

Addressing educational gaps through multidisciplinary team education in eosinophilic oesophagitis management

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ABSTRACT

Once considered a rare disease, eosinophilic oesophagitis (EoE) is becoming increasingly prevalent, yet many healthcare professionals (HCPs) remain unfamiliar with the underlying pathophysiology and optimal management approaches. For this study, we developed a faculty-led, online, continuing medical education activity on EoE. The effectiveness of this activity was evaluated according to Moore's framework, with changes in knowledge and competence (Moore's Levels 3 and 4) assessed for a cohort of gastroenterologists, dietitians, allergists and immunologists ($N = 300$), using questionnaires completed before and after participation. Changes in HCP confidence in treating EoE were also reported and remaining educational gaps were identified. The activity was viewed by a global audience of 5,330 participants within 6 months, and significant improvements in knowledge and competence were reported following participation in the activity across all specialities, regions and experience (mean [standard deviation] score pre- versus post-activity: 4.32 [1.38] versus 5.46 [0.82]; $p < 0.001$). Confidence in treating EoE also increased from pre- to post-activity, with the proportion of participants reporting that they felt moderately or extremely confident increasing from 53% to 82%. Several educational unmet needs were identified, which can be used to inform the design of future educational activities in EoE

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Introduction


Eosinophilic oesophagitis (EoE) is a chronic, inflammatory condition affecting the oesophagus. It is reported to affect up to 1 in 1,000 people and has been identified in up to 23% of patients undergoing endoscopy for dysphagia [1,2]. In adults, the main clinical manifestations are dysphagia and food impaction, with less common symptoms including chest pain, refractory heartburn and regurgitation [1]. In children, symptoms may be more subtle and may include failure to thrive, vomiting and nausea [1]. Diagnosis of EoE requires endoscopy and 2–4 biopsies taken from both the proximal and distal oesophagus, with the histological detection of oesophageal eosinophilia (defined as ≥ 15 eosinophils/high power field), combined with symptoms of oesophageal dysfunction, required for a definitive diagnosis [3].

EoE is a complex condition that requires patient-centric management by a multidisciplinary team

(MDT), including input from gastroenterologists, allergists/immunologists and dietitians [4,5]. The importance of MDT management was highlighted in a recently published charter, which states that patients with an eosinophil-associated disorder (EAD) require access to an appropriate MDT to confirm the diagnosis and determine the best treatment approach on a case-by-case basis [6].

The management of patients with EoE can be challenging for several reasons. Firstly, many healthcare professionals (HCPs) are still unfamiliar with the condition, despite the number of diagnoses increasing exponentially [7]. Secondly, rapid advances have been made in elucidating the underlying pathophysiology and in the development of novel targeted therapies in recent years [8], and as a result, it can be challenging for HCPs to remain up to date with guidelines, current management approaches and clinical developments. Thirdly,

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adherence to both dietary and medical treatments has been reported to be low for adult patients with EoE [9], requiring HCPs to be confident in their guidance and explanations for the importance of adherence to therapy.

Several reports have suggested that there may be gaps in the knowledge and competence of HCPs who manage patients with EoE. Firstly, multiple surveys of gastroenterologists in the USA, Germany, Europe, United Arab Emirates and Australia/New Zealand found that EoE management is variable and often discordant with published guidelines [10–14]. Secondly, a recent case-based survey of primary care physicians, allergists, gastroenterologists and emergency physicians in the USA highlighted gaps in EoE management and concluded that future educational initiatives are required to reduce practice variation and increase the use of evidence-based decision making [15,16]. Results from a study of gastroenterologists have shown that continuing medical education (CME) has the potential to address educational gaps in the management of EoE, as participation in an online CME activity resulted in increased knowledge, competence and confidence among the participants [17].

CME plays a vital role across all medical specialties, with the objective being to ensure that HCPs remain up to date with advances in their field and, ultimately, to improve patient outcomes [18–21]. Traditionally, CME has involved face-to-face educational activities; however, these can be cost and time prohibitive for HCPs with busy clinical schedules [18,22,23]. To overcome these limitations, there has been growing use of online CME activities, with uptake of this approach accelerating during the COVID-19 pandemic [23]. Online activities offer many advantages for HCPs, including ease of access and the fact that they can be viewed at a time convenient to a global audience [22,23]. The option to pre-record rather than live stream CME activities [23] may also offer increased convenience and flexibility to international faculty.

The objectives of this analysis were to evaluate participation and satisfaction with an online CME activity for EoE and to measure changes in knowledge and competence following engagement with the activity. In addition, changes in HCP confidence were reported and remaining educational gaps in the management of EoE were solicited from learners. The degree of change across outcomes measures was assessed for the overall cohort and between specialties to determine current needs and allow future educational initiatives to be tailored accordingly.

Methods

Educational Activity

Educational gaps were identified by Touch Independent Medical Education (touchIME; an organisation that provides independent medical education for HCPs) through a review of the relevant published literature and feedback from expert faculty specialising in EoE. These were used to develop the following learning objectives: (1) to explain how the complex pathophysiology of EoE impacts diagnosis; (2) to assess the symptoms associated with EoE and the impact of this progressive disease on patients; and (3) to evaluate how the emerging biological treatment options for EoE may be integrated with current dietary and pharmacological approaches. To address these learning objectives, a faculty-led, online, CME-accredited touchMDT activity was developed. The activity comprised three 10-minute videos to ensure that learners were able to gain actionable education in a short burst of focused learning. Topics included EoE pathophysiology, symptom burden and emerging management options. Moreover, the activity included case-based discussions and practical educational insights to ensure that learnings could be applied directly to clinical practice. In addition, each video could be accessed separately, so that HCPs could engage with the topic of most interest to them. The videos featured an allergist/immunologist, a gastroenterologist and a dietitian. For learning objectives 2 and 3, the discussion focused on a patient case example and highlighted the role of different MDT members in the diagnosis and management of the patient, including monitoring disease activity and treatment response. CME accreditation was provided by the University of South Florida (USF) Health, which is accredited by the Accreditation Council for Continuing Medical Education (ACCME) as a provider of continuing professional development.

The activity was free to access and is available on two online medical education websites, touchIMMUNOLOGY.com and touchRESPIRATORY.com, from May 2022 until May 2023. To bring the educational activity to the attention of the target audience of HCPs specialising in gastroenterology, immunology, allergy or paediatrics, a combination of communication channels was used, including emails to touchIMMUNOLOGY.com and touchRESPIRATORY.com subscribers within the first 12 weeks and then 6 months after the activity launch; advertisements in peer-reviewed journals (*touchREVIEWS in Respiratory & Pulmonary Diseases* and *touchREVIEWS in RMD*); medical society partnerships throughout the lifetime of the activity; and HCP-targeted social media announcements on Facebook,

LinkedIn and Twitter throughout the lifetime of the activity. The campaign was targeted at a global audience, with no geographical restrictions on access, although the focus countries were the EU5 [France, Germany, Italy, Spain, United Kingdom], Latin America and North America.

Assessment of Educational Outcomes

Outcomes for the educational activity were assessed according to Moore's expanded outcomes framework Levels 1–4 [24]. Level 1 was assessed over the first 6 months after launch as two variables: the number of participants who engaged in the activity and the average time spent by participants viewing the video. Geolocation, participant numbers and overall average time participants spent on the activity were captured using Google Analytics.

Levels 2–4 were assessed using outcomes questionnaires, with all data collected by an independent third party (Nuaxia Limited [Richmond, United Kingdom]) that was not involved in the development of the activity to avoid bias. Financial incentives were provided for the HCPs to complete the questionnaires. The activity was targeted at a global audience of gastroenterologists, immunologists, allergists and dietitians, with a focus on the EU5 [France, Germany, Italy, Spain, United Kingdom], Latin America and North America, although there were no geographical restrictions on access. All participants were required to declare whether or not they care for patients with EoE, and only those who did were permitted to continue. This was to ensure the sample was taken from relevant respondents (HCPs who completed the questionnaire pre-activity) and learners (HCPs who participated in the activity and completed the post-activity questionnaire). To avoid any pre-exposure bias and to obtain a statistically representative sample size, data were collected using an independent samples model for each activity. All questionnaires were fielded to a database of 52,069 HCPs and then "closed" once a prespecified number had responded. The pre-activity questionnaires were fielded to respondents 1–2 weeks before activity launch (to ensure the sample was from HCPs who had not interacted with the activity) and the post-activity questionnaires were fielded at launch to learners who had participated in the activity and matched for speciality (n). For Levels 2–4, the learners who responded to the post-activity questionnaires viewed the activity as part of the questionnaire process.

The Level 2 satisfaction questionnaire included six statements that were to be answered using a 1–5

Likert scale (where 5 represents the highest satisfaction; **Supplementary Table S1**). Four separate Level 3–4 questionnaires were created for the four specialities (allergists, immunologists, gastroenterologists, dietitians; **Supplementary Table S2**) to reflect their different roles and responsibilities in the management of patients with EoE. The Level 3–4 questionnaires comprised six questions based on the activity content and learning objectives, categorised into key themes of pathophysiology, symptoms/impact of disease, and emerging biologic treatments, which were deemed important to improving the identification and management of patients with EoE in practice. Questions were developed by touchIME medical writers and directors and approved for scientific and medical accuracy by the faculty. All questions were multiple choice and included four possible answers, of which only one was correct. The Level 3 questions were structured to assess knowledge and application to clinical practice and included both declarative knowledge (Level 3a) and procedural knowledge (Level 3b). The Level 4 questions were structured as patient cases to directly assess competence in making the correct clinical decision.

Confidence and Intention to Change Practice

To assess confidence, respondents and learners from each speciality were asked the following question before and after participating in the activity: "*How confident are you in treating eosinophilic oesophagitis?*" Participants could then choose from five mutually exclusive responses ranging from not confident to extremely confident.

After participating in the activity, learners from each speciality were asked: "*As a result of your participation in this session, will you make a change in your practice?*" Mutually exclusive responses were: Yes; Uncertain – more education needed; Uncertain – practical limitations; No – more education needed; and No – practical limitations.

Identification of Remaining Educational Gaps

Potential educational gaps were drafted by touchIME medical directors with input from the faculty and were included at the end of the questionnaires. Learners who completed the post-activity Level 3–4 questionnaire were asked to rank the five predefined, potential educational gaps by importance: Latest data on emerging therapies for EoE; Multidisciplinary management of EoE; Nutritional needs in patients with EoE; Diagnosis of EADs; and Current treatment strategies

for EoE. The results were analysed by speciality using a single transferable vote system (detailed in **Supplementary Appendix 1**).

Statistical Analysis

Data were analysed using SPSS Statistics version 28.0.1 (IBM, New York, NY, United States). Based on the target population of learners and sample size, a statistical power calculation was used to determine the number of respondents ($n = 150$) and learners ($n = 150$) required to detect a statistically significant difference between surveys conducted before and after the activity with a margin of error of ~5%. For the satisfaction (Level 2) questionnaire, mean scores were calculated for the individual questions and an overall satisfaction score was calculated as the average across all satisfaction fields. For the Level 3 and 4 analysis, the mean and median numbers of correct answers were calculated for both the pre- and post-activity data sets and the results were compared using an independent samples t-test. To analyse the results by country, speciality and experience, a two-way ANOVA was used. Individual questions were analysed first using a paired samples t-test and then by one-way ANOVA.

Ethical Considerations

The faculty for the touchMDT consented to the necessary use, distribution and reproduction of their contribution to the activities and assigned the entire copyright and all other intellectual property rights existing in their contributions to touchIME. In compliance with the European Union General Data Protection Regulation [25], HCPs who responded to the outcomes questionnaires were informed before their input that their identity and personal data were strictly confidential and would not be revealed without their explicit further consent. This study does not report experiments on human subjects; therefore, Institutional Research Board approval and informed consent are not applicable.

Results

Assessment of Educational Activities

Level 1 – Participation

By 6 months after launch, 5,330 participants had engaged with the activity, with an average participation time of 05:39 minutes (**Table 1**). Participants from 35 countries engaged with the activity, with the largest

Table 1. Engagement results and demographics of participants in the activity.

Participant engagement, n	5,330
Countries reached, n	35
Mean length of participation, minutes	05:39
Country^a, n (%)	
Colombia	1,683 (31.6)
Mexico	1,058 (19.8)
Canada	616 (11.6)
Argentina	472 (8.9)
Italy	388 (7.3)
Rest of world	350 (6.6)
United Kingdom	183 (3.4)
Spain	168 (3.2)
United States	137 (2.6)
Brazil	107 (2.0)
Germany	61 (1.1)
France	61 (1.1)
Chile	46 (0.9)

Data collected on 21 November 2022, 6 months after launch of the activity.

^aCountry where the participant was based at the time of completing the activity. The activity was targeted to a global audience, with a focus on EU5 (France, Germany, Italy, Spain, United Kingdom), Latin America, and North America.

proportion of HCPs being based in Columbia, followed by Mexico and Canada. All other countries were each represented by fewer than 10% of participants (**Table 1**).

Level 2 – Satisfaction

Overall satisfaction with the activity was 87%. Across specialities, satisfaction scores ranged from 4.4 to 4.5 for relevance to clinical practice, 4.3 to 4.5 for meeting the stated learning objectives, and from 4.1 to 4.3 for impact on management strategies (**Supplementary Table S1**).

Levels 3 and 4 – Knowledge and Competence

Overall, 150 respondents completed the survey before the launch of the activity and 150 learners completed the survey post-activity. Both surveys were completed by allergists ($n = 37$), dietitians ($n = 37$), gastroenterologists ($n = 39$) and immunologists ($n = 37$). Before the activity, 51.33% (77/150) of respondents answered at least five out of six questions correctly. This increased to 88% (132/150) of learners post-activity (**Figure 1a**). The number of correctly answered questions was significantly higher in post-activity learners versus pre-activity responders (median [IQR]: 5.0 [3.0–5.0] to 6.0 [5.0–6.0]; mean [SD]: 4.32 [1.38] to 5.46 [0.82]; $p < 0.001$; **Figure 1b**).

The lowest levels of knowledge and competence pre-activity were reported for the dietitians subgroup. Respondents in this subgroup achieved a mean pre-activity score of 3.11 correctly answered questions and 8% answered at least five questions correctly (**Figure 2, Supplementary Figure S1**). In contrast, gastroenterologists had the highest levels of knowledge and competence pre-activity, with a mean score of 5.26 correctly

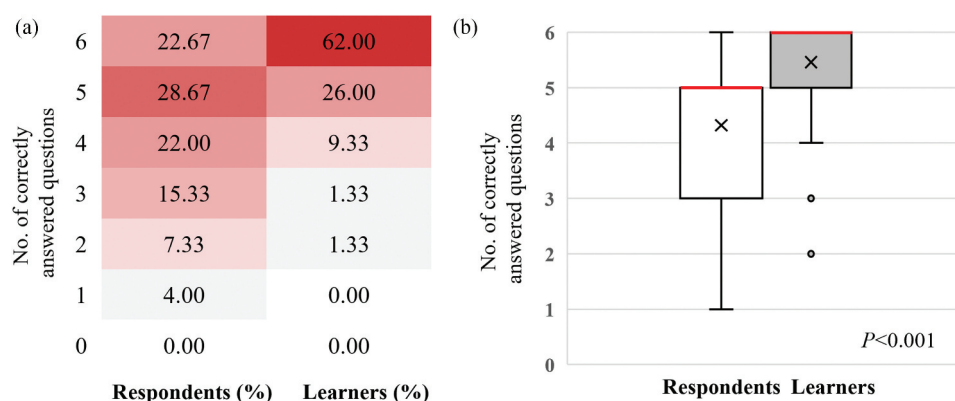


Figure 1. Summary of the number of correct responses for the Level 3 and 4 outcomes questionnaires pre- and post-activity.

The heatmap (a) shows the proportion of respondents ($n = 150$) and learners ($n = 150$) who answered specific numbers of questions correctly, as displayed by colours ranging from white (lowest proportion of respondents and learners) to dark red (highest proportion of respondents and learners). The box-and-whisker plot (b) shows the distribution of the number of correctly answered questions by all respondents and learners. The horizontal red line within the box indicates the median, the ‘x’ symbol represents the mean, the boxes indicate the interquartile range (IQR), and the vertical lines (whiskers) extend to the range of values, excluding outliers. Outliers are defined as values that fall outside a distance of 1.5 times the IQR from the upper and lower quartiles, and are represented by empty circles. Respondents and learners are defined as healthcare professionals who completed the pre- and post-activity questionnaires, respectively.

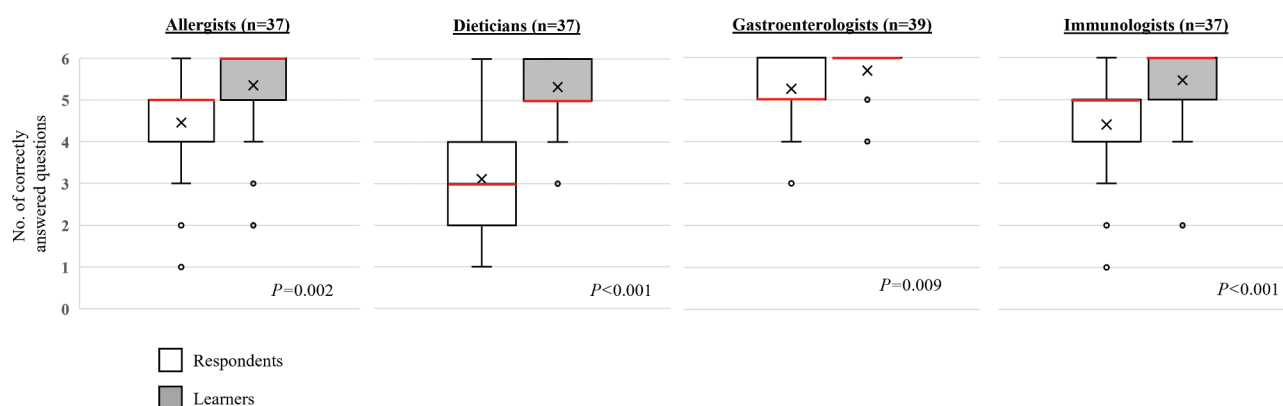


Figure 2. Summary of the number of correct responses for the Level 3 and 4 outcomes questionnaires pre- and post-activity by speciality.

The box-and-whisker plots show the distribution of the number of correctly answered questions by respondents and learners in subgroups defined by speciality. The horizontal red line within the box indicates the median, the ‘x’ symbol represents the mean, the boxes indicate the interquartile range (IQR), and the vertical lines (whiskers) extend to the range of values, excluding outliers. Outliers are defined as values that fall outside a distance of 1.5 times the IQR from the upper and lower quartiles, and are represented by empty circles. Respondents and learners are defined as healthcare professionals who completed the pre- and post-activity questionnaires, respectively.

answered questions and with 82% answering at least five questions correctly (Figure 2, Supplementary Figure S1). Post-activity, high levels of knowledge and competence were achieved by all learners, with statistically significant increases in the number of correctly answered questions observed for all specialities (allergists, $p = 0.002$; dietitians, $p < 0.001$; gastroenterologists, $p = 0.009$; immunologists, $p < 0.001$) (Figure 2). Mean post-activity scores ranged from 5.32 to 5.69 (Figure 2) and 87–92% of respondents answered at least five out of six questions correctly.

In an analysis of the responses by region, the mean number of questions answered correctly was

significantly higher in post-activity learners versus pre-activity responders for all regions ($p < 0.001$) and the difference was generally similar across regions ($p = 0.782$) (Supplementary Figure S2a). Learners also answered a significantly higher mean number of questions correctly versus responders regardless of years in practice ($p < 0.001$); the difference varied across levels of experience ($p = 0.031$), between respondents and learners with 1–10 years in practice (mean [SD]: 3.95 [1.33] to 5.39 [0.85]) compared with those with >10–20 years (mean [SD]: 4.41 [1.40] to 5.50 [0.75]) or > 20 years (mean [SD]: 4.72 [1.34] to 5.48 [0.94]) in practice

(Supplementary Figure S2b). Overall, all learners, irrespective of years of experience, achieved a similarly high level of knowledge and competence following the activity despite the different pre-activity levels.

Statistically significant differences between respondents and learners were observed for all question types (Level 3a: 63% versus 85% [$p < 0.001$; declarative knowledge]; Level 3b: 78% versus 95% [$p < 0.001$, procedural knowledge]; Level 4: 80% to 96% [$p < 0.001$, competence]). For all question types, the biggest difference in proportion of correctly answered questions between respondents and learners was observed for dietitians, with absolute increases of 32%, 35% and 42% observed for declarative knowledge, procedural knowledge and competence, respectively.

In a qualitative analysis of questions on specific topics to address the activity learning objectives,

dietitians, immunologists and allergists had lower baseline knowledge than gastroenterologists on the pathophysiology of EoE (learning objective 1), with 30–51% of respondents from these speciality sub-groups answering the relevant two questions correctly pre-activity (Figure 3). Gastroenterologists had higher baseline knowledge on this topic, with 69% and 90% of respondents answering these two questions correctly pre-activity. Levels of baseline knowledge were higher for the other two topics (learning objectives 2 and 3), with 51–68% of dietitians, 73–95% of immunologists, 81–97% of allergists, and 85–97% of gastroenterologists correctly answering questions on the symptoms and impact of EoE and on the emerging biologic treatment options. Reflecting the low baseline, the largest increase in questions answered correctly from pre-activity respondents to post-activity learners was observed for the pathophysiology of EoE, although

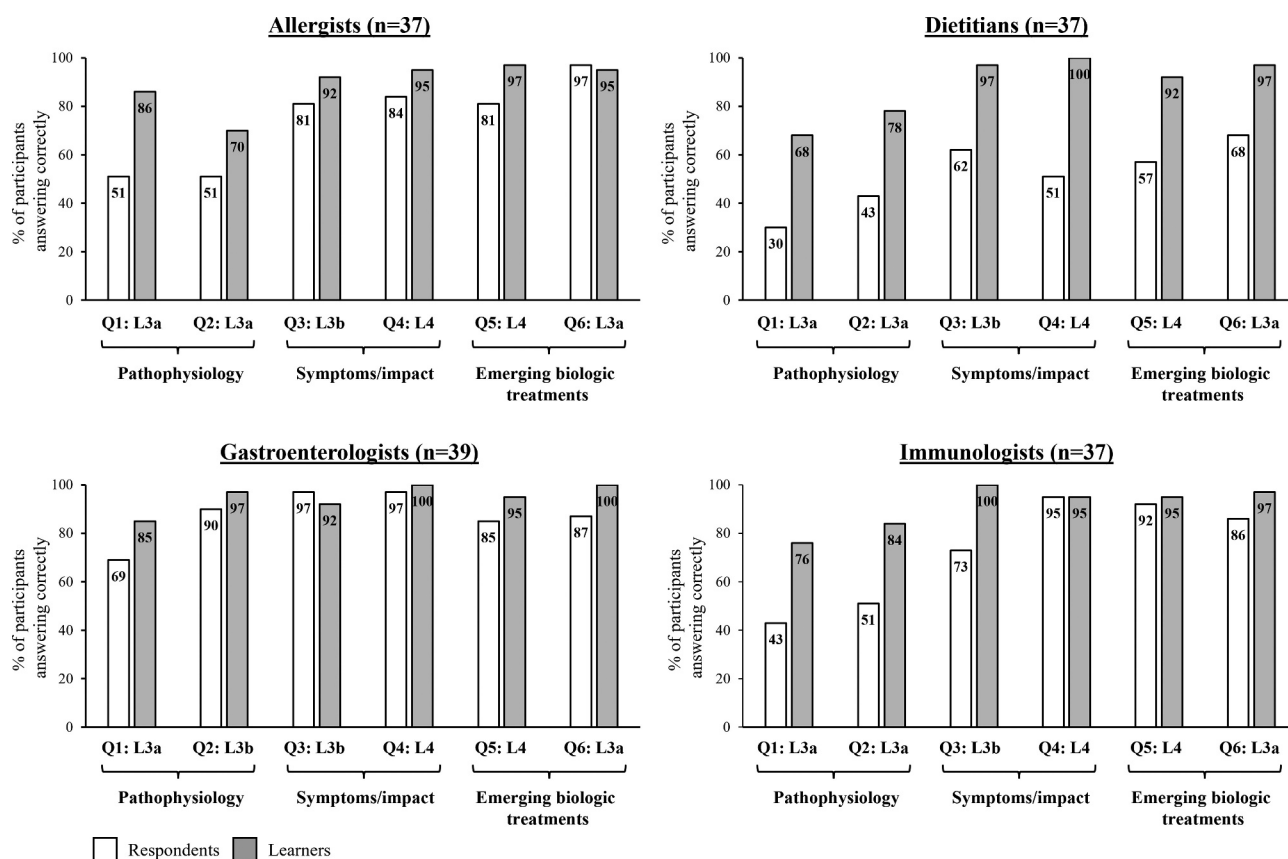


Figure 3. Summary of correct responses for individual questions for the Level 3 and 4 outcomes questionnaire pre- and post-activity by speciality.

The bar graphs show the percentage of respondents and learners who answered each question correctly. Numbers within bars indicate their value. Respondents and learners are defined as healthcare professionals who completed the pre- and post-activity questionnaires, respectively. Level 3a questions measure declarative knowledge, Level 3b questions measure procedural knowledge and Level 4 questions measure competence. Three learning objectives were examined using this questionnaire: (1) explain how the complex pathophysiology of EoE impacts diagnosis, (2) assess the symptoms associated with EoE and the impact of this progressive disease on patients, and (3) evaluate how the emerging biological treatment options for EoE may be integrated with current dietary and pharmacological approaches.

Full details of each question are provided in Supplementary Table S1.

this remained the topic with the lowest scores post-activity. Knowledge and competence were very high post-activity for symptoms/impact of EoE and emerging biologic treatment options, with $\geq 92\%$ of learners answering these questions correctly after participating in the activity.

Confidence and Intention to Change Practice

Across all specialities, confidence in treating EoE was higher in post-activity learners compared with pre-activity respondents, with the proportion of participants reporting that they felt moderately confident increasing from 30% to 50% and those who reported feeling extremely confident increasing from 23% to 32%. Pre-activity, the lowest levels of confidence were reported by dietitians, with only 27% considering themselves to be moderately confident and none reporting extreme confidence in managing patients with EoE (Figure 4). Post-activity, 62.2% of dietitians reported feeling moderately confident and 13.5% reported feeling extremely confident. This was the largest increase reported of all the specialities.

More than two-thirds (68% [102/150]) of learners stated that they would make a change to their practice

following their participation in the educational activity. Of the remaining learners, 18% (27/150) were uncertain and 14% (21/150) would not make a change. In total, 20% (30/150) indicated that more education on the subject would be beneficial. The proportion of learners who would make a change in their practice varied between specialities, ranging from 59% of gastroenterologists to 76% of dietitians. The proportion of learners who felt that they required more education in order to change their practice also varied between specialities and included 13% of immunologists, 17% of dietitians, 22% of allergists, and 28% of gastroenterologists.

Identification of Remaining Educational Gaps

In the analysis of incorrectly answered questions post-activity, there remained an education gap among some specialists in the understanding of the pathophysiology of EoE, with 30% of allergists answering question 2 incorrectly and 32% of dietitians answering question 1 incorrectly (Supplementary Table S2).

Both allergists and dietitians identified the diagnosis of EADs and MDT management of EoE as important unmet educational needs in this area. In contrast,

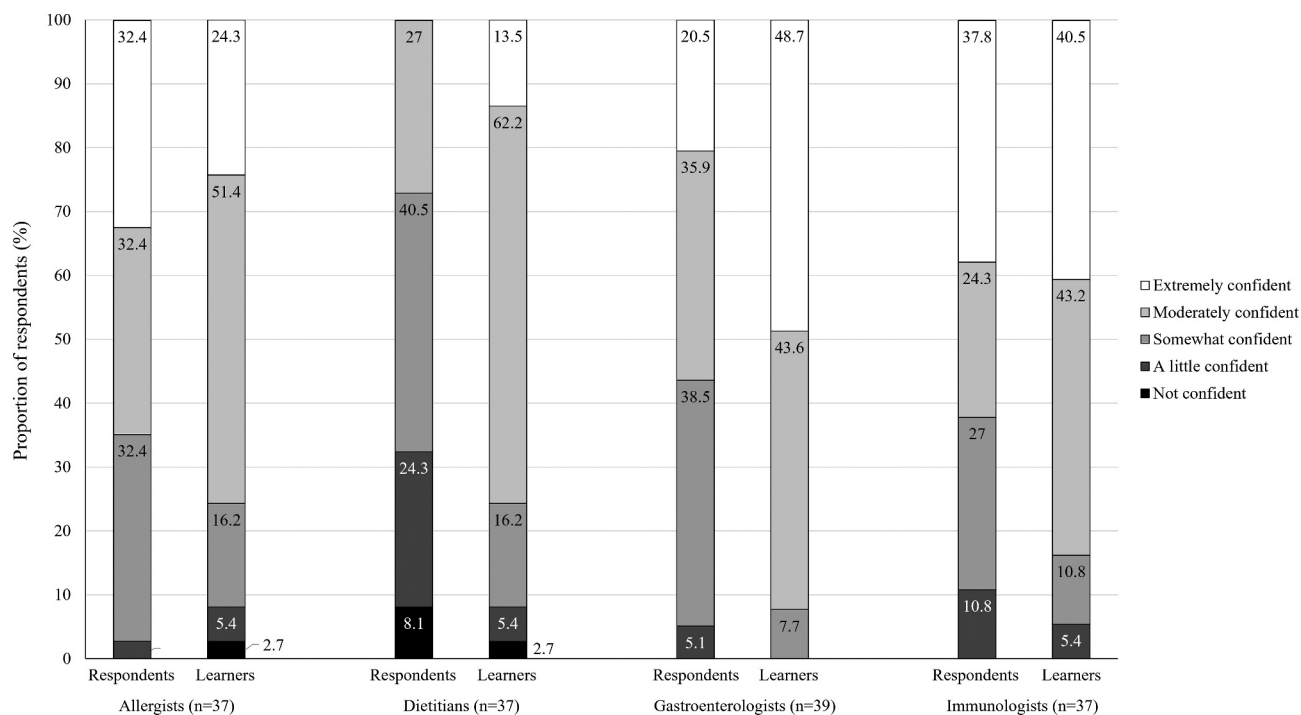


Figure 4. Proportion of respondents and learners who reported confidence in treating EoE pre- and post-activity by speciality.

The stacked bar graphs show the percentage of respondents and learners who reported that they were not confident, a little confident, somewhat confident, moderately confident or extremely confident at treating EoE. Numbers within bars indicate their value. Respondents and learners are defined as healthcare professionals who completed the pre- and post-activity questionnaires, respectively.

Table 2. Unmet educational needs identified post-activity by speciality.

Allergists	Dietitians	Gastroenterologists	Immunologists
(1) Diagnosis of eosinophil-associated disorders	(1) Diagnosis of eosinophil-associated disorders	(1) Current treatment strategies for EoE	(1) Nutritional needs in patients with EoE
(2) Multidisciplinary management of EoE	(2) Nutritional needs in patients with EoE	(2) Latest data on emerging therapies for EoE	(2) Current treatment strategies for EoE
(3) Current treatment strategies for EoE	(3) Multidisciplinary management of EoE	(3) Multidisciplinary management of EoE	(3) Latest data on emerging therapies for EoE

The top three unmet educational needs are shown, as identified by learners who completed the Level 2–4 questionnaires following launch of the touchMDT activity. Learners were required to rank five, predefined, potential educational gaps in response to the question “What do you think is the most important unmet educational need in this therapy area?”

EoE, eosinophilic oesophagitis; touchMDT, touch MultiDisciplinary Team.

gastroenterologists and immunologists ranked current treatment strategies for EoE as being particularly important unmet needs (Table 2).

Discussion

In this study, we evaluated learning outcomes following an online educational activity on the MDT management of patients with EoE. The activity was viewed by a global audience of 5,330 participants in the first 6 months after launch, and high levels of satisfaction were reported with the activity, with learners reporting that the activity was relevant to clinical practice, met the stated learning objectives, and had a positive impact on management strategies.

Following participation in the touchMDT activity, significant improvements in knowledge and competence on EoE and its management were reported for learners across all specialities, regions and experience. Of the pre-activity respondents, dietitians had the lowest levels of knowledge and competence and also were the least confident in managing patients with EoE. A positive correlation between years of experience and pre-activity knowledge and competence was observed, with mean pre-activity scores of 3.95, 4.41 and 4.72 reported for respondents with 1–10 years, > 10–20 years and > 20 years in practice, respectively. This may have led to the greater improvement in post-activity scores observed for learners who had 1–10 years in practice compared with those with > 10–20 years or > 20 years. Post-activity, all learners, irrespective of experience and speciality achieved similarly high levels of knowledge, competence and confidence. These results validate the design of the educational activity, which reflected the importance of the MDT in the management of EoE. In addition, the activity was also largely case-based to ensure that it was directly applicable to participants’ daily practice.

In terms of the specific learning objectives, knowledge regarding the pathophysiology of EoE was a clear unmet educational need pre-activity among allergists,

dietitians and immunologists, and to a lesser extent, gastroenterologists. Reasons for this are unknown but may reflect differences in speciality training. Although notable improvements were made after participation in the activity, there remained some room for improvement in knowledge on this topic, particularly among allergists, dietitians and immunologists. In contrast, very high scores were achieved for the other learning objectives across all specialities post-activity. Self-reported remaining educational gaps differed between specialities, with allergists and dietitians identifying the diagnosis of EADs and MDT management of EoE as important educational needs, whereas for gastroenterologists and immunologists, current treatment strategies were of greater interest. This may be reflective of roles within the MDT and general EoE management.

The value of the activity is also supported by the finding that more than two-thirds of learners stated that they would make a change to their practice following participation in the activity. However, this did vary by speciality, with a higher proportion of gastroenterologists stating that they required additional education prior to changing their practice compared with other specialities, despite gastroenterologists having the highest mean scores post-activity.

There were several limitations associated with this study. Firstly, subgroup analyses by region and years of experience were limited by the sample size, which resulted in a higher margin of error when evaluating data in subgroups. Secondly, the samples were not matched in order to avoid pre-exposure bias, so a direct impact of the education on individuals’ increase in knowledge and competence could not be assessed. Thirdly, we cannot rule out that other educational activities may also have contributed to the improvements in knowledge and competence, as the post-activity questionnaire was not sent to HCPs who did not complete the activity. Fourthly, analyses did not include additional specialities such as general practitioners and nurse endoscopists who are involved in the identification and management of patients with EoE. Finally, as for all studies on

medical education outcomes, this analysis may potentially have been affected by self-selection bias, i.e. HCPs who felt that they lacked knowledge on these topics were more likely to participate than those who considered their knowledge up to date.

Comparison to Prior Work

Published data on outcomes following participation in educational activities in EoE are extremely limited, with the study by Dermer et al. being the only one identified from a review of the literature [17]. The results of this study are consistent with those of Dermer et al. and support the benefits of online, MDT-focused CME for improving the knowledge and competence of HCPs who are managing patients with this condition.

Conclusions

In this study, statistically significant higher levels of knowledge and competence were demonstrated in HCPs (gastroenterologists, dietitians, allergists and immunologists) who participated in a short, MDT-focused, free-to-access, online CME activity on EoE compared with those who did not. Improvements were observed across all specialities, regions and years of experience, indicating the broad value of this educational activity. Post-activity learners also reported improvements in confidence in treating EoE following participation in the activity. The activity described here was viewed by ~ 5,300 participants during the first 6 months after launch, indicating that HCPs found the format to be convenient and easily accessible. The same format could be applied to the development of education for other speciality groups who would benefit from CME on the topic of EoE, such as general practitioners and nurses. Several unmet educational needs were also identified after participation in the activity, including the diagnosis of EADs, current treatment strategies for EoE, and nutritional needs of patients with EoE. These unmet needs can be used to inform the design of future educational activities for HCPs who manage this disease. Future studies may also be designed to assess higher Moore's Levels, such as performance (Level 5) and changes in the health status of individual patients or a community of patients (Levels 6 and 7).

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Data availability statement

Data will be shared with bona fide researchers submitting a research proposal to touchIME. Access requests should be submitted to Alex Noble (Alex.Noble@touchime.org). Data will be made available from the study publication date. Any individual participant data will be shared in data sets in a de-identified/anonymised format.

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