Economic Burden of Atopic Dermatitis in High-Risk Infants Receiving Cow's Milk or Partially Hydrolyzed 100% Whey-Based Formula

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Objective To estimate the health and economic impact of feeding partially hydrolyzed formula–whey (PHF-W) instead of standard cow's milk formula (CMF) for the first 4 months of life among US infants at high risk for developing atopic dermatitis (AD).

Study design A Markov model was developed integrating published data, a survey of US pediatricians, costing sources and market data, and expert opinion. Key modeled outcomes included reduction in AD risk, time spent post AD diagnosis, days without AD flare, and AD-related costs. Costs and clinical consequences were discounted at 3% annually.

Results An estimated absolute 14-percentage point reduction in AD risk was calculated with the use of PHF-W compared with CMF (95% CI for difference, 3%-22%). Relative to CMF, PHF-W decreased the time spent post-AD diagnosis by 8.3 months (95% CI, 2.78-13.31) per child and increased days without AD flare by 39 days (95% CI, 13-63) per child. The AD-related, 6-year total cost estimate was $495 less (95% CI, −$813 to −$157) per child with PHF-W ($724 per child; 95% CI, $385-$1269) compared with CMF ($1219 per child; 95% CI, $741-$1824).

Conclusion Utilization of PHF-W in place of CMF as the initial infant formula administered to high-risk US infants not exclusively breastfed during the first 4 months of life may reduce the incidence and economic burden of AD. Broad implementation of this strategy could result in a minimum savings of $355 million per year to society. *(J Pediatr 2015;166:1145-51)*.

Atopic dermatitis (AD) is an increasingly prevalent chronic skin disease which typically presents during infancy.[1] In the US, AD affects 11%-17% of children.[2,3] More than 50% of children with AD will develop asthma and allergies in the first few years of life.[4] Pediatric AD is associated with a considerable resource use, economic, and quality of life burdens.[1,5-7]

Results from the German Infant Nutritional Intervention (GINI) study demonstrated that infants with atopic heredity fed a standard intact protein cow's milk formula (CMF) during the first 4 months of life had a higher incidence of AD up to age 10 years compared with those fed a partially hydrolyzed 100% whey-based formula (partially hydrolyzed formula–whey [PHF-W]) or an extensively hydrolyzed casein formula (extensively hydrolyzed formula–casein [EHF-C]) during the first 4 months of life.[8] These findings, from the largest independent study on this topic to date, have been observed or confirmed in several subsequent studies, including meta-analyses.[9-12] As a result, the use of hydrolyzed formulas is considered a viable AD risk-reduction strategy in high-risk formula-fed infants by US and European organizations.[13-15]

In the US, PHF-W is marketed for routine use in healthy infants from birth, and the cost is about the same as for intact CMFs. In contrast, EHF-C is typically reserved for infants with special nutritional needs and not typically used in healthy infants from birth. EHF-C costs more than routine intact CMFs and may require a physician's prescription under the Special Supplemental Nutrition Program for Women, Infants, and Children.

The use of PHF-W in high-risk infants has been found to be cost-effective and/or cost-saving compared with CMF in several developed countries, including

AD	Atopic dermatitis
ADCS	Atopic dermatitis-controlled state
CMF	Cow's milk formula
EHF-C	Extensively hydrolyzed formula–casein
GINI	German Infant Nutritional Intervention
PHF-W	Partially hydrolyzed formula–whey
PSA	Probabilistic sensitivity analysis
uSA	Univariate deterministic sensitivity analysis

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Germany,[16] Australia,[17] and France.[18] Similar information is lacking for the US, however. In the present study, we used established health economic mathematical modeling techniques[19,20] to estimate the economic impact of feeding US infants at high-risk for developing AD with PHF-W instead of CMF for the first 4 months of life.

Methods

Our analysis was conducted using Markov cohort modeling techniques,[21,22] adopting a US societal perspective to include direct medical (eg, physician visits), direct nonmedical (eg, transportation costs for physician visits), and indirect (eg, productive time lost attending a sick child) costs associated with formula feeding and AD treatment regardless of the party ultimately bearing these costs. Consistent with the GINI study,[23] a 6-year time horizon was adopted to capture the longer-term impact of this early, short-term nutritional intervention. Likewise, the target population (high-risk infants, defined as having at least 1 biologic parent or sibling with an allergic disease history), age at formula initiation, formula feeding duration, and AD incidence were based on the GINI study.[24]

Model Structure

Our model follows for up to age 6 years a simulated cohort of newborns who initiated a 4-month feeding course of PHF-W or CMF (**Figure 1**; available at www.jpeds.com). All formula use was assumed to continue until age 12 months using age- and nutrition requirement–appropriate volumes. Over time, it was assumed that a percentage of children developed AD, based on the GINI study, and as a result were treated by: (1) a change in infant formula only; (2) the addition of pharmacotherapy only with no change in formula; or (3) a change in infant formula and addition of pharmacotherapy. These approaches were selected in accordance with previous models (eg, that of Iskedjian et al),[18] a US survey of 101 pediatricians on the management patterns of AD in infants and toddlers (children aged ≤36 months),[25] and the opinion of 4 clinicians with expertise in treating pediatric AD. Infants who may have responded to a given formula change were assumed to continue on it until age 12 months or their next AD flare. Children who responded to pharmacotherapy were assumed to finish their treatment course and remained on their assigned formula until age 12 months. Thus, from year 1 through year 6, the pharmacotherapy-only treatment approach was used exclusively.

In this model, treatment response rates were assumed to be assessed every 2 weeks and determined the speed at which AD symptoms resolved and children were transitioned to an AD-controlled state (ADCS). Children in the ADCS were at risk for acute dermatitis flares, which were treated with generally treatment algorithms as the initial AD event. Mortality risk unrelated to AD was included as well, to account for lost PHF-W investment in cases of premature death (for simplicity, not shown in **Figure 1**).[26]

Model Inputs

Several model inputs were obtained from a 2011 survey of 101 US pediatricians on the management patterns of AD in infants and toddlers (children aged ≤36 months).[25] The design and key results of that survey are available elsewhere.[25] In brief, a convenience sample of US practicing pediatricians, the majority from the 25 most populous states, was identified. Survey questions assessed physician characteristics, referral patterns, laboratory test use, emollient use, treatment approach (based on age, severity, and symptom location, ie, face or trunk and extremities), recurrence, and hospitalization. Additional questions were aimed at quantifying AD treatment-associated costs. Questions regarding dietary management were defined as formula changes and were limited to infants (age <12 months) not exclusively breastfed. A pharmacologic approach was defined as prescribing or suggesting active medications.

The age-stratified biweekly AD probabilities for CMF (**Table I**; available at www.jpeds.com) were obtained using the linear interpolation of the 1-, 3-, and 6-year cumulative incidence data from the GINI study.[23] The corresponding probabilities for PHF-W were derived on the basis of the cumulative relative risk from the same study, by multiplying the adjusted relative risk by the 6-year cumulative incidence.[23] The case severity distribution (**Table I**) was derived from the US pediatrician survey. The distribution of treatment modalities and their corresponding response rates by age and initial severity of AD presentation, as well as flare risk by age and severity, were obtained from the US pediatrician survey (**Table I**).

Daily formula volume intake was estimated using unpublished data (unpublished data, Nestlé Nutrition, July 3, 2013) from the Feeding Infants and Toddlers Study.[27,28] All infant formula acquisition prices and relative market shares were estimated using Nielsen data (unpublished data, Nestlé Nutrition, June 5, 2013). The cost of the initially assigned formulas were estimated as $16.13/356 g for PHF-W and $16.13/353 g for CMF. Up to 2 treatment formula changes were allowed in the event that AD developed and treatment included a switch from initially assigned formula to a treatment formula. The latter included EHF-C, an amino acid-based formula, a soy-based formula, and, for patients assigned CMF, PHF-W, and vice-versa, in proportions reported in the US pediatrician survey. Treatment formula costs were based on the acquisition prices of each type of formula and their relative usage frequency, as reported in the US pediatrician survey. Only the additional costs incurred as a result of feeding with an alternative infant formula above and beyond the cost of CMF were considered, because infants would be fed with formula until age 12 months when not exclusively breastfed.

Pharmacotherapy regimen utilization was determined using data from the US pediatrician survey, supplemented with clinical expert opinion (**Table II**; available at www.jpeds.com) and corresponding costs were obtained from drug price references,[29] including online retailers (eg, http://www.google.com/shopping) for over-the-counter products.

Regardless of treatment approach, emollient use was assumed in 89.7% of cases of mild AD and 93.4% of cases of moderate/severe AD.

Annual pediatrician visit numbers associated with AD treatment (specifically, 2.45 visits for those with mild AD and 5.78 visits for those with moderate/severe AD, excluding the initial visits at AD presentation) were derived from the US pediatrician survey. Clinical expert opinion was used to support the assumptions that proportions of visits made to pediatricians vs specialists ranged from 27% to 89%, depending on the severity of initial AD presentation, age, and type of visits (ie, initial or follow-up). Costs of pediatrician visits ($52.32) and specialist visits ($86.47) were based on national average reimbursement figures based on Current Procedural Terminology codes,[30,31] taking into account a mix of commercial and public insurance.[32]

A child presenting with AD was assumed to be eligible for various tests (eg, skin prick, specific IgE, radioallergosorbent test, bacterial culture) in proportions varying from 0% to 20% depending on the specific test and the initial severity of AD presentation, as reported in the US pediatrician survey. The costs of the tests were obtained from the Ingenix National Fee Analyzer 2013,[31] reflecting a mix of public and private payers.[30,32] Based on the foregoing, the estimated amount spent on tests was $8.50 for mild AD cases and $31.37 for moderate/severe AD cases.

Indirect costs included the time lost to take care of a child with AD, assumed to be 4 hours at the time of initial AD development plus 2 hours for each subsequent physician visit. The time lost was valued at $15.20/hour, based on the average hourly wage ($23.98)[33] adjusted for 63.4% labor force participation.[34] Finally, travel costs to and from a physician's office was valued at $3.13 (representing an average distance traveled for pediatric services of 5.15 miles[35] at a cost of $0.61 per mile traveled[36]).

In accordance with economic research guidelines,[20] all costs and effects occurring after the first year were discounted at a rate of 3%.

Outcome Measures and Analyses

Base case outcomes for each treatment arm (ie, CMF and PHF-W) included the proportion of children developing AD, the average number of months a child was expected to have AD (ie, from the time of AD diagnosis to the end of the 6-year period), and the number of days without AD flare. Differences between treatment arms were calculated and the relative economic value of PHF-W vs CMF was formally evaluated using incremental cost-effectiveness ratios—calculated by dividing the difference in cost by difference in outcome between the 2 formulas—including the incremental cost per AD case avoided and cost per AD-free day gained.

Univariate deterministic sensitivity analyses (uSAs) and multivariate probabilistic sensitivity analyses (PSAs) were conducted to assess the impact of model parameter uncertainty on the results. Specifically, a deterministic uSA was conducted on individual model parameters, keeping the base case values for other parameters in the model unchanged. In the multivariate PSA, the model outcomes were replicated 5000 times using a different value for each input parameter derived from specified distributions. These 5000 PSA results were then used to estimate nonparametric bootstrapped 95% CIs around all reported mean outcome values.[20] Distribution selected for key epidemiologic and treatment patterns (eg, beta) are reported in **Table I**. Uniform distributions were used for costs, with variations of ±25% around base case values.

Results

Modeled health outcomes were significantly better in the children receiving PHF-W than in those receiving CMF (**Table III**). This finding is consistent with the GINI study results,[23] on which the present model was based. Specifically, feeding of PHF-W instead of CMF resulted in an absolute 14 percentage-point reduction in AD incidence (95% CI for difference, 3%-22%), a mean 8.3-month reduction in the total time spent following an AD diagnosis as a result of reduction in incidence or delayed in onset of AD (95% CI for difference, 2.78-13.31 months), and a mean 39-day increase in days without AD flare (95% CI for difference, 13-63 days).

The overall total net cost was $495 (95% CI for difference, −$813 to −$157) less for high-risk children initially fed PHF-W ($724 per child; 95% CI, $385-$1269) compared with CMF ($1219 per child; 95% CI, $741-$1824) over the 6-year time horizon regardless of whether or not the child developed AD. Total costs were driven primarily by pharmacologic treatment, followed by physician visits. Net cost savings with PHF-W were predicted to occur almost immediately and to improve over time (from $54 by the end of year 1 to $495 by the end of year 6; **Figure 2**), because formula costs were virtually identical, whereas AD incidence, and hence costs, diverged almost instantly.

Because the use of PHF-W was associated with reductions in the number of AD cases and increases in AD-free days relative to CMF, as well as with cost savings, it was considered a dominant strategy over CMF. This dominance was also observed in 99.72% of 5000 multivariate PSA simulations (**Figure 3**).

The factors of greatest influence on the difference in costs between the PHF-W and CMF cohorts in uSA were AD probability in the CMF group (ie, background incidence) and AD relative risk between the CMF and PHF-W groups. Specifically, the cost difference between the 2 groups increased with higher background AD incidence with CMF and higher reductions in risk for PHF-W relative to CMF. Other variables with a minor impact on the results included infant formula cost, discount rates, and risk of flare. Most other variables when analyzed alone had no meaningfully impact on the cost difference.

Finally, the average total direct and indirect (undiscounted) estimated cost of developing AD within the first 6 years of life was $3284 per patient with AD. The average annual total direct and indirect (undiscounted) estimated cost for an incident AD case was $787 (including $659 in

Table III. Base case model results (discounted) for a healthy formula-fed infant with a positive family history of AD

Variables	Initial formula used		
	PHF-W	CMF	Difference
Formula risk reduction, $*	−1.16	-	−1.16
Formula treatment, $	1.84	4.22	−2.38
Physician visits, $	219.22	368.27	−149.05
Pharmacotherapy, $	381.02	641.25	−260.23
Diagnostic testing, $	3.50	5.51	−2.01
Hospitalization, $	1.64	2.59	−0.95
Indirect costs, $	118.10	197.60	−79.50
Total costs, $, mean (95% CI)	724.16 (385-1269)	1219.45 (741-1824)	−495.29 (−813 to −157)
Proportion of children developing AD, %, mean (95% CI)	24 (0.13-43)	38 (23-54)	−14 (−22 to 3)
Days with AD flare, mean (95% CI)	56 (31-97)	95 (58-138)	−39 (−63 to −13)
Months of life post-AD diagnosis, mean (95% CI)	12.1 (6.6-19.9)	20.3 (12.1-28.9)	−8.3 (−13.3 to −2.9)
ICER cost per AD case avoided, $			Dominant (ie, −3590)†
ICER cost per days without AD flare gained, $			Dominant (ie, −12.86)†

ICER, incremental cost-effectiveness ratio.
Dominance refers to a situation in which effectiveness is higher and costs are lower.
*The formula risk reduction and formula management costs are only the excess costs over and beyond the cost of feeding using CMF.
†Negative ICER values suggest a net cost savings due to an avoided AD case and gain in AD-free day indicating dominance of PHF-W over CMF.

direct costs), regardless of the type of formula fed during infancy. The estimated total annual number of physician visits per AD case was approximately 3.58 visits.

Discussion

Our mathematical model suggests that the use of PHF-W instead of CMF for the first 4 months of life should result in a reduced clinical burden of AD and net cost savings. These findings are consistent with results from other developed countries.[16-18] A strength of this analysis is the reliance on a US-based survey of pediatricians[25] as a source of AD treatment pattern and outcome inputs. In contrast, most previous studies relied solely or heavily on expert opinion for resource utilization-related model inputs.[16,18]

The cost-effectiveness of decreasing the risk of AD in US children depends in large part on 3 factors: formula costs, AD incidence, and AD treatment costs. First, the prices of the PHF-W and CMF used in this study were almost identical owing to market dynamics; thus, infant formula cost did not influence the results. Second, the absolute 14-percentage point difference in AD incidence between PHF-W and CMF fed infants in the present analysis reflects the GINI study results[23] and is consistent with that reported in previous studies.[9-12,37]

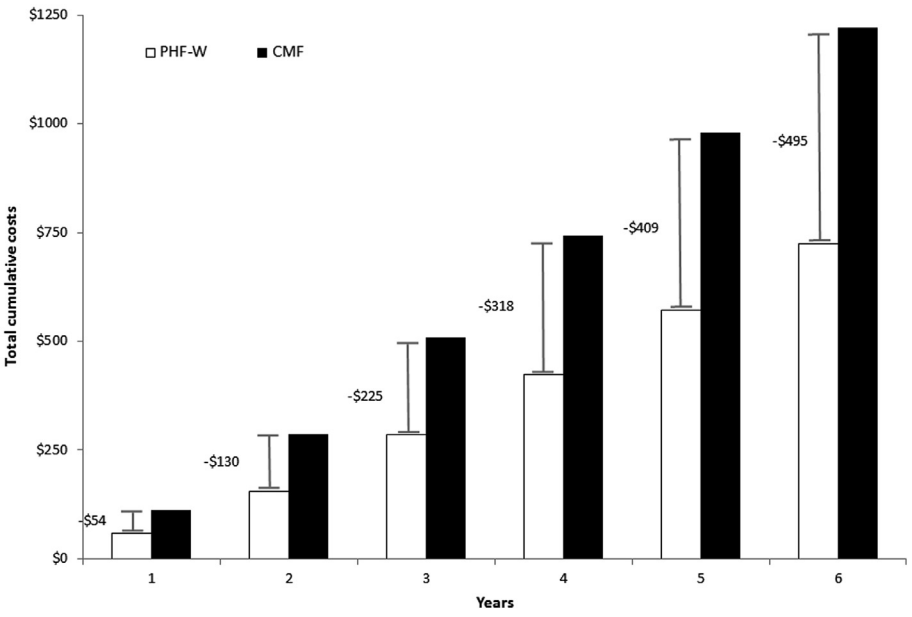

Figure 2. Effect of initial formula administration on cumulative AD-related total costs in healthy infants with a family history of atopic disease, by year. Cumulative overall costs were lower for high-risk children initially fed PHF-W compared with those fed CMF across all years regardless of whether or not the child developed AD.

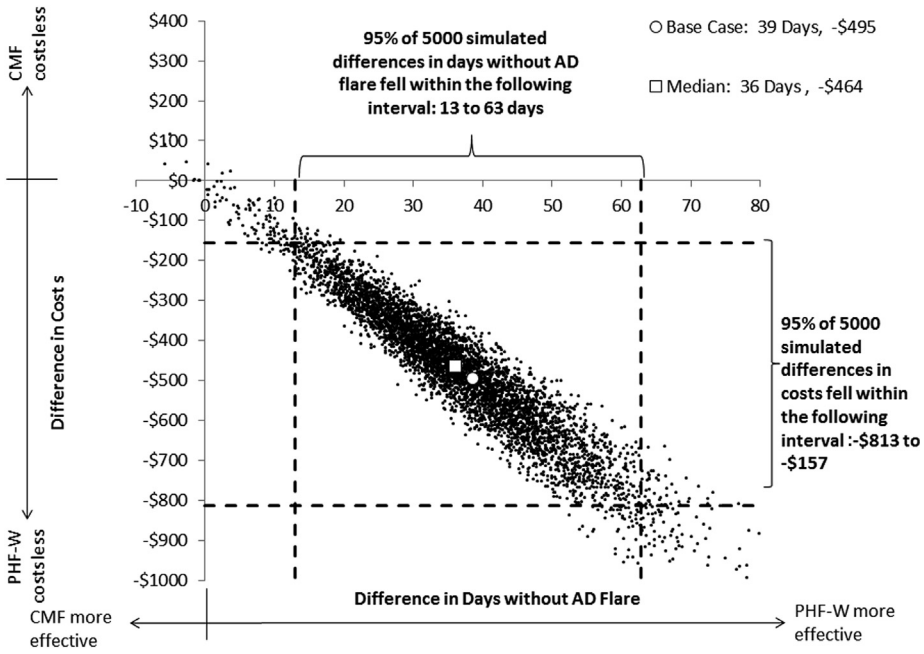

Figure 3. Scatterplot of difference in costs and days without AD flare. Each *black dot* represents 1 of the 5000 multivariate PSA simulations.

The third factor affecting the cost-effectiveness of AD risk reduction is the average annual cost of AD treatment for a patient aged 0-6 years. The estimated annual direct cost of AD treatment was $659, and the total cost was $787. If not conservative, these estimates are consistent with previously reported pediatric AD treatment costs, which have varied from $705[7] (including private insurer costs only) to $1160[7] (including Medicaid costs only) and $1314[5] (including costs to private insurers and families) (all values inflation-adjusted to 2013 dollars). In addition, 3.58 AD physician visits were estimated to occur annually per patient with AD consistent, if not conservative, compared with values from other published studies,[38,39] in particular the 5.4 annual visits assumed in a German economic analysis of the GINI study.[16]

Thus, all 3 of the aforementioned factors affecting cost-effectiveness were based on and/or consistent with the literature and contributed to the estimated cost savings associated with the use of PHF-W instead of CMF in formula-fed high-risk infants.

These results can help estimate the broader, national impact of feeding PHF-W instead of CMF to US infants who are not exclusively breastfed, regardless of family history of atopic disease. If one assumes that of the estimated 4 million children born in the US annually,[40] approximately 52% are not exclusively breastfed,[41] then 31% of nonexclusively breastfed infants are born with a family history of AD, and if all are assumed to receive CMF, then the (undiscounted) savings for the high-risk population alone is approximately $355 million per year (ie, $787/year × 0.70 year × 4 million × 52% × 31%).

To further extrapolate the savings that may be achieved among US children without a family history of atopic disease requires some assumptions regarding both the incidence of AD and the impact of PHF-W compared with CMF in that population. For instance, if one assumes that the risk of AD among children without a family history is one-half of that in those with a family history, and that the relative reduction in the incidence of AD for PHF-W relative to CMF is the same in both populations, then the (undiscounted) savings of feeding PHF-W compared with CMF in those without a family history is approximately $395 million (ie, $787/year × 0.70 year × 50% × 4 million × 52% × 100% − 31%). Under such a scenario, the maximum potentially achievable (undiscounted) savings for the entire population (with or without a family history) is approximately $750 million per year. Similarly, if all nonexclusively breastfed infants in the US received PHF-W instead of CMF, then the total estimated number of AD physician visits avoided could be extrapolated to 3.4 million visits, including 1.6 million visits for infants and children with a family history.

Our study results should be interpreted in light of the following limitations. First, the US pediatrician survey on which the analysis is largely based did not always differentiate between the 2 age groups (0-12 months and >1 year), and thus the overall percentage distribution of patients with AD based on disease severity, initial diagnostic testing, and disease flare probability did not differ by age. Second, the model assumed that all infants would stop receiving infant formula as a nutrition source after 12 months, and thus only pharmacologic treatments were used for children aged 1-6 years. In reality, it is possible that children aged ≥1 year may still be fed with toddler formula. Third, although reliance on a survey of 101 physicians allowed for a more detailed assessment of AD costs,

the detailed questions regarding infant formula might have caused respondents to overreport nutritional interventions at the expense of the more costly pharmacologic approach, which in turn would slightly overestimate the cost savings associated with AD risk reduction. Finally, some possible lost productivity cost due to AD (including, eg, time lost for daily care of a child with AD) was not considered in our analysis. As a result, indirect costs accounted for only 16% of AD-related costs, despite ample evidence indicating that such costs likely account for a significantly greater proportion of total AD-related costs.[18,42,43] As such, the estimated savings associated with PHF-W use are most likely underestimated. Other general limitations inherent to any modeling study, such as the simplification of a complex reality and the use of assumptions from multiple sources, apply to the present analysis as well.

Based on the mathematical model used herein and its assumptions, the use of PHF-W instead of CMF in healthy infants with a family history of allergy who are not exclusively breastfed may be expected to help reduce the incidence of AD and to increase the number of days without AD flares. In the US, the use of PHF-W may provide a net cost savings of $495 per child to the healthcare system and society. Full implementation of this approach could result in an estimated minimum savings of $355 million per year to society and the avoidance of 1.6 million visits per year. Given these estimates and the continuing pressure on the healthcare system imposed by chronic conditions,[19] implementing this strategy should be a consideration for physicians, particularly pediatricians, as well as US private and public health care payers. ■

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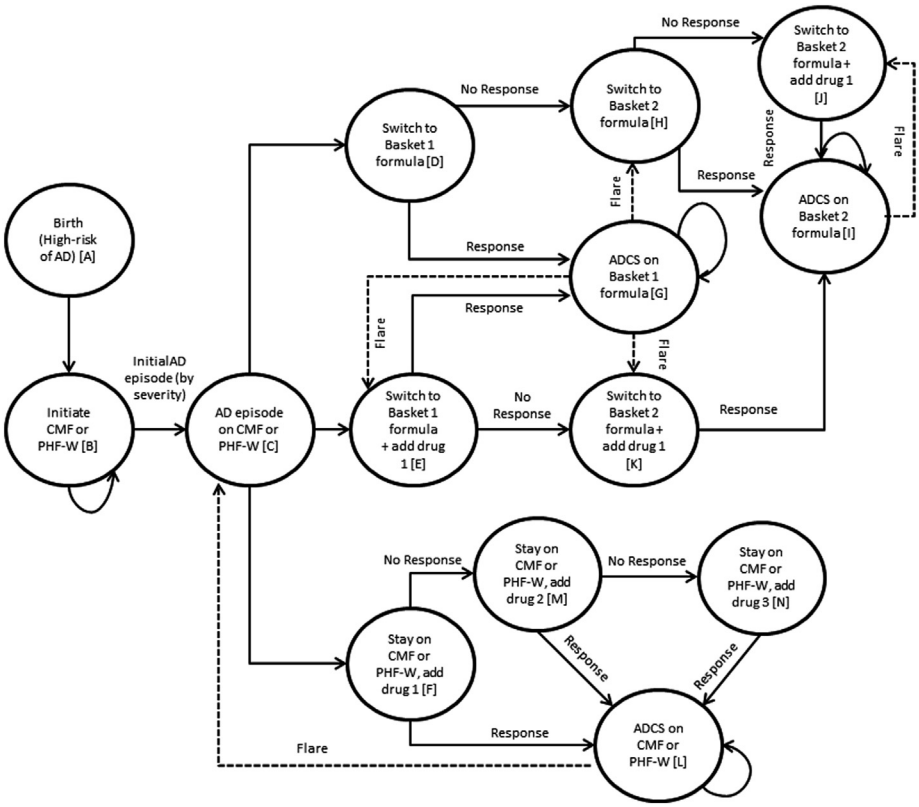

Figure 1. Schematic diagram of the Markov decision model for healthy children at high risk for AD. Children not exclusively breastfed with a family history of allergy enter into the model at birth [A] and initiate a 4-month course of PHF-W or CMF [B]. Children who develop AD [C] are treated by 1 of 3 approaches: formula change only [D], formula change combined with first-line pharmacotherapy [E], or first-line pharmacotherapy only [F]. After first-line treatment, children either enter into the ADCS or, if no response is seen, have a change in treatment regimen [G-N].

Table I. Epidemiologic, clinical, and effectiveness inputs

Variables	Base case	Value in uSA*		Probability distribution for PSA	Source
		Low	High		
AD probability with CMF, %					von Berg et al, 2008[23]
0-1 y	16.80	6.96	29.85	Beta	
>1-3 y	20.07	9.00	34.19	Beta	
>3-6 y	8.42	0.18	29.66	Beta	
AD cumulative relative risk; PHF-W vs CMF					von Berg et al, 2008[23]
0-1 y	0.54	0.33	0.89	Exponential	
1-3 y	0.57	0.36	0.90	Exponential	
3-6 y	0.82	0.40	1.70	Exponential	
Proportion of mild cases, %, 0-6 y	73.20	72.63	73.82	Beta	US pediatrician survey
Flare-up probability, %, 0-6 y					US pediatrician survey
Mild AD	46.72	43.34	50.12	Beta	
Moderate/severe AD	56.86	51.79	61.86	Beta	
AD management 0-12 mo, mild AD, %†					US pediatrician survey
Dietary	12.40	11.90	12.85	Dirichlet	
Combined	48.20	48.59	47.85	Dirichlet	
Medical	39.40	39.51	39.30	Dirichlet	
AD management 0-12 mo, moderate/severe AD, %†					US pediatrician survey
Dietary	12.40	11.61	13.17	Dirichlet	
Combined	48.20	48.83	47.61	Dirichlet	
Medical	39.40	39.56	39.22	Dirichlet	
AD management 1-6 y, mild to severe AD, %					US pediatrician survey
Medical	100	100	100	NA	
Infant formula change response rate, %					US pediatrician survey
For AD infants initially on PHF-W	32.90	26.56	39.56	Beta	
For AD infants initially on CMF	32.50	26.15	39.19	Beta	
Combination therapy response rate, mild AD, %					US pediatrician survey
First-line	68.50	64.70	72.18	Beta	
Second-line	69.30	62.54	75.67	Beta	
Third-line	66.40	53.47	78.19	Beta	
Combination therapy response rate, moderate/severe AD, %					US pediatrician survey
First-line	59.00	51.87	65.95	Beta	
Second-line	62.20	51.37	72.45	Beta	
Third-line	65.20	47.91	80.63	Beta	
First-line pharmacotherapy response rate, 0-12 mo, %					US pediatrician survey
Mild AD	53.70	48.67	58.69	Beta	
Moderate/severe AD	54.10	45.81	62.28	Beta	
First-line pharmacotherapy response rate, 1-6 y, %					US pediatrician survey
Mild AD	61.30	58.40	64.16	Beta	
Moderate/severe AD	54.20	49.01	59.35	Beta	
Second-line pharmacotherapy response rate, all ages, %					US pediatrician survey
Mild AD	66.30	61.92	70.55	Beta	
Moderate/severe AD	57.00	49.52	64.32	Beta	
Third-line pharmacotherapy response rate, all ages, %					US pediatrician survey
Mild AD	64.20	55.77	72.21	Beta	
Moderate/severe AD	33.80	19.06	50.37	Beta	

NA, not applicable.
*Owing to a lack of data sources, some value inputs were based on arbitrary variation rather than on the distribution assumption in the PSA to test the univariate sensitivity.
†All 3 categories were varied simultaneously instead of varying a single proportion of case distribution using a Dirichlet distribution, so that the proportions added up to 100%. This is a scenario analysis rather than a uSA.

Table II. Medical treatments used and acquisition costs by AD disease severity and age group

Age group	Percentage of patients with AD receiving treatment*												Acquisition cost per unit, $	
	0-12 mo						>1-6 y							
AD severity at presentation	Mild			Moderate/severe			Mild			Moderate/severe				
Treatment line	1	2	3	1	2	3	1	2	3	1	2	3	0-12 mo	>1-6 y
Topical emollients (during and after flares)	90	90	90	93	93	93	90	90	90	93	93	93	11.27†,‡	11.27†,‡
Barrier repair topical therapy	4	7	2	16	7	2	5	40	1	13	14	2	148.00†	148.00†
Low-potency topical corticosteroids	40	42	1	26	10	0	37	43	22	28	12	1	65.40†	65.40†
Medium-potency topical corticosteroids	5	42	22	57	18	2	8	5	5	59	25	3	36.55†	54.81†
High-potency topical corticosteroids	0	2	4	5	16	1	0	4	7	6	5	10	6.66†	6.66†
Other topical anti-inflammatory agents	0	3	10	2	10	10	0	3	1	1	2	0	347.42†	347.42†
Antibacterial soap or cleanser	3	5	5	9	2	5	2	4	3	6	2	5	4.32†,‡	4.32†,‡
Topical antibiotics	2	1	1	1	8	1	2	4	2	1	6	1	15.05†	15.05†
Oral antihistamines	7	16	5	30	27	1	7	15	3	34	25	0	9.07†	9.06†
Other corticosteroid/immunosuppressant	0	1	0	1	10	1	0	0	0	1	0	0	67.44†	67.44†
Oral antibiotics	0	2	1	6	5	4	0	2	0	3	3	0	24.81†	31.20†

*Source: US pediatrician survey for percentage of patients with AD using each treatment and clinical expert opinion for specific brands (not shown).
†RED BOOK Online.[29]
‡Costs for over-the-counter products were obtained from online retailers (eg, http://www.google.com/shopping).