. How has ACBS prescribing changed during this pilot project?
   [Possible prompts: cost savings, more appropriate ACBS prescribing]

7. Can you see other areas of work within the practice, which would benefit from this new model of care?

8. How has your awareness of nutrition changed? Ask for examples.

9. With regard to this project on a dietitian working within the MDT in Primary Care, is there anything else anyone wants to comment on?

References

BRITISH DIETETIC ASSOCIATION (2017) Dietitians in Primary care. Birmingham, BDA.

CLEGG, A., BATES, C., YOUNG, J., RYAN, R., NICHOLS, L., ANN TEALE, E., MOHAMMED, M. A., PARRY, J. & MARSHALL, T. (2016) Development and validation of an electronic frailty index using routine primary care electronic health record data. *Age Ageing,* 45**,** 353-60.

COOPER, R., KUH, D., HARDY, R., MORTALITY REVIEW, G., FALCON & TEAMS, H. A. S. (2010) Objectively measured physical capability levels and mortality: systematic review and meta-analysis. *BMJ,* 341**,** c4467.

FRIED, L. P., TANGEN, C. M., WALSTON, J., NEWMAN, A. B., HIRSCH, C., GOTTDIENER, J., SEEMAN, T., TRACY, R., KOP, W. J., BURKE, G., MCBURNIE, M. A. & CARDIOVASCULAR HEALTH STUDY COLLABORATIVE RESEARCH, G. (2001) Frailty in older adults: evidence for a phenotype. *J Gerontol A Biol Sci Med Sci,* 56**,** M146-56.

GRIMSHAW, K. E., BRYANT, T., OLIVER, E. M., MARTIN, J., MASKELL, J., KEMP, T., CLARE MILLS, E. N., FOOTE, K. D., MARGETTS, B. M., BEYER, K. & ROBERTS, G. (2015) Incidence and risk factors for food hypersensitivity in UK infants: results from a birth cohort study. *Clin Transl Allergy,* 6**,** 1.

MURARO, A., WERFEL, T., HOFFMANN-SOMMERGRUBER, K., ROBERTS, G., BEYER, K., BINDSLEV-JENSEN, C., CARDONA, V., DUBOIS, A., DUTOIT, G., EIGENMANN, P., FERNANDEZ RIVAS, M., HALKEN, S., HICKSTEIN, L., HOST, A., KNOL, E., LACK, G., MARCHISOTTO, M. J., NIGGEMANN, B., NWARU, B. I., PAPADOPOULOS, N. G., POULSEN, L. K., SANTOS, A. F., SKYPALA, I., SCHOEPFER, A., VAN REE, R., VENTER, C., WORM, M., VLIEG-BOERSTRA, B., PANESAR, S., DE SILVA, D., SOARES-WEISER, K., SHEIKH, A., BALLMER-WEBER, B. K., NILSSON, C., DE JONG, N. W., AKDIS, C. A., ALLERGY, E. F. & ANAPHYLAXIS GUIDELINES, G. (2014) EAACI food allergy and anaphylaxis guidelines: diagnosis and management of food allergy. *Allergy,* 69**,** 1008-25.

MURPHY, J. L., ABURROW, A., GUESTINI, A., BROWN, R., PARSONS, E. & WALLIS, K. (2020) Identifying older people at risk of malnutrition and treatment in the community: prevalence and concurrent validation of the Patients Association Nutrition Checklist with 'MUST'. *J Hum Nutr Diet,* 33**,** 31-37.

NATIONAL INSTITUTE FOR HEALTH AND CLINICAL EXCELLENCE (2011) Food allergy in children and young people: Diagnosis and assessment of food allergy in children and young people in primary care and community settings. London, NICE.

NHS ENGLAND (2019) The NHS Long Term Plan – a summary. London, NHS.

NHS ENGLAND & ROYAL COLLEGE OF GENERAL PRACTITIONERS (2016) General Practice Forward View. London, NHS England.

NICE (2006) Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition. *Clinical Guideline.* England, National Institute for Health and Care Excellence.

NOTTINGHAM CITY COUNCIL (2020) Nottingham Insight.

NOTTINGHAMSHIRE AREA PRESCRIBING COMMITTEE (2018) Guidance on the diagnosis and management of cow's milk allergy in infants and children.

NOTTINGHAMSHIRE CITY COUNCIL (2020) Nottinghamshire Insight.

PRESCOTT, S. L., PAWANKAR, R., ALLEN, K. J., CAMPBELL, D. E., SINN, J., FIOCCHI, A., EBISAWA, M., SAMPSON, H. A., BEYER, K. & LEE, B. W. (2013) A global survey of changing patterns of food allergy burden in children. *World Allergy Organ J,* 6**,** 21.

PRIMARY CARE WORKFORCE COMMISSION (2015) The future of primary care: creatng teams for tomorrow. Leeds, Health Education England.

ROCKWOOD, K., SONG, X., MACKNIGHT, C., BERGMAN, H., HOGAN, D. B., MCDOWELL, I. & MITNITSKI, A. (2005) A global clinical measure of fitness and frailty in elderly people. *CMAJ,* 173**,** 489-95.

SLADKEVICIUS, E., NAGY, E., LACK, G. & GUEST, J. F. (2010) Resource implications and budget impact of managing cow milk allergy in the UK. *J Med Econ,* 13**,** 119-28.

TRAVERS, J., ROMERO-ORTUNO, R., BAILEY, J. & COONEY, M. T. (2019) Delaying and reversing frailty: a systematic review of primary care interventions. *Br J Gen Pract,* 69**,** e61-e69.

VENTER, C., PEREIRA, B., VOIGT, K., GRUNDY, J., CLAYTON, C. B., HIGGINS, B., ARSHAD, S. H. & DEAN, T. (2008) Prevalence and cumulative incidence of food hypersensitivity in the first 3 years of life. *Allergy,* 63**,** 354-9.

WILLIAMS, M. (2013) The Importance and Practical implementation of the Low FODMAP Diet. *Complete Nutrition Focus.*

WORLD HEALTH ORGANISATION (2019) Primary Health Care: Main Terminology. Geneva, World Health Organisation.