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Table 2 Dermatologists recommendations

Recommendations by dermatology	(*n* = 102)
Add a systemic medication	59.8% (61)
Add topical med	51.0% (52)
Additional internal organ monitoring (pulmonary function test, echocardiography, etc)	34.3% (35)
Laboratories	26.5% (27)
Referral to other specialty	25.5% (26)
Intralesional (sodium sulphate, botulinum toxin)	18.6% (19)
Remove systemic medication	8.8% (9)
Pulsed Dye Laser	7.8% (8)
Phototherapy	2.9% (3)
Remove topical med	2.0% (2)
Systemic medication recommendations	(*n* = 61)
Phosphodiesterase inhibitor	37.7% (23)
Calcium channel blockers	34.4% (21)
Pentoxifylline	28.6% (6)
Hydroxychloroquine	8.2% (5)
Colchicine	6.6% (4)
Oral antibiotics	6.6% (4)
Endothelin receptor antagonist	4.9% (3)
ACE inhibitor	1.6% (1)
Anti-coagulant	1.6% (1)
Immunosuppressant	39.3% (24)
Mycophenolate Mofetil	70.8%(17/24)
Methotrexate	16.7% (4/24)
Cyclophosphamide	8.3% (2/24)
Azathioprine	4.1% (1/24)
Topical medication recommendations	(*n* = 52)
Topical steroid	38.5% (20)
Topical nitrogenous agent	25.0% (13)
Wound care (topical antibiotics, silvadene and zinc oxide)	13.5% (7)
Topical sodium thiosulfate	11.5% (6)
Vitamin D analogue	5.8% (3)
Topical calcineurin inhibitor	3.8% (2)
Urea	3.8% (2)
Brimonidine	1.9% (1)
Intralesional therapy recommendation	(*n* = 19)
Botulinum toxin	78.6% (15)
Sodium thiosulfate	21.1% (4)

dermatologic experts in autoimmune connective tissue disease, potentially biasing towards more severe SSc and a higher level of dermatologic involvement. Nevertheless, our results indicate that while dermatologists may play an active role in the management of SSc, referral to dermatology is often delayed, and patients often present to dermatologists with advanced cutaneous involvement. Future studies are warranted to determine whether earlier dermatologic involvement in the diagnosis and management of SSc may prevent additional morbidity and long-term sequela associated with this disease.

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Conflict of interest

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Impact of an e-learning programme on pharmacists' management of atopic dermatitis

Dear Editor,

Atopic dermatitis (AD) is a common skin condition that has a significant impact on patients' quality of life. Inadequate compliance with therapy often leads to treatment failure; therefore, therapeutic education is fundamental for AD management. However, conflicting strategies among caregivers, including pharmacists, lead to confusion and therapeutic non-adherence. As pharmacists are the last healthcare workers to interact with patients before they commence at-home treatment, they play a key role in patient care. Corticophobia (the fear of using corticosteroids) is highly frequent among AD patients and is rooted partially in insufficient knowledge regarding topical corticosteroids.[1,2] This study aimed to evaluate the impact of an e-learning programme on pharmacists' knowledge of AD management.

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This e-learning programme, named Parcours Officinal du Patient (POP) training, comprised six complementary modules designed by six French AD reference centres and was validated through consensus by the French Group on Therapeutic Education in Dermatology (GET) (Fig. 1a). Participants were recruited by email or via conference or press release and had to register online (https://poptraining.fondation-dermatite-atopique.org) to complete the course. After the training, pharmacists could download various educational tools and display a label on the pharmacy's window indicating to patients their specific skill in the management of AD. We provided a blended approach to learning: in-person training, live webcast and rebroadcasting. Participants' level of knowledge was evaluated immediately before and after each e-learning session, as well as in a 9-month follow-up via an online questionnaire for final evaluation. A responder was defined as a registered participant with at least one before/after e-learning evaluation recorded. Each evaluation was scored from 0 to 20.

The programme recorded 1630 registrations and 367 responders, with a maximum of 334 responses for the first e-learning session (Fig. 1a). The main professional category of the responders was pharmacists (48%, 175), students (29%, 107) and pharmacy dispensers (15%, 55) (Fig. 1b). The preferred method of the e-learning was by rebroadcasting, with a large audience on days when pharmacies were closed (Fig. 1c).

Participants' level of knowledge increased after each e-learning session, especially after the first two sessions dedicated to pathophysiology and corticophobia (Fig. 2a). Subanalysis by professional groups (pharmacists, students and pharmacy dispensers) showed similar trends, suggesting that all participants benefited from the training. The median score of AD knowledge was 13.4 (12.7–14.1) before training, 16.7 (16.2–17.3) immediately after training and 16.0 (15.4–16.6) after nine months (Fig. 2b). In addition, we registered 2261 downloads of the educational tools that were made available for responders. Thus, the e-learning programme significantly improved pharmacists' AD management knowledge, which was sustained over a 9-month period.

Pharmacists' need for appropriate training in AD management has been reported extensively.[3,4,5] This may be due to a lack of education regarding skin diseases and dermatological care in pharmacology training programmes. Capitalizing on the possibilities presented by current digital tools, we report here the efficacy of a free e-learning programme that sustainably improved participants' level of knowledge regarding AD management. Interestingly, the most significant knowledge progression was observed after participants completed the AD pathophysiology and corticophobia e-learning sessions. This confirms that corticophobia remains an important issue that digital training could partially mitigate.[6] However, we observed a low response rate (23%) and a decline in responders'

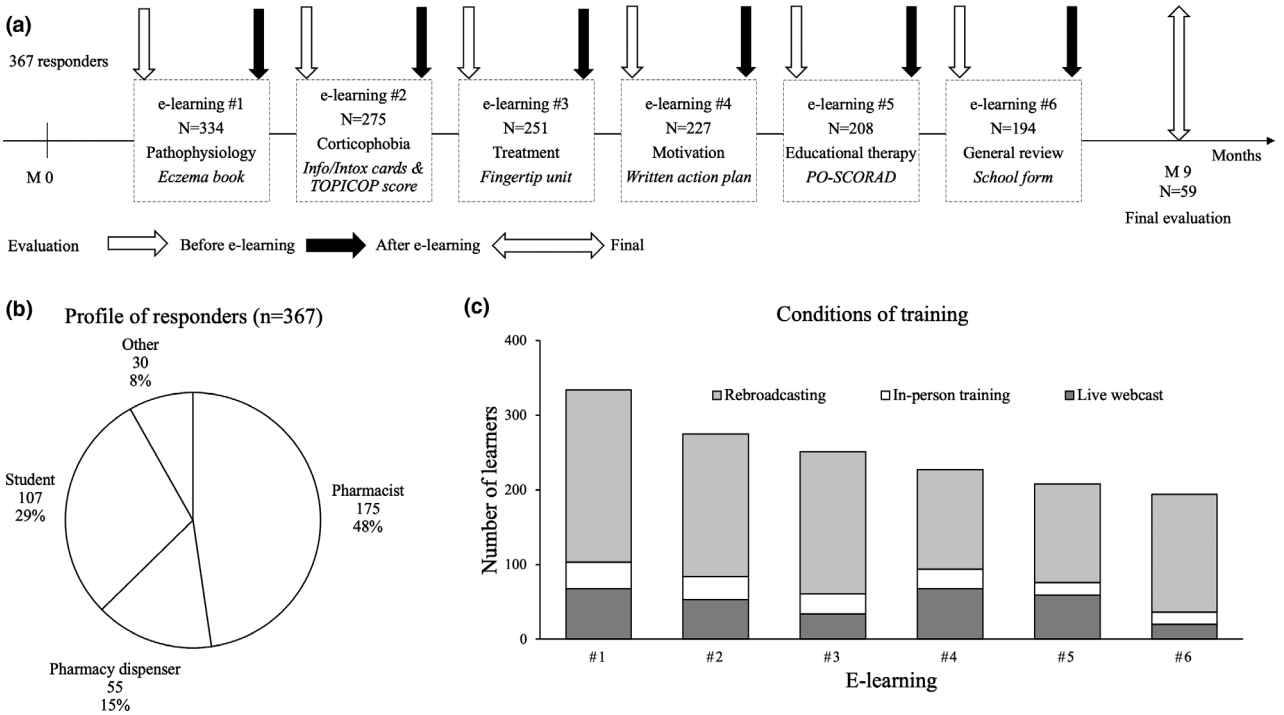

Figure 1 Characteristics of the e-learning programme and of the responders. (a) Design of the programme. Downloadable tools are indicated in italics. (b) Professional category of the responders. (c) Distribution of the responders, according to the e-learnings and the conditions of training.

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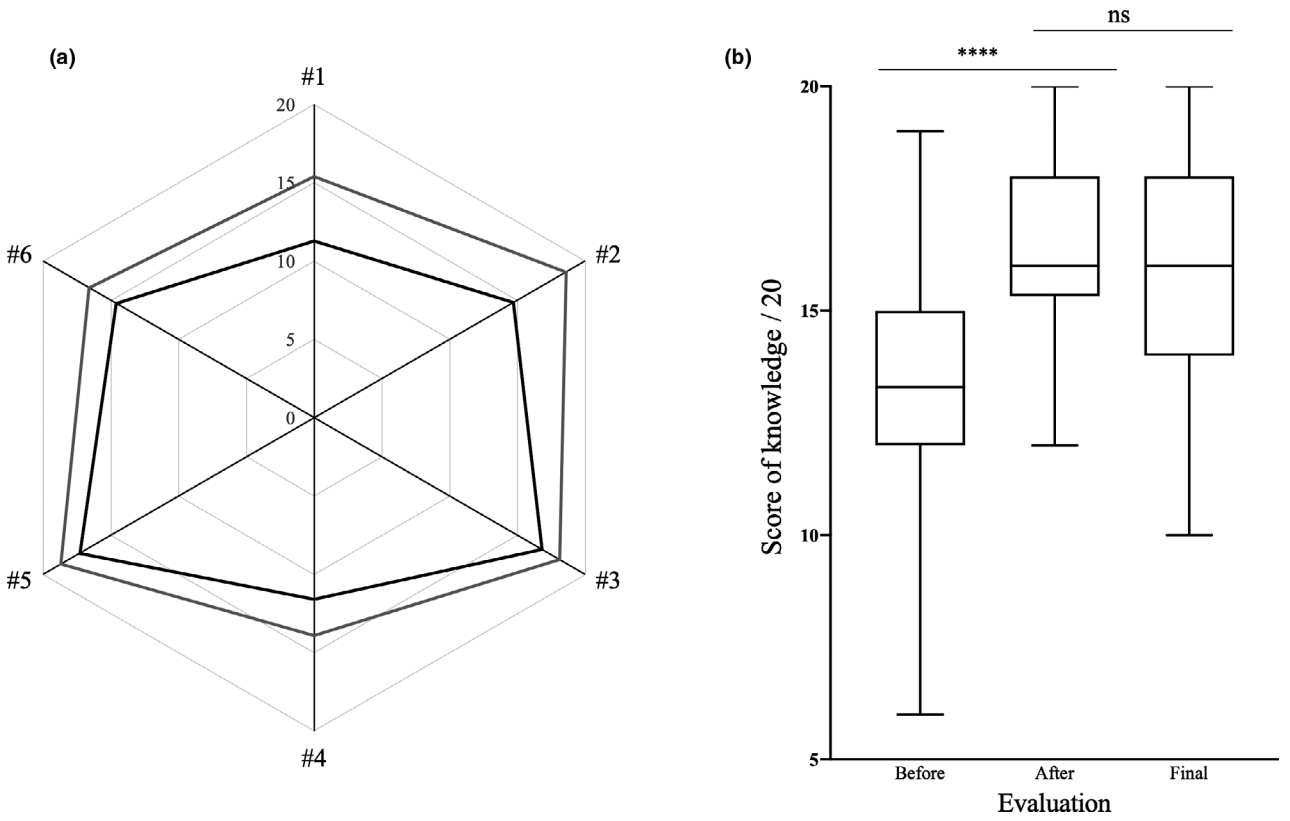

Figure 2 (a) Evaluation of knowledge along the e-learning programme. The mean scores before (black line) and after (grey line) each e-learning (from #1 to #6) are expressed using a spider web chart, with a maximum of 20 points. (b) Boxplots display the median of scores before, after and at the final evaluation. The paired *t*-test was used (****, $P < 0.0005$; ns, not significant).

participation over time, possibly due to the high number of modules required to be completed and because the programme was free of charge.

In conclusion, the digital approach presented here focused on pharmacists and facilitated a transfer of skills and knowledge via tools shared with patients. Future interventions should evaluate the impact of a shortened version of this programme, integrating patients' experiences in the pharmacy context.

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Conflicts of interest

ACG has nothing to disclose. JFS is a consultant for the Eczema Foundation. SM is working for the Eczema Foundation. PB is working for Pierre Fabre Laboratories. CJD is working for the Eczema Foundation. AN is an investigator for AbbVie, Eli Lilly, Incyte, LEO Pharma, Novartis and Sanofi; is a consultant for Pfizer Inc., AbbVie, Eli Lilly, Galderma, LEO Pharma, Novartis and Sanofi; is a speaker for AbbVie, Regeneron and Sanofi; and is on advisory boards for Pfizer Inc., AbbVie, LEO Pharma and Sanofi.

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Anaphylaxis to vaccination and polyethylene glycol: a perspective from the European Anaphylaxis Registry

To the Editor,

The COVID-19 pandemic is currently one of the most important health challenges, and the recently approved vaccines can save millions of lives. However, the fact that anaphylaxis might occur after vaccination has raised much concern. Currently, Centers for Disease Control and Prevention (CDC) reported the rate of 2.5–4.7 cases/million mRNA vaccine doses administered.[1] The allergen(s) causing these reactions remain unknown. Polyethylene glycol (PEG) has surfaced as a possible elicitor, considering that this ingredient has previously been identified as an allergen.[2,3]

The European Anaphylaxis Registry is a database of anaphylaxis cases collected from more than a hundred tertiary allergy centres from twelve European countries and Brazil.[4] Herein, the data from 13 354 cases, reported between 2007 and 2020 was screened to identify reactions caused by vaccination or PEG. Table 1 presents anaphylaxis cases caused by vaccination; 14 of such reactions were reported (14/2350; 0.6% of all reactions caused by drugs). The majority of them were observed in children (10/14). Four patients had an atopic background. Reactions to all major types of vaccines were reported. More than half of the reactions (8/13) occurred within 10 min after immunization; however, four reactions had a delayed onset (>1 h). Six reactions were classified as moderate and eight reactions as severe.[5]

Table 2 presents data on reactions to PEG. Six reactions to PEG and one to polysorbate (a possibly cross-reactive allergen) were identified (7/2350; 0.3% of all drug-induced anaphylaxis cases). All patients were adults. An atopic background was reported in three cases. The basal tryptase was within normal range in all patients with available data (4/4). The time between exposure and onset of the symptoms was within half an hour (6/6). All reactions manifested with skin and cardiovascular symptoms, two of them were classified as severe and five as moderate.[5]

The Anaphylaxis Registry is not a population-based database, and it is not suitable to estimate incidence. However, a very low number of reactions reported to vaccinations (14/13 354) or PEG (6/13 354) suggests that these reactions are very rare, confirming previously published data (incidence of anaphylaxis to vaccination in the USA was recently estimated as 1.3/1 000 000[6]). The reactions to PEG in the registry might be underreported (and reported as idiopathic anaphylaxis or misdiagnosed, for example as anaphylaxis to corticosteroids, paclitaxel or local anaesthetics), as PEG is a commonly used additive, which might have been 'overlooked' in some cases.

The rate of patients with an atopic background in our study [29% (4/14) for vaccine and 43% (3/7) for PEG anaphylaxis] was very similar to the one reported by CDC (29%; 6/21)[7] and in the currently published case series of 10 Danish patients allergic to PEG (30%; 3/10).[2] This rather low rate of patients with an atopic background, might suggest that these reactions have distinct/additional pathomechanisms[8,9] than, for example common food anaphylaxis. Our study does not suggest that mastocytosis is an underlying disease in these reactions.

Vaccines are an extremely effective method to prevent illnesses and death, and they are safe from an allergist's point of view with only very rare instances of severe reactions. Nevertheless, partially due to misleading information, many patients with allergies feel anxious in terms of getting the SARS-CoV-2 vaccination.[10] This might lead to lower immunization rate and hence higher mortality and morbidity due to this now preventable disease. Therefore, identifying whether PEG is the antigen responsible and determining the mechanisms of these reactions are of great importance. Here, more data on the cases (including data on comprehensive allergological work-up) should be urgently made available to help the scientific community to identify the patients who are truly at risk and thus raise the acceptance of the vaccine.

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