

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



LSHTM Research Online

Abuabara, K; Magyari, AM; Hoffstad, O; Jabbar-Lopez, ZK; Smeeth, L; Williams, HC; Gelfand, JM; Margolis, DJ; Langan, SM; (2017) Development and validation of an algorithm to accurately identify atopic eczema patients in primary care electronic health records from the UK. *The Journal of investigative dermatology*. ISSN 0022-202X DOI: <https://doi.org/10.1016/j.jid.2017.03.029>

Downloaded from: <http://researchonline.lshtm.ac.uk/id/eprint/3851063/>

DOI: <https://doi.org/10.1016/j.jid.2017.03.029>

Usage Guidelines:

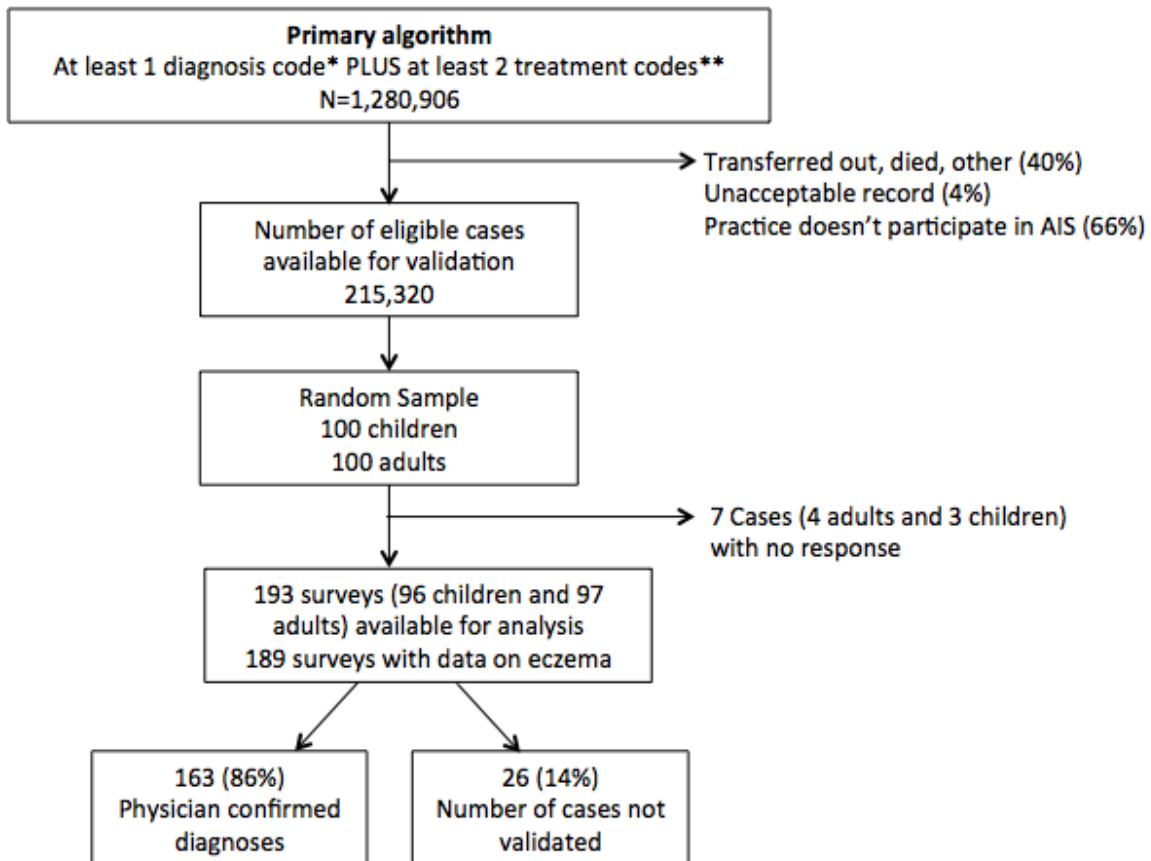
Please refer to usage guidelines at <https://researchonline.lshtm.ac.uk/policies.html> or alternatively contact researchonline@lshtm.ac.uk.

Available under license: <http://creativecommons.org/licenses/by-nc-nd/2.5/>

<https://researchonline.lshtm.ac.uk>

TABLES/FIGURES

Figure 1. Flow chart showing the sampling of patients from THIN and resulting classification



Notes: [*Any of the 5 most commonly used READ codes \(Atopic Dermatitis/ Eczema M111.00, Infantile Eczema M112.00, Flexural Eczema M113.00, Allergic/Intrinsic Eczema M114.00, or Eczema NOS M12z100\).](#) [**Any code for topical emollients, topical steroids, topical calcineurin inhibitors, topical anti-infective treatments, systemic immunomodulatory medications \(including methotrexate, azathioprine, mycophenolate, cyclosporine, or biologics\) or phototherapy on separate days; see Supplemental Table 2\).](#)

Table 1. Distribution of codes in the entire THIN database

	Total	Children (ages 0-17)	Adults (ages 18+)
	N = 9,775,618	N = 1,404,158	N = 8,371,460
<i>Diagnosis codes</i>	<u>Proportion of individuals</u>		
Atopic Dermatitis/ Eczema M111.00	6%	13%	5%
Infantile Eczema M112.00	1%	7%	0%
Flexural Eczema M113.00	1%	2%	0%
Allergic/Intrinsic Eczema M114.00	0%	0%	0%
Eczema NOS M12z100	6%	8%	6%
<u>One or more</u> of the 5 codes listed above	13%	23%	11%
<u>Two or more</u> of the 5 codes listed above	4%	10%	4%
<u>One or more</u> of 32 likely eczema codes*	14%	25%	13%
<u>One or more</u> of 74 possible eczema codes*	29%	47%	26%
<u>Prescription codes</u>			
<u>One or more prescription for any AD-related therapy**</u>	<u>45%</u>	<u>57%</u>	<u>42%</u>
<u>One or more prescription for a topical steroid or calcineurin inhibitor**</u>	<u>39%</u>	<u>42%</u>	<u>38%</u>
<u>One or more prescription for an AD-related systemic treatment **</u>	<u>1%</u>	<u>0%</u>	<u>1%</u>
<u>Other codes</u>			
<u>One or more exclusionary condition***</u>	<u>7%</u>	<u>3%</u>	<u>8%</u>
<u>One or more dermatology consult code</u>	<u>4%</u>	<u>2%</u>	<u>5%</u>
<u>One or more biopsy or patch testing code</u>	<u>1%</u>	<u>0%</u>	<u>1%</u>

Notes: Ages as of Jan 2013; note that among adults, codes may have occurred before age 18. [*See Supplemental Table 1.](#) [**Includes topical skin preparations, topical steroids, topical calcineurin inhibitors, topical anti-infective treatments, and systemic treatments \(including methotrexate, azathioprine, mycophenolate, cyclosporine, biologics or phototherapy\); see supplemental Table 2.](#) [***See Supplemental Table 3.](#)

Table 2. Survey sample characteristics

<i>Survey responses</i>	Total*	Confirmed eczema*	No eczema*	Chi² or Fisher's p-value
	200	163 (81.5%)	26 (13%)	
<i>Diagnosis codes</i>				
Atopic Dermatitis/ Eczema M111.00	116 (58%)	98 (60%)	13 (50%)	0.330
Infantile Eczema M112.00	30 (15%)	24 (15%)	4 (15%)	0.930
Flexural Eczema M113.00	16 (8%)	13 (8%)	2 (8%)	0.960
Allergic/Intrinsic Eczema M114.00	3 (2%)	3 (2%)	0 (0%)	0.486
Eczema NOS M12z100	86 (43%)	73 (45%)	9 (34%)	0.331
Mean number (SD) of the 5 eczema codes listed above	1.3 (0.5)	1.3 (0.6)	1.1 (0.3)	0.051
Mean number (SD) of 32 likely eczema codes**	2.6 (2.9)	2.8 (3.1)	1.7 (1.2)	0.070
Mean number (SD) of 74 possible eczema codes**	4.0 (3.8)	4.1 (3.9)	3.2 (3.3)	0.271
<i>Prescription codes</i>				
Mean number (SD) of prescriptions for any AD-related therapy ***	16.3 (24.5)	17.5 (26)	11.1 (15.0)	0.226
Mean number (SD) of topical steroid or calcineurin inhibitor prescriptions***	9 (15)	6.6 (8.9)	6.5 (7.9)	0.953
Mean number (SD) of AD-related systemic treatment codes***	0.4 (5.8)	0.5 (6.4)	0 (0)	0.691
<i>Other</i>				
Mean number (SD) of exclusionary diagnostic codes [^]	0.4 (1.7)	0.3 (0.7)	0.5 (1.6)	0.281
Total (%) with at least one exclusionary condition [^]	29 (15%)	25 (15.3%)	3 (11.5%)	
Mean number (SD) of diagnostic procedure (biopsy or patch testing) codes [^]	0	0	0	N/A
Mean number (SD) of dermatology consultation codes [^]	0.2 (1.1)	0.3 (1.6)	0.0 (0.2)	0.308
Total (%) with at least one dermatology consult code	19 (10%)	18 (11%)	1 (4%)	
History of atopy, N (%) ^{^^}	64 (39%)	56 (41%)	6 (24%)	0.110
Male N (%)	100 (50%)	86 (53%)	9 (35%)	0.086

Notes: *Columns do not sum to 200 because of missing values (7 unreturned surveys and 4 returned surveys missing a response to the eczema question). **See Supplemental Table 1. ***Includes topical skin preparations, topical steroids, topical calcineurin inhibitors, topical anti-infective treatments, and AD-related systemic treatments (including methotrexate, azathioprine, mycophenolate, cyclosporine, biologics or phototherapy); see supplemental Table 2. [^]See supplemental Table 3. ^{^^}Per physician response on survey; defined as a history of "other atopic disease (e.g. asthma or allergic rhinitis) for adults OR a family history of atopic disease in a first degree relative if aged under 4 years"

Table 3. Positive Predictive Value of Coding Algorithms

	True Positive / All Positive	% of patients with confirmed eczema identified	All		Children (ages 0-17)		Adults (ages 18+)	
			PPV (%)	95%CI	PPV (%)	95%CI	PPV (%)	95%CI
<i>Baseline algorithm</i>								
One of 5 eczema codes + at least 2 treatment codes on separate dates (survey selection criteria)	163/189	N/A	86%	(80-91%)	90%	(83-96%)	82%	(73-89%)
<i>Alternative algorithms*</i>								
Baseline algorithm; at least one treatment is a topical steroid/TCI code	157/183	96%	86%	(80-91%)	90%	(81-95%)	82%	(73-89%)
Baseline algorithm; at least two treatments are topical steroid/TCI codes	133/153	82%	87%	(81-92%)	91%	(82-97%)	84%	(74-91%)
Baseline algorithm; at least one treatment is a topical steroid/TCI code either 3 months prior or up to 1 year after the eczema code	81/92	50%	88%	(80-94%)	92%	(80-98%)	84%	(70-94%)
Baseline algorithm + an additional eczema code (2 eczema codes total)	83/91	51%	91%	(83-96%)	94%	(82-99%)	88%	(74-96%)
Baseline algorithm + an additional eczema code (2 eczema codes total); at least one treatment is a topical steroid/TCI code	82/90	50%	91%	(83-96%)	94%	(83-99%)	88%	(74-96%)
Baseline algorithm + an additional eczema code (2 eczema codes total); at least two treatments are topical steroid/TCI code	133/153	82%	87%	(81%-92%)	91%	(82%-97%)	84%	(74%-91%)
Baseline algorithm + no exclusionary condition code	138/161	85%	86%	(79-91%)	89%	(81-95%)	82%	(71-90%)
Baseline algorithm + asthma or rhinitis code	52/56	32%	93%	(83-98%)	95%	(76-100%)	91%	(77-98%)
Baseline algorithm + dermatology consult code	18/19	11%	95%	(74-100%)	100%	(54-100%)	92%	(64-100%)

Notes: *See Supplemental Tables 2 and 3 for lists of codes. TCI= topical calcineurin inhibitor

Table 4. Age at diagnosis or at last disease activity requiring contact with the physician

	Distribution of estimates by source		Difference between physician estimate from survey and database	
	Mean	95% CI	Mean	95% CI
<i>Age in years at diagnosis (N=160)</i>				
Physician survey	17.9	(14.3, 21.4)	N/A	N/A
Database				
First diagnosis code*	17.1	(13.5, 20.6)	0.8	(-0.3, 1.9)
First prescription for any eczema treatment**	17.4	(13.9, 21.0)	0.4	(-0.8, 1.7)
<i>If no symptoms in the year prior to the last visit date, age at last disease activity (N=53)</i>				
Physician survey	20.7	(14.3, 27.2)	N/A	N/A
Database				
Last diagnosis code*	22.0	(15.6, 28.5)	-1.3	(-2.5, -0.1)
Last prescription for any eczema treatment**	24.6	(14.3, 27.2)	-3.9	(-5.3, -2.4)

Notes: *Any of the 5 most commonly used codes (Atopic Dermatitis/ Eczema M111.00, Infantile Eczema M112.00, Flexural Eczema M113.00, Allergic/Intrinsic Eczema M114.00, Eczema NOS M12z100). **See Supplemental Table 2.