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~ The genetic basis of epilepsy has a range according to country and publication from 14% -24.4%,² to 50%¹, to 70-80%³

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ORIGINAL ARTICLE

Costs and uptake of a community model of paediatric food allergy care versus specialist hospital care: A before-and-after controlled trial

Harriet Hiscock ^{1,2,3}, Prescilla Perera,^{1,2} Mimi LK Tang,^{3,4,5} Margaret H Danchin,^{3,6,7} Valerie Sung ^{2,3,7} and Jonathan Karnon⁸

Departments of ¹Health Services Research Unit, ²Allergy and Immunology, ³General Medicine, Royal Children's Hospital, ⁴Centre for Community Child Health, ⁵Allergy Immunology, ⁶Vaccine and Immunisation Research Group, Murdoch Children's Research Institute, ⁷Department of Paediatrics, University of Melbourne, Melbourne, Victoria and ⁸School of Public Health, University of Adelaide, Adelaide, South Australia, Australia

Aim: To compare the costs of community-based food allergy model of care (intervention cohort, IC) with a tertiary-hospital, specialist allergy clinic model of care (control cohort, CC).

Methods: In this pragmatic controlled trial, children (aged 0–12 years) newly referred to the allergy clinic at Melbourne's Royal Children's Hospital with suspected/known food allergy to three or fewer foods were allocated to see either a community-based paediatrician, trained via online webinars and web-based clinical decision support tools for food allergy diagnosis and management, or a hospital allergist. Per-patient costs to the health-care system and out-of-pocket costs to families seen within 12 months (clinician time, allergy tests and medicare billing) were compared between the two models of care.

Results: At 12 months, 54/181 (30%) CC families had been seen in the allergy clinic and 93/115 (81%) of the IC families who chose to see a community paediatrician had been seen. In an intention-to-treat analysis (ITT), health-care system costs per IC patient were higher than the costs per CC patient (mean cost \$333 versus \$319, respectively; mean difference \$14, 95% Confidence Interval (CI) –97 to 118, $P = 0.81$). Total out-of-pocket costs to family were \$129 in the IC compared with \$89 in the CC (mean difference \$40, 95% CI \$4–\$77, $P = 0.03$).

Conclusions: A community-based model of care for simple food allergy showed that costs to the health-care system were similar between the community model and hospital care but did not show reduced out-of-pocket costs to the families 12-months post-enrolment.

Key words: children; community; food allergy care; model; paediatrician.

What is already known on this topic

1 High prevalence of food allergy among Australian children and limited specialist allergy services based primarily at tertiary hospitals have resulted in waiting times in excess of 18 months for children with a suspected simple food allergy to access specialist allergy clinics.

What this paper adds

1 A new model of allergy care, delivered by trained community-based paediatricians, allows children with simple food allergy to be seen at no extra cost to the healthcare system.
2 This community-based new model could provide an efficient means of managing children with simple food allergy.

Prevalence of food allergies in the developed world has increased.^{1–3} Food allergies particularly affect children and can adversely impact their and their families' quality of life.⁴

In Australia, many children with food allergy are managed by allergy specialists in hospital settings. This has led to extended outpatient clinic waiting times for children with suspected food allergies to be assessed.⁵ As a result, parents may consider unproven alternatives to diagnose and manage food allergy,

which not only increases health-care costs but may also lead to misdiagnosis,⁶ an increased risk of adverse reactions from allergenic foods or unnecessary child dietary restrictions.^{7–9}

The diagnosis of food allergy relies on clinical history together with demonstration of serum specific IgE (sIgE). sIgE may be detected by skin-prick test or serum levels of sIgE (ssIgE), and both are applied in the clinical setting, either alone or together.¹⁰ Recent data have confirmed the reliability of ssIgE testing for the diagnosis of food allergies, paving the way for a decentralised model of care.¹¹

Based on a previous successful pilot study,¹² we conducted a large pragmatic trial comparing a community-based model of care for the management of simple (i.e. three or fewer foods) food allergy with standard specialist hospital-based care. We found that, compared to hospital care, families who received

Correspondence: Professor Harriet Hiscock, Health Services Research Unit, Royal Children's Hospital, 50 Flemington Road, Parkville, 3052, Victoria, Australia. Fax: +61 3 9345 5900; email: hiscock@rch.org.au

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community-based care were seen 10 months sooner, reported fewer anaphylactic reactions and received care that was of comparable quality.¹³

In this paper, we report on the health-care system and family out-of-pocket costs of the community and hospital models of care at 12 months post-enrolment. We hypothesise that compared with specialist hospital-based care, costs to the health-care system of the community care model would be lower, but out-of-pocket costs to the family would be higher.

Methods

Design and setting

Details of the trial methodology have been published.¹³ We compared control cohort (CC) with an intervention cohort (IC). Families in the CC were recruited first and received standard hospital-based care based on skin-prick testing at the Royal Children's Hospital (RCH) allergy clinic. Families in the IC were recruited next and offered the opportunity to see a general paediatrician in the community. We invited community-based paediatricians with no formal allergy training and a practice within 20 km of where children on the clinic waiting list resided (except for 12 families living in regional areas) to complete the Clinical Decision Support webinar training programme and deliver care to IC families. Consultations with paediatricians are subsidised by the federal government's Medicare scheme, and families may be charged variable out-of-pocket consultation fees depending on the doctor they see.

Eligibility and recruitment of families

A consecutive sample of children aged 0–12 years newly referred to the RCH allergy clinic waiting list between 13 August 2015 and 22 March 2017 with suspected allergy to peanut, soy, wheat, cow's milk, egg, shellfish, sesame and tree nuts were invited to take part. Children referred with suspected allergy to more than three foods, known or suspected anaphylaxis (based on referral letter or parent report at study intake interview), co-morbid severe eczema or referred by a paediatrician for opinion were excluded, as were families with insufficient English proficiency to complete questionnaires.

Participants recruited between 2 September 2015 and 21 June 2016 received standard hospital-based care and formed the CC. Participants recruited between 22 June 2016 and 5 May 2017 formed the IC. The study was approved by the RCH Human Research Ethics Committee (HREC 35133). All families provided written informed consent.

Intervention

We have previously reported on our intervention and its outcomes.¹³ Briefly, three web-based clinical decision support flowcharts (one each for IgE, non-IgE mediated food allergy and eczema) were designed by general paediatricians and allergists to cover nine key practice parameters common to published international guidelines.^{14–17} Each flowchart was accompanied by background information on key questions to ask in a history and on key signs to detect in an examination. Parent education

materials were embedded as downloadable PDF files in each of the flowcharts. Community paediatricians were invited to complete the training in the three 1-hour webinars.

After training, paediatricians conducted consultations with children in the IC based on the Clinical Decision Support flowcharts. They saw each child for an initial consultation, with a follow-up consultation if required.

For each consultation, allergists and community paediatricians were asked to complete a Consultation Record, recording the child's diagnosis(es), management (including skin-prick or sIgE testing), Medicare billing item, consultation start and finish time, and follow-up, including whether they referred the child back to the allergy clinic for an oral food challenge.

Standard hospital allergy clinic care

Clinicians working in the hospital allergy clinic typically saw the child once to take a history, examine the child, order SPTs where relevant and formulate a diagnosis and management plan. SPTs were performed by a clinic nurse on the same day.

Outcome measures

Health-care system costs

We calculated costs to the health-care system for children who had received an allergy consultation by 12 months post-enrolment. Cost of allergy care included Medicare Benefits Schedule (MBS) item fees claimed for visits to community-based paediatricians and to hospital-based allergy specialists, and the costs of the allergy tests and oral food challenges. Duration of visit to the community paediatrician was calculated from the Consultation Record. Time and motion data were collected from a sub-sample of 20 patients who attended the allergy clinic to estimate the total time spent with allergists and clinic nurses during clinic appointments. An average time per consultation was assumed for all families attending the clinic which included CC families and some IC families who had chosen not to see a community paediatrician.

Relevant unit costs were attached to recorded resource use (see Table 1) at each point of contact with a community paediatrician or allergy clinic to estimate a total cost for each study participant.

Costs to the family

In the baseline, 6 months and 12 months post-enrolment surveys, parents were asked to report on health service use and costs incurred for suspected food allergies including use of pharmaceuticals, alternative therapies and other health professional attendances for the preceding 6-month period. As we are estimating the average out-of-pocket costs up to 12 months post-enrolment, we included the families completing both the 6- and 12-month surveys.

Total out-of-pocket costs to families were calculated using travel distance to consultations and to have blood tests done; out-of-pocket costs for consultations and blood tests; time away from usual activities to attend consultations; purchasing of over-the-counter medicines (e.g. antihistamine, adrenaline auto-injectors); out-of-pocket costs incurred through the purchase of the literature works relating to the management of allergies; and out-of-

pocket costs incurred through visits to health professionals, including GPs, paediatricians, allergy specialists and dietitians, allergy-related ED visits and inpatient admissions.

To calculate the costs associated with distances travelled, Government allowances of \$0.66 per km were applied to the reported travel distances. An hourly value for time away from usual activities was based on the Australian median annual salary (\$66 000) divided by the standard working hours per year (1725) to generate a value of \$38.26.¹⁸ For over-the-counter medicines, unit costs were derived from the Pharmaceutical Benefits Schedule.¹⁹

Analysis

The primary analysis was done by intention to treat (ITT), including all participants enrolled in the study within the cohort that they were recruited into regardless of whether they had been seen at the time of follow-up. As a secondary analysis, we conducted a per-protocol (PP) analysis where we excluded CC families who withdrew from the allergy clinic waitlist or failed to attend their appointment and IC families who chose not to see or failed to attend the paediatrician appointment.

For both the ITT and PP analyses, total costs for the CC and IC groups as well as average costs and consultation times per patient in each group were estimated over the 12-month period. The cost and time data were bootstrapped to generate 95% confidence interval (CI) for each of the analysis outputs for the CC and IC group (due to the highly skewed nature of the cost data), as well as for the differences between the groups.

Results

Of the 994 children assessed for eligibility, 507 were eligible, of which 373 (74%) consented to take part. Of the 192 in the IC, 115 (60%) indicated that they wanted to take up the community-based model of care, with 93 of these patients (81%) doing so by 12 months. Of the 181 in the CC, 54 (28%) saw a hospital allergist by 12 months, 108 (60%) had not received an appointment at 12 months and 19 had an appointment scheduled but failed to attend (11%). Overall, sample retention at 6 and 12 months after recruitment was 325/373 (87%) and 317/373

(85%), respectively. Table 2 shows baseline characteristics of the IC and CC groups, based on the ITT and PP analyses. IC families who chose to see the community paediatrician were similar to those who did not with respect to child age and number and type of suspected food allergies (all $P < 0.05$, Table S1, Supporting Information).

Twenty-six community paediatricians took part in this study. The number of community paediatrician appointments attended by each IC child were one ($n = 20$), two ($n = 59$) or three ($n = 2$). For 12 children, we were unable to determine the number of appointments because their Consultation Records were incomplete. Of the 93 children seen by a community paediatrician, 34 (37%) were referred back to the hospital by the paediatrician oral food challenge ($n = 19$), possible anaphylaxis ($n = 6$), SPT required ($n = 4$) or others ($n = 5$). Of the 19 referred for an oral food challenge, 7 (41%) were thought to need an oral food challenge by an RCH allergist.

Health-care system costs

Table 3 reports the average cost and consultation time estimates per child seen for the two groups as well as the aggregate costs per group. In the ITT analysis, average costs per patient receiving allergy care were \$333 in the IC compared with \$319 in the CC (mean difference \$14, 95% CI $-\$97$ to $\$118$, $P = 0.81$). The increased costs in the community model are due to follow-up paediatrician visits and the costs of the 29 families who waited and were seen in the allergy clinic. In the PP analysis, however, average costs per patient was slightly lower in the community model (\$284 for the IC vs. \$319 for the CC; mean difference $-\$35$ (95% CI $-\$156$ to $\$62$), $P = 0.54$).

For the ITT analysis, total healthcare system costs across the IC were \$49 973 compared with \$17 213 in the CC; difference, \$28 759 (95% CI $\$19\,805$ – $\$39\,400$, $P < 0.0001$), reflecting increased access to health services in the IC.

Family out-of-pocket costs

In the ITT analysis, the total out-of-pocket costs per family was \$129 in the IC compared with \$89 in the CC (mean difference \$40, 95% CI $\$4$ – $\$77$, $P = 0.03$, Table 4). In the PP analysis, the difference in total out-of-pocket cost per family was higher (\$171 for the IC vs. \$73 for the CC; mean difference \$98 (95% CI $\$58$ – $\$138$), $P < 0.0001$).

Costs relating to time away from usual activities (productivity losses) were also higher in the IC. In the ITT analysis, IC losses equated to \$389 compared with \$339 in the CC (mean difference \$50, 95% CI $-\$115$ to $\$215$, $P = 0.55$). In the PP analysis, losses to the value of \$379 were estimated for the IC compared to \$304 in the CC (mean difference \$75, 95% CI $-\$84$ to $\$234$, $P = 0.35$).

Discussion

This is the first study to evaluate the costs of a community-based model of care for simple paediatric food allergy based on sIgE. In the ITT analysis, there was a greater overall mean cost to the health-care system per patient seen, higher out-of-pocket costs to the family and higher productivity losses in the IC versus CC. However, when the analysis was restricted to those families who received their allocated intervention (PP analysis), there was a lower mean cost to the health-care system in the IC versus CC

Table 1 Unit costs

Resource	Unit cost (\$)
Initial attendance (<45 min) MBS Item 110†	128.3
Initial attendance (>45 min) MBS Item 132†	224.35
Subsequent attendances (<20 min) MBS Item 116†	64.2
Subsequent attendances (<20 min) MBS Item 133†	112.3
Skin-prick test (hospital)	33.15
sIgE test (community)	22.8
sIgE test (hospital)	22.8
Ara h2 test (hospital)	22.8
Oral food challenge	1150

†MBS Item unit costs reflect 85% of the full MBS Item benefits. MBS, Medicare Benefits Schedule, sIgE, serum-specific immunoglobulin E.

Table 2 Baseline characteristics of participants, by intention-to-treat and per-protocol analysis

Characteristics	Intention to treat (all families)		Intention to treat (seen by 12 months)		Per protocol (all families)		Per protocol (seen by 12 months)	
	Intervention (n = 192, n (%))	Control (n = 181, n (%))	Intervention (n = 123, n (%))	Control (n = 54, n (%))	Intervention (n = 93, n (%))	Control (n = 157, n (%))	Intervention (n = 93, n (%))	Control (n = 54, n (%))
Child								
Age in years, M (SD)	3.7 (2.8)	3.4 (2.9)	3.8 (3.0)	2.0 (2.3)	4.2 (3.1)	3.4 (3.1)	4.2 (3.1)	2.0 (2.3)
Male	113 (58.9)	95 (52.5)	75 (61.0)	30 (55.6)	59 (63.4)	79 (50.3)	59 (63.4)	30 (55.6)
1st child	95 (49.5)	95 (52.5)	64 (52.0)	30 (55.6)	43 (46.2)	81 (51.6)	43 (46.2)	30 (55.6)
Health-care card	54 (28.1)	51 (28.2)	31 (25.2)	10 (18.5)	21 (22.6)	43 (27.4)	21 (22.6)	10 (18.5)
Child's condition								
Number of known/suspected food allergies:								
1	108 (56.3)	115 (63.5)	72 (58.5)	37 (68.5)	54 (58.1)	96 (61.2)	54 (58.1)	37 (68.5)
2	54 (28.1)	53 (29.3)	34 (27.6)	14 (25.9)	26 (28.0)	50 (31.9)	26 (28.0)	14 (25.9)
3 or more	30 (15.6)	13 (7.2)	17 (13.8)	3 (5.6)	13 (14.0)	11 (7.0)	13 (14.0)	3 (5.6)
Suspected/known allergens								
Peanut	96 (50.0)	80 (44.2)	63 (51.2)	23 (42.6)	50 (53.8)	74 (47.1)	50 (53.8)	23 (42.6)
Tree nuts	64 (33.3)	57 (31.5)	40 (32.5)	9 (16.7)	34 (36.6)	48 (30.6)	34 (36.6)	9 (16.7)
Egg	60 (31.3)	64 (35.4)	39 (31.7)	27 (50)	22 (23.7)	55 (35.0)	22 (23.7)	27 (50)
Cow's milk	33 (17.2)	32 (17.7)	19 (15.5)	12 (22.2)	17 (18.3)	29 (18.5)	17 (18.3)	12 (22.2)
Other	26 (13.5)	16 (8.8)	11 (8.9)	3 (5.6)	7 (7.5)	12 (7.6)	7 (7.5)	3 (5.6)
Previous diagnoses:								
Eczema	123 (64.1)	111 (61.3)	76 (61.8)	34 (63.0)	57 (61.3)	101 (64.3)	57 (61.3)	34 (63.0)
Hay fever†	33 (17.2)	33 (18.2)	19 (15.5)	7 (13.0)	17 (18.3)	29 (18.5)	17 (18.3)	7 (13.0)
Asthma‡	41 (21.4)	37 (20.4)	25 (20.3)	8 (15.0)	22 (23.7)	31 (19.8)	22 (23.7)	8 (14.8)
Family characteristics								
English main language in the home	144 (75.0%)	144 (79.6%)	94 (76.4)	43 (79.6)	71 (76.3)	124 (79.0)	71 (76.3)	43 (79.6)
Socio-economic status (SEIFA§, M (SD))	1010.7 (53.6)	1016.1 (55.8)	1003.8 (58.4)	1020.9 (53.14)	1001.4 (61.0)	1016.4 (54.0)	1001.4 (61.0)	1020.9 (53.14)
Family member with medical conditions:								
Food allergy	57 (29.7)	59 (32.6)	27 (22.0)	16 (29.6)	18 (19.4)	51 (32.5)	18 (19.4)	16 (29.6)
Eczema	94 (49.0)	82 (45.3)	55 (44.7)	23 (42.6)	41 (44.1)	70 (44.6)	41 (44.1)	23 (42.6)
Hay fever¶	117 (60.9)	121 (66.9)	78 (63.4)	33 (61.1)	59 (63.4)	100 (63.7)	59 (63.4)	33 (61.1)
Asthma‡‡	81 (42.2)	77 (42.5)	55 (44.7)	21 (38.9)	43 (46.2)	65 (41.4)	43 (46.2)	21 (38.9)
Responding parent								
Age in years, M (SD)‡‡	36.1 (5.7)	36.2 (5.7)	36.1 (5.9)	36.2 (5.7)	36.5 (6.1)	36.2 (5.8)	36.5 (6.1)	35.0 (5.6)
Mother§§	166 (86.5)	165 (91.2)	105 (85.4)	51 (94.4)	79 (85.0)	142 (91.5)	79 (85.0)	51 (94.4)
Has cohabiting partner	175 (91.2)	166 (91.7)	116 (94.3)	50 (92.6)	88 (94.6)	145 (92.4)	88 (94.6)	50 (92.6)
Highest education:								
Completed University Qualification¶¶	113 (58.9)	124 (68.5)	70 (56.9)	37 (68.5)	54 (58.1)	108 (68.8)	54 (58.1)	37 (68.5)

†One missing value from the ITT IC (all families), 3 missing values from the ITT CC (all families), missing value from PP IC (seen by 12 months), 1 missing value from PP IC (all families), 1 missing value from the PP CC (all families), 1 missing value from the ITT CC (all families), 1 missing value from the ITT CC (all families). ‡Two missing values from the ITT CC (all families), 1 missing value from the PP CC (all families). §SEIFA (Socio-Economic Indexes for Areas) was developed by the Australian Bureau of Statistics to rank areas in Australia by relative socioeconomic disadvantage, based on the 5-yearly census data. Mean = 1000, SD = 100.²⁰ ¶One missing value from the ITT IC (all families), 1 missing value from the ITT IC (seen by 12 months). ††One missing value from the ITT IC (all families), 2 missing values from the ITT CC (all families), 1 missing value from the ITT IC (seen by 12 months), 1 missing value from the PP IC (all families), 1 missing value from the ITT CC (all families). ‡‡Three missing values from the ITT IC (all families), 2 missing values from the ITT CC (all families), 2 missing values from the PP CC (all families). §§One missing value from the ITT CC (all families), 1 missing value from PP CC (all families), ¶¶One missing value from the ITT IC (all families). CC, control cohort; IC, intervention cohort; ITT, intention to treat; PP, per protocol.

but the total out-of-pocket and productivity costs were higher in the IC (although neither reached statistical significance). Based on the costs to the health-care system, this suggests that community-based care provides an efficient means to deliver timely care for simple food allergy with minimal increased costs to families. We could find no other evaluations of models that aim to shift simple food allergy care from over-burdened hospital systems.^{14,15} Hence our study provides important and novel information on the costs of such a model and addresses a major issue in health-care access for children with food allergy.

To implement a community model of care for managing simple food allergies, triaging of children with suspected simple food allergy away from hospital services to a trained community paediatrician would need to occur. Such triaging raises issues around equity of care and parent rights to choose where their child is treated. While some community paediatricians in Victoria bulk bill (6 of 26 did so in this study), many do not. As a result, families may have to pay an out-of-pocket cost to see a community-based paediatrician for a service, which would not be incurred in the public hospital system. In this trial, we told families about potential out-of-pocket costs and despite this, 60% of eligible families chose to see the community paediatrician. This percentage could rise with active re-direction of referrals but such re-direction would need to consider family preference and ability to pay. Some Australian paediatric hospital allergy clinics already actively re-direct referrals for children with suspected simple food allergies back to their primary care providers.²¹

Within the IC, 34 families were referred back to the allergy clinic; 19 for a possible oral food challenge. This undermines the efficacy of the model. However, of these, only seven went on to have an oral food challenge. Further research is needed to understand why this is so (e.g. lack of clarity about when a challenge is/is not needed and variation in individual allergist care) and changes to training or guidelines may be required to reduce what seemed to be some unnecessary referrals back to the hospital.

This study has several strengths. We had a large sample, good clinical engagement with community paediatricians, comprehensive cost data, high retention rates and little missing data. A limitation was that families were not randomly allocated to groups, so potential unmeasured confounders could be unequally distributed between groups. In a pragmatic trial such as this, we could not use a parallel design because doing so would artificially reduce the time to be seen (our primary outcome) in the CC as we would have recruited our intervention sample from the waitlist, therefore reducing the length of the waitlist. Nevertheless, baseline socio-demographic and child atopy characteristics were broadly similar between the two groups. We could not blind families to their group status, but this is unlikely to have affected the costs of care as these are largely beyond the family's influence. The 12-month time horizon limited the capture of longer-term cost differences between children in the IC and CC groups and our results may not generalise to families attending appointments after this period. We only studied one model of food allergy care, and further research could examine costs of food allergy care delivered by private specialists. Finally, our results may not generalise to non-English-speaking families.

Table 3 Cost to the health-care system for children seen by 12 months

	Intention-to-treat analysis			Per-protocol analysis				
	Intervention cohort (n = 123) allergy clinic visit	30: Control cohort (n = 54)	Difference (IC-CC)	P value	Intervention cohort (n = 93) of whom 31 referred and seen in allergy clinic	Control cohort (n = 54)	Difference (IC-CC)	P value
Time (mins) spent per patient seen (95% CI)†	73 (69–78)	111 (97–126)	–38 (–49––27)	<0.0001	63 (59–66)	111 (97–126)	–49 (–63 to –35)	<0.0001
Costs per patient (\$) (95% CI) for:								
SPT (community)	1.0 (0–3)	13 (11–16)	–16 (–20 to –13)	<0.0001	2 (0–3)	9 (6–11)	–21 (–24 to –17)	<0.0001
SPT (hospital)‡	14 (13–16)	1.0 (0.3–1.8)	14 (12–16)	<0.0001	18 (16–20)	1.0 (0.2–2.1)	18 (15–20)	<0.0001
sigE test (community)								
sigE test (hospital)	0 (0–1)	0 (0–1)	0 (–1 to 1)	0.85	0 (0–0)	0 (0–1)	0 (–1 to 0)	0.19
ARA h2	78 (25–150)	106 (22–217)	–28 (–135 to 77)	0.62	11 (0–32)	106 (22–217)	–95 (–217 to 0)	0.08
Oral Food Challenge								
MBS item fees (comm.)§	184 (174–195)	66.9 (55.3–78.6)	5 (–7 to 17)	0.47	236 (222–250) 41.7 (27.6–55.5)	179.8 (167–193.5)	56 (42–70)	<0.0001
MBS item fees¶ (hospital)								
Average costs (\$ per/patient seen (95% CI)	333 (270–414)	319 (225–430)	14 (–97 to 118)	0.81	284 (250–324)	319 (225–430)	–35 (–156 to 62)	0.54
Total costs (\$) in 12 months (95% CI)	45 973 (37 238–57 167)	17 213 (12 168–23 216)	28 759 (19 805–39 400)	<0.0001	30 661 (26 996–34 970)	17 213 (12 168–23 216)	13, 448 (6141–19 980)	<0.001

†Assuming patients referred to the RCH by a community paediatrician had an average contact of 111 min (as observed for other patients attending the RCH). ‡One missing value from the ITT CC, 1 missing value from the PP CC. §Five missing values from the ITT IC, 5 missing values from the PP IC. ¶One missing value from the ITT CC, 1 missing value from the ITT IC, 1 missing value from the PP IC, 1 missing value from the PP CC. CC, control cohort; IC, intervention cohort; ITT, intention to treat; MBS, Medicare Benefits Schedule; PP, per protocol.

Table 4 Out-of-pocket costs to the family within 12 months

	Intention-to-treat analysis			P value	Per-protocol analysis			P value
	Intervention Cohort (n = 163)	Control Cohort (n = 135)	Difference (IC-CC)		Intervention Cohort (n = 82)	Control Cohort (n = 121)	Difference (IC-CC)	
Average (mean) costs per patient (\$) at 12 months (95% CI) for:								
Study visits								
Paediatrician visits OOP	49.2 (34.2–64.3)	0	49.2 (32.8–65.7)	<0.0001	86.7 (60.1–113.3)	0	86.7 (65–108.3)	<0.0001
Community blood tests OOP	2 (0.3–3.6)	0	2 (0.2–3.8)	0.03	4 (0.7–7.2)	0	4 (1.3–6.6)	0.004
Total visits OOP (visit and blood tests OOPs)	51.2 (35.9–66.6)	0	51.2 (34.4–68.1)	<0.0001	90.7 (63.5–117.7)	0	90.7 (68.6–112.7)	<0.0001
Travel to visit and blood tests OOP†	21.3 (17.1–25.5)	7.4 (4.6–10.3)	13.9 (8.6–19.2)	<0.0001	31.1 (24.3–38)	8.3 (5.1–11.5)	22.8 (16–29.6)	<0.0001
Total visit OOP‡	72.5 (56.1–89)	7.4 (4.6–10.3)	65.1 (46.9–83.3)	<0.0001	121.8 (94.1–149.4)	8.3 (5.1–11.5)	113.4 (90.6–1336.3)	<0.0001
Other services accessed								
GP OOP§	1.8 (0.4–3.1)	3 (1–5)	–1.2 (–3.6 to 1.1)	0.30	0.4 (0–1.2)	3 (0.9–5.2)	–2.6 (–5.3 to 0)	0.05
Paediatrician OOP	5.8 (0.8–10.7)	6.3 (0.4–13)	–0.5 (–8.7 to 7.6)	0.90	5.2 (0–11.8)	6.2 (0–13.6)	–1 (–11.4 to 9.4)	0.85
OTC OOP	23.4 (19–27.8)	16.5 (12.9–20.2)	6.9 (1.0–12.7)	0.02	24.8 (18.6–31)	15.6 (12–19.3)	9.2 (2.5–15.9)	0.01
Other services accessed OOP¶	25.9 (10.7–41)	55.8 (31.3–80.3)	–29.9 (–2.2 to –57.6)	0.03	18.5 (0.6–36.5)	39.5 (17.9–61.1)	–21 (–51 to 9)	0.17
Total OOP of all other services accessed††	56.8 (38–75.6)	81.6 (54.9–108.3)	–24.8 (–56.6 to 7)	0.49	49 (29.5–68.4)	64.4 (41.2–87.7)	–15.4 (–47.7 to 16.9)	0.35
Total OOP‡‡	129.4 (104.3–154.5)	89.1 (62.5–115.7)	40.3 (3.8–76.8)	0.03	170.7 (135.9–205.6)	72.7 (49.5–95.9)	98 (58.1–138)	<0.0001
Parents “days off” to attend visits§§	152.9 (116.4–189.4)	70.8 (40.7–100.9)	82.1 (33.7–130.4)	0.001	209.6 (152.4–266.8)	79 (45.7–112.3)	130.6 (69–192.2)	<0.0001
Parents “days off” to attend other services	236.1 (132.3–334)	268.4 (156.8–380)	–32.3 (–184.4 to 120)	0.68	169.8 (73.8–264.7)	225.1 (136.1–314.1)	–55.3 (–188.5 to 77.8)	0.41
Total productivity losses	389 (273.8–504.2)	339.2 (222.2–456.3)	49.8 (–115 to 214.6)	0.55	379.4 (250.5–508.3)	304.1 (205.7–402.6)	75.3 (–83.6 to 234.1)	0.35

†Two missing values from the ITT IC, one missing value from the PP CC. ‡Three missing values from the PP CC. §One missing value missing from the ITT IC, five missing values from the PP CC.

¶Two missing values from the PP CC. ††Two missing values from the PP CC. ‡‡Three missing values from the ITT IC, eight missing values from the PP CC. §§Two missing values from the PP CC. CC, control cohort; IC, intervention cohort; ITT, intention to treat; OOP, out of pocket; OTC, over the counter; PP, per protocol.

Implications for clinical practice or health policy

Published results of our trial provide evidence that community-based paediatricians offer sooner the care that is of similar quality and safety to that provided by their allergy specialist counterparts.¹³ This economic analysis suggests that the new model could provide an efficient means of managing simple paediatric food allergy care. Ultimately, some care for less complex food allergy could be de-centralised from tertiary specialists to community paediatricians, which will require triaging of hospital referrals and training of community paediatricians. This, in turn, could shorten tertiary centre waiting lists and free up these centres to manage more complex food allergy.

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Supporting Information

Additional Supporting Information may be found in the online version of this article at the publisher's web-site:

Table S1. Breakdown of baseline characteristics for intervention cohort participants, by intention-to-treat.

Supplementary Table 1. Breakdown of baseline characteristics for Intervention cohort participants, by intention-to-treat

Child's Characteristics	IC – saw pediatrician (N=115)	IC – saw RCH allergist (N=77)
Age in years, <i>M (SD)</i>	3.9 (3.0)	3.3 (2.6)
Male, n (%)	72 (62.6)	41 (53.3)
Number of known/suspected food allergies, n (%):		
1	63 (54.8)	45 (58.4)
2	32 (27.8)	22 (28.6)
3	20 (17.4)	10 (13.0)
4	0 (0.0)	0 (0.0)
Socio-economic status (SEIFA*) <i>M (SD)</i>	1004.7 (58.0)	1019.7 (45.1)

* SEIFA (Socio-Economic Indexes for Areas) was developed by the Australian Bureau of Statistics to rank areas in Australia by relative socio-economic disadvantage, based on the 5-yearly Census data. Mean=1000, SD=100.²⁰

Abbreviations: ITT, intention to treat