



# Attending Training Courses on Barrett's Esophagus Improves Adherence to Guidelines: A Survey from the Italian Society of Digestive Endoscopy

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## Abstract

**Background** Little is known on practice patterns of endoscopists for the management of Barrett's esophagus (BE) over the last decade.

**Aims** Our aim was to assess practice patterns of endoscopists for the diagnosis, surveillance and treatment of BE.

**Methods** All members of the Italian Society of Digestive Endoscopy (SIED) were invited to participate to a questionnaire-based survey. The questionnaire included questions on demographic and professional characteristics, and on diagnosis and management strategies for BE.

**Results** Of the 883 SIED members, 259 (31.1%) completed the questionnaire. Of these, 73% were males, 42.9% had > 50 years of age and 68.7% practiced in community hospitals. The majority (82.9%) of participants stated to use the Prague classification; however 34.5% did not use the top of gastric folds to identify the gastro-esophageal junction (GEJ); only 51.4% used advanced endoscopy imaging routinely. Almost all respondents practiced endoscopic surveillance for non-dysplastic BE, but 43.7% performed eradication in selected cases and 30% practiced surveillance every 1–2 years. The majority of endoscopists managed low-grade dysplasia with surveillance (79.1%) and high-grade dysplasia with ablation (77.1%). Attending a training course on BE in the previous 5 years was significantly associated with the use of the Prague classification (OR 4.8, 95% CI 1.9–12.1), the top of gastric folds as landmark for the GEJ (OR 2.45, 95% CI 1.27–4.74) and advanced imaging endoscopic techniques (OR 3.33, 95% CI 1.53–7.29).

**Conclusions** Practice patterns for management of BE among endoscopists are variable. Attending training courses on BE improves adherence to guidelines.

**Keywords** Barrett's esophagus · Diagnosis · Surveillance · Treatment

## Introduction

Barrett's esophagus (BE) is a complication of gastro-esophageal reflux disease characterized by the replacement of the stratified squamous epithelium of the distal esophagus with specialized columnar epithelium [1]. Barrett's esophagus is a well-known precancerous condition that through the development of low- and high-grade dysplasia could evolve into esophageal adenocarcinoma [1]. The incidence of BE has been rising over the last decade, particularly in Europe [2, 3], together with an increase in the incidence of esophageal adenocarcinoma [4]. Unfortunately, the mortality for esophageal cancer is extremely high with 5-years survival rates of less than 20% [5].

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An appropriate diagnosis and management of BE is crucial to improve secondary prevention for esophageal adenocarcinoma, reducing mortality and disease-related costs. The introduction of the endoscopic Prague C&M classification [6] and “Seattle” biopsy sampling protocol [7], along with advanced imaging endoscopic techniques (high-definition endoscopy with dye or virtual chromoendoscopy) [8] and an appropriate endoscopic surveillance [9] have certainly improved the detection of dysplasia and early esophageal adenocarcinoma in BE. Moreover, novel endoscopic techniques, such as mucosectomy and radiofrequency ablation, have shown to be effective and safe for treating superficial neoplastic lesions in BE [10, 11].

Several international guidelines have been released and updated in order to improve the management of BE, inducing changes and innovation to diagnosis, surveillance and treatment modalities [12]. However, several studies highlighted the presence of a substantial variability in the adherence of physicians to BE guidelines [13, 14]. Indeed, little is known on the practice patterns of endoscopists in the management of BE, in particular in Europe, over the last decade. In fact, only four questionnaire-based surveys, one in Europe (the ESGE survey) [15], two in the USA [16, 17] and one in Australia [18], have been conducted to assess the current practice of gastroenterologists for the diagnosis and management of BE. A better knowledge of practice patterns of endoscopists regarding the management of BE is essential to guide and implement interventions, including training courses, that may improve their adherence to guidelines.

The aim of this survey was to assess practice patterns of endoscopists in the diagnosis, surveillance and treatment of Barrett’s esophagus in Italy.

## Methods

This survey was conducted by the Italian Society of Digestive Endoscopy (SIED) between March and July 2016. All 883 members of SIED were invited to participate to the survey, after excluding members still in training or retired. A self-administered questionnaire was distributed to the attendees of the annual SIED National Course, held in Siena in March 2016, whereas an on-line version of the questionnaire was sent by email to the remaining SIED members who did not attend the course. There were no incentives for the participation to the survey. This survey study was an initiative of the Scientific Committee of the Italian Society of Digestive Endoscopy and was conducted after it was approved by the Governing Council of the Society itself. Written informed consent to anonymous use of data provided in the questionnaire was individually obtained from all participant endoscopists.

## Questionnaire Development

The questionnaire was developed by the SIED scientific board committee and was based on most recent BE international guidelines, position statements and questionnaires [15, 16, 19–22].

The questionnaire had three sections. The first section included six questions regarding demographic and professional characteristics of the participant endoscopists, such as age (< 30, 30–40, 41–50, 51–60, > 60 years), gender, area of residence, practice setting (community hospital, university hospital or private hospital) duration of endoscopic activity (< 5, 5–10, 11–15, 16–20, > 20 years) and attendance to a BE training course over the last 5 years. The second section included five questions regarding the diagnosis of BE, such as the landmark used to define the gastro-esophageal junction (GEJ), the use of the Prague classification, the use of “Seattle” biopsy protocol and the use of advanced endoscopic imaging techniques. Finally, the third section included six questions on endoscopic surveillance and treatment of non-dysplastic and dysplastic BE.

## Statistical Analysis

We performed descriptive analyses using percentages for categorical variables, and we calculated statistical differences between percentages using the Chi Square test. Multivariate logistic regression analyses were performed to investigate factors associated with different practice patterns for the management of BE. Odds Ratios (OR) and 95% confidence interval (CI) were calculated after adjusting for gender, age, practice duration and practice setting. A *p* value < 0.05 was considered statistically significant. Statistical analysis was performed using STATA (Stata-Corp, College Station, Texas).

## Results

Of the 883 members of SIED, 259 completed the questionnaire with a response rate of 31.1%. Not all participants answered to all the questions, thus the number of responses for each variable varied accordingly. Among the participants, 73% were males, 42.9% had > 50 years of age and 65.6% had > 10 years of practice. The majority of endoscopists (68.8%) practiced in community hospitals, whereas 23.4% worked at University hospitals. Slightly more than half (61%) of endoscopists attended a training course on Barrett’ esophagus in the last 5 years.

Participants to the survey were similar to the eligible population of SIED members in terms of age, gender, area of residence and practice setting. Table 1 shows demographic and professional characteristics of participants and SIED members.

### Diagnosis of Barrett's Esophagus

The majority (82.9%, 214/258) of endoscopists reported to measure the extent of BE using the Prague classification and to perform biopsy sampling according to the Seattle protocol (84.4%, 216/256). However, only 65.5% (167/255) of participants used the top of the gastric folds to identify the GEJ, while 27.1% (69/255) used the Z line, 5.9% (15/255) the distal end of palisade vessels and 1.6% (4/255) the diaphragmatic hiatus. The presence of intestinal metaplasia was required for diagnosis of BE by 88.3% (226/256) of participants. Only half (51.4%, 131/255) of respondents used

routinely advanced endoscopic imaging techniques, such as high-definition (HD) endoscopy, narrow band imaging (NBI), autofluorescence imaging (AFI) and confocal laser endomicroscopy (confocal); 29.4% (75/255) used advanced imaging only in patients with suspected dysplasia or cancer. Table 2 shows in detail the practice patterns of the participants for the diagnosis of BE.

### Management of Barrett's Esophagus

Almost all participants (99.6%, 253/254) practiced endoscopic surveillance for BE without dysplasia; however, 43.7% (111/254) performed eradication treatment of non-dysplastic BE in selected cases, such as those with young age (< 40 years) at diagnosis, long segment BE (> 3 cm) or family history for esophageal cancer. As for the frequency of surveillance, 69.2% (176/254) of endoscopists practiced endoscopic surveillance every 3–5 years, 23.3% (60/254) every 2 years and 6.7% (17/264) every year. Barrett's esophagus with low-grade dysplasia was managed with endoscopic surveillance by 79.1% (201/254) of endoscopists, with 53.9% (137/254) performing eradication treatment only to selected cases (age < 40 years at diagnosis, long segment BE > 3 cm, family history for esophageal cancer), whereas 20.9% (53/254) practiced endoscopic eradication to all patients. Patients with low-grade dysplasia received endoscopic surveillance yearly by 84.8% (196/231) of respondents. The majority (77.1%, 188/244) of endoscopists managed BE with high-grade dysplasia or intramucosal adenocarcinoma with an endoscopic treatment, whereas only 16.3% (40/231) referred such patients to surgery. In total, 62.9% (146/232) of endoscopists answered to be able to perform endoscopic eradication techniques, whereas 37.1% (186/232) was not. The most frequently endoscopic techniques performed by participants were endoscopic mucosal resection (46.7%) and radiofrequency ablation (29.7%). Table 3 shows the practice patterns of the participants for the surveillance and treatment of BE.

**Table 1** Demographic and professional characteristics of participants to the survey and members of the Italian Society of Digestive Endoscopy (SIED)

	Participants n. 259 n. (%)	Members of SIED n. 883 n. (%)	<i>p</i> value
<b>Sex</b>			
Male	189 (73)	572 (64.8)	0.14
Female	70 (27)	311 (35.2)	
<b>Age group (years)</b>			
< 30	14 (5.4)	33 (3.7)	0.30
30–40	71 (27.4)	247 (28)	
41–50	63 (24.3)	180 (20.4)	
51–60	82 (31.7)	292 (33)	
> 60	29 (11.2)	131 (14.8)	
<b>Area of residence</b>			
North-West	72 (27.8)	201 (22.8)	0.37
North-East	48 (18.5)	162 (18.3)	
Center	56 (21.6)	204 (23.1)	
South and Islands	83 (32)	316 (35.8)	
<b>Practice setting</b>			
Community hospital	178 (68.7)	611 (69.2)	0.32
University hospital	61 (23.6)	225 (25.5)	
Private hospital	20 (7.7)	47 (5.3)	
<b>Practice duration (years)</b>			
< 5	52 (20.1)		
5–10	37 (14.3)		
11–15	43 (16.6)		
16–20	36 (13.9)		
> 20	91 (35.1)		
<b>Attendance to Barrett's esophagus training course in the last 5 years</b>			
Yes	158 (61)		
No	101 (39)		

### Predictors for Practice Patterns

A multivariate regression analysis showed that attending a training course on the management of BE during the previous 5 years was significantly associated with the use of the Prague classification (OR 4.8, 95% CI 1.9–12.1,  $p=0.001$ ), the top of the gastric folds as landmark for the GEJ (OR 2.45, 95% CI 1.27–4.74,  $p=0.008$ ) and the use of advanced imaging endoscopic techniques (OR 3.33, 95% CI 1.53–7.29,  $p=0.003$ ) (Table 4). Male endoscopists attended a training course on BE more frequently than females (79% vs. 63.4%, OR 2.37, 95% CI 1.16–4.82,  $p=0.017$ ) (Table 4).

**Table 2** Practice patterns of participants in the diagnosis of Barrett's esophagus (BE)

	Participants n. (%)
I identify the gastro-esophageal junction with:	
Total	255
The top of gastric folds	167 (65.5)
Distal end of the palisade vessels	15 (5.9)
Z line	69 (27)
Diaphragmatic hiatus	4 (1.6)
The definition of BE is:	
Total	256
Columnar epithelium with intestinal metaplasia	226 (88.3)
Columnar epithelium with or without intestinal metaplasia	30 (11.7)
I describe the extension of BE using:	
Total	258
“Short” and “long” segment Barrett's esophagus	25 (9.7)
Barrett's esophagus length only	16 (6.2)
Prague C&M classification	214 (82.9)
I do not describe Barrett's esophagus extension	3 (1.2)
In patients with areas of salmon-colored mucosa in the distal esophagus, I perform:	
Total	256
1–2 random biopsies	7 (2.7)
3–4 random biopsies	33 (12.9)
4-quadrant biopsies every 1–2 cm	216 (84.4)
I do not perform biopsies	0
In patients with BE, I use advanced endoscopic imaging techniques <sup>a</sup> :	
Total	255
Routinely	131 (51.4)
In case of suspected or known dysplasia/cancer	75 (29.4)
Never	49 (19.2)

<sup>a</sup>High-definition endoscopy, Narrow Band Imaging, Autofluorescence imaging, Confocal laser endomicroscopy

## Discussion

Our survey showed that the practice patterns of endoscopists for the management of BE are still variable. The majority of participants referred to use the Prague classification to measure the extension of BE; however about one third used incorrectly the Z line as landmark for the GEJ. Only half of the endoscopists used advanced endoscopic imaging techniques routinely. Almost all respondents practiced endoscopic surveillance for non-dysplastic BE; however, one third performed endoscopic eradication treatment in selected cases, and one third practiced frequent endoscopic surveillance, every 1–2 years. The majority of participants managed low-grade dysplasia with endoscopic surveillance and high-grade dysplasia or intramucosal carcinoma with endoscopic treatment. Endoscopists who used the Prague classification, including the top of the gastric folds as landmark for the GEJ, and used advanced imaging endoscopic techniques were more

likely to have attended a training course on BE during the previous 5 years.

In our survey, the majority of endoscopists used the Prague classification, in line with the ESGE survey where this classification was used by 78% of respondents from European countries [15], but in contrast with surveys from the USA that showed a less frequent use (22–53% of participants) [16, 17]. However, we found that about one third of participants incorrectly used the Z line, which is the landmark of the squamo-columnar junction, to define the location of the GEJ. Notably, the diagnosis of BE encompasses the endoscopic recognition of the GEJ, which defines the true end of the esophagus. The definition of the endoscopic landmark that best identifies the GEJ is still controversial and there is not a universally accepted definition. In Asia, the distal end of palisade vessels is used as GEJ landmark, and it could be applied also in Western countries [23]. Nevertheless, current guidelines recommend the use of the proximal extent of the gastric folds as it is considered the best and

**Table 3** Practice patterns of participants in the management of Barrett's esophagus (BE)

	Participants <i>n.</i> (%)
My management of BE without dysplasia is:	
Total	254
Endoscopic surveillance in all patients	142 (55.9)
Endoscopic surveillance with eradication treatment in selected cases <sup>a</sup>	111 (43.7)
Endoscopic eradication treatment for all patients	0
Neither surveillance or endoscopic treatment	1 (0.4)
I perform surveillance of BE without dysplasia:	
Total	254
Yearly	17 (6.7)
Every 2 years	59 (23.2)
Every 3 years	157 (61.8)
Every 4 years	2 (0.8)
Every 5 years	17 (6.7)
> 5 years	2 (0.8)
My management of BE with low-grade dysplasia is:	
Total	254
Endoscopic surveillance	64 (25.2)
Endoscopic surveillance with eradication treatment in selected cases <sup>a</sup>	137 (53.9)
Endoscopic treatment for all patients	53 (20.9)
No surveillance or endoscopic treatment	0
I perform surveillance of BE with low-grade dysplasia:	
Total	231
Yearly	196 (84.8)
Every 2 years	23 (10)
Every 3 years	11 (4.8)
Every 4 years	0
Every 5 years	1 (0.4)
> 5 years	0
My management of BE with high-grade dysplasia or intramucosal carcinoma is:	
Total	244
Endoscopic treatment	188 (77.1)
Referral to surgery	40 (16.4)
Endoscopic surveillance with eradication treatment in selected cases <sup>a</sup>	12 (4.9)
Endoscopic surveillance	4 (1.6)
Which of the following endoscopic techniques do you use to eradicate BE:	
Total	232
I'm not able to perform any endoscopic eradication treatment	186 (37.1)
I use at least one of the following techniques <sup>b</sup>	146 (62.9)
Endoscopic mucosal resection	109 (46.7)
Radiofrequency ablation	69 (29.7)
Argon plasma coagulation	43 (18.5)
Endoscopic submucosal dissection	29 (12.5)
Multipolar electrocoagulation	6 (2.6)

<sup>a</sup>Age < 40 years, BE length > 3 cm, family history for esophageal adenocarcinoma

<sup>b</sup>More than one answer is allowed

**Table 4** Association between practice patterns of endoscopists and attendance to a training course on Barrett’s esophagus (BE) in the last 5 years

	Attendance to a training course on BE in the last 5 years		OR (95% CI)
	No	Yes	
	<i>n</i> (%)	<i>n</i> (%)	
<b>Sex</b>			
Female	37 (36.6)	33 (20.9)	1
Male	64 (63.4)	125 (79.1)	2.37 (1.16–4.82)
<b>Age (years)</b>			
≤ 50	58 (57.4)	90 (57)	1
> 50	43 (42.6)	68 (43)	0.99 (0.46–2.15)
<b>Practice setting</b>			
Community hospital	71 (70.3)	107 (67.7)	1
University hospital	25 (26.7)	36 (22.8)	1.10 (0.49–2.29)
Private clinic	5 (5)	15 (9.5)	1.75 (0.51–6.01)
<b>Practice duration (years)</b>			
≤ 10	38 (37.6)	51 (32.3)	1
> 10	63 (62.4)	107 (67.7)	1.89 (0.87–4.09)
<b>Use of Prague classification<sup>a</sup></b>			
No	30 (30)	14 (8.9)	1
Yes	70 (70)	144 (91.1)	4.80 (1.9–12.1)
<b>Use of the top of gastric folds as landmark for GEJ<sup>b</sup></b>			
No	45 (45.9)	43 (27.4)	1
Yes	53 (54.1)	114 (72.6)	2.45 (1.27–4.74)
<b>Use of Seattle biopsy protocol<sup>c</sup></b>			
No	13 (13.3)	27 (17.1)	1
Yes	85 (86.7)	131 (82.9)	0.43 (0.16–1.14)
<b>Use of advanced endoscopic imaging techniques<sup>b</sup></b>			
No	31 (31.3)	18 (27.1)	1
Yes	68 (68.7)	138 (88.5)	3.33 (1.53–7.29)
<b>Endoscopic surveillance for non-dysplastic BE every 3–5 years<sup>d</sup></b>			
No	36 (36.4)	42 (27.1)	1
Yes	63 (63.6)	113 (72.9)	1.56 (0.79–3.09)
<b>Use of endoscopic eradication techniques<sup>e</sup></b>			
No	33 (38.4)	53 (36.3)	1
Yes	53 (61.4)	93 (63.7)	0.76 (0.38–1.51)

Advanced imaging endoscopy techniques: high-definition endoscopy, narrow band imaging, autofluorescence imaging or confocal laser endomicroscopy. Endoscopic techniques for BE eradication: endoscopic mucosal resection, endoscopic submucosal dissection, radiofrequency ablation, argon plasma coagulation or multipolar electrocoagulation

GEJ gastro-esophageal junction, OR odds ratio, CI confidence interval

<sup>a</sup>Missing data for one participant

<sup>b</sup>Missing data for four participants

<sup>c</sup>Missing for data for three participants

<sup>d</sup>Missing data for five participants

<sup>e</sup>Missing data for twenty-seven participants

easier landmark [19–22, 24]. The use of incorrect landmark for the GEJ could lead to a miss-classification of BE with a negative impact on the early diagnosis of dysplasia and cancer.

No data are available about the use of the “Seattle” biopsy protocol in Europe over the last decade. In our survey, we found that the majority of participants used this standardized biopsy protocol; this data is similar to that reported from surveys in the US [17] and Australia [18].

Current guidelines recommend the use of advanced endoscopic imaging techniques as they increase the likelihood to detect dysplasia and cancer through targeted biopsies [22, 24, 25]. Advanced endoscopy imaging may change BE sampling strategy from the Seattle protocol to targeted biopsies [26]. However, we found that only half of participants used advanced endoscopic techniques routinely, while one third used these techniques only in case of suspected neoplasia. Similar data have been reported by previous surveys in Europe [15] and US [16]. Our findings confirm that there is not yet a widespread use of advanced imaging endoscopy in BE management. Interventions to implement the use of advanced imaging modalities in this setting are certainly warranted.

In our survey, almost all respondents practiced endoscopic surveillance for non-dysplastic BE in accordance with guidelines [19–22, 24, 25]. However, about half of participants performed endoscopic eradication for patients with additional risk factors for esophageal adenocarcinoma, such as age < 40 years, BE length > 3 cm and family history of esophageal cancer [27]. This practice was reported in previous surveys from Europe [15] and US [16, 17], but only by 2% to 12% of participants. Even though the 2012 ASGE guidelines suggested to consider endoscopic ablation for non-dysplastic BE in selected patients with higher risk of cancer [20], current guidelines do not recommend this practice [21, 22, 24, 25] for several reasons including the low incidence of esophageal adenocarcinoma [28], the need of surveillance after ablation for the risk of buried metaplasia [29] and the lack of cost-effectiveness [30]. However, our results may be partially explained by an Italian position paper that suggested ablation therapy for non-dysplastic BE in selected cases [31]. Further research is needed evaluating benefits, risks and costs of this management strategy before it use in clinical practice.

Indeed, according to guidelines patients with non-dysplastic BE should undergo endoscopic surveillance every 3–5 years [20–22, 24, 25]. Recently, in order to reduce unnecessary endoscopy, the timing of surveillance endoscopies has been proposed as a quality indicator in the management of BE [32]. In our survey, one third of participants

practiced endoscopic surveillance too frequently. Although the adherence to appropriate surveillance intervals has improved substantially over the last years, in US about 40% of patients with non-dysplastic BE still undergo a frequent surveillance (every 1–2 years), [33] resulting in a 40% excess of upper endoscopies over a 10-year surveillance period [34]. Thus, we confirm that there is an overuse of endoscopic surveillance in non-dysplastic BE; unnecessary endoscopies have a negative impact on health-related costs, and may reduce the availability of other appropriate procedures, such as colonoscopies for colorectal cancer screening.

The management of BE with low-grade dysplasia has changed in recent years with endoscopic treatment being preferred to endoscopic surveillance [24, 25, 35, 36]. In our survey, as well as in previous surveys [15–18], the majority of participants practiced endoscopic surveillance, limiting endoscopic treatment to selected cases with additional risk factors for esophageal adenocarcinoma. Our result is partially explained by the fact that, at the time of the survey, the optimum management of low-grade dysplasia was still unclear and endoscopic surveillance was still considered an appropriate management [19–22].

As expected, the majority of endoscopists preferred endoscopic therapy to esophagectomy for high-grade dysplasia and early adenocarcinoma, in agreement with international guidelines [19–22, 24, 25, 35, 36]. Endoscopic mucosal resection and radiofrequency ablation were the most common endoscopic treatments, in line with previous surveys [15–18].

We found that endoscopists who attended a training course on BE in the previous 5 years were significantly more likely to use the Prague classification, the top of the gastric folds as landmark for the GEJ and advanced endoscopic imaging techniques. Novel imaging techniques have been introduced only recently in clinical practice [35, 36] and clearly require experience and specific training. Our data would support the need of implementing training courses on the management of BE, mainly focusing on the diagnosis, also by using advanced endoscopy imaging; attending training courses regularly seems to be the best way to keep up with the latest evidence-based strategy for the management of BE.

To our knowledge, this is the largest and more comprehensive survey on practice patterns of endoscopists for the diagnosis and management of BE over the last 10 years in Europe. The ESGE survey, conducted in 2014, included 163 gastroenterologists and only half of them came from European countries. In addition, the ESGE survey did not provide information on several practice patterns, such as the landmark used to identify the GEJ, the use of the “Seattle”

biopsy protocol and the frequency of endoscopic surveillance [15].

This study has several limitations. The main limitation is the low response rate of 31%. However, this response rate is in line with that of previous surveys, ranging from 8% to 45% [16, 17]. Furthermore, a selection bias cannot be excluded, as we do not have information on the characteristics of non-respondents that may differ from those of respondents. For example, our respondents may be more experienced with BE than non-respondents, which may result in an overestimation of the true adherence to guidelines. However, our study sample is similar to the members of SIED in terms of age, gender, area of residence and hospital setting. Furthermore, questionnaire-based surveys have inherent limitations about telling the truth, and responses may be skewed toward adherence to guidelines. Thus, participants may have answered according to what they perceived to be correct rather than according to their practice introducing a response bias. However, given the paucity of data on the practice patterns of endoscopists on the management of BE, our results are valuable.

In conclusion, practice patterns for management of BE among endoscopists are variable. Future efforts should focus on implementing interventions, training courses and educational tools on the management of BE to improve endoscopists’ adherence to guidelines. Particular attention should be given to the diagnosis of BE, including the use of advanced endoscopy imaging, and appropriate surveillance of non-dysplastic BE.

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## Compliance with Ethical Standards

**Conflict of interest** The authors declare that they have not conflict of interest.

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