

2023-01-17

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<http://hdl.handle.net/10026.1/20182>

10.1111/jhn.13130

Journal of Human Nutrition and Dietetics

Wiley

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Impact of a dietitian in general practice: paediatric food allergy

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Funding information

British Dietetic Association

Abstract

Background: Food allergy in infants and young children places a significant burden on primary care. This study evaluated a dietetic-led paediatric food allergy service, which attempts to provide more rapid access to the dietitian and reduce the need for general practitioner (GP) and secondary care appointments.

Methods: Two community dietetic services for children referred with food allergy were compared. The first was dietetic-led care where dietitians train community children's nurses to recognise potential cases of food allergy, undertake basic diagnostic assessment and subsequently refer to the dietitian. The other was a more traditional dietetic community service where patients were referred predominantly by the GP or secondary care.

Results: In dietetic-led care 86 patients were seen, compared to 96 in dietetic community care. Dietetic-led care received fewer referrals from the GP, 36% versus 67% ($p < 0.001$); GP appointments for allergy-related conditions prior to dietetic referral were lower, 3 versus 6 visits ($p = 0.001$); and input from secondary care was also lower, 8 versus 25 patients ($p = 0.002$) compared with dietetic community care. Children referred to dietetic-led care were younger, 78% < 6 months versus 40% ($p < 0.001$) in dietetic community care.

Conclusions: Dietetic-led care describes a model that has the potential to reduce GP and secondary care appointments, identify patients more quickly and reduce the time to receive dietetic input, thereby resolving symptoms more quickly and reducing prescribed medications. This model demonstrates the importance of integrated care and multidisciplinary working, offering a solution to reducing GP workload while maintaining or improving patient care.

KEYWORDS

community, dietitian, general practice, paediatric food allergy, primary care, workforce

Key points

- The prevalence of paediatric food allergy is increasing and is an area that has a high impact on the general practitioner (GP) workload.
- Dietitians play a central role in the management of food allergies in infants and children.
- Healthcare can be organised in a variety of ways; here a dietetic-led service is compared to a traditional model of dietetic community care to show the advantages of each.
- A dietetic-led model, which focuses on integration of care and multidisciplinary working, offers a potential solution to reduce part of the GP workload while maintaining or improving patient care.

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INTRODUCTION

The prevalence of paediatric food allergy in western countries is estimated at 6%–8% in children under 3 years, with cow's milk allergy (CMA) being the most common (2%–5% prevalence).^{1–3} This represents a common condition for general practitioners (GPs) to diagnose and manage,^{4–7} and contributes a significant financial burden on the UK National Health Service (NHS).⁸

Food allergy is a complex problem for GPs to manage without additional training and experience. The symptoms of non-IgE mediated CMA often overlap with other common functional, gut-related conditions (including infantile colic, constipation, gastro-oesophageal reflux) and atopic conditions (such as eczema) which can lead to misdiagnoses and inappropriate prescribing.⁹ For non-IgE-mediated CMA to be diagnosed a detailed allergy-focused clinical history should be taken,^{5,10} looking for a group of symptoms involving a combination of upper and lower gastrointestinal symptoms and possible involvement of skin and respiratory systems, to avoid the suggested over diagnosis of CMA.¹¹ This takes time and experience to complete accurately. The diagnostic process can be challenging because it requires strict avoidance of the offending food allergen for 2–6 weeks accompanied by resolution of symptoms with subsequent re-introduction to see if symptoms recur.⁵ This process can cause anxiety, and impacts on the child's and family's quality of life.¹² If an IgE-mediated allergic reaction is suspected, this can be confirmed via a skin prick test and/or specific IgE antibody blood test which is not commonly undertaken in the community and if the result is unclear a supervised oral milk challenge may be needed to confirm the diagnosis.⁵ Historically, GPs have received little or no training in allergy,^{13,14} which can result in the patient attending multiple GP appointments to get a diagnosis or referral to secondary care, where waiting lists tend to be long.^{8,13}

Allergy training has now been included in the 2019 revision of the UK curriculum for doctors training to be GPs,¹⁴ but a systematic review to understand the delivery of allergy services worldwide¹⁵ concluded that both primary and secondary care allergy pathways seemed inadequate, leading to delays in patient management and poor outcomes. A qualitative study in the UK looking at parent experiences of current paediatric allergy pathways reported difficulties in access to both primary and secondary care services and obtaining timely appropriate information,¹⁶ in keeping with that previously described.¹⁷ Parents also highlighted the need for access to other health professionals (psychologists and dietetics) as part of allergy services.¹⁶

Dietitians play a central role in the management of food allergies in infants and children,^{5,10} where dietary avoidance of the allergen is the key intervention, resulting in complete or almost complete resolution of symptoms.¹⁸ Children with food allergies following

exclusion diets have been found to have nutritional disorders and growth deficit compared to non-allergic children.^{19,20} The dietitian can ensure nutritional adequacy of allergen-elimination diets to prevent deficiency, maintain nutritional status and growth, provide advice on introduction of solids and support individualised reintroduction of allergens.^{21,22}

The usual pathway of care for paediatric food allergy patients being referred to dietitians depends on the likelihood of CMA. If CMA is indicated or proven, the GP will usually refer to a community dietitian for management. If the diagnosis is less clear, the GP will refer to a paediatrician for definitive diagnosis, which may or may not be accompanied by referral to a hospital-based dietitian. This process often involves delay between referral, diagnosis and dietetic management, and in some cases no dietetic support is offered, despite national and international guidance^{10,18,23} highlighting that dietitians are central to management. During this process the child is likely to experience ongoing allergic symptoms, delays in development, increased risk of nutritional deficiencies (following exclusion of major food groups to avoid suspected allergens) and possible faltering growth.²⁰ Lack of timely support can result in long-term feeding difficulties, resulting in significant reduction in quality of life for the child and family.^{12,20,24}

Recognition and management of paediatric food allergy is a known challenge to primary care, yet there is little published research exploring the dietitian's role.

This study was designed to evaluate a model of dietetic-led care for paediatric food allergy, which attempts to provide more rapid access to the dietitian and reduce the need for GP appointments, by training community children's nurses to identify potential food allergies and provide early access to dietetic treatment.

METHODS

Design

This service evaluation compared two service models for children referred with suspected or confirmed food allergy: dietetic-led and community dietetic care. The primary outcomes for both groups were referral source, age at referral and number of GP, secondary care and other health professional patient appointments prior to dietetic referral for potential allergy-related conditions. Secondary outcomes included prescription of medications pre and post diagnosis, feeding methods and patient related outcomes including symptoms.

Dietetic-led care

The model involves the community children's public health nursing team (0–19 nursing team) referring

children directly to dietetic-led care (which comprises a small team of community paediatric dietitians), with less reliance on the GP. The dietitians train the 0–19 nursing team to provide first line management for functional gastrointestinal disorders in infants (colic, reflux and constipation) and how to complete an allergy-focused clinical history to support the identification of possible underlying food allergy. When the nursing team identify a possible case of CMA, they advise a 4-week cow's milk exclusion trial, recommending either an extensively hydrolysed formula or cow's milk exclusion diet for breastfeeding mothers, in accordance with the Nottinghamshire wide area prescribing committee guidelines for CMA.²⁵ After 4 weeks, if non-IgE-mediated allergy is suspected, cow's milk is reintroduced to confirm the diagnosis and patients are then referred to the dietitians. Patients with suspected IgE-mediated allergy are referred to the dietitian without a cow's milk re-challenge, and the dietitian may co-ordinate allergy testing to confirm the diagnosis. The GP's only input is to prescribe the formula, although in most cases GPs will have had a contact with the patient previously and ruled out any underlying medical concerns.

Following dietetic referral, the dietitian ensures that both symptoms and nutritional status are managed effectively. The dietitian works at an advanced level taking an active role in the use of medicines to manage allergy-related symptoms, including recommendations to the GP to prescribe or cease prescribing medications. The dietitian organises any necessary allergy tests in collaboration with the GP, and results are interpreted by the dietitian who continues to manage the patient. Referral to secondary care is undertaken if the patient is considered to be at risk of anaphylaxis, or presents with complex unresolving symptoms (e.g., severe eczema, persistent faltering growth). This model is designed to provide the patient with the most rapid, effective and safe care, to reduce unnecessary contact with the GP and minimise prescription of medications. This service is referred to as dietetic-led care.

Dietetic community care

In this more traditional model of care, the dietetic service is referred both non IgE- and IgE-mediated allergies, where diagnosis and management of CMA is in accordance with the same Nottinghamshire Area prescribing CMA guidelines²⁵ as used by dietetic-led care. Patients are seen individually or in groups, and similarly to the dietetic-led service, the dietitian will manage symptoms and optimise nutritional status. Referrals are received from GPs, members of the community children's nursing team or paediatricians. Allergy testing for IgE-mediated is a two-step process; the dietitian refers the patient back to the GP, who then refers the patient to secondary care for allergy testing. Once the result is

known, patients may remain under the care of the dietetic community team or transfer to a specialist service in secondary care, depending on where they live and results of the test. Some *ad hoc* training is provided by the dietetic team for health visitors although the uptake of this is low. This service is referred to as dietetic community care and is used as the comparator to dietetic-led care.

Data collection

Both service models prospectively collected data from infants and children (0–11 years of age) referred for suspected or confirmed food allergy (symptoms recur on reintroduction, or positive allergy sensitisation test) over a 10-month period. The following data were extracted for both groups between October 2019 to July 2020 from Systmone electronic records onto a customised Excel data collection spreadsheet: referral source, waiting time to dietetic service, appointment type, reason for referral, age of referral, health professionals seen and secondary care admissions prior to dietetic referral, feeding methods, symptoms and medications at referral, dietitians' involvement in medical management and subsequently dietetic outcomes and patient feedback. A patient satisfaction questionnaire was given to each patient to complete; the questionnaire for those seen in a group was a modified version but with similar questions.

Statistical analysis

Data were exported into Statistical Package for the Social Sciences (SPSS, version 25) for data cleaning and analysis. Percentages were used to characterise the sample. Data for health professional appointments per patient prior to dietetic consultation and time to referral in days were tested for normality and examined using Mann–Whitney U test or a *t*-test as appropriate for the data distribution.

Ethics

Ethical approval was granted by the Faculty of Health Research Ethics and Integrity Committee, University of Plymouth (reference number 18/19-1128), and each site gained approval and registered the project within their organisation.

RESULTS

Data from 182 paediatric allergy patients were included: 96 from the traditional community care and 86 from the dietetic-led care.

Referral source and waiting times to the dietetic services

Figure 1 shows the referral source for both services. Most referrals to dietetic community care came from GPs, whereas most referrals for dietetic-led care came from members of the 0-19 nursing team.

The time in working days from receipt of referral to patients seeing the dietitian was shorter for dietetic-led care (mean = 11.9 days, sd = 6.1) compared to dietetic community care (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).

Patient characteristics

Figure 2 shows that most patients referred to dietetic-led care were under 6 months of age, compared with dietetic community care where 34% were over 1 year of age.

The types of referrals received by both services were very similar. The majority consisted of confirmed or suspected non-IgE-mediated CMA: dietetic-led care 80% (69/86) and dietetic community care 85% (82/96). Few children were referred with confirmed or suspected IgE-mediated CMA: dietetic-led care 3.5% (3/86) and dietetic community care 5% (5/96). Some were suspected of having IgE-mediated food allergy following dietetic consultation: dietetic-led care 17% (15/86) and dietetic community care 6% (6/96). The remaining referrals related to a combination of other food allergies.

There was a wide spectrum of presenting symptoms at referral relating to the skin, gastrointestinal and respiratory tract systems across both services, but gut symptoms (with or without others) were the most common in both services (94% in dietetic-led vs. 100% dietetic community care). For further details see Supplementary Information Table A. Of those exclusively

breastfeeding (20% dietetic-led vs. 11% community care), 88% (15/17) in dietetic-led care and 70% (7/10) in dietetic community care required maternal cow's milk exclusion diets.

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

The number of patients seen by health professionals and number of appointments per patient with each type of health professional prior to seeing the dietitian are presented in Table 1. Most patients from both services were seen by a GP for potential allergy-related symptoms prior to their dietetic appointment with a far lower number seen by a paediatric consultant in secondary care. The number of GP and consultant contacts was significantly fewer in dietetic-led care compared to dietetic community care.

The 0-19 nursing team had contact with a greater number of children in dietetic-led care (85%) compared with dietetic community care (66%), but there was no difference in the number of allergy-related contacts per patient. 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-hour visits due to allergy symptoms prior to dietetic referral, and no differences were found between services.

Appointment type

In dietetic community care, 53% (51/96) of patients were seen individually and 47% (45/96) were seen in a group. Of those seen in a group 38% (17/45) requested additional follow-up appointments either face to face or by telephone. All patients (86) in dietetic-led care were

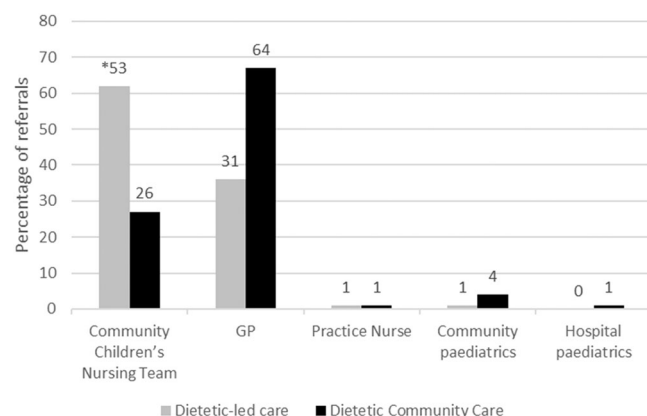


FIGURE 1 Referral source for the two models of dietetic care as a percentage of total referrals NB: Fisher's exact test referral source dietetic-led versus community care $p < 0.001$ *Figures above each bar represent the numbers of referrals in each group

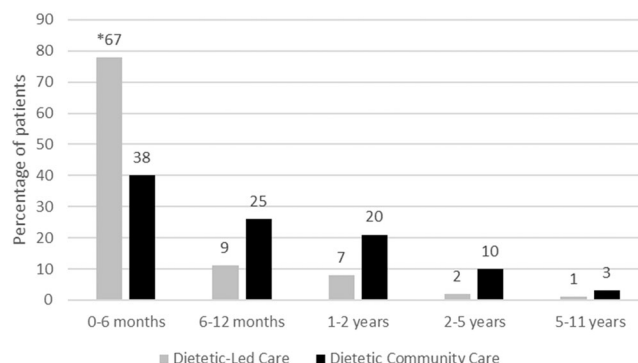


FIGURE 2 Age at referral for the two models of dietetic care NB: Fisher's exact test age of referral dietetic-led versus community care $p < 0.001$ *Figures above each bar represent the numbers of patients in each group

TABLE 1 Number of health professional appointments per patient prior to dietetic consultation

Healthcare professional	Dietetic-led care <i>n</i> = 86		Dietetic community care <i>n</i> = 96		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; <i>p</i> < 0.001
A&E	18 (21%)	0 (0, 0–4)	18 (19%)	0 (0, 0–3)	U = 4179; <i>p</i> = 0.84
Consultant in secondary care	8 (9%)	0 (0, 0–1)	25 (26%)	0 (1, 0–13)	U = 3389; <i>p</i> = 0.002
Out-of-hour medic	4 (5%)	0 (0, 0–2)	8 (8%)	0 (1, 0–3)	U = 4019; <i>p</i> = 0.49
Community children's nursing team (0–19 team)	73 (85%)	2 (3, 0–11)	63 (66%)	2 (4, 0–11)	U = 4622; <i>p</i> = 0.16
Practice nurse	4 (5%)	3 (3, 0–14)	2 (2%)	2 (4, 0–14)	U = 4581; <i>p</i> = 0.2
Midwife	1 (1%)	0 (0, 0–1)	3 (3%)	0 (0, 0–2)	U = 4046; <i>p</i> = 0.37

Abbreviations: GP, general practitioner; IQR, interquartile range.

seen individually with follow-up offered as either face to face, telephone or via e-mail.

Dietary aims and outcome data

The dietary aims and outcome data were collated only for dietetic-led care because a significant amount of data was missing for dietetic community care, predominantly due to patients being seen in a group setting. Many patients seen in the group setting had open appointments where they could return for follow-up within a year from their initial appointment; consequently, little follow-up data were available within the timeframe of this project.

Dietary aims agreed with parents of the patients, for which outcome data collected were: optimising nutritional status/growth, meeting energy and protein requirements, improving micronutrient status, improving dietary intake, using the exclusion diet appropriately and reducing unnecessary dietary restrictions. Almost all (98%) of the dietary aims set with patients seen in the dietetic-led care were either fully (89%) or partially met (9%).

Figure 3 shows that the vast majority of patients' symptoms improved or resolved completely after dietetic consultations (i.e., eczema flares resolved, bowels normalised, reflux resolved).

Medical management

Both the dietetic-led care and dietetic community care were involved in the rationalisation of prescribable nutrition products, such as specialist milk formula and rationalising medical interventions for eczema, gastro-oesophageal reflux disease and constipation. There was a

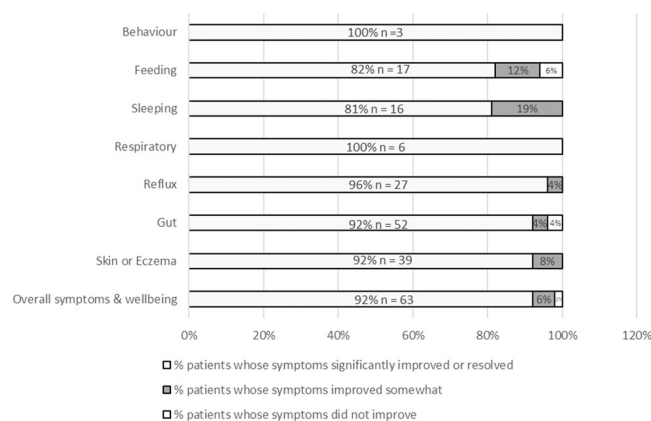


FIGURE 3 Improvement in patients' reported symptoms after consultations in the dietetic-led care

substantial reduction in all medications following referral to both services as shown in Figure 4.

Patient feedback

Patients from both services rated their experience highly. In dietetic community care, 60% (27/45) of parents seen in groups completed a feedback questionnaire, and all but one was able to understand all the information provided. The majority 93% (25/27) answered yes to the question 'I feel the session has given me the confidence and knowledge to manage my child's condition'. For those seen individually 20% (10/51) completed feedback questionnaires and 100% rated their overall satisfaction as excellent.

In dietetic-led care 53% (46/86) of parents completed feedback, and 98% rated their overall satisfaction as

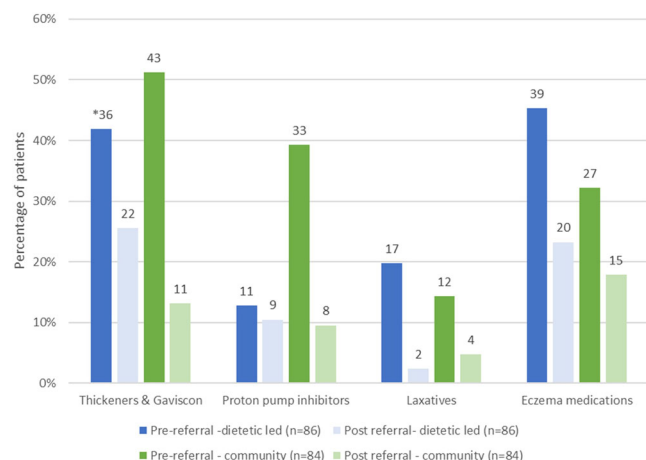


FIGURE 4 Medications prescribed before referral and following dietetic intervention in both services

excellent. All of these parents stated that they would recommend this service to friends and family if they needed similar care (96% [44/46] extremely likely, 4% [2/46] likely).

DISCUSSION

This is the first service evaluation to compare the patient journey for these two different models of paediatric dietetic care. In dietetic-led care, the dietitians use their expertise to train the community 0–19 nursing team to recognise potential cases of food allergy, undertake basic diagnostic assessment and then refer to the dietitian for dietary management. This was compared to the more traditional model, referred to as dietetic community care, where dietitians receive most referrals from GPs and secondary care services. In the dietetic-led model, patients are often referred directly to the dietitian by the 0–19 nursing team, removing the need for the GP to refer. Patients seen under the dietetic-led care model were referred at an earlier age, had fewer GP appointments and few were referred to secondary care prior to seeing the dietitian, suggesting this model streamlined the patients' journey and potentially made more efficient use of healthcare professionals' time.

Both service models provided care for similar numbers of patients during the 10-month service evaluation (6 months recruitment, 4 months follow-up), which appeared to meet the need within their geographical areas (patients were generally seen within 2–5 weeks of referral). This suggests that both models have similar capacity to see new patients. This is important, as it is known from previous research that parents have trouble in accessing suitable services and obtaining timely information about their child's allergy.¹⁶

Community 0–19 nursing teams are often the first point of contact for potential paediatric allergy patients;

however, they may not have had training, which means patients are often treated for individual symptoms, but the root cause (the allergy) remains undiagnosed. In the dietetic-led care service, the dietitians provide regular training to the 0–19 nursing team on identifying when CMA is more likely. This means the correct diagnostic processes are initiated immediately, accelerating the management plan, avoiding repeat referrals to the GP and minimising the prescription of unnecessary medications.

The data show significantly fewer referrals coming from GPs in the dietetic-led model, a saving in GP time. In addition to fewer referrals being initiated by the GP, the number of appointments with the GP was significantly less with dietetic-led care. It is estimated that 52% of the cost of diagnosing a food allergy in children comes from a mean of seven GP visits per patient,⁸ comparable to the six we found in the community dietetic care. If this figure is reduced by half, as we have shown in the dietetic-led care, significant costs savings may be gained from this model of care. Input from secondary care was also significantly lower in the dietetic-led model (8 vs. 25 patients; $p = 0.002$), which equates to further potential cost savings.

The majority of patients under dietetic-led care were referred at an earlier age (78% under 6 months of age) with fewer GP and consultant appointments prior to seeing the dietitian, suggesting this model streamlined the patients' journey, utilising other community-based healthcare professional time. The earlier age of patients at referral in dietetic-led care is likely to reflect the training provided to the 0–19 nursing team to support early recognition and diagnosis of food allergy, and consequently earlier referral to the dietetic service. Earlier referrals can support exclusive breastfeeding and prevent prescriptions of hypoallergenic formula as well as minimise eating behaviour difficulties and poor nutritional status.^{19,20} Although the 0–19 nursing team referred far more children in the dietetic-led model, the numbers of appointments per patient with the team prior to referral were similar across the two services (see Table 1), suggesting that the new model does not cause an unsustainable impact on community nursing workload.

Although fewer referrals were initiated by the GP, and fewer GP appointments occurred prior to seeing the dietitian in dietetic-led care, the GP was still involved with the majority (93%) of patients from this service. It is important that children receive a medical assessment as part of the allergy-focused history to rule out any other underlying causes.⁵ GPs also have a key role in prescribing medications to manage common functional gut conditions and eczema flare ups, both of which can be symptoms of CMA. At present, the dietitians need GPs to start, alter or stop prescriptions, as dietitians do not yet have independent prescribing rights. Dietitians can now study to gain supplementary prescribing rights,

and it is possible that such arrangements could result in a reduction in GP administration time. Interestingly, the GP was only involved in 86% of patients from community dietetic care. We speculate that this is due to greater involvement of secondary care, since 26% of the patients were under a consultant in this service.

The majority of referrals for both services were for non-IgE-mediated CMA which is the most common food allergic presentation in infants and young children.^{26,27} Presenting symptoms were varied, involving gut, skin and respiratory systems (alone or in combination), and feeding difficulties and poor sleeping. Unexplained skin rashes account for 20%–30% of primary care visits²⁸ and are often poorly recognised as a symptom of non-IgE-mediated CMA. Atopic eczema is reported in 60% of infants under 1 year diagnosed with food allergy.²⁹ Prescription of emollients, topical corticosteroids or both were no longer necessary in approximately half of the children following diagnosis and/or referral to a dietitian in both services resulting in cost savings.

Constipation or straining is frequently missed as a symptom of CMA,³⁰ indicating the need for training, education and access to expert dietetic advice.^{31,32} Following referral to the dietitian and food allergy diagnosis, between 66% and 88% reduction in prescription of laxatives was seen, with only 2%–5% of infants across both services continuing to have laxatives prescribed.

Gastro-oesophageal reflux disease is another common symptom of CMA.^{24,33} The presence of reflux or vomiting can lead to over-prescription of proton pump inhibitors (PPI), which are not thought to be effective in this age group, could have side effects,^{34–36} and increase prescribing costs. International guidelines suggest that CMA should be excluded prior to prescribing PPIs.^{37,38} In the community dietetic service 39% of the patients were prescribed a PPI prior to diagnosis compared with only 13% in the dietetic-led service where it is actively discouraged, falling to 10% in both services after cow's milk exclusion.

There is a common theme between the two models of care where dietitians apply advanced clinical reasoning, working as advanced clinical practitioners in the area of paediatric allergy. This enables them to review the management of conditions such as eczema, constipation and gastro-oesophageal reflux, and to recommend prescription changes to the GP. The optimisation of medicines by these dietitians offers further opportunity to make cost savings in this area.

The results of this service evaluation illustrate the difference between two models of care, both of which 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, including what advantages each may bring. Dietetic-led care highlights the benefits of integration and multidisciplinary care; dietitians empower the 0–19 nursing team to identify and accurately refer patients for an appropriate treatment. This model reduces the

pathway of care for the patient, reduces the workload for GPs and is an example of harmonising allergy care.^{39,40}

There are some limitations worth noting. A cost-effectiveness analysis of the two models was beyond the scope of this project but would be valuable to understand the costs of delivering the services, any cost savings and improvements in outcomes for patients. A recent paper, however, has described the increased health economic impact of CMA in childhood,⁴¹ for which our findings may provide some solutions. One obvious difference between the models is the availability of group sessions in dietetic community care, which could result in some cost savings assuming most patients do not subsequently require individual support. Groups can also be a useful way to manage large numbers of referrals, keep waiting times to a minimum and provide a flexible educational offering to patients. A second limitation is the missing follow-up data from both models associated with ongoing patient care, suggesting an extended evaluation project, including 1-year follow-up, would have been better to assess longer-term benefit in this patient group.

CONCLUSION

Food allergy in infants and young children places a significant burden on primary care. A dietetic-led care model which focuses on integrated care and multi-disciplinary team working has the potential to reduce GP and secondary care appointments, identify food allergic patients more quickly and reduce the time to access dietetic care.

FUNDING INFORMATION

This work was funded by a project grant award to the University of Plymouth by the British Dietetic Association (BDA). Officers of the BDA had no role in the development of the protocol, design of the study, data collection and collation, nor interpretation and discussion of the data.

AUTHOR CONTRIBUTIONS

All authors contributed to the conception and design of the study, the analysis and interpretation of the data and the drafting of the paper. All authors critically reviewed its content and have approved the final version submitted for publication.

ACKNOWLEDGEMENTS

We would like to thank the Community Dietetic team at Nottinghamshire Healthcare NHS Foundation Trust, and Craig Dodds and Sarah Baker, community paediatric dietitians, Nottingham CityCare Partnership.

CONFLICTS OF INTEREST

Mary Hickson, Avril Collinson, Lisa Waddell and Amy Freeman-Hughes are members of the BDA.

TRANSPARENCY DECLARATION

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

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PEER REVIEW

The peer review history for this article is available at <https://publons.com/publon/10.1111/jhn.13130>.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Collinson A, Waddell L, Freeman-Hughes A, Hickson M. Impact of a dietitian in general practice: paediatric food allergy. *J Hum Nutr Diet.* 2023;1–9.
<https://doi.org/10.1111/jhn.13130>